Appendix A
Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan

Electronic copies of this document are available at https://www.placer.ca.gov/3362/Placer-County-Conservation-Program.

Hard copies of this document are also available for public inspection, by appointment, during regular business hours, at the following locations (subject to COVID-19 restrictions).

- City of Lincoln Planning Department, 600 5th Street, Lincoln, CA 95648.
- Placer County Community Development Resource Agency, 3091 County Center Drive, Auburn, CA 95603.

PLACER COUNTY CONSERVATION PROGRAM

WESTERN PLACER COUNTY HABITAT CONSERVATION PLAN/ NATURAL COMMUNITY CONSERVATION PLAN

February 2020

Contents

List of Tables xii
List of Figures xvi
List of Acronyms and Abbreviations xix

Chapter 1 Introduction 1-1

1.1 Overview 1-1
1.1.1 Goals Set Forth in the Agency Planning Agreement (2001) 1-2
1.1.2 Guiding Principles 1-4
1.1.3 HCP/NCCP Implementation 1-6
1.1.4 Purpose 1-6
1.2 Scope of the Western Placer County HCP/NCCP 1-8
1.2.1 Plan Area 1-8
1.2.2 Covered Activities 1-9
1.2.3 Covered Natural Communities 1-10
1.2.4 Covered Species 1-11
1.2.5 Plan Designations 1-12
1.2.6 Permits 1-14
1.2.7 Permit Term 1-14
1.3 Related Local Programs 1-16
1.3.1 County Aquatic Resources Program 1-16
1.3.2 Placer Legacy Program 1-17
1.3.3 Coordinated Resource Management Plans 1-18
1.4 Overview of HCP/NCCP Planning Process 1-18
1.4.1 Background 1-18
1.4.2 The Planning Process 1-19
1.4.3 Interagency Working Group 1-20
1.4.4 Biological Working Group 1-20
1.4.5 Science Advisors 1-20
1.4.6 Consultant Team 1-21
1.4.7 Public Outreach and Involvement 1-21
1.5 Regulatory Setting 1-21
1.5.1 Federal and State Endangered Species Laws 1-22
1.5.2 Federal and State Wetland Laws and Regulations 1-26
1.5.3 Other Federal and State Wildlife Laws and Regulations 1-29
1.5.4 National Environmental Policy Act 1-30

1.5.5 California Environmental Quality Act 1-30
Chapter 2 Covered Activities 2-1
2.1 Introduction 2-1
2.2 Definitions 2-1
2.3 Existing Geography and Land Use 2-1
2.4 Permittees, Plans, Policies, and Programs 2-5
2.4.1 City of Lincoln 2-5
2.4.2 Placer County 2-8
2.4.3 Placer County Water Agency 2-19
2.4.4 South Placer Regional Transportation Authority 2-20
2.4.5 Placer Conservation Authority 2-20
2.4.6 Participating Special Entities 2-21
2.5 Permit Coverage 2-22
2.5.1 Entities Conducting Activities 2-22
2.5.2 Plan Area Components 2-24
2.6 Categories of Covered Activities 2-28
2.6.1 Valley Potential Future Growth Area (A1) 2-34
2.6.2 Valley Conservation and Rural Development Area (A2) 2-35
2.6.3 Foothills Potential Future Growth Area (A3) 2-37
2.6.4 Foothills Conservation and Rural Development Area (A4) 2-39
2.6.5 Regional Public Programs 2-39
2.6.6 In-Stream Activities 2-58
2.6.7 Conservation Programs 2-63
2.7 Activities not Covered by this Plan 2-73
Chapter 3 Physical and Biological Setting 3-1
3.1 Introduction 3-1
3.2 Physical Setting 3-2
3.2.1 Topography 3-2
3.2.2 Geology and Soils 3-3
3.2.3 Climate 3-4
3.2.4 Atmospheric Nitrogen Deposition 3-6
3.2.5 Wildfire 3-7
3.2.6 Streams and Watersheds 3-8
3.2.7 Stream System 3-16
3.2.8 Hydrologic Modifications 3-19
3.3 Biological Setting Methodology 3-24
3.3.1 Communities, Land Cover, and Constituent Habitat 3-24

3.3.2 Covered Species 3-41
3.4 Plan Area Communities 3-47
3.4.1 Past Vegetation and Land Use 3-53
3.4.2 Grassland 3-54
3.4.3 Vernal Pool Complex 3-59
3.4.4 Aquatic/Wetland Complex 3-69
3.4.5 Riverine/Riparian Complex 3-76
3.4.6 Oak Woodland 3-94
3.4.7 Valley Oak Woodland 3-104
3.4.8 Rice Agriculture 3-106
3.4.9 Field Agriculture 3-108
3.4.10 Orchards and Vineyards Agriculture 3-111
3.4.11 Managed Open Water 3-113
3.4.12 Rural Residential 3-115
3.4.13 Urban 3-117
3.5 Trends and Foreseeable Change 3-120
3.5.1 Global Climate Change 3-120
3.5.2 Temperature 3-121
3.5.3 Precipitation 3-122
3.5.4 Snowpack, Runoff, and Flooding 3-122
3.5.5 Drought 3-123
3.5.6 Fire 3-123
3.5.7 Atmospheric Nitrogen Deposition 3-124
3.5.8 Trend Effect on Biological Resources 3-125
Chapter 4 Effects of Covered Activities 4-1
4.1 Introduction 4-1
4.2 Definitions 4-2
4.3 Methods for Quantifying Effects 4-4
4.3.1 Methods for Land Conversion and Permanent Direct Effect 4-4
4.3.2 Methods for Assessing Temporary Direct Effects 4-13
4.3.3 Methods to Estimate Indirect Effects in the Valley 4-15
4.3.4 Methods to Assess Indirect Effects from the Increase in Rural Densities in the Foothills 4-22
4.3.5 Methods for Effects of Covered Activities on Streams 4-23
4.3.6 Methods for Effects of Covered Activities on Watersheds 4-25
4.3.7 Methods for Habitat Enhancement, Restoration, and Creation 4-25
4.3.8 Limitations of Analysis 4-26

4.4 Effects from Covered Activities....4-27
4.4.1 Valley Potential Future Growth....4-28
4.4.2 Valley Conservation and Rural Development....4-29
4.4.3 Foothills Potential Future Growth....4-30
4.4.4 Foothills Conservation and Rural Development....4-32
4.4.5 Regional Public Programs....4-33
4.4.6 In-Stream Programs....4-48
4.4.7 Conservation Programs....4-52
4.5 Effects on Communities....4-62
4.5.1 Natural Communities....4-64
4.5.2 Semi-natural Communities....4-66
4.5.3 Other Agriculture....4-67
4.5.4 Urban (Non-Natural)....4-67
4.6 Effects on Watersheds....4-67
4.7 Effects on Covered Species....4-71
4.7.1 Swainson's Hawk....4-77
4.7.2 California Black Rail....4-78
4.7.3 Western Burrowing Owl....4-79
4.7.4 Tricolored Blackbird....4-80
4.7.5 Giant Garter Snake....4-82
4.7.6 Western Pond Turtle....4-83
4.7.7 Foothill Yellow-legged Frog....4-85
4.7.8 California Red-legged Frog....4-86
4.7.9 Salmonids: Central Valley Fall-/Late Fall-Run Chinook Salmon, Central Valley Steelhead....4-87
4.7.10 Valley Elderberry Longhorn Beetle....4-91
4.7.11 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp....4-92
4.7.12 Conservancy Fairy Shrimp....4-96
4.8 Effects on Critical Habitat....4-96
4.8.1 Central Valley Steelhead....4-97
4.8.2 Vernal Pool Fairy Shrimp....4-99
4.9 Cumulative Effects....4-100
4.9.1 Ongoing and Routine Agriculture....4-100
4.9.2 Use of Existing Roads....4-101
4.9.3 Water Supply....4-101
Chapter 5 Conservation Strategy....5-1
5.1 Introduction....5-1

5.1.1 Planning Levels....5-1
5.1.2 Definitions....5-1
5.1.3 Conservation Strategy Components....5-4
5.1.4 Chapter Organization....5-5
5.2 Conservation Strategy Framework....5-5
5.2.1 Approach to Developing Conservation Commitments....5-6
5.2.2 Approach to Coordinating with Wetland Requirements for Clean Water Act Needs....5-7
5.2.3 Data Sources....5-7
5.2.4 Framework for Biological Goals, Objectives, and Conservation Measures....5-10
5.2.5 Landscape-level Biological Goals and Objectives....5-12
5.2.6 Natural Community–level Biological Goals and Objectives....5-16
5.2.7 Species-level Biological Goals and Objectives....5-35
5.3 Conservation Measures....5-56
5.3.1 Conservation Measure 1: Establish Reserve System....5-57
5.3.2 Conservation Measure 2: Manage and Enhance the Reserve System....5-95
5.3.3 Conservation Measure 3: Restore and Create Natural Communities and Covered Species' Habitat....5-121
5.3.4 Conservation Measure 4: Plan Area-wide Actions....5-133
5.4 Mitigation and Conservation Outcomes....5-134
5.4.1 Swainson's Hawk....5-134
5.4.2 California Black Rail....5-136
5.4.3 Western Burrowing Owl....5-137
5.4.4 Tricolored Blackbird....5-139
5.4.5 Giant Garter Snake....5-140
5.4.6 Western Pond Turtle....5-142
5.4.7 Foothill Yellow-legged Frog....5-143
5.4.8 California Red-legged Frog....5-144
5.4.9 Covered Salmonids....5-145
5.4.10 Valley Elderberry Longhorn Beetle....5-147
5.4.11 Vernal Pool Branchiopods....5-148

Chapter 6 Program Participation and Conditions on Covered Activities....6-1

6.1 Introduction....6-1
6.1.1 Definitions....6-1
6.1.2 Categories of Conditions....6-4
6.1.3 Regional Approach....6-4
6.1.4 Use of Standards, Guidelines, and BMPs....6-5

6.1.5 Qualified Biologist/Qualified Professional 6-5
6.2 Program Participation: Receiving Take Authorization under the Plan 6-6
6.2.1 Evaluation Process for Permittee Projects 6-7
6.2.2 Application Process for Private Projects 6-8
6.2.3 Application Process for Participating Special Entity Projects 6-11
6.2.4 HCP/NCCP Participation Package 6-11
6.3 Conditions on Covered Activities 6-20
6.3.1 General Conditions 6-21
6.3.2 Conditions to Avoid and Minimize Effects on Specific Natural Communities 6-29
6.3.3 Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System 6-45
6.3.4 Regional Public Programs 6-46
6.3.5 Conditions to Minimize Effects on Covered Species 6-55
6.3.6 Reserve Management Conditions 6-79
Chapter 7 Monitoring and Adaptive Management Program 7-1
7.1 Introduction 7-1
7.1.1 Regulatory Context 7-1
7.1.2 Adaptive Management 7-2
7.1.3 Program Objectives 7-3
7.1.4 Program Scope 7-4
7.1.5 Take Authorization during Monitoring 7-14
7.2 Overview 7-14
7.2.1 Types of Monitoring 7-14
7.2.2 Program Phases 7-18
7.2.3 Guidelines for Monitoring 7-23
7.3 Landscape-level Monitoring Actions 7-28
7.3.1 Assimilate Results of Pre-acquisition Assessments and Other Surveys 7-29
7.3.2 Monitor Land Cover in the Plan Area 7-29
7.3.3 Assess and Monitor Landscape Linkages 7-30
7.3.4 Track Climate Change 7-31
7.3.5 Track Invasive Species and Disease 7-31
7.3.6 Track Recreation in the Reserve System 7-33
7.3.7 Monitor Disturbance Events 7-33
7.4 Natural Community–level Monitoring Actions 7-34
7.4.1 Develop Conceptual Ecological Models 7-34
7.4.2 Enhance Natural Community Mapping 7-34
7.4.3 Monitor Natural Communities 7-36
7.5 Species-level Monitoring Actions 7-47

7.5.1 Swainson's Hawk 7-47
7.5.2 California Black Rail....7-48
7.5.3 Western Burrowing Owl 7-50
7.5.4 Tricolored Blackbird....7-51
7.5.5 Giant Garter Snake....7-53
7.5.6 Western Pond Turtle....7-55
7.5.7 Foothill Yellow-legged Frog 7-57
7.5.8 California Red-legged Frog....7-60
7.5.9 Salmonids: Central Valley Steelhead and Central Valley Fall-/Late Fall-run Chinook Salmon 7-61
7.5.10 Valley Elderberry Longhorn Beetle 7-64
7.5.11 Vernal Pool Branchiopods....7-65
7.6 Adaptive Management Program Implementation 7-72
7.6.1 Program Infrastructure 7-72
7.6.2 Wildlife Agencies....7-73
7.6.3 Science Advisors....7-74
7.6.4 Land Management Agencies....7-74
7.6.5 The Public....7-74
7.7 Data and Reporting....7-74
Chapter 8 Plan Implementation 8-1
8.1 Overview....8-1
8.1.1 The Placer County Conservation Program....8-1
8.1.2 The Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan 8-2
8.1.3 The Western Placer County Aquatic Resources Program and In-lieu Fee Program 8-2
8.1.4 Coordinated Implementation of the HCP/NCCP, the CARP, and the In-lieu Fee Program....8-4
8.2 Implementation Structure 8-7
8.2.1 Implementing Agreement....8-8
8.2.2 Placer Conservation Authority....8-8
8.2.3 The County of Placer and the City of Lincoln....8-8
8.2.4 Placer County Water Agency 8-9
8.2.5 South Placer Regional Transportation Authority....8-10
8.2.6 Wildlife Agencies....8-10
8.2.7 Science Advisors and Land Managers....8-13
8.2.8 Public Input....8-14
8.3 Responsibilities of the Placer Conservation Authority 8-16

8.3.1 Implementation of Conservation Measures 8-16
8.3.2 Administration and Funding 8-18
8.3.3 Monitoring, Adaptive Management, and Scientific Oversight 8-19
8.3.4 Real Estate Activities 8-20
8.3.5 Grant Administration 8-20
8.3.6 Budget Analysis 8-20
8.3.7 GIS/Database Maintenance 8-20
8.3.8 Public Outreach and Education 8-20
8.3.9 Legal and Financial Services 8-21
8.3.10 Consultants and Contractors 8-21
8.4 Establishing the Reserve System 8-21
8.4.1 Criteria for Reserve System Lands 8-22
8.4.2 Process for Acquiring Lands 8-23
8.4.3 Stay Ahead Provision 8-27
8.4.4 Jump Start 8-32
8.4.5 Land Acquired by Other Organizations or through Partnerships 8-34
8.4.6 Advance Acquisition of Vernal Pool Complex Lands and Proposed 2-Year Maximum Extent of Take 8-34
8.4.7 Private Mitigation and Conservation Banks 8-35
8.4.8 Mitigation for Activities not Covered by the Plan 8-36
8.4.9 Conservation Easements 8-37
8.4.10 Grazing Leases or Licenses within the Reserve System 8-42
8.4.11 Willing Sellers 8-43
8.4.12 Gifts of Land 8-43
8.4.13 Land Dedication in Lieu of Land Conversion Fee 8-43
8.5 Management and Enhancement of the Reserve System 8-45
8.5.1 Reserve Unit Management Plans 8-46
8.6 Management Conducted by Third Parties 8-46
8.7 Restoration and Creation of Natural Communities and Covered Species' Habitat 8-47
8.7.1 Restoration Plans 8-47
8.7.2 Restoration or Creation in Lieu of Special Habitat Fees 8-47
8.8 Monitoring and Adaptive Management 8-48
8.8.1 Adaptive Management Input 8-49
8.8.2 Approval of Monitoring Personnel for Take of Covered Species 8-49
8.9 Take Authorization under the Plan 8-50
8.9.1 Permittee Responsibilities 8-50
8.9.2 PCA Responsibilities 8-51

8.9.3 Wildlife Agency Responsibilities in Approving Take Authorizations for Covered Activities 8-52
8.9.4 Take Authorization for Participating Special Entities 8-53
8.9.5 Placer Vineyards Specific Plan 8-55
8.9.6 Coverage Option for Certain Minor Activities 8-58
8.10 Compliance Tracking and Data Management 8-59
8.10.1 Compliance Tracking 8-59
8.10.2 Database Development and Maintenance 8-59
8.11 Reporting 8-61
8.12 Schedule and Milestones 8-63
Chapter 9 Costs and Funding 9-1
9.1 Introduction 9-1
9.2 Cost to Implement the HCP/NCCP 9-1
9.3 Cost Estimate Methodology and Assumptions 9-2
9.3.1 Establish Reserve System 9-7
9.3.2 Restore Natural Communities and Covered Species' Habitat 9-10
9.3.3 Manage and Enhance the Reserve System 9-15
9.3.4 Monitoring, Research, and Scientific Review 9-19
9.3.5 Environmental Compliance 9-21
9.3.6 Plan Administration 9-21
9.3.7 Contingency 9-23
9.3.8 Costs in Perpetuity 9-24
9.3.9 Plan Preparation Costs 9-27
9.4 Funding Sources and Assurances 9-27
9.4.1 HCP/NCCP Development Fees 9-30
9.4.2 Local Funding 9-50
9.4.3 State and Federal Funding 9-51
9.4.4 Other Local, State and Federal Sources 9-58
9.4.5 Funding Adequacy 9-58
9.4.6 Funding for Post-permit Management and Monitoring 9-61
Chapter 10 Assurances 10-1
10.1 Introduction 10-1
10.2 Definitions 10-1
10.2.1 Changed Circumstances 10-1
10.2.2 Unforeseen Circumstances 10-2
10.3 Changed and Unforeseen Circumstances Addressed by this Plan 10-2
10.3.1 Covered Species Listed 10-7

10.3.2 Non-Covered Species Listed 10-7
10.3.3 Destruction of Woodlands Due to Fire 10-8
10.3.4 Expansion of Non-native Species or Disease 10-12
10.3.5 Flooding of Vernal Pools and Riparian Sites 10-14
10.3.6 Destruction of Restoration Projects through Drought 10-16
10.3.7 Climate Change 10-18
10.4 Assurances 10-21
10.4.1 Federal No Surprises 10-21
10.4.2 Federal Section 7 Consultations 10-21
10.4.3 State NCCP Assurances 10-22
10.4.4 Conservation Contributions by State and Federal Agencies 10-22
10.4.5 Assurances for Approved Covered Activities 10-22
10.5 Modifications to the Plan 10-23
10.5.1 Administrative Changes 10-23
10.5.2 Minor Modifications 10-24
10.5.3 Amendments 10-25

Chapter 11 Alternatives to Take 11-1

11.1 Introduction 11-1
11.2 Description of Take Alternatives 11-1
11.2.1 No Take Alternative 11-1
11.2.2 Project-by-Project Permitting Take Alternative 11-2
11.2.3 Reduced Number of Covered Species Take Alternative 11-4
11.2.4 Reduced Permit Term Take Alternative 11-4

Chapter 12 References 12-1

Chapter 1 12-1
Chapter 2 12-1
Chapter 3 12-3
Chapter 4 12-14
Chapter 5 12-17
Chapter 6 12-25
Chapter 7 12-26
Chapter 8 12-31
Chapter 9 12-31
Chapter 10 12-32
Chapter 11 12-33

Appendix A Implementing Ordinance Template

Appendix B Implementing Agreement

Appendix C Evaluation of Special-Status for Coverage in Placer County

Appendix D Species Accounts/Envirograms

Appendix E PCWA Natural Resource Management Plan

Appendix F Fuel Management

Appendix G Take Assessment Methodology

Appendix H Existing Open Space Lands

Appendix I Project Specific Take and Mitigation Assessment Example

Appendix J Reserve Unit Management Plan Template

Appendix K Conservation and Agriculture Easement Templates

Appendix L Public Review Draft Implementation Cost Estimates and Assumptions

Appendix M Growth Scenario Memo

Appendix N Placer Vineyards Specific Plan

Tables

1-1 Covered Species 1-12

1-2 Stream System, Uplands, and Major Reservoir Area (Acres) within Plan Area A 1-13

2-1 Existing Land Use in Western Placer County 2-3

2-2 Plan Area Components 2-24

2-3 Plan Area Components by Covered Activity Category 2-26

2-4 Placer County Conservation Plan Growth Scenario 2-30

2-4A Existing Housing and Employment (2014) 2-30

2-4B 50-Year Growth Increment for PCCP Planning 2-31

2-4C Housing and Employment Totals at end of 50-year Permit Term 2-32

2-5 Land Development to Accommodate Growth for the 50-year Permit Term by 10-year Period (acres) 2-33

2-6 Land Use Consistent with Urban and Suburban General Plan Designations 2-34

2-7 Land Use Consistent with Rural and Agricultural General Plan Designations 2-36

2-8 Public Facilities Consistent with Rural and Agricultural General Plan Designations 2-38

2-9A Current Planned Wastewater Management Projects 2-44

2-9B Water Supply Projects 2-48

2-9C Solid Waste Management Projects 2-53

2-9D Flood Control and Water Conservation Projects 2-60

3-1 Western Placer Watersheds – Land Area (acres) 3-9

3-2 Western Placer Watersheds –Length (stream miles) 3-10

3-3 Western Placer Streams, Canals, and Reservoirs (Miles) 3-11

3-4 Boundary Widths for Specified Stream Reaches 3-18

3-5 Summary of Barriers to Fish Passage in Western Placer County 3-21

3-6 Communities and Land-cover Types 3-25

3-7 Habitat Constituents and their Primary Associated Community Types 3-26

3-8 Habitat Constituents Associations with Land Cover 3-27

3-9 Modeled Habitat for Covered Species 3-29

3-10 Proportion of Vernal Pool Complex Constituent Habitats by Land-cover Type (Plan Area A) 3-39

3-11 Proportion of Aquatic/Wetland Complex Constituent Habitats by Land-cover Type (Plan Area A) 3-39

3-12 Proportion of Riverine/Riparian Complex Constituent Habitats by Land-cover Types (Plan Area A) 3-40

3-13 Acres of Communities and Land-cover Types 3-48

3-14 Estimated Acres of Constituent Habitats in Plan Area A Extrapolated from Survey Results 3-49

3-15a Acres of Communities in Plan Area A by Watershed 3-50

3-15b Communities in the Valley Sorted by Watershed (acres) 3-51

3-15c Communities in the Foothills Sorted by Watershed (acres) 3-52

3-16 Relative Disturbance in each Vernal Pool Complex Land-cover Type 3-60

3-17 Salmonid Habitat in Western Placer County (stream miles) 3-82

3-18 Salmonid Stream Habitat Characteristics in Western Placer County 3-83

4-1 Maximum Permanent Direct Effect on Communities and Constituent Habitats (acres) Based on Land Conversion 4-8

4-2 Rural Residential Direct Effect Footprint as a Function of Parcel Size (Acres) 4-11

4-3 Maximum Temporary Direct Effects (Acres) 4-14

4-4A Estimates of Present and Future Indirect Effects from Urban Development within the Valley PFG (acres) 4-17

4-4B Estimates of Present and Future Indirect Effects from Rural Development within the Valley Conservation and Rural Development Area (acres) 4-19

4-4C Estimates of Current Indirect Effects from Urban Growth along the Conservation and Rural Development Area/PFG Border in the Valley (acres) 4-21

4-4D Maximum for On-site Indirect Effects on All Vernal Pool Constituent Habitat Wetland 4-22

4-5 Indirect Effects in the Foothills – Increased Rural Density (acres) 4-23

4-6 Calculation of Crossings per Stream Mile 4-24

4-7A Permanent Effects on Salmonid Habitat 4-50

4-7B Temporary Effects on Salmonid Habitat 4-50

4-8A Effects on Watersheds within All of Plan Area A 4-68

4-8B Effects on Watersheds within Valley 4-69
4-8C Effects on Watersheds within Foothills 4-69
4-9 Proportion of Regional Watersheds in the Western Placer Planning Area (acres) 4-71
4-10 Covered Species' Habitat Model Summary 4-73
4-11 Permanent Direct Effect of Covered Species' Modeled Habitat (acres)....4-74
4-12 Temporary Direct Effects on Covered Species' Modeled Habitat (acres) 4-75
5-1 Acronyms for Landscape-, Community-, and Species-level Goals, Objectives, and Conservation Measures 5-12
5-2 Acquisition Commitments (acres)....5-29
5-3 Natural Community and Constituent Habitat Protection Commitments (acres) 5-58
5-4 Natural Community Restoration Commitments (acres) 5-61
5-5 Summary of Effects and Conservation (acres)....5-63
5-6 Covered Species' Protection and Restoration Commitments (acres)....5-66
5-7 Commitments by Time Period for Restoration/Creation Independent of Effect 5-123
5-8 Biological Goals, Objectives, and Conservation Measures 5-153
6-1 In-stream and Stream System BMPs 6-36
6-2 Conditions on Covered Transportation Projects....6-47
6-3 Species Survey Summary 6-56
7-1 Example Success Criteria for Monitoring Effectiveness of Selected Management Actions 7-6
7-2 Schedule of Monitoring Tasks over the Permit Term 7-11
8-1 Jump Start Lands to Be Counted toward Plan Land Acquisition Commitments by Community Type....8-33
8-2 Schedule for Implementation Tasks 8-64
9-1 Summary of Capital and Total Cumulative Operating Costs through 50-Year Permit Term (rounded)....9-5
9-2 Habitat Restoration Cost per Acre by Natural Community Type....9-13
9-3 Western Placer County HCP/NCCP Implementation Budget: Post Permit (2019 dollars) 9-26
9-4 Funding Plan....9-29

9-5 Chart of Effects and Development Fees 9-32

9-6 Land Conversion Fee Schedule 9-35

9-7 Special Habitats Fee Schedule 9-36

9-8 Development Fee Adjustment Indices....9-44

9-9 Likely Federal and State Funding Sources for HCPs and NCCPs in California 9-53

10-1 Thresholds and Responsive Actions for Changed and Unforeseen Circumstances Addressed by the Plan 10-4

10-2 Burned Acres by Land Use Type throughout the Plan Area (1950 to 2014)....10-10

10-3 Drought History for Placer County over the Past 50 Years....10-17

10-4 Baseline Mean Temperature (°F) 1981 to 2010....10-20

Figures

1-1 Location

1-2 Western Placer County and the Plan Area

1-3 Plan Area Vicinity Air Photo

1-4 Permittees and Western Placer County Jurisdictions

1-5 PCCP Designation Map

1-6 Streams, Canals, and Reservoirs

2-1 Western Placer County Jurisdictions

2-2 Land Use in Western Placer County

2-3 Permittee General Plan Land Use Designations

2-4 Plan Area Components

2-5 Subarea B2 Site – PCWA Operations and Maintenance

2-6 Subarea B3 Site – Raccoon Creek Floodplain

2-7 Subarea B4 Site – Fish Passage Improvement

2-8 Subarea B5 Site – Big Gun Conservation Bank

2-9 Public Projects

2-10 Stream Crossings

3-1 Topography

3-2 Geology and Soils

3-3 Rainfall and Evapotranspiration

3-4 Historical Wildfire Locations

3-5 Fire Threat

3-6 Streams, Canals, and Reservoirs

3-7 Watersheds

3-8 Stream System Boundary Widths

3-9 Mitigation within the Stream System and Adjoining Areas

3-10 PCCP Stream System

3-11 Communities

3-12 Potential Vegetation

3-13 Grassland and Vernal Pool Complex

3-14 Aquatic/Wetland Complex and Riverine/Riparian Complex

3-15 Oak Woodland and Valley Oak Woodland

3-16 Agriculture and Semi-Natural Communities

3-17 Urban and Non-Natural Communities

4-1 Estimating Land Conversion in the Valley – Schematic

4-2 Estimating Land Conversion in the Foothills – Schematic

4-3 Central Valley Steelhead Critical Habitat

4-4 Vernal Pool Fairy Shrimp Critical Habitat

5-1 Conservation Zones and Key Linkages

5-2 Distribution of Rice in Plan Area

5-3 Potential Giant Garter Snake Dispersal Corridors

5-4 Conservation Opportunities in Plan Area B3 and B4

5-5 Regional Conservation Plans

5-6 Restoration Opportunity Areas

5-7 Conservancy Fairy Shrimp Survey Area

5-8 Potential Fish Passage Enhancement Projects

5-9 Vernal Pool Branchiopods in Western Placer

6-1 Participation Package Process

7-1 Adaptive Management Process

7-2 Monitoring and Adaptive Management Process

7-3 Adaptive Management and Role of Conceptual Models

7-4 Experimental Approaches

7-5 Monitoring Program Phases

8-1 Relationship of the Placer Conservation Authority to External Parties

8-2 Land Acquisition Process

8-3 Potential Roseville Annexation Area

9-1 Mitigation within the Stream System and Adjoining Areas

Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
°F	Fahrenheit
ARPS	American River Pump Station
asl	above sea level
Authority	Western Placer Waste Management Authority
BMP	best management practice
BO	Biological Opinion
BRI	Bender Rosenthal, Inc.
BWG	Biological Working Group
CALVEG	Classification and Assessment with Landsat of Visible Ecological Groupings
CARP	County Aquatic Resources Program
CARP	Western Placer County Aquatic Resources Program
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
Central Valley Chinook and Steelhead Recovery Plan	Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
City	City of Lincoln
CNDDB	California Natural Diversity Database
collectively, the Wildlife Agencies	USFWS, NMFS, and CDFW
County	County of Placer
County	Placer County
CPD	Commercial Planned Development
CRMP	Coordinated Resource Management Plan
CWA	Clean Water Act
CWA	Federal Clean Water Act
CWHR	California Wildlife Habitat Relationships
Design Manual	West Placer Storm Water Quality Design Manual

District	Placer County Flood Control and Water Conservation District
DPS	Distinct Population Segment
DSDD	Doty South Diversion Dam
EFH	essential fish habitat
EIR	environmental impact report
EIS	environmental impact statement
ERP	Ecosystem Restoration Plan
ESA	Endangered Species Act
ESA	Federal Endangered Species Act
ESU	evolutionarily significant unit
EXR	Existing Reserves and Other Protected Areas
FEMA	Federal Emergency Management Agency
Foothills	Sierra Nevada Foothills portion of the Plan Area
FTE	full time equivalent
GIS	geographic information system
GPS	global positioning system
GSP	Groundwater Sustainability Plan
Guidelines	Survey Guidelines for the Listed Large Branchiopods
HCP	Habitat Conservation Plan
HCP/NCCP or Plan	Western Placer County Conservation Habitat Conservation Plan and Natural Community Conservation Plan
Hidden Falls	Hidden Falls Regional Park
HUC	Hydrologic Unit Code
I-	Interstate
IAWG	Interagency Working Group
IPM	Integrated Pest Management
ITP	Incidental Take Permit
IWM	instream woody material
JSA	Jones and Stokes Associates
kg/ha/yr	kilograms per hectare per year
LID	Low Impact Development
LIDAR	Light Detection and Ranging
LIDS	Low Impact Development Standards
MBTA	Migratory Bird Treaty Act
MFP	Middle Fork Project
mgd	million gallons per day
MIG|TRA	MIG|TRA Environmental Sciences
MRF	Materials Recovery Facility

MS4	municipal separate storm sewer system
NCCP	Natural Community Conservation Plan
NCCP Act	California Natural Community and Conservation Planning Act
NCCP Act	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NID	Nevada Irrigation District
NMFS	National Marine Fisheries Service
NOX	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRMP	Natural Resource Management Plan
O&M	operations and maintenance
OHWM	Ordinary High Water Mark
OSC	Open Space and Conservation
PCA	Placer Conservation Authority
PCCP	Placer County Conservation Program
PCE	Primary Constituent Element
PCWA	Placer County Water Agency
PCWHR	Placer County Wildlife Habitat Relationship
PDs	Planned Residential Developments
PFG	Potential Future Growth
PFG	Potential Future Growth Area
PFG	Valley Potential Future Growth Area
PG&E	Pacific Gas & Electric Company
PG/CC	Pleasant Grove/Curry Creek
Placer Legacy Program	Placer Legacy Open Space and Agricultural Conservation Program
Planning Agreement	HCP/NCCP Planning Agreement
PMVCD	Placer Mosquito and Vector Control District
PRC	California Public Resources Code
PVSP	Placer Vineyards Specific Plan
RAA	Reserve Acquisition Area
RWQCB	Regional Water Quality Control Board
SMD	Sewer Maintenance District
SOI	sphere of influence
SPRTA	South Placer Regional Transportation Authority
SR	State Route

SSMP	site-specific management plan
SSWD	South Sutter Water District
State Water Board	State Water Resources Control Board
Sub-basin	North American River Groundwater Sub-basin
SWPPP	Storm Water Pollution Prevention Plan
U.S.C.	United States Code
U.S.C.A	United States Code Annotated
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Valley	Sacramento Valley portion of the Plan Area
WHIPPET	Weed Heuristics: Invasive Population Prioritization for Eradication Tool
WPCGMP	Western Placer County Groundwater Management Plan
WRSL	Western Regional Sanitary Landfill
WWPI	Western Wood Preservers Institute
WWTP	wastewater treatment plant

Chapter 1
Introduction

1.1 Overview

Placer County, California, stretches 90 miles, east from Sutter and Sacramento Counties to the California-Nevada state line, and comprises a land area of nearly 1 million acres (just over 1,500 square miles[1]) (see Figure 1-1). In this document, the term "western Placer County" refers to roughly 261,000 acres, ranging from the city of Auburn and California State Route 49 westward to the Nevada, Yuba, Sutter, El Dorado, and Sacramento county lines (see Figure 1-2).

The Placer County Conservation Program (PCCP) applies to western Placer County and specific areas where conservation activities will take place in neighboring Sutter County, as shown in Figure 1-2. The goal of the PCCP is to provide an effective framework to protect, enhance, and restore the natural resources in specific areas of western Placer County while streamlining environmental permitting for Covered Activities. Within this framework, the PCCP will achieve conservation goals, comply with state and federal environmental regulations, accommodate anticipated urban and rural growth, and permit the construction and maintenance of infrastructure needed to serve the county's population.

The PCCP includes three separate, but complementary, components that support two sets of state and federal permits:

- **Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan**, referred to as the HCP/NCCP or "Plan." The Plan is a joint HCP and NCCP that will protect fish and wildlife and their habitats and fulfill the requirements of the federal Endangered Species Act (ESA) and the California Natural Community and Conservation Planning Act (NCCP Act).
- **Western Placer County Aquatic Resources Program,** referred to as the CARP. The CARP will protect streams, wetlands, and other water resources and fulfill the requirements of the federal Clean Water Act (CWA) and analogous state laws and regulations.
- **In-Lieu Fee Program** is a program under which compensatory mitigation requirements under Section 404 of the CWA can be fulfilled by payment of a fee. The In-Lieu Fee Program will provide wetland mitigation "credits" that can be used to fulfill Section 404 compensatory mitigation requirements. The In-Lieu Fee Program will provide compensatory mitigation for impacts on aquatic resources for all projects and activities that are covered under the HCP/NCCP and the CARP.

This document is the Western Placer County HCP/NCCP. An overview of the Plan is provided in the Executive Summary. The Plan was prepared by the local agencies that will become ***Permittees***, in cooperation with state and federal regulatory agencies, collectively termed the "Resource Agencies."

[1] This document uses *acres* as the primary land area measure: 1 acre = 43,560 square feet; 640 acres = 1 square mile; 2.47 acres = 1 hectare.

The Permittees (see Figure 1-4) are as follows:

- Placer County (County)
- City of Lincoln (City)
- South Placer Regional Transportation Authority (SPRTA)
- Placer County Water Agency (PCWA)
- Placer Conservation Authority (PCA), created to implement the HCP/NCCP and the CARP on behalf of the other Permittees

The ***Resource Agencies*** are state and federal resource protection agencies with regulatory authority regarding some aspect of the PCCP. The Resource Agencies comprise the *Wildlife Agencies* and the *Water Resource Agencies*.

The ***Wildlife Agencies*** are the permitting agencies under the federal ESA and the California NCCP Act:

- California Department of Fish and Wildlife (CDFW)
- U.S. Fish and Wildlife Service (USFWS)
- National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration

The ***Water Resource Agencies*** are the permitting or overseeing agencies under the state Porter-Cologne Water Quality Control Act and the federal CWA:

- Central Valley Regional Water Quality Control Board (RWQCB)
- U.S. Army Corps of Engineers (USACE)
- U.S. Environmental Protection Agency (USEPA)

While the Plan does not provide compliance under the CWA, the Plan has been developed to streamline future compliance and to integrate with other water resource permitting efforts.

The Permittees will vest the responsibility for implementing the Plan in the PCA (see Section 8.3, *Responsibilities of the Placer Conservation Authority*). Although the PCA will oversee implementation of the Plan on behalf of the Permittees, the Permittees will ultimately be responsible for compliance with all the terms and conditions of the state and federal permits.

In addition to the Permittees, other parties may elect to seek coverage under the HCP/NCCP as "Participating Special Entities," as described in Section 8.9.4, *Take Authorization for Participating Special Entities*.

1.1.1 Goals Set Forth in the Agency Planning Agreement (2001)

In 2001, the County, the California Department of Fish and Game (now CDFW), USFWS, and NMFS signed an agreement describing the development of joint conservation plans under the California NCCP Act and the federal ESA for the Placer Legacy Open Space and Agricultural Conservation Program (Placer Legacy Program). As part of that agreement, the parties developed a process for developing HCP/NCCP guidelines, as follows.

Planning Agreement 1.2.5, Placer Legacy Program HCP/NCCP Guidelines. Based on input and analysis from the Scientific Working Group, the Citizens Advisory Committee, and the public, the County identified the following guidelines for preparation of a joint HCP/NCCP. These guidelines have been incorporated into the Placer Legacy Program's implementation documents; the Placer Legacy Program Summary Report, dated June 2000; and the Placer Legacy Program Implementation Report, dated June 2000. The County has used these documents and the guidelines therein to guide its implementation of the Placer Legacy Program. The parties recognize that the guidelines may be modified during development of the HCP/NCCP to fulfill the requirements of state and federal law.

Planning Agreement 1.2.5.1, Best Available Scientific Information. The HCP/NCCP will be based on the best available scientific information. The HCP/NCCP will:

- Be based on principles of conservation biology, community ecology, landscape ecology, individual species' ecology, and other scientific knowledge and thought
- Be based on thorough surveys of all species of federal, state, and local concern on lands dedicated to conservation or mitigation and other lands where Covered Activities will occur
- Be reviewed by well-qualified, independent scientists
- Identify and designate biologically sensitive habitat areas for preservation
- Determine the extent of impacts on species from incidental take caused by development and other Covered Activities
- Require monitoring of target species on developed, mitigation, and other preserved lands for the duration of each HCP/NCCP
- Seek to contribute to the recovery, not just the maintenance, of Covered Species

Planning Agreement 1.2.5.2, Open and Transparent Process. The HCP/NCCP will be prepared in an open and transparent process, with input from all concerned citizens. The process used to prepare the HCP/NCCP will:

- Provide for thorough public review and comment
- Include a citizen working group that will review the Plan at every stage of development
- Require that negotiations with applicable agencies be conducted in an open manner

Planning Agreement 1.2.5.3, Essential Elements. The HCP/NCCP will include the following elements:

- Monitoring and review of plan objectives and milestones at defined intervals to ensure that they are being met, including the identification of a process to suspend, modify, or revoke permits if there is not sufficient compliance with the agreed-upon objectives
- Adequate funding sources identified up front for habitat preservation and species recovery goals, based on realistic estimates of future land value for the life of the permits
- Adequate funding for monitoring to determine that plan goals are actually being met
- Adaptive management and periodic review, with sufficient funding to support changes in take activity and mitigation required to meet the Plan's goals
- Acquisition of required mitigation lands before development proceeds
- Performance standards for contributing to species recovery

1.1.2 Guiding Principles

The Permittees and key stakeholders, with input from the scientific community, identified the guiding principles and broad goals (Sections 1.1.2.1 through 1.1.2.6) to guide development of the PCCP conservation strategy.

The overall goals of the PCCP are as follows:

- Protect and enhance ecological diversity and function in the greater portion of western Placer County, while allowing appropriate and compatible growth in accordance with applicable laws
- Sustain all natural communities that are currently present in the western Placer County landscape
- Partially restore or enhance certain natural communities and ecosystem processes and functions
- Ensure population stability and sustainability of Covered Species and contribute to the species' recovery
- Maintain connectivity between habitats across the landscape
- Address cumulative impacts of intensive land use and urbanization in Placer County

Several broad goals support the overall goals as articulated below.

1.1.2.1 Protect Natural Plant Communities and Wildlife Habitats

Western Placer County contains oak woodlands, aquatic and wetland ecosystems, valley foothill riparian areas, and vernal pool grasslands. All of these natural communities provide valuable habitat for several plant and wildlife species that have been identified by state and federal agencies as threatened, endangered, or species of concern (listed species). Although not a natural community, agricultural lands also provide habitat for many wildlife species.

Preserving natural communities and specific agricultural lands is essential if listed species are to persist in western Placer County. Preservation of some communities will also benefit the residents of Placer County by controlling floods, improving local climate, preventing soil erosion, maintaining soil fertility, and controlling agricultural pests and disease vectors. Additional benefits include recreational opportunities contributing to the quality of life for residents.

1.1.2.2 Base Conservation on a Scientific Classification of Natural Communities

Natural communities may be classified in several ways. The PCCP utilizes a classification system called California Wildlife Habitat Relationships (CWHR; https://www.dfg.ca.gov/biogeodata/cwhr/). CWHR was adapted for application to the County to account for specific conditions such as habitat patch sizes, disturbance, threats, and associated wildlife species. As a first step in the PCCP planning process, the entire planning area was mapped into CWHR types. This mapping is one of the basic elements for conservation planning.

1.1.2.3 Provide a Conservation Reserve System that Includes All Natural Communities

Western Placer County does not contain large areas of public land, but there are a number of parcels in public or other ownership that will be preserved in perpetuity and protected for conservation or open space use. Although these properties were not necessarily selected on the basis of landscape-level conservation objectives, existing protected areas can provide the foundation for a comprehensive natural Reserve System that meets the habitat needs of Covered Species. Moreover, there are opportunities for restoration and enhancement within existing protected areas. The conservation strategy will create a Reserve System designed to ensure viability of Covered Species. Existing protected areas and CARP areas will be integrated into a Reserve System of parcels acquired under the Plan. The Reserve System will aim to preserve large, intact habitats that are well connected with each other. Ultimately, the Reserve System will reflect scientifically sound principles of conservation biology, incorporating known biological information as well as new information as it becomes available through implementation of the PCCP.

1.1.2.4 Employ Creative Methods for Funding Conservation and Mitigation

Implementation of the PCCP conservation strategy will require a combination of funding sources. The majority of funding for land acquisition will come from applicants during the project entitlement process. Applicants may also offer land dedications where feasible and desirable. To ensure that funding is not entirely dependent on the rate or number of development projects, additional funding will be sought from local, state, or federal sources. A range of tools may be used to ensure that the mitigation component of the PCCP will be successful and equitable to landowners. These tools are not mutually exclusive and could be used in a variety of combinations. Land dedication, acquisition of conservation easements, conservation plan impact fees, mitigation and conservation banking, and transferable development rights may be used as mitigation measures in specific instances.

1.1.2.5 Provide a Consistent, Efficient, and Equitable Development Permit Process

The PCCP will provide a comprehensive mitigation and conservation strategy that meets federal and state regulatory requirements. Once approved by the appropriate state and federal agencies, the PCCP will simplify the environmental review of public and private projects, make mitigation requirements consistent and predictable, and ensure that the mitigation measures provided contribute to the overall goals of the PCCP.

1.1.2.6 Manage Conservation Reserves for Sustainability

Present knowledge of biological resources in Placer County is sufficient to support the PCCP planning process in general. Less is known about practical land management and compatible agriculture and other land use effects, so the PCCP will need to be adaptable based on information learned through its implementation. Preserve lands, protected in perpetuity, will need to be administered by one or more entities capable of overseeing management, monitoring, and adaptive management. The Permittees have identified a Joint Powers Authority, namely the PCA, to carry out this task. The PCA would assume responsibility for collecting impact fees and using them to

purchase land or conservation easements from willing landowners, accepting lands dedicated for mitigation or other purposes, and developing and implementing management plans for all such lands.

The PCA will provide implementation monitoring and will track changes in land use and ensure fees and other conservation measures are fully executed. A biological monitoring program will become the basis for decisions concerning management activities of conservation lands to achieve the goals and the objectives of the PCCP. The link between management activities and the integrity of natural communities and the status of Covered Species is only as strong as the ability of biological monitoring to measure change and make recommendations on how to respond to change. Consequently, monitoring is an essential component of the PCCP.

1.1.3 HCP/NCCP Implementation

To implement the HCP/NCCP, the general plans and associated planning tools of Placer County and the City of Lincoln will most likely be supplemented by policy amendments, specific implementing ordinances, revisions to zoning ordinances, and changes to procedures for development permitting and California Environmental Quality Act (CEQA) compliance. A primary goal in creating the process for project review under the HCP/NCCP will be to increase simplicity and, as much as possible, to fulfill the requirements of all applicable local, state, and federal environmental requirements using one process (in other words, to provide "one-stop permitting").

The HCP/NCCP can be amended and implementation actions adjusted consistent with its original intent. Implementing ordinances and general plan elements may need to be changed in response to changes in the HCP/NCCP. The HCP/NCCP will not limit County or City land use authority, including their authority to adopt ordinances or revise their general plans. However, amendments to the HCP/NCCP itself will require the approval of the state and federal regulatory agencies that initially approve the Plan (Wildlife Agencies). If a new or revised ordinance or amendment to a general plan would require an amendment to the HCP/NCCP, the state and federal regulatory agencies would have to be consulted about the possibility of amending it.

1.1.4 Purpose

The purpose of the PCCP is to protect and enhance ecological diversity and function, including aquatic resource functions and values, in the greater portion of western Placer County while allowing appropriate and compatible growth in accordance with applicable laws. To this end, the Western Placer County HCP/NCCP describes how to avoid, minimize, and mitigate effects on endangered and threatened species, thereby addressing the permitting requirements relevant to these species for activities conducted in the Plan Area by the Permittees. These Covered Activities include urban growth and a variety of road, water, and other needed infrastructure construction and maintenance activities. The Plan also describes the responsibilities associated with operating and maintaining the new habitat reserves that will be created to mitigate anticipated effects resulting from growth and development activities.

This Plan is both an HCP intended to fulfill the requirements of the ESA and an NCCP to fulfill the requirements of the NCCP Act. As an NCCP, this Plan not only addresses mitigation but will also provide for the conservation and management of listed species and help preclude the need to list additional species in the future. The Permittees are voluntarily preparing this Plan as an NCCP to provide a higher level of conservation for the benefit of natural resources in western Placer County

than is strictly required for California Endangered Species Act (CESA) or ESA compliance. An NCCP also provides a higher level of regulatory benefit and greater opportunity for state and federal funding than does a stand-alone HCP.

The Plan will achieve the specific objectives listed below.

1. Provide comprehensive species, natural community, and ecosystem conservation in the Plan Area
2. Provide for the conservation and management of the Covered Species in the Plan Area and contribute to the recovery of listed species in Placer County and Northern California
3. Protect and enhance biological and ecological diversity in the County
4. Establish a regional system of habitat reserves to preserve, enhance, restore, manage, and monitor native species and the habitats and ecosystems upon which they depend
5. Enhance and restore stream and riparian systems inside and outside the habitat reserves to provide additional benefit to native fish and other stream-dwelling species
6. Allow issuance of federal permits to the Permittees for lawful incidental take[2] of species listed as threatened or endangered pursuant to the ESA resulting from development under the Permittees' adopted plans, policies, and programs
7. Allow issuance of a state authorization to the Permittee for lawful take of both non-listed species and species listed as threatened or endangered pursuant to the CESA resulting from development under the Permittees' adopted plans, policies, and programs
8. Streamline and simplify the process for future incidental take authorization of currently non-listed species that may become listed pursuant to the ESA during the permit term
9. Standardize avoidance, minimization, mitigation, and compensation requirements of all applicable laws and regulations related to biological and natural resources within the Plan Area so that public and private actions will be governed equally and consistently, thereby reducing delays, expenses, and regulatory duplication
10. Provide a less costly, more efficient project review process that will result in greater conservation than the current project-by-project, species-by-species endangered species compliance process
11. Provide a streamlined aquatic resource protection and permitting process, the CARP, to provide the basis for streamlined USACE/CWA permitting and 1602 permitting for PCCP Covered Activities, as well as provide the basis for CWA Section 404 programmatic general permits for PCCP Covered Activities and a programmatic certification of the Programmatic General Permits by the RWQCB under CWA Section 401
12. Provide a means for local agencies receiving permits to extend incidental take authorization to private entities subject to their jurisdiction, integrating endangered species permitting with local land use authorization

Incidental take authorization (referred to as take authorization in this document) will be granted by USFWS, NMFS, and CDFW (collectively, the Wildlife Agencies). The Permittees are asking the

[2] Take as defined by the federal ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

Wildlife Agencies to issue permits that authorize incidental take of Covered Species. The Plan includes a conservation strategy to mitigate effects on these Covered Species. The conservation strategy provides for the conservation and management of Covered Species and their habitats.

It is anticipated that the Plan will allow issuance of incidental take permits (ITPs) under the ESA and the NCCP Act by the Wildlife Agencies to the local jurisdictions. The Permittees will then be able to use those permits for their own operations, maintenance, and capital projects. The Permittees will also be able to extend the take authorization to private entities conducting activities covered by this Plan and under their jurisdiction[3] (see Chapter 2, *Covered Activities,* for a summary of activities eligible for these permits). The Wildlife Agencies will also provide assurances to the Permittees that no further commitments of funds, land, or water will be required to address effects on Covered Species beyond those described in the Plan as long as the Permittees are adequately implementing the Plan (see Chapter 10, *Assurances*).

The Plan will also be used to assist with compliance under Section 7 of the ESA for projects with federal agency involvement.

1.2 Scope of the Western Placer County HCP/NCCP

1.2.1 Plan Area

The Plan Area is the area within which Covered Activities would be implemented, and take resulting from such activities would be covered under the permit or take authorization granted to the Permittees. Placer County stretches from the Sacramento Valley east to the Sierra Nevada and the California-Nevada state line and covers a total area of 1,500 square miles (962,000 acres). The area proposed for permit coverage under the HCP/NCCP has two main parts and associated subcomponents, as shown on Figure 1-2:

- **Plan Area A** is the main focus of the HCP/NCCP and where all future growth and most of the Covered Activities will take place; the area is covered by a comprehensive permit. Plan Area A is the city of Lincoln plus all unincorporated lands within western Placer County: approximately 210,000 acres, or roughly five-sixths of western Placer County.
- **Plan Area B** comprises several specific additional areas in Placer County and adjacent Sutter County where only specific Covered Activities may occur (see Section 2.5.2, *Plan Area Components,* for more detail about Plan Area B).
    - B1, Permittee Activity in Non-participating City Jurisdiction
    - B2, PCWA Zone 1 Operations and Maintenance
    - B3, Raccoon Creek Floodplain Conservation
    - B4, Fish Passage Channel Improvement
    - B5, Big Gun Conservation Bank

[3] Note that the HCP and NCCP permits will only authorize the incidental take of Covered Species. Most Covered Activities will also require additional local authorization (e.g., CEQA), and some Covered Activities will also require additional state or federal authorization (see Section 1.5, *Regulatory Setting*).

Nearly all of the Plan Area—approximately 95 percent—is in private ownership. Land use and biology within the Plan Area reflect the transition from the Sacramento Valley to the Sierra Nevada foothills across numerous watersheds, including the Bear and American Rivers. Figure 1-3 illustrates the changing mosaic of agriculture, urban development, and woodland from the Sacramento River and the western edge of the Plan Area (Valley) eastward to the northeastern edge of the Plan Area (Foothills). It is important to note that the HCP/NCCP uses the division between Valley and Foothills as a way of organizing Covered Activities and the effect analysis:

- The *Valley* portion of Plan Area A comprises the city of Lincoln and unincorporated western Placer County below roughly 200 feet in elevation. Vernal pool grassland complexes and annual grasslands are the primary natural communities in the Valley.
- The *Foothills* portion of Plan Area A comprises the unincorporated communities along the Interstate 80 corridor, the unincorporated Auburn area, and the northern Foothills that support most of the woodland communities in the Plan Area.

1.2.2 Covered Activities

The goal of this Plan is to protect species and their habitats in a manner that supports the issuance of incidental take authorizations for Covered Species under the ESA and the NCCP Act for certain types of activities in specific areas of Placer County, in accordance with approved land use plans. Covered Activities are generally any actions undertaken in the Plan Area by or under the authority of the Permittees that may affect Covered Species or covered natural communities. Covered Activities may be projects, programs, or operations and maintenance (O&M). Covered Activities fall into the following categories.

1. Valley Potential Future Growth
2. Valley Conservation and Rural Development
3. Foothills Potential Future Growth
4. Foothills Conservation and Rural Development
5. Regional Public Programs
6. In-stream Programs
7. Conservation Programs

For details on the Covered Activities and the criteria used to select them, see Chapter 2, *Covered Activities*.

The Plan analyzes the biological resources and identifies a conservation strategy reflecting the geography of natural communities and Covered Species. The Plan also analyzes land use patterns and forecasts the extent and location of urban, suburban, and rural growth and seeks to reconcile potential future growth with the conservation strategy.

1.2.3 Covered Natural Communities

In accordance with the NCCP Act, this Plan will protect native biological diversity, habitat for native species, natural communities, and local ecosystems. This broad scope will conserve a wide range of natural resources, including habitat for Covered Species and other native species.

Chapter 3, *Physical and Biological Setting*, describes the way the HCP/NCCP organizes land cover types and constituent habitats as natural and semi-natural communities. The HCP/NCCP uses the term *community* to mean land cover types grouped together based on similarity in vegetation type, vegetation structure, ecological function, and current land use.

This Plan recognizes four types of communities: natural communities, semi-natural communities (e.g., rice, field crop), other agriculture (i.e., orchards and vineyards), and urban (non-natural) communities.

The organization of the communities is as follows:

- Natural Communities
    - Grassland
    - Vernal Pool Complex
    - Aquatic/Wetland Complex
    - Riverine/Riparian Complex
    - Valley Oak Woodland
    - Oak Woodland
- Semi-natural Communities
    - Rice
    - Field Crop
- Other Agriculture
    - Orchard and Vineyard
- Urban and Non-natural Communities
    - Managed Open Water
    - Rural Residential
    - Urban

The Plan recognizes key components of natural communities that have particular habitat value, called *constituent habitats* (see Section 3.3.1, *Communities, Land Cover, and Constituent Habitat*):

- Vernal Pool Complex Community
    - Vernal Pool Constituent Habitat
        - Vernal Pools
        - Seasonal Wetland in Vernal Pool Complex
        - Seasonal Swales

- Aquatic/Wetland Complex Community
    - Aquatic/Wetland Constituent Habitats
        - Fresh Emergent Marsh
        - Lacustrine (pond)
        - Non-vernal Pool Seasonal Wetland
- Riverine/Riparian Complex Community
    - Riverine/Riparian Constituent Habitats
        - Riparian
        - Riverine

The Plan's effects analysis in Chapter 4, *Effects of Covered Activities*, and conservation strategy in Chapter 5, *Conservation Strategy*, proposes maximum extent of take that would be covered by the Plan and conservation commitments for the six natural communities and key constituent habitats. Although they have variable habitat value, the Plan also proposes maximum extent of take that would be covered by the Plan and conservation commitments for semi-natural communities and other agriculture, which also provide size, buffering, and continuity value to the Reserve System.

1.2.4 Covered Species

In accordance with the NCCP Act, this Plan will protect native biological diversity, habitat for native species, natural communities, and local ecosystems. This broad scope will conserve a wide range of natural resources, including native species that are common or rare. However, the permits issued by the Wildlife Agencies will name specific species that are either currently listed as threatened or endangered or that may become listed during the permit term.

This Plan addresses 14 Covered Species, as listed below and in Table 1-1. The species subject to coverage were selected from a larger list, as described in Appendix C, *Evaluation of Special Status for Coverage in Placer County.* The Covered Species listed in Table 1-1 will be included on the ESA and NCCP Act permits.

The Plan includes conservation measures to protect all 14 Covered Species, whether or not they are currently listed. Accordingly, any non-listed species addressed by the Plan's conservation strategy will not require additional conservation within the Plan Area should that species become listed during the permit term.

Table 1-1. Covered Species

Common Name	Scientific Name	Status	
		Federal	State
Birds			
Swainson's hawk	*Buteo swainsoni*	BCC	ST
California black rail	*Laterallus jamaicensis coturniculus*	BCC	ST & FP
Western burrowing owl	*Athene cunicularia*	BCC	SSC
Tricolored blackbird	*Agelaius tricolor*	UR	SC
Reptiles			
Giant garter snake	*Thamnophis gigas*	FT	ST
Western pond turtle	*Emys marmorata*	UR	SSC
Amphibians			
Foothill yellow-legged frog	*Rana boylii*		SE
California red-legged frog	*Rana draytonii*	FT	SSC
Fish			
Central Valley steelhead – Distinct Population Segment	*Oncorhynchus mykiss irideus*	FT	
Central Valley fall/late fall-run Chinook salmon Evolutionarily Significant Unit	*Oncorhynchus tshawytscha*	SC	SSC
Invertebrates			
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	
Conservancy fairy shrimp	*Branchinecta conservatio*	FE	
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT	
Vernal pool tadpole shrimp	*Lepidurus packardi*	FE	

Status

Federal

FE = Federally Listed as Endangered
FT = Federally Listed as Threatened
BCC = U.S. Fish and Wildlife Service Birds of Conservation Concern
SC = National Marine Fisheries Service Species of Concern
UR = Under Review

State of California

SC = State Candidate
SE = State-listed as Endangered
ST = State-listed as Threatened
FP = Fully Protected
SSC = California Department of Fish and Wildlife Species of Special Concern

1.2.5 Plan Designations

The HCP/NCCP designates Plan Area A according to three major categories for Plan implementation (see Figure 1-5):

Reserve Acquisition Area (RAA). An area designated in the PCCP within which a connected Reserve System will be assembled. The ultimate Reserve System will be built based upon property owners' willingness to sell property or conservation easements and the ability of these properties to

meet PCCP mitigation and conservation requirements. The conservation strategy would establish most of the PCCP Reserve System in the RAA.

Potential Future Growth Area (PFG). An area designated within the Plan Area that has the potential to accommodate projected growth and to create impacts that will be mitigated under the PCCP. The growth scenario allocates most of the covered growth to the PFG.

Existing Protected Areas and Other Reserves. All lands that are currently protected. Some public and private lands are already in protected conservation or open space use.

Stream System: Streams and aquatic resources within the Plan Area as defined in Section 3.2.7, *Stream System*.

The HCP/NCCP designations affect the location and character of Covered Activities described in Chapter 2, *Covered Activities,* determine the estimates and proposed maximum extent of land conversion and Covered Species take to be covered by the Plan in Chapter 4, *Effects of Covered Activities*, and guide the conservation strategy in Chapter 5, *Conservation Strategy*.

The Plan uses the Stream System as an overlay on the designations map. The presence of the Stream System affects Covered Activities, informs land conversion and take of Covered Species, and guides the conservation strategy in the HCP/NCCP. The CARP also uses the Stream System as defined in Section 3.2.7, *Stream System*. The Stream System is depicted in Figure 1-6. .

The HCP/NCCP designations and the Stream System definition are key concepts for the Western Placer County HCP/NCCP. The breakdown of Plan Area A according to these categories is summarized in Table 1-2.

Table 1-2. Stream System, Uplands, and Major Reservoir Area (Acres) within Plan Area A

	Stream System[a]	Uplands	Major Reservoir	Total
All Plan Area A				
Reserve Acquisition Area	17,095	50,395	835	68,325
Potential Future Growth Area	7,974	114,004	3,821	125,799
Existing Protected Areas and Other Reserves	2,760	13,271		16,031
All Plan Area A	***27,828***	***177,670***	***4,656***	***210,154***
Valley				
Reserve Acquisition Area	15,611	28,485		44,095
Potential Future Growth Area	3,549	43,384		46,933
Existing Protected Areas and Other Reserves	2,175	7,668		9,843
All Valley	***21,334***	***79,537***		***100,871***
Foothills				
Reserve Acquisition Area	1,484	21,910	835	24,230
Potential Future Growth Area	4,425	70,621	3,821	78,866
Existing Protected Areas and Other Reserves	585	5,603	—	6,188
All Foothills	***6,494***	***98,134***	***4,656***	***109,284***

Source: Placer County 2015; MIG|TRA 2015.

[a] The Stream System does not include all potential streams in the Plan Area, as some are under the minimum mapping unit. The mapped and described Stream System is not equivalent to what may be under the jurisdiction of CDFW or other regulatory agencies. See full description of the Stream System in Section 3.2.7, *Stream System*.

1.2.6 Permits

The Permittees are requesting the following permits and authorizations:

1. A renewable 50-year ITP issued by USFWS under the ESA for 12 Covered Species
2. A renewable 50-year ITP issued by NMFS under the ESA for two Covered Species
3. A renewable 50-year incidental take authorization issued by CDFW under the NCCP Act for 14 Covered Species (fulfills the requirements of the CESA)

These permits will be tied to this Plan and to the Implementing Agreement (Appendix B, *Implementing Agreement*). Each permit will be issued to all Permittees collectively. Prior to permit expiration, the Permittees may apply to renew or amend the Plan and its associated permits and authorizations to extend their terms.

1.2.7 Permit Term

The permit term is the time period during which all Covered Activities can receive take authorization, consistent with the requirements of the Plan. The permit term is also the time in which all conservation actions must be successfully completed to offset the effects of the Covered Activities.

The initial permit term is proposed to be 50 years, which corresponds to the planning horizon used in the long-range growth projection scenario.

The permit term of 50 years was selected because it allows for the full and successful implementation of (1) the Covered Activities (Chapter 2, *Covered Activities*); (2) the conservation strategy (Chapter 5, *Conservation Strategy*); (3) the monitoring and adaptive management program (Chapter 7, *Monitoring and Adaptive Management Program*); and (4) the funding strategy (Chapter 9, *Costs and Funding*). Each of these components is discussed below.

Take authorization for all Covered Activities, including covered O&M activities, will expire at the end of the permit term, unless the permit is renewed or extended. Near the end of the permit term, the Permittees will determine whether to request a permit term extension through the formal amendment process described in Chapter 10, *Assurances*.

Based on the implementation horizon for covered projects, the ongoing regulatory requirement of O&M activities, the need to acquire lands for a successful Reserve System, and the need for adequate funding, the Plan Permittees have determined that a 50-year permit term will best address regulatory and biological considerations. In summary, the 50-year permit term provides sufficient time to accomplish the following critical elements of the Plan:

1. Allow sufficient time for implementation of current general plans
2. Fully implement the Permittees' projects that are covered by the Plan
3. Implement the Permittees' conservation activities as long as is feasible
4. Allow sufficient time to assemble the Plan Reserve System from willing sellers and partnerships with local agencies and private landowners
5. Secure all necessary funding for Plan implementation during the permit term to generate funding for the Plan in perpetuity

6. Develop an effective adaptive management program that will be implemented in perpetuity, given the uncertainties about the ecology of Covered Species and appropriate responses to resource management
7. Provide sufficient incentive for the Plan Permittees to commit the substantial resources necessary to complete the conservation plan (i.e., the permit term covers enough projects and activities to make the large up-front investment in the Plan cost effective)
8. Time for restoration to be put in place and monitored

1.2.7.1 Time to Implement Covered Activities

Major local planning documents have time horizons between 20 and 50 years, reflecting the time it takes to secure the funding and permits and construct the projects identified in the plans. The largest source of Covered Activities is projected urban growth within the Placer County and City of Lincoln General Plans. The City of Lincoln's General Plan has a 50-year time frame. Placer County's General Plan and community plans have various timelines. The County has plans to update its general plan starting in 2018. The general plans describe how and where growth may occur, but full build-out is not anticipated within the next 50 years for the County and City, particularly for non-residential development (e.g., commercial, professional office, and industrial). See Appendix M, *Growth Scenario Memorandum*, for additional details.

1.2.7.2 Time to Implement, Monitor, and Adjust Conservation Actions

The length of the permit term provides adequate time for the assembly of a Reserve System and development of a management program on reserve lands. Land will be acquired only from willing sellers. A 50-year permit term provides adequate time for willing landowners to become available and for the land agents of the Plan to negotiate a fair price for the land in fee title or conservation easement (see Chapter 5, *Conservation Strategy*, for a description of the land acquisition requirements of the Plan and Chapter 8, *Plan Implementation*, for a description of the land acquisition process). It may take several years to complete a single land acquisition or purchase a conservation easement. Because many such transactions will be required to assemble the Reserve System, adequate time is needed to ensure this can happen before the end of the permit term. Conservation actions that occur outside the Reserve System on stream segments (e.g., stream barrier removal or modification) may require similarly long time periods to negotiate and implement.

A permit term of 50 years also allows the monitoring and adaptive management programs to become well established and successful. As described in Chapter 7, *Monitoring and Adaptive Management Program*, the monitoring and adaptive management program will go through three distinct phases: data inventory, targeted studies, and long-term monitoring. Each phase will take many years to complete successfully.[4] One type of monitoring, called "status and trend monitoring," will track long-term trajectories of species' populations and other physical and biological conditions in the Plan Area. A permit term of 50 years will provide adequate time to collect enough data to detect trends for all of the Covered Species; if management responses are necessary, the permit term will also allow sufficient time to adjust management. Monitoring the success of restoration

[4] Many regional HCPs and NCCPs approved in Southern California more than 10 years ago are still developing their monitoring programs, demonstrating that it takes decades to develop and implement a successful monitoring program on such a large scale.

actions (described in Chapter 5, *Conservation Strategy*) is expected to take 5 to 10 years for each restoration project. Most restoration actions cannot be initiated until land is acquired. A permit term of 50 years is necessary to allow enough time to complete land acquisition with at least 5 to 10 years remaining on the permit in which to successfully initiate or complete (and possibly remediate if necessary) all restoration actions.

A successful program for management, monitoring, and adaptive management is essential to the success of the Reserve System after the permit term. The Permittees will be obligated during the permit term to address changes in circumstances foreseen by the Plan (see Chapter 10, *Assurances*) and remediate the conservation areas affected by these changes. A longer permit term is more likely to encompass a changed circumstance that will require a remedial action.

1.2.7.3 Time to Secure Adequate Funding

A 50-year permit term allows sufficient time to generate the necessary funding for Plan implementation. As described in Chapter 9, *Costs and Funding*, the Plan will be funded by a wide variety of local, state, and federal sources. Some of these sources will not be available for 10 to 30 years or more. To take advantage of these funding sources, the permit term must be at least 50 years.

Funding is also needed during the permit term to implement management and monitoring after the permit expires (e.g., an endowment). In Chapter 9, *Costs and Funding*, the Plan describes how and when this will be accomplished. The permit term must therefore allow sufficient time to accumulate long-term funding.

1.3 Related Local Programs

1.3.1 County Aquatic Resources Program

The CARP is a component of the PCCP that identifies, classifies and protects Aquatic Resources of Placer County within the Plan area. The program outlines a process to issue authorizations to impact Aquatic Resources of Placer County for Covered Activities requiring a Land Conversion Authorization from a Local Agency. It provides a programmatic framework for Covered Activities to obtain permits for impacts on aquatic resources within the Plan Area. The CARP will include an Aquatic Resource Ordinance and be implemented as part of the PCCP. The CARP classifies the various aquatic resources within the county that are under USACE (404 permit), RWQCB (401 permit), and CDFW (1602 permit) authorities. It also identifies categories of permits that would be allowed under the program.

The CARP requires the implementation of avoidance, minimization, and compensatory mitigation measures for work in "waters of the county," including discharges of fill material; alterations to the bed, bank, shoreline, or channel of county streams, lakes, and ponds; and removal of riparian and wetland vegetation. The CARP will ensure that impacts on waters of the county are avoided, minimized, and mitigated at a landscape level by establishing buffers around aquatic resources and identifying important areas for protection and inclusion in the PCCP Reserve System. CARP requirements complement the HCP/NCCP conservation strategy and supplement HCP/NCCP requirements for aquatic resources.

USACE is required to consider potential impacts on cultural resources under Section 106 on the National Historic Preservation Act (NHPA) (16 United States Code [U.S.C.] 470) before issuing a CWA Section 404 permit. The NHPA created the President's Advisory Council on Historic Preservation to review and comment upon activities sponsored or licensed (permitted) by the federal government (e.g., USACE) that may have an effect on resources listed or eligible for listing on the National Register of Historic Places. Compliance through Section 106 involves a demarcation of the area to be affected and may include surveys to ascertain the presence of artifacts that are eligible for National Register of Historic Places listing. The Advisory Council on Historic Preservation, State Historic Preservation Officer/Tribal Historic Preservation Officer, and other consulting parties advise and assist the federal agency official in this effort. This consultation ordinarily occurs between federal agencies. This consultation can take a considerable amount of time, depending upon the circumstances. Because the CARP is intended to streamline the permit process, the County is proposing a Memorandum of Understanding with the State Historic Preservation Officer to oversee permit compliance on behalf of USACE while adhering to specific requirements under Section 106 of the NHPA.

1.3.2 Placer Legacy Program

The impetus for development of the PCCP, the Placer Legacy Program, is a separate County program that was developed to protect Placer County's diverse open space and agricultural resources and help maintain the county's high quality of life while promoting its economic vitality. The Placer Legacy Program has goals that may overlap with some PCCP goals, but it was developed within a different context of local, state, and federal regulatory environmental requirements, relying upon existing statutes and general plan policies for implementation.

The Placer Legacy Program will remain an active program within the county. The Placer Legacy Program will continue to acquire land and may, depending upon funding sources and land suitability, be considered as contributing to the PCCP Reserve System.

Through the Placer Legacy Program, open space will be protected to:

- Maintain agriculture as a viable part of the economy
- Protect the diversity of plant and animal communities, including endangered and other special-status species
- Protect and expand outdoor recreation areas
- Protect areas that are scenic or historically significant
- Establish open space buffers between communities
- Ensure public safety

Key elements of the Placer Legacy Program are to:

- Provide a wide variety of ownership, preservation, and funding methods to address the diverse circumstances present in the county
- Benefit the county's economic future by clearly maintaining the county as an outstanding place to live and do business
- Maintain local land use control by taking a leadership role in the preservation of endangered species and habitat protection

- Identify open spaces of importance to residents of the cities as well as the unincorporated area
- Improve certainty in the regulatory process
- Design the program to allow phasing and early opportunities for successful implementation

The program requires identifying and working with willing sellers and willing buyers for all land transactions, which will be similar to the PCCP. A core interest of the program is to enable the County to make itself a willing buyer to persons wishing to sell interests in lands having value for conservation purposes. No property owner may be coerced or forced to sell any rights to their property, nor may condemnation proceedings be used to implement the program.

1.3.3 Coordinated Resource Management Plans

The Plan targets riverine and riparian habitats as a natural community covered under the HCP/NCCP and through the CARP. Existing Coordinated Resource Management Plans on Dry Creek and Auburn Ravine/Raccoon Creek provide valuable information to assist the PCA in developing mitigation efforts, conservation actions, and best management practices for watersheds, riverine and riparian natural communities, and the Stream System for the PCCP. In addition, the Raccoon Creek Watershed Assessment, which was developed in conjunction with this Plan, will help guide conservation efforts within that watershed.

1.4 Overview of HCP/NCCP Planning Process

1.4.1 Background

In April 1998, the Placer County Board of Supervisors directed the Placer County Planning Department to prepare a program to implement the open space and conservation goals and policies of the 1994 Placer County General Plan. This program, now known as the Placer Legacy Program (see Section 1.5.2, *Federal and State Wetland Laws and Regulations*), was approved in June 2000 and is the impetus for initiating the larger PCCP effort.

The development of the separate PCCP was initiated in 2000 after the Board voted unanimously to initiate both the Placer Legacy Program and the work program for the PCCP. In 2001, Placer County, CDFW, USFWS, and NMFS finalized an HCP/NCCP Planning Agreement (Planning Agreement). The Planning Agreement identifies the Permittees, the program areas and phases, regulatory goals, the planning process and guidelines for plan development, commitment of resources to complete the program, and other miscellaneous provisions.

The Placer Legacy Program's conservation goals are broader than those of the PCCP, although several of the principles identified and processes used were also incorporated into the development of the PCCP. Although the Placer Legacy Program addresses agricultural viability and several open space objectives (scenic, public safety, community edges/buffers, and outdoor recreational opportunities), the PCCP is intended to meet regulatory requirements under state and federal law for biological resources. The focus of the Western Placer County HCP/NCCP is to implement a conservation strategy to provide a comprehensive plan for the conservation of all natural communities, endangered species, and other less sensitive species of native wildlife, fish, and plants in western Placer County.

The process used to develop the PCCP relied upon many of the same principles from the Placer Legacy Program, which included independent scientific input and analysis, extensive public participation, as well as solicited advice from key groups of stakeholders. Background biological studies were conducted to provide baseline data on the natural resources in the Plan Area and help inform the preparation of the administrative draft PCCP (2005). To assist in the development of the PCCP, the County formed three working groups: (1) Biological Stakeholder Working Group, (2) Interagency Working Group (IAWG), and (3) Scientific Working Group. The County also collaborated with a non-profit business association, the Sierra Business Council, to facilitate the public participation process.

After preparation of the administrative draft HCP/NCCP and receipt of comments from the Wildlife Agencies, the process shifted to the development of data that could support a "hard line" conservation reserve map and achieving a balance between general plans for the County and City of Lincoln and the need to development a conservation strategy. In 2007, work resumed through the formation of an ad hoc committee, consisting of elected representatives from Placer County and the City of Lincoln. The ad hoc committee was created to engage the decision-makers from the County and City of Lincoln to develop a coordinated framework for decision making, a conservation map, and a forum to discuss local priorities. In September of 2008, the Board unanimously adopted the ad hoc committee's recommendations to work with partners (City of Lincoln, PCWA, SPRTA, and the Placer County Resource Conservation District) and coordinate with the public and Resource Agencies to finish the work plan and prepare a second draft.

A key component of the HCP/NCCP is the mapping of conservation opportunity areas. To develop that map, it was necessary to initiate a partial update of the land cover mapping that was originally prepared for the first draft HCP/NCCP. The new mapping focused on updating land cover within the valley where there had been a dramatic increase in growth since the preparation of the original maps and to implement input received from science advisors on how to map vernal pool complexes. As part of the land cover update, input was sought from key stakeholders, local area biologists familiar with western Placer County, and the general public on the mapping process and results.

In the spring of 2013 a general consensus was reached between the County, City, and Resource Agencies on a reserve map alternative for the preparation of the PCCP. Since 2013 that reserve map alternative has served as the foundation for the PCCP that has been prepared and references an RAA as well as areas where Covered Activities are likely to occur.

1.4.2 The Planning Process

The Placer County HCP/NCCP was a coordinated effort by four local agencies (i.e., the Permittees).

- Placer County
- City of Lincoln
- SPRTA
- PCWA

Coordination and management of the Plan involved the legislative governing bodies of the four Permittees; an IAWG, consisting of designated staff members from each of the Permittees and Wildlife Agencies; a Biological Working Group (BWG); and a Stakeholder Group. A Placer County

Program Manager reported to the various groups and was responsible for day-to-day administration of the planning effort. Each group is described in the following section.

In 2001, Placer County entered into a Planning Agreement with CDFW, USFWS, and NMFS regarding the PCCP. The Planning Agreement defines the goals and obligations with regard to development of a legally sufficient and approvable Plan that will form the basis for take permits for Covered Activities and Covered Species, which is a joint conservation plan under the California NCCP Act and the federal ESA. The duration of the Planning Agreement was extended twice, and it remains in effect.

1.4.3 Interagency Working Group

After the Planning Agreement was signed by all parties, the conservation planning process for the HCP/NCCP began with the establishment of an IAWG. The IAWG is made up of the County planning staff, staff members from the Wildlife Agencies, staff members from other participating agencies, and the County's consultants. The group initially met monthly in Auburn, or more frequently as necessary, to assist the Permittees with the preparation of the HCP/NCCP. Later meetings to discuss the drafting of the conservation strategy were held less frequently. The IAWG has guided the scope of work and methodologies used in the various biological studies conducted in support of the HCP/NCCP. Members have also provided input on the development of numerous aspects of the conservation strategy, including the different analysis zones, conservation areas, mitigation ratios, and reserve acquisition criteria.

1.4.4 Biological Working Group

During the HCP/NCCP preparation, the BWG generally met monthly, or as necessary, to provide stakeholder input into the conservation planning process. Meetings were held in an open public forum and comprised local environmental organizations, farming interests, development industry representatives, and other landowner representatives. The BWG has been involved with reviewing and discussing findings of biological studies conducted in the Plan Area and reviewing and commenting on the development of the conservation strategy. The group was also asked to provide specific input on various aspects of the draft HCP/NCCP.

1.4.5 Science Advisors

USFWS and NMFS encourages the use of a scientific advisory committee during the development and implementation of an HCP (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016). Independent scientific input is required by the NCCP Act (Section 2810(b)(5)). CDFW provides guidelines for "obtaining independent scientific analysis and input, to assist … Permittees in meeting scientifically sound principles for the conservation and management of species" and for assembling a science advisory group, defining their scope of work, involving a facilitator, and providing scientific advice (California Department of Fish and Game 2002). The science advisory process for the HCP/NCCP was guided by CDFW guidelines.

The Science Advisors are an independent group of scientists retained by Placer County under the direction of CDFW. The Science Advisors reviewed available information on biological resources and published a report in January 2004 (Brussard et al. 2004). The Science Advisors identified the ecosystems described in Chapter 3, *Physical and Biological Setting*, and made recommendations for their conservation and management. Those recommendations are included in Chapter 5,

Conservation Strategy. Permittees considered all comments from the Science Advisors' report when developing the Plan.

1.4.6 Consultant Team

This Plan was prepared by a consultant team under the guidance and direction of the County management team. The consulting team provided scientific, planning, legal, and other technical assistance. The members of the consulting team had the following responsibilities.

- MIG|TRA Environmental Sciences, Inc.: geographic information system, technical analysis, and preparation of the HCP/NCCP
- Hausrath Economics Group: cost and funding analysis
- North Fork Associates/Salix: preparation of the CARP and Valley land cover analysis
- ICF: baseline data, assistance with the HCP/NCCP, and preparation of the environmental impact statement/environmental impact report (EIS/EIR)
- Resources Law Group: Implementing Agreement, legal documents, and legal assistance
- Urban Economics: funding plan and development fee nexus study
- ECORP Consulting, Inc.: background data and preparation of a programmatic agreement for Section 106 of the NHPA

1.4.7 Public Outreach and Involvement

Public involvement has been an integral part of the process of developing this Plan. Stakeholders and the public have been actively involved throughout the planning process and have had the opportunities to provide their input and influence on the development of the Plan through public meetings and hearings.

In addition, a website was created that provided information on all public meetings and HCP/NCCP documents while also providing opportunities for comments and feedback (http://www.placer.ca.gov/Departments/CommunityDevelopment/planning/PCCP.aspx).

The Permittees developed this Plan in compliance with public involvement guidelines established by USFWS and NMFS (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016) and the requirements of the NCCP Act (California Fish and Game Code 2815).

1.5 Regulatory Setting

The PCCP is designed to comply with the ESA, CESA, NCCP Act, CWA (Sections 401 and 404), and California Fish and Game Code Sections 1600 et seq. and support the issuance of permits under those laws for Covered Activities. The HCP/NCCP is designed to comply with the ESA, CESA, and NCCP Act; the CARP is designed to comply with the CWA and California Fish and Game Code Sections 1600 et seq.

The HCP/NCCP also fulfills, in whole or in part, the requirements of several other California and federal environmental laws as they may pertain to Covered Activities, including:

- Migratory Bird Treaty Act (MBTA) (16 United States Code Annotated [U.S.C.A.] Section 703 et seq.)
- National Environmental Policy Act (NEPA) (42 U.S.C.A. Section 4321 et seq.)
- California Native Plant Protection Act (California Fish and Game Code Section 1900 et seq.)
- California Fish and Game Code Sections 3511, 4700, 5050, 5515 (Fully Protected Species)
- California Fish and Game Code Section 3503 (Bird Nests)
- California Fish and Game Code Section 3503.5 (Birds of Prey)
- The California Environmental Quality Act (California Public Resources Code [PRC] Section 21000, et seq.)

Additionally, land uses within unincorporated Placer County and the city of Lincoln are governed by the respective jurisdiction's general plan and ordinances. Those general plans and ordinances provide the local regulatory setting for western Placer County and are discussed below. More detailed discussion of these plans and ordinances is provided in the PCCP EIS/EIR.

1.5.1 Federal and State Endangered Species Laws

1.5.1.1 Federal Endangered Species Act

USFWS and NMFS administer the ESA. The ESA requires each agency to maintain lists of imperiled native species and affords substantial protections to these "listed" species. NMFS jurisdiction under the ESA is limited to the protection of marine mammals, marine fishes, and anadromous fishes; all other species are subject to USFWS jurisdiction.

USFWS and NMFS may "list" a species if it is endangered (i.e., at risk of extinction throughout all or a significant portion of its range) or threatened (likely to become endangered within the foreseeable future). Section 9 of the ESA prohibits the "take" of any wildlife species listed as endangered and most species listed as threatened. Take, as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harm is defined as "any act that kills or injures the species, including significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." Harass means "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." (50 Code of Federal Regulations [CFR] 17.3).

The ESA includes exceptions to this general take prohibition that allow an action to be carried out, despite the fact that the action may result in the take of listed species, where conservation measures are included for the species. Section 7 of the ESA provides an exception for actions authorized (e.g., under a Section 404 permit), funded, or carried out by a federal agency, and Section 10 provides an exception for actions that do not involve a federal agency.

To receive a Section 10(a)(1)(B) ITP for take of federally listed fish and wildlife species "that is incidental to, but not the purpose of, otherwise lawful activities," the permit applicant is required to provide:

- A complete description of the activity sought to be authorized

- An HCP that specifies:
    - The impact that will most likely result from the taking of Covered Species
    - The steps the applicant will take to monitor, minimize, and mitigate such impacts to the maximum extent practicable
    - The funding that will be available to implement such steps
    - The procedures to be used to deal with unforeseen circumstances
    - The alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be utilized
    - Such other measures that the Interior Secretary or Commerce Secretary may require as being necessary or appropriate for purposes of the Plan (50 CFR 17.22(b))

USFWS or NMFS will issue an ITP if the Interior Secretary or Commerce Secretary, as the case may be, finds that the ITP application and HCP meet the following criteria:

- The taking will be incidental.
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.
- The applicant will ensure that adequate funding for the Plan will be provided.
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.
- The measures, if any, required by the Secretary of Interior or Commerce Secretary will be met (16 U.S.C.A. Section 1539(a)(2)(B)).

Section 9 also prohibits the "removal or reduction to possession" of any listed plant species "under federal jurisdiction" (i.e., on federal land, where federal funding is provided, or where federal authorization is required). The ESA does not prohibit take of listed plants on non-federal land, other than prohibiting the removal, damage, or destruction of such species in violation of state law. Consistent with Section 7 (a)(2) of the ESA, however, Section 10 prohibits the issuance of an ITP that would appreciably reduce the likelihood of the survival and recovery in the wild (i.e., "jeopardize") of any endangered or threatened species, including plants.

1.5.1.2 California Endangered Species Act

Administered by CDFW, the CESA prohibits the take of listed species and also species formally under consideration for listing ("candidate" species) in California. Under the CESA, take means "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (California Fish and Game Code Section 86). Therefore, take under the CESA does not include "the taking of habitat alone or the impacts of the taking."[5] However, the killing of a listed species that is incidental to an otherwise lawful activity and not the primary purpose of the activity is take under the CESA. Incidental take of state-listed species may be authorized by CDFW if CDFW determines that the impacts of the take are minimized and "fully mitigated," among other findings by CDFW. For the purposes of permitting take under this Plan, see the section on the NCCP Act below.

[5] Environmental Council of Sacramento v. City of Sacramento, 142 Cal. App. 4th 1018 (2006).

1.5.1.3 Natural Community Conservation Planning Act

The NCCP Act was enacted to implement broad-based planning to provide for effective protection and conservation of California's wildlife heritage while continuing to accommodate growth. The NCCP Act does not focus only on listed species and is broader in its orientation and objectives than the ESA or CESA. The NCCP Act encourages local, state, and federal agencies to prepare comprehensive conservation plans that maintain the continued viability of species and biological communities affected by human changes to the landscape. Preparation of an NCCP is voluntary. The primary objective of the NCCP program is to conserve natural communities at the ecosystem scale while accommodating compatible land use.

To be approved by CDFW, an NCCP must provide for the conservation and management of Covered Species and the protection of natural communities within the Plan Area. In the NCCP Act, conservation means the use of methods and procedures within the Plan Area that are necessary to bring any Covered Species to the point at which measures provided under CESA are not necessary, or for a Covered Species not listed under CESA, to maintain or enhance the condition of such species so that listing under CESA will not become necessary. This conservation standard is one of the major differences in requirements for an NCCP as compared to an HCP prepared to satisfy the ESA.

The NCCP Act provides for incidental take authorization such that Covered Activities resulting in incidental take of listed species may be carried out without violating the CESA.[6] Permits issued under the NCCP Act can also be broad and may include both listed species and non-listed species. CDFW approves an NCCP for implementation after making certain findings listed here, accompanied by *italic text* explaining how the requirement is addressed in the HCP/NCCP (California Fish and Game Code 2820):

1. The Plan has been developed consistent with the process identified in the Planning Agreement entered into pursuant to California Fish and Game Code Section 2810.

   A representative of CDFW has been an active participant with the County's IAWG and BSG and has ensured that the County has developed the Plan in accordance with the Planning Agreement. In addition, a group of independent Science Advisors prepared and submitted a report (Brussard et al. 2004) providing guidance for use in the development of the HCP/NCCP. Many of the recommendations of the Science Advisors have been incorporated in the HCP/NCCP.

2. The Plan integrates adaptive management strategies that will be periodically evaluated and modified based on the information from the monitoring program and other sources, which will assist in providing for the conservation of Covered Species and ecosystems within the Plan Area.

   An adaptive management and monitoring program has been developed for the HCP/NCCP (Chapter 7, Monitoring and Adaptive Management Program). The adaptive management and monitoring program reflects suggestions presented in the publication "Designing Monitoring Programs in an Adaptive Management Context for Regional Multiple Species Conservation Plans" (Atkinson et al. 2004).

3. The Plan provides for the protection of habitat, natural communities, and species diversity on a landscape or ecosystem level through the creation and long-term management of habitat

[6] The NCCP Act states that CDFW "may authorize by permit the taking of any Covered Species whose conservation and management is provided for in a natural community conservation plan approved by [CDFW]" (California Fish and Game Code Section 2835).

reserves or other measures that provide equivalent conservation of Covered Species appropriate for land, aquatic, and marine habitats within the Plan Area.

The HCP/NCCP calls for the ultimate establishment of more than 50,000 acres of new reserves and existing protected lands containing a variety of natural communities, including vernal pools, annual grasslands, valley foothill riparian areas, and valley oak and other types of oak woodlands and the Stream System (Chapter 5, Conservation Strategy). The reserves will be managed in perpetuity, either in fee title or as conservation easements (Chapter 5, Conservation Strategy). Most of the reserve land area will be acquired as mitigation lands required to offset impacts of habitat loss resulting from growth (Chapter 5, Conservation Strategy); other reserve land area will be conservation lands acquired using state, federal, and other public funds (Chapter 9, Costs and Funding).

4. The Reserve Systems and conservation measures in the Plan Area provide for the conservation of species by:

   (A) Conserving, restoring, and managing representative natural and semi-natural landscapes to maintain the ecological integrity of large habitat blocks, ecosystem function, and biological diversity

   (B) Establishing one or more reserves or other measures that provide equivalent conservation of Covered Species within the Plan Area and linkages between them and adjacent habitat areas outside of the Plan Area

   (C) Protecting and maintaining habitat areas large enough to support sustainable populations of Covered Species

   (D) Incorporating a range of environmental gradients (such as slope, elevation, aspect) and high habitat diversity to provide for shifting species distributions due to changed circumstances

   (E) Sustaining the effective movement and interchange of organisms between habitat areas in a manner that maintains the ecological integrity of the habitat areas within the Plan Area

   The HCP/NCCP will ultimately create a system of large, interconnected reserves that meet the goals and objectives for specific natural communities and for specific Covered Species (Chapter 5, Conservation Strategy). These goals and objectives include recommendations from the Science Advisors and other HCP/NCCP studies regarding, among other things, reserve sizes, connectivity, buffers, and use of best management practices. The HCP/NCCP includes specific reserve selection criteria, which will contribute toward achieving this goal, and describes the expected future conditions of the reserve lands.

5. The Plan identifies activities, and any restrictions on those activities, allowed within reserve areas that are compatible with the conservation of species, habitats, natural communities, and their associated ecological functions.

   Because the PCA or equivalent land management entity acquires reserve lands, site-specific management plans (SSMPs) will be prepared for each reserve or reserve complex (see Chapter 5, Conservation Strategy). Each SSMP will outline the policies under which the parcel will be managed, describe the specific management activities that will be implemented, specify the restoration and enhancement needs, and define reserve water management. The SSMP will also address activities that can take place within the reserves and those that will be prohibited. Examples of activities that will typically be prohibited include dumping, vandalism, unauthorized hunting and fishing, collection of plants or animals, and off-road vehicle use.

6. The Plan contains specific conservation measures that meet the biological needs of Covered Species and that are based upon the best available scientific information regarding the status of Covered Species and the impacts of permitted activities on those species.

   Specific conservation measures for Covered Species are contained in Chapter 5, Conservation Strategy. The analysis of impacts of urban development and other Covered Activities on Covered Species is contained in Chapter 4, Effects of Covered Activities.

7. The Plan contains a monitoring program.

   See Chapter 7, Monitoring and Adaptive Management Program, and number (2), above.

8. The Plan contains an adaptive management program.

   See Chapter 7, Monitoring and Adaptive Management Program, and number (2), above.

9. The Plan includes the estimated timeframe and process by which the reserves or other conservation measures are to be implemented, including obligations of landowners and Plan signatories and consequences of the failure to acquire lands in a timely manner.

   The intent of the HCP/NCCP is to keep the establishment of mitigation reserve lands ahead of habitat loss from Covered Activities. The HCP/NCCP contains a requirement that reserve lands be acquired at Plan start-up through a combination of public and mitigation funding, roughly proportional to the projected habitat impacts. Thereafter, the program will always have reserve lands in excess of those required to mitigate cumulative losses from growth. The obligations of PCCP participants and Plan signatories are contained the Implementing Agreement and in Chapter 8, Plan Implementation.

10. The Plan contains provisions that ensure adequate funding to carry out the conservation actions identified in the Plan.

    See Chapter 9, Costs and Funding.

1.5.2 Federal and State Wetland Laws and Regulations

The PCCP will address the requirements of several state and federal regulations that specifically address wetlands.

1.5.2.1 Federal Clean Water Act, Section 404

The PCCP includes a program to support issuance of Section 404 permits for Covered Activities with effects on waters of the county. This program, together with the CARP, described in Section 1.5.1, *Federal and State Endangered Species Laws*, as well as other local programs, plans, and resource management efforts, provide a framework that will be implemented as part of the overall PCCP to comply with the CWA. This program will specify procedures and avoidance, minimization, and mitigation measures for waters of the United States, including vernal pools, that will be used by USACE to develop a permitting strategy for Covered Activities under the PCCP, which may include issuance of a Section 404 Programmatic General Permit, Regional General Permit, Letter of Permission procedures, and Standard Permit procedures.

In accordance with the USEPA's *Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredge or Fill Material,* except as provided for under Section 404(b)(2) of the CWA, no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed

discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences (40 CFR Section 230.10(a)). As a part of this process, USACE must analyze a range of alternatives and determine that the proposed activity is the least environmentally damaging practicable alternative before it can grant a permit authorizing the discharges. Where the activity associated with a discharge is proposed for a special aquatic site (e.g., wetland) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not "water dependent"), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise (40 CFR Section 230.10(a)(3)).

In addition to this alternatives analysis, the guidelines identify that no discharge of dredged or fill material shall be permitted if it: (1) causes or contributes to violations of any applicable state water quality standard; (2) violates any applicable toxic effluent standard or prohibition under Section 307 of the CWA; (3) jeopardizes the continued existence of species listed as endangered or threatened under the ESA or results in likelihood of the destruction or adverse modification of Critical Habitat; or (4) violates any requirement imposed by the Secretary of Commerce to protect any marine sanctuary designated under title III of the Marine Protection, Research, and Sanctuaries Act of 1972 (40 CFR 230.10(b)). The guidelines also identify that no discharge of dredged or fill material shall be permitted that will cause or contribute to significant degradation of the waters of the United States (40 CFR Section 230.10(c)). Finally, the guidelines require that except as provided under Section 404(b)(2) of the CWA, no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem (40 CFR 230.10(d)). In addition to the requirements of the Section 404(b)(1) Guidelines, USACE may only issue a permit if it is determined that a proposed action is not contrary to the public interest, which includes a determination on the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed structure or work. Finally, unless the proposed action is categorically excluded from NEPA, as defined in USACE regulations at 33 CFR Section 325, Appendix B(6), USACE must ensure a proposed action is in compliance with NEPA, which includes the identification and evaluation of effects of alternatives to the proposed action. Accordingly, USACE would must evaluate alternatives to ensure compliance with the guidelines, USACE public interest review requirements, and NEPA before any permit decisions can be made, including decisions on the issuance of a Programmatic or Regional General Permit for those activities identified in the CARP. However, USACE need not prepare two separate alternatives analyses to satisfy the guidelines, public interest review, and NEPA, because the USACE regulations identify that the alternatives analysis should be thorough enough to use for both the public interest review and the guidelines where applicable (33 CFR Section 325, Appendix B(5)(a)), and the guidelines provide that, in most cases, the alternatives analysis required for NEPA will provide the information necessary for the alternatives analysis required by the guidelines (40 CFR Section 230.10(a)(4)). The CARP and the HCP/NCCP will be analyzed in the same EIS, with USFWS as the lead agency and USACE as a cooperating agency, and the EIS's alternatives analysis will be sufficiently complete that it will satisfy the USACE alternative analysis obligations under the guidelines, public interest review, and NEPA.

USACE will rely on and tier from the EIS's alternatives analysis in reviewing subsequent permit applications for projects that fall within the HCP/NCCP and the CARP's parameters.

The CARP is intended to allow for a consistent review of aquatic resources and provide a streamlined process for compliance with Section 404 of the CWA for Covered Activities.

1.5.2.2 Federal Clean Water Act, Section 401 Water Quality Certification

Under the CWA, Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401 and the State's Porter-Cologne Water Quality Control Act. In California, Section 401 certifications are handled by the RWQCBs. The PCCP falls under the jurisdiction of the Central Valley RWQCB. The Central Valley RWQCB must certify that the discharges authorized under Section 404 will comply with state water quality standards and other requirements of the CWA.

Section 404 permits issued by USACE based on the wetland conservation program in the PCCP must be certified under Section 401 by the Central Valley RWQCB. It is anticipated that this permit will be included as a part of the CARP process and that a programmatic approach will be implemented for Section 401 permits in conjunction with the USACE Section 404 permit.

1.5.2.3 California Fish and Game Code Sections 1600–1616

Under California Fish and Game Code Section 1600 et seq., CDFW regulates activities that affect streams, lakes, and fish and wildlife resources associated with these aquatic systems. CDFW has the authority to regulate work that will "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris waste or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake" (California Fish and Game Code Section 1602). An entity that proposes to carry out such an activity must first notify CDFW. Where CDFW determines that the activity may "substantially adversely affect an existing fish or wildlife resource," the entity proposing the activity enters into an agreement with CDFW that includes conditions under which the activity shall be carried out in a way that protects the affected fish and wildlife resource.

The HCP/NCCP specifies avoidance, minimization, and mitigation requirements for "streams", "rivers", and "lakes", as those terms are used in the Plan. This Plan has been designed as much as possible to fulfill the requirements of California Fish and Game Code Section 1600 et seq. for the covered activities. However, because Section 1600 et seq. is separate and distinct from the NCCP, notification under Section 1600 et seq. is still required and CDFW would separately assess that notification[7]. Proponents of Covered Activities can include these NCCP measures in their notifications to and agreements with CDFW pursuant to Section 1600 et seq. In this way, and as applied to the Covered Species, proponents of Covered Activities may be able to streamline the permitting process with CDFW pursuant to Section 1600 et seq. by agreeing to fulfill the conditions on Covered Activities described in Chapter 6, *Program Participation and Conditions on Covered Activities*, and any applicable conditions in the CARP.

[7] For example, Section 1600 et seq. does not define "river", "stream" or "lake". The definition of these features under this NCCP may in some cases differ from how CDFW under Section 1600 et seq. identifies these features in the field for each project. Further, an agreement under Section 1600 et seq. may address more species than the Covered Species addressed by this Plan.

1.5.3 Other Federal and State Wildlife Laws and Regulations

1.5.3.1 Migratory Bird Treaty Act

The MBTA of 1918, as amended, implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds is unlawful, as is taking of any parts, nests, or eggs of such birds (16 U.S.C. 703).

1.5.3.2 Magnuson-Stevens Fishery Conservation and Management Act

Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires federal agencies to consult with NMFS on activities that may affect essential fish habitat (EFH) for species that are managed under federal fishery management plans in United States waters. The statutory definition of EFH includes those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity, which encompasses all physical, chemical, and biological habitat features necessary to support the entire life cycle of the species in question. Waters potentially affected by the HCP/NCCP include EFH for Pacific salmon.

1.5.3.3 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act of 1936 provides a basic procedural framework for the orderly consideration of fish and wildlife conservation and enhancement measures in federally constructed, permitted, or licensed water development projects (16 U.S.C. 661–667e et seq.). The act provides that, whenever any water body is proposed to be controlled or modified "for any purpose whatever" by a federal agency or by any public or private agency under a federal permit or license, the action agency is required first to consult with the wildlife agencies, "with a view to the conservation of fish and wildlife resources in connection with that project." The act authorizes preparation of reports and recommendations by the Secretary of the Interior and/or Commerce and the head of the state agency responsible for the administration of fish and wildlife resources, to be submitted to the action agency. That report, if prepared, must be made available to Congress or other authorizing agents when decisions are made to authorize (or not to authorize, or authorize with modifications) a project. Other provisions of the act relate to the acquisition and use of project lands and waters for fish and wildlife purposes, the evaluation of project effects including benefits and costs, and related matters.

1.5.3.4 California Fully Protected Species

In the 1960s, before the CESA was enacted, the California legislature identified specific species for protection under the California Fish and Game Code. These fully protected species may not be taken or possessed at any time, and licenses or permits generally cannot be issued for their take, except for collecting these species for necessary scientific research and relocation of bird species for the protection of livestock. Fully protected species are described in Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code. However, California Fish and Game Code Section 2835 allows for CDFW to authorize the taking of fully protected species whose conservation and management is provided for in an approved NCCP. This Plan includes conservation measures that provide for the conservation and management of the California black rail, a fully protected species. Other fully protected species that occur in the Plan

Area but are not likely to be affected by Covered Activities and are not covered under the HCP/NCCP include, but are not restricted to, bald eagle (*Haliaeetus leucocephalus*), American peregrine falcon (*Falco peregrinus anatum*), white-tailed kite (*Elanus leucurus*), golden eagle (*Aquila chrysaetos*), and ring-tailed cat (*Bassariscus astutus*).

1.5.3.5 Oak Woodlands Conservation Act

State law directs the County to determine the significance of impacts on native oak woodlands and, when appropriate, to mitigate those impacts. PRC Section 21083.4 requires the County to determine whether projects "may result in a conversion of oak woodlands that will have a significant effect on the environment." When it is determined that such a project may have a significant effect, specific CEQA mitigation is required. PRC Section 21083.4 mitigation standards apply to all native oak species, except those oaks determined by the California Department of Forestry and Fire Protection to be growing on timberland.

1.5.4 National Environmental Policy Act

NEPA requires federal agencies to include in their decision-making process appropriate and careful consideration of all environmental effects of a proposed action and reasonable alternatives. Documentation of the environmental impact analysis and efforts to avoid or minimize the adverse effects of proposed actions must be made available for public notice and review. This analysis is documented in either an environmental assessment or an EIS. Project proponents must disclose in these documents whether their proposed action will adversely affect the human or natural environment. NEPA's requirements are primarily procedural rather than substantive in that NEPA requires disclosure of environmental effects and mitigation possibilities but includes no requirement to mitigate.

The issuance by USFWS and NMFS of an ITP under Section 10 of the ESA constitutes a federal action. Therefore, USFWS and NMFS must comply with NEPA and will need to ensure that the EIS/EIR satisfies all regulatory requirements prior to the take permit being issued for the NCCP/HCP. A draft EIS was released on [*date TBD*] for a 90-day comment period that closed on [*date TBD*]. The draft EIS accompanies this draft HCP/NCCP.

1.5.5 California Environmental Quality Act

CEQA is similar to, but more extensive than, NEPA in that it requires significant environmental impacts of proposed projects be reduced to a less-than-significant level through adoption of feasible avoidance, minimization, or mitigation measures, unless overriding considerations are identified and documented that make the mitigation measures or alternative infeasible. CEQA applies to certain activities in California undertaken by either a public agency or a private entity that must receive some discretionary approval from a California government agency. In issuing the NCCP Act permit, CDFW must comply with CEQA. Similarly, the action of the Permittees in adopting the Plan is subject to CEQA compliance. Placer County is serving as the lead agency under CEQA. To comply with CEQA, the Permittees released a draft joint EIS/EIR on [*date TBD*]. The public comment period on the draft EIS/EIR closed on [*date TBD*]. The draft EIS/EIR accompanies this draft HCP/NCCP.

The draft EIS/EIR prepared for this HCP/NCCP is intended to provide programmatic compliance with CEQA for all activities covered by this Plan. Future projects that receive take coverage under the Plan must also comply with CEQA (State CEQA Guidelines Section 15168(a)) at the project level

through their local jurisdiction. It is expected that the conservation provided in this Plan will be sufficient to meet all CEQA mitigation standards for impacts on the special-status species and natural communities that are covered in this Plan. However, because circumstances may change, full CEQA coverage through the EIS/EIR prepared for this HCP/NCCP cannot be guaranteed. Barring major changes, it is expected that future CEQA documents for activities that receive take coverage under this Plan will incorporate the conservation measures in this Plan by reference to comply with CEQA for the Covered Species and natural communities addressed in this Plan. The Plan implements a conservation strategy designed to achieve a comprehensive set of biological goals and objectives. Furthermore, as an NCCP, the Plan provides for broad-based planning to preserve natural communities at the ecosystem scale.

Many of the conservation measures in the Plan will also benefit other special-status species (i.e., species not covered by the Plan); such measures may be sufficient to meet CEQA standards for these other species as well.

This Page Intentionally Left Blank

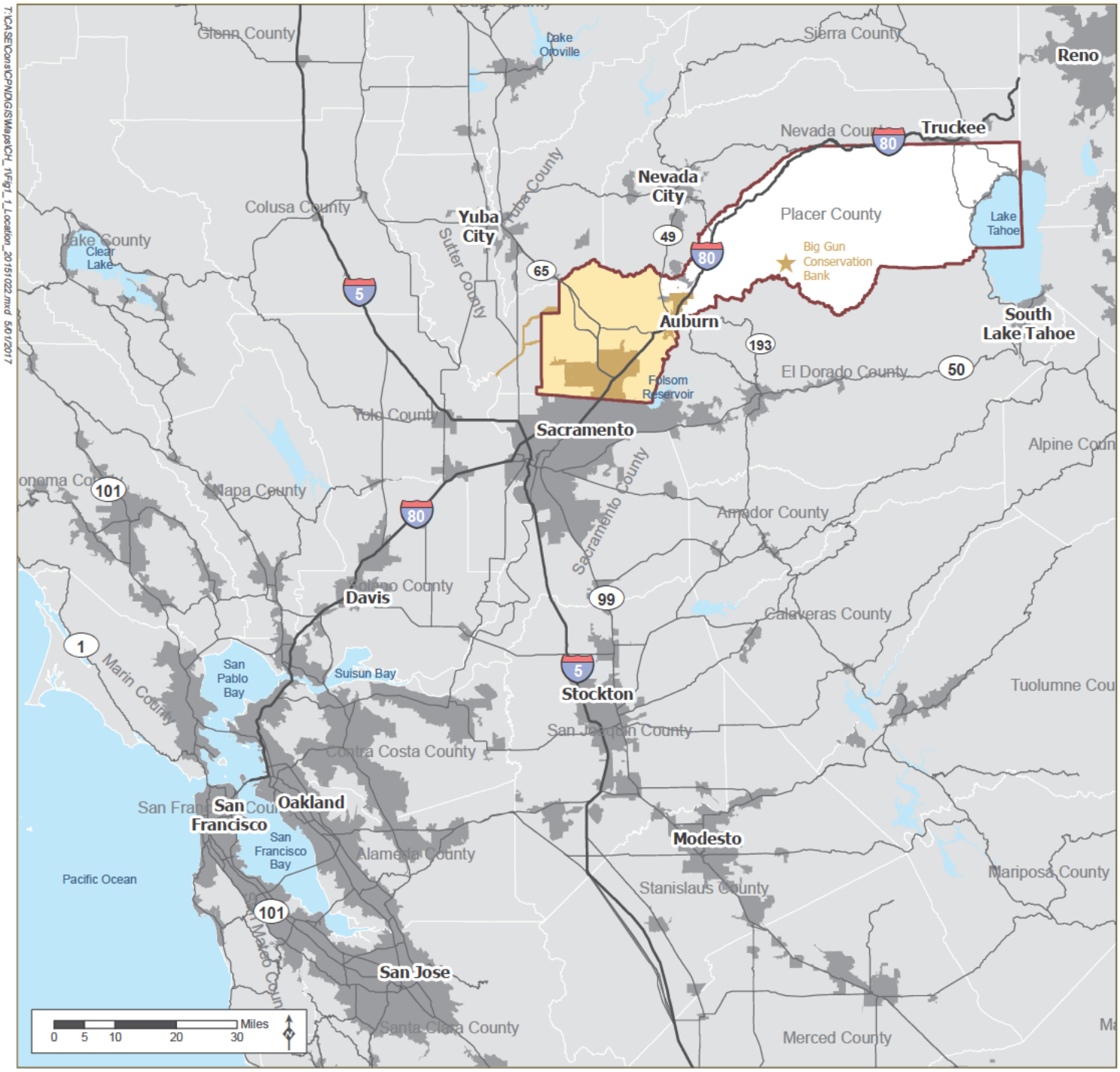
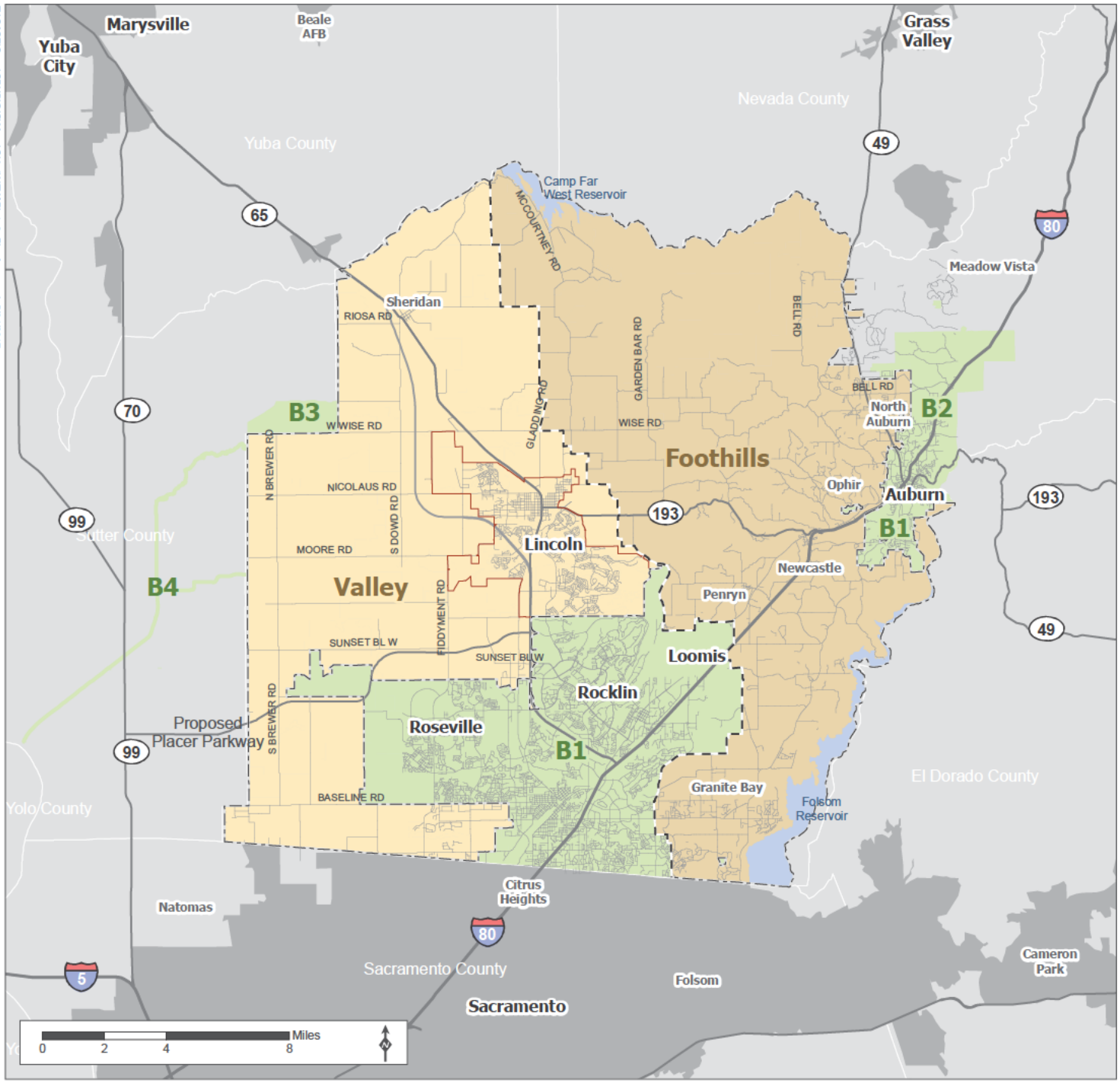


Figure 1-1 Location

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA 2015; CalTrans

- Interstate
- Highway
- Road
- City of Lincoln
- Valley/Foothill Divide
- Surrounding Urban Area

Plan Area A

Valley	100,698 acres
Foothills	109,134 acres
All Plan Area A	209,832 acres

Plan Area B

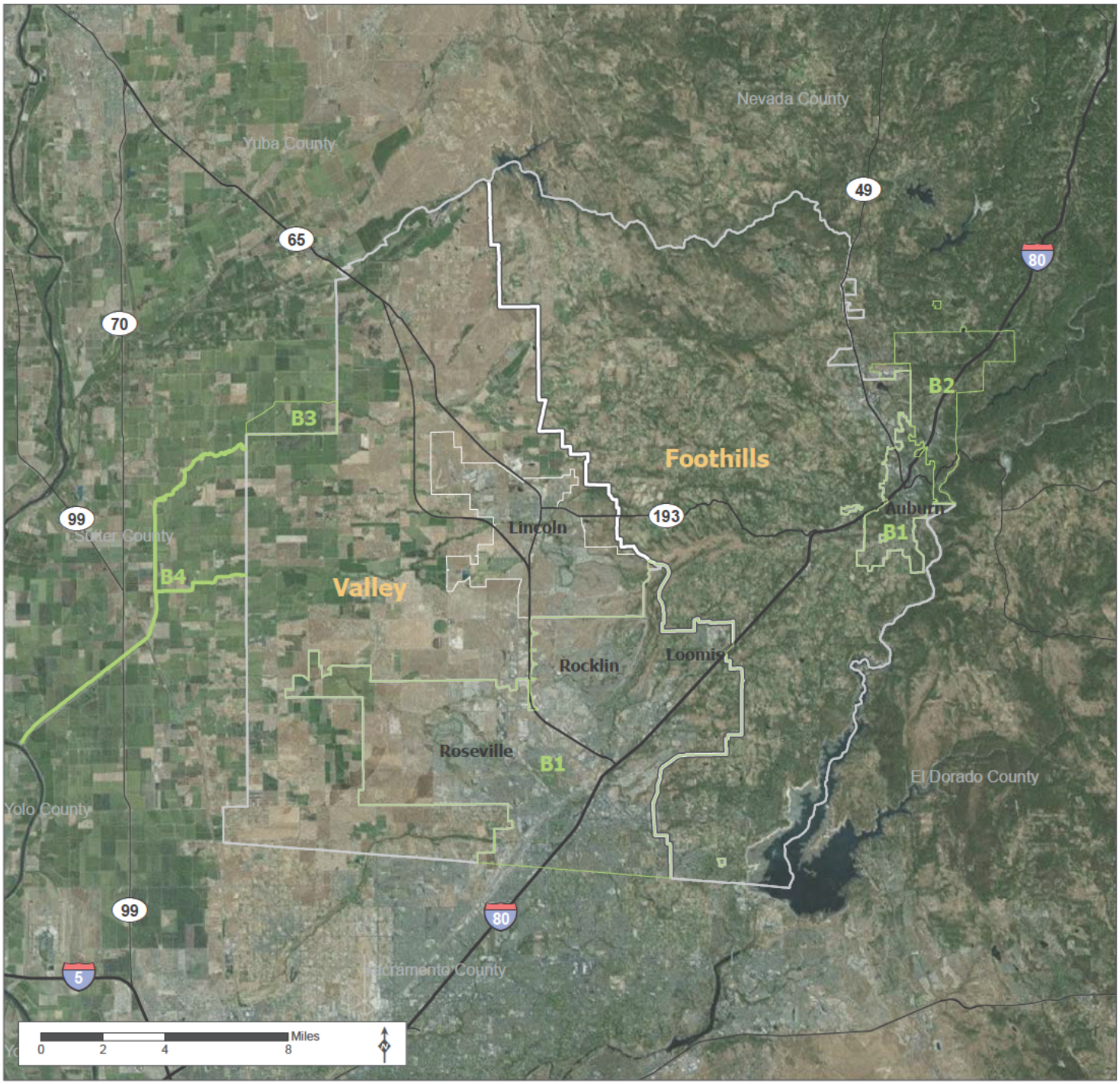
- B1. Permittee Activity in Non-Participating City Jurisdiction. 50,636 acres
- B2. PCWA Zone 1 Operations and Maintenance. 6,315 acres
- B3. Raccoon Creek Floodplain Conservation. 1,724 acres in Sutter County
- B4. Fish Passage Channel Improvement. 33 miles of channels in Sutter County
- B5. Big Gun Conservation Bank. 52 acres in Placer County (Not shown on map)

MIG | TRA

Figure 1-2 Western Placer County and the Plan Area

Placer County Conservation Program - Western Placer County HCP/NCCP

T:\CASE\Const\CPNDIG\SMaps\CH_1\Fig1_3_Aerial_20170501.mxd 5/1/2017



Source: Placer County, 2014; MIG | TRA 2015; CalTrans

Interstate
Highways
Valley/Foothill Divide

Plan Area A

Valley. 100,921 acres
Foothills. 109,295 acres
All Plan Area A. 210,216 acres

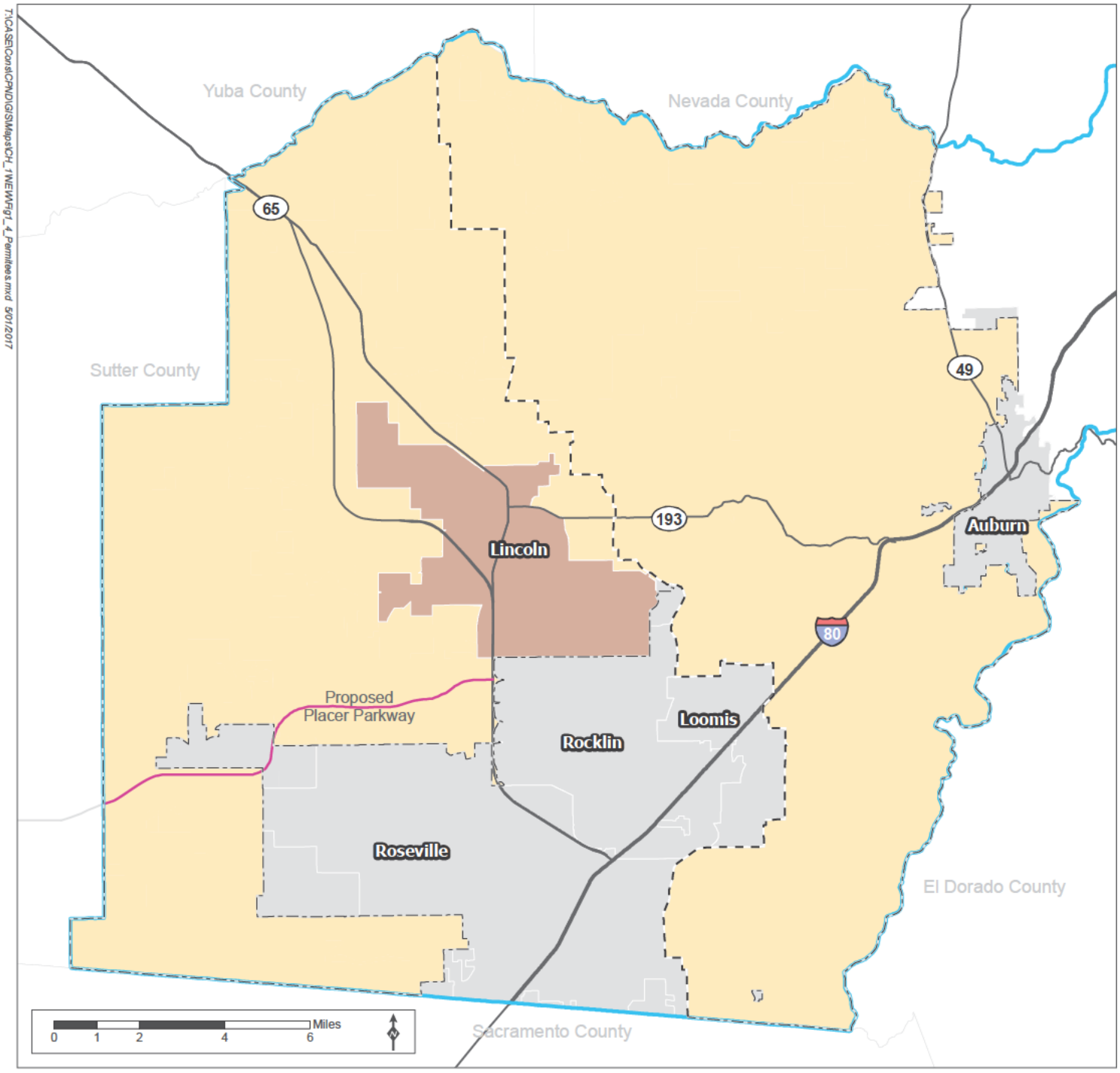
Plan Area B

B1. Permittee Ac ivity in Non-Par icipating City Jurisdiction. 50,636 acres
B2. PCWA Zone 1 Opera ions and Maintenance. 6,315 acres
B3. Raccoon Creek Floodplain Conservation. 1,724 acres in Sutter County B4.
Fish Passage Channel Improvement. 33 miles of channels in Sutter County
B5. Big Gun Conserva ion Bank. 52 acres in Placer County (Not shown on map)

MIG | TRA

Figure 1-3 Plan Area Vicinity Air Photo

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; PCWA

Permittees

- Placer County
- Lincoln
- South Placer Regional Transportation Au hority (SPRTA)
- Placer County Water Agency (PCWA) Boundary
- All Plan Area: Placer Conservation Authority (PCA)

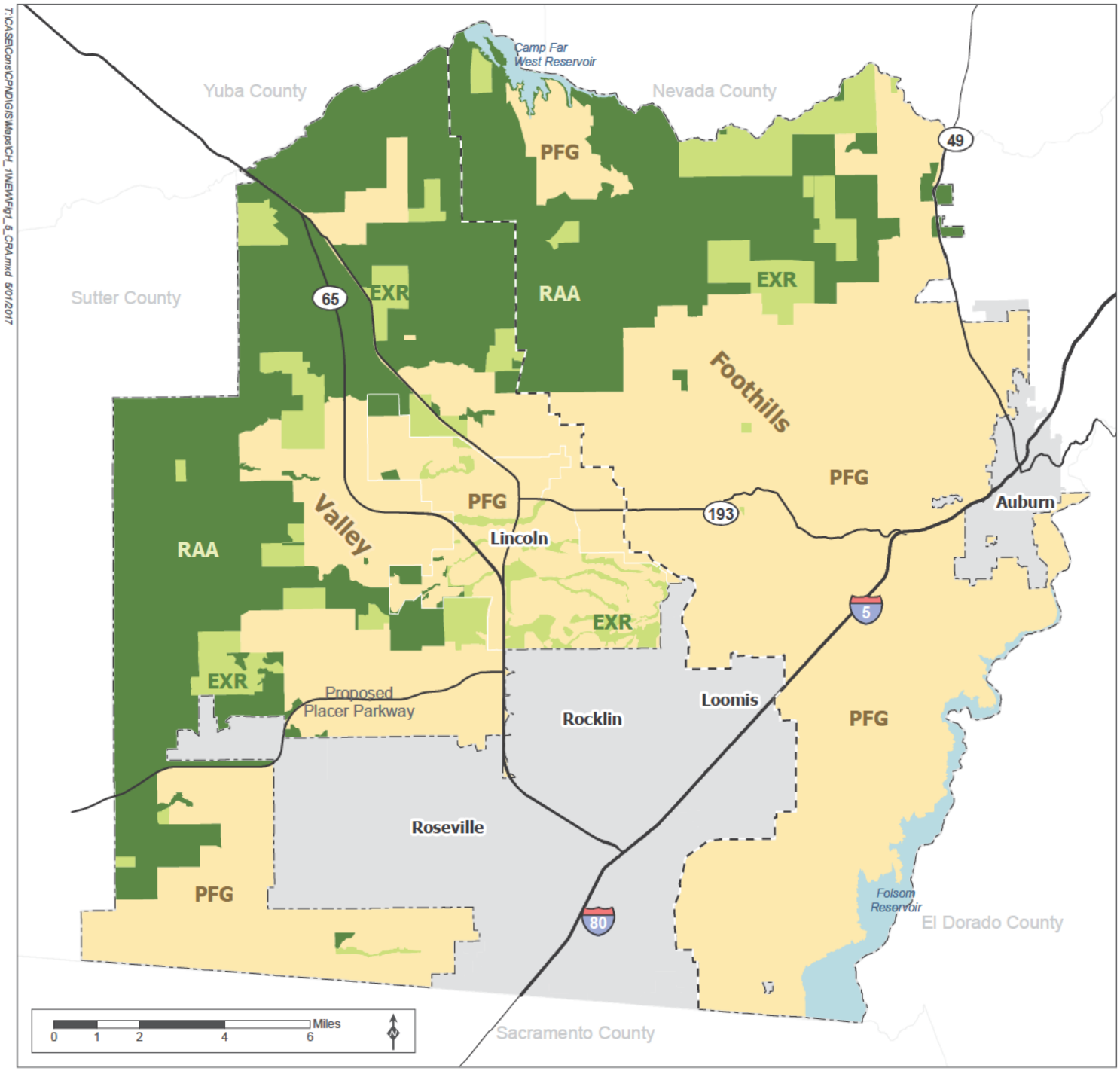
Non-Participating Cities

- Roseville
- Rocklin
- Loomis
- Auburn

MIG | TRA

Figure 1-4 Permittees and Western Placer County Jurisdictions

Placer County Conservation Program - Western Placer County HCP/NCCP

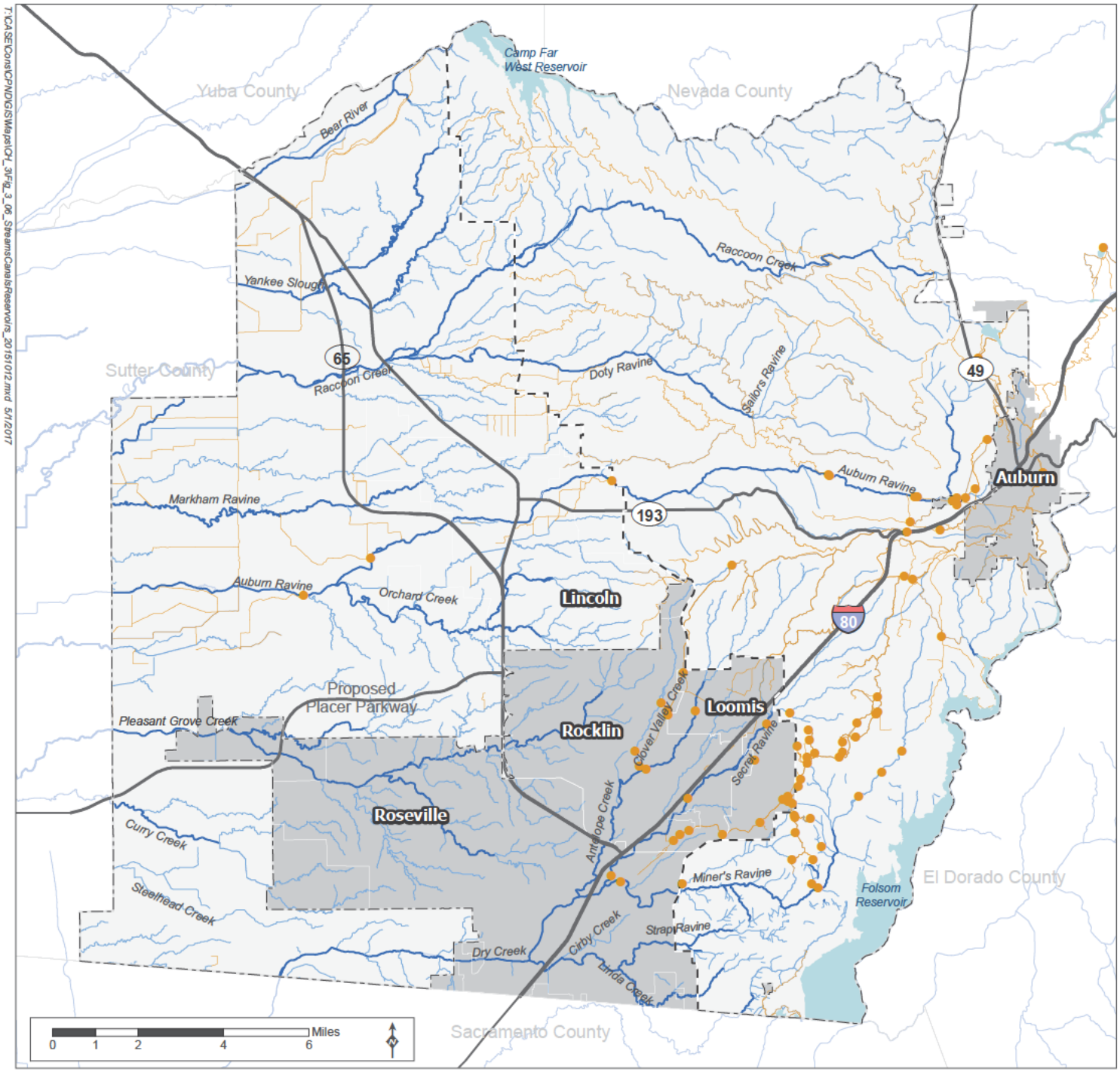


Source: Placer County, 2014; MIG | TRA 2015

- Reserve Aquisition Area (RAA)
- Poten ial Future Growth Area (PFG)
- Existing Protected Area and Other Reserves (EXR)
- Non-participating City
- Area A Boundary
- Highways
- Valley/Foothill Divide

Figure 1-5 PCCP Designation Map

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA, 2015; PCWA, 2013; USGS

- Major Stream
- Minor Stream
- Canal
- PCWA Canal/Stream Turnout or Diversion
- Reservoir
- Non-Participating City
- Valley/Foothill Divide
- Plan Area A

Figure 1-6 Streams, Canals, and Reservoirs

Placer County Conservation Program - Western Placer County HCP/NCCP

MIG | TRA

Chapter 2
Covered Activities

2.1 Introduction

This chapter provides a description of Covered Activities, including an overview of existing land use in the Plan Area, the Permittees' current general plans land use designations, and the programs and policies relevant to land conservation and open space. These existing programs govern the Permittees' activities and will serve as a basis for implementation of the Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP or Plan).

The chapter defines the Plan Area subject to the permits and the activities covered under the Placer County Conservation Program (PCCP) (see Section 2.5.2, *Plan Area Components*).

The Covered Activities are grouped into categories that are based on similarity of effect, due either to the part of the Plan Area affected or the nature of the activity. The activities are defined here in general terms. The effects analysis in Chapter 4, *Effects of Covered Activities*, provides detail and quantifies activities to estimate potential effect. It also proposes the maximum extent of effects to Covered Species that would be covered under the Plan. Chapter 6, *Program Participation and Conditions on Covered Activities,* sets specific limits on activities to avoid or minimize effects.

2.2 Definitions

Covered Activities. Generally any action undertaken in the Plan Area by or under the authority of the Permittees that may affect Covered Species or covered natural communities. Covered activities may be projects, programs, or operations and maintenance (O&M).

Land Use Designation. Refers to the formal designation of the general location and intensity of housing, business, industry, open space, education, public buildings and grounds, waste disposal facilities, and other land uses that appears in the land use element of a general plan adopted by a Permittee. Future Covered Activities undertaken by Permittees, including zoning, specific plans, and public works, must be consistent with the land use designation and other contents of the general plan.

2.3 Existing Geography and Land Use

Placer County stretches 90 miles, from Sacramento County to the California-Nevada state line, and comprises nearly 1 million acres, just over 1,500 square miles,[1] as shown on Figure 1-1. Most of the population in Placer County is on the valley floor and in the lower foothills in the western quarter of the county, which is where future growth is projected to occur. In this document, the term "western Placer County" refers to roughly 261,000 acres, extending from the city of Auburn and State Route (SR) 49 westward to the Yuba, Sutter, and Sacramento County lines (refer to Figure 1-2).

[1] This document uses *acres* as the primary land area measure (640 acres = 1 square mile; 2.47 acres = 1 hectare).

Today, within western Placer County, about 58,400 acres—20 percent of the total land area—lie within the boundaries of incorporated cities: Auburn, Lincoln, Loomis, Rocklin, and Roseville. The remaining unincorporated land is currently under the jurisdiction of Placer County. Auburn, Lincoln, Rocklin, and Roseville have adopted city spheres of influence (SOIs) that collectively cover about 26,000 acres, or 12 percent of the unincorporated area (see Figure 2-1). An SOI is defined as a planning boundary outside of an agency's legal boundary (such as the city limit line) that designates the agency's probable future boundary and service area.

The County of Placer (County) and the City of Lincoln (City) are PCCP Permittees. Their direct land use authority applies to 209,832 acres of western Placer County, which is termed *Plan Area A* (see Section 2.5.2, *Plan Area Components*).

The other cities in western Placer County—Auburn, Loomis, Rocklin, and Roseville—are not included as Permittees and are termed *non-participating cities.* The incorporated area of these cities, along with portions of their SOIs, total 50,600 acres; this constitutes the non-participating cities' jurisdiction. Some infrastructure projects and other activities carried out in the non-participating cities by the PCCP Permittees will be covered in Plan Area B (see Section 2.5.2, *Plan Area Components*).

Some portions of the SOI for non-participating cities are included in the Plan Area A (North Auburn and Bowman) and others are not (Roseville and Rocklin). The decision to include some SOI was guided by whether the area is currently being developed in the unincorporated county or if the area is expected to be annexed by a non-participating city during the permit term. If any portion of the PCCP Plan Area is annexed by a non-participating city, such as Roseville, during the permit term, development there will be covered under the PCCP as a Participating Special Entity (see Chapter 8, *Plan Implementation,* Section 8.9.4, *Take Authorization for Participating Special Entities*).

The western Placer County landscape and associated land uses are greatly influenced by topography. Elevation ranges from approximately 40 feet above sea level on the Sacramento Valley floor up to 2,300 feet above sea level in the Sierra Nevada foothills north of Auburn. The valley floor has extensive areas of agricultural uses as well as urban and suburban development along Interstate (I-) 80 and SR 65.

Figure 2-2 and Table 2-1 show the present pattern and extent of urban and agricultural use. Natural vegetation that still exists in the valley generally consists of grasslands, vernal pool complexes within a grassland matrix, and riparian woodlands. The foothills in the northeastern and eastern parts of the Plan Area (Loomis, Newcastle, Penryn, Auburn) are dominated by rural-residential land use, woodlands, orchards, and grazing land. The unincorporated Auburn area is both urban and rural residential in character.

Table 2-1. Existing Land Use in Western Placer County

Land Use	Valley	Foothills	NPC	All Western Placer
Land Use Area (acres)				
Field/Orchard	3,121	2,578	2,104	7,804
Rangeland	54,399	25,400	9,618	89,418
Rice	19,580	ND	ND	19,580
Woodland	4,269	54,630	5,788	64,687
Wetland	2,396	1,344	285	4,025
Reservoir	ND	4,657	ND	4,657
Rural Residential	4,943	14,042	ND	18,984
Urban/Suburban	12,107	6,646	32,841	51,594
Total	100,816	109,297	50,636	260,749
Land Use as % of Subarea				
Field/Orchard	3%	2%	4%	3%
Rangeland	54%	23%	19%	34%
Rice	19%	ND	ND	8%
Woodland	4%	50%	11%	25%
Wetland	2%	1%	1%	2%
Reservoir	-	4%	ND	2%
Rural Residential	5%	13%	ND	7%
Urban/Suburban	12%	6%	65%	20%
Total	100%	100%	100%	100%

Sources: MIG|TRA; PCCP GIS 2012; CDFG 2009 - (geographic information system vegetation data provided by California Department of Fish and Game to the Placer County Planning Department)

For uniform mapping, land-use categories are based on land-cover types in the Valley and Foothills and California wildlife habitat relationship types mapped in the non-participating cities. The land-use category and its land-cover components are as follows:

Field/Orchard: Orchards, Alfalfa, Row Crops, Stock Ponds, Unidentified Croplands, Vineyards

Rangeland: Annual Grassland, Vernal Pool Complex, Pasture

Rice: Rice

Woodland: Barren (Rock outcrops/cliffs), Blue Oak Woodland, Foothill Chaparral, Interior Live Oak Woodland, Mixed Oak Woodland, Oak - Foothill Pine Woodland, Oak Woodland – Savanna, Riparian Woodland, Valley Oak Woodland

Wetland: Fresh Emergent Wetland, Lacustrine, Riverine, Seasonal Wetland, Springs and Seeps

Reservoir: Reservoir

Rural Residential: Rural Residential, Rural Residential Forested

Urban/Suburban: Disturbed Lands, Eucalyptus Woodland, Landscape and Golf Course Ponds, Roads, Urban Golf Courses, Urban Parks, Urban Riparian, Urban Wetland, Urban Woodland, Urban/Suburban

NPC = non-participating city; ND = no data

The transition from the Sacramento Valley to Sierra Nevada foothills, which occurs roughly along the 200-foot elevation line, is reflected by differences in land use, ecology, and the distribution of natural communities and Covered Species. For this reason, the Plan Area is divided into three main subareas:

- The Valley (approximately 100,500 acres) consists of urban and suburban areas in Lincoln and unincorporated areas surrounded by agricultural uses and natural grassland and vernal pool complexes.
- The Foothills (approximately 109,000 acres) are characterized by lower-density suburban and rural-residential development along the I-80 corridor (approximately 41,000 acres) and lower-density rural-residential development, grazing land, and natural woodland communities in the North Foothills (approximately 68,000 acres).
- The non-participating cities' jurisdiction (approximately 50,600 acres) is mainly already in urban and suburban use.

Most of the county's agricultural land is in unincorporated western Placer County. As of 2014, agricultural land uses in this area included fruit and nut crops (mostly walnut orchards), irrigated field crops (mostly irrigated pasture and rice), nursery stock, and non-irrigated pasture. Placer County ranchland (in the northwestern parts of the Plan Area and west of SR 65) supports approximately 11,900 head of cattle and 9,000 sheep. Apiaries and nursery products are other elements of agricultural activity in western Placer County. For the county overall, livestock and poultry production was valued at more than $22 million as of 2014. Rice production ranks first in value in the county, with a gross value of more than $24 million (Placer County Agricultural Crop Report 2014).

Over the last 150 years, many of the county's once vast grasslands, woodlands, and riparian areas have been converted to urban, rural, suburban, and agricultural use. Since 1940, Placer County has almost doubled in population every 20 years. The pace of growth and change in land use accelerated in the 1970s, with economic growth stimulating more residential growth. In 1970, the entire population of the county was 78,000; as of 2010, Roseville alone had nearly 120,000 people. From 2000 to 2010, Placer County was the fastest growing county in California in terms of population growth. Although this growth rate has recently slowed, the county's high quality of life is expected to continue to attract an increasing share of regional residential and economic activity.

In 1967, Placer County's first general plan outlined a vision that has been consistently applied for decades and is the foundation for most county development patterns ever since. The unincorporated areas were to be dominated by agricultural land uses to the west, timberlands to the east, and rural-residential land uses throughout the foothills. Urban land uses would be located in cities and existing unincorporated communities. The Sunset Industrial Area south of Lincoln would be devoted to non-residential, employment-generating land uses. For the unincorporated area, a series of community plans were created that further defined land use and development potential.

The cities in western Placer County responded to the growth pressures of the 1970s and 1980s by expanding their designated SOIs (generally considered to be future city limits or service area boundaries) into unincorporated county land. Although the County's 1994 general plan generally reaffirmed the vision to concentrate growth in cities and existing unincorporated communities, it also established specific plan development standards for the area known as the Placer Vineyards Specific Plan Area, a future growth study area for unincorporated agricultural land west of the city of Roseville, and an area known as Boulder Ridge (the location of the Bickford Ranch Specific Plan).

Much of the new entitled development of the last decade occurred in this area, either as lands annexed to the City of Roseville or within specific plans approved by Placer County (Bickford Ranch Specific Plan, Placer Vineyards Specific Plan, and Regional University Specific Plan).

2.4 Permittees, Plans, Policies, and Programs

Only activities undertaken by or on the authority of a Permittee are Covered Activities. The Permittees participating in the PCCP include:

- City of Lincoln
- Placer County
- Placer County Water Agency (PCWA)
- South Placer Regional Transportation Authority (SPRTA)
- Placer Conservation Authority (PCA), created to implement the Plan on behalf of all Permittees

This section identifies the Permittees and describes the plans, policies, and programs that are relevant to the PCCP.

2.4.1 City of Lincoln

The City of Lincoln is located on the eastern edge of the Sacramento Valley floor, at the base of the Sierra Nevada foothills. Lincoln was incorporated in 1890 and is one of six cities in Placer County. As of 2014, the incorporated city limits encompassed 13,440 acres of land, roughly bounded by Wise Road to the north, Sierra College Boulevard to the east, Athens Road to the south, and Airport Road to the west, shown on Figure 1-2.

2.4.1.1 General Plan Land Use

The City of Lincoln General Plan (City of Lincoln 2008) designates the general location and intensity of present and future housing, commercial, open space, public services, and other land uses inside the existing city incorporated area. The planned urban growth will be covered by the PCCP. Adopted in March 2008 and updated in 2012 and 2014, the City of Lincoln General Plan addresses a planning area covering a total of 35,200 acres, termed the *Lincoln Planning Area*, which includes the 13,440-acre existing city incorporated area, most of the Lincoln SOI, and additional currently unincorporated lands. The 2008 planning area boundaries extend north to Raccoon Creek and Doty Ravine, east along McCourtney Road and Sierra College Boulevard, south to the city of Rocklin and Athens Avenue west of SR 65, and about 2 miles west of Dowd Road.

The City undertakes long-range planning for lands not currently in its city boundaries; the designations for these lands outside the currently incorporated area indicate where the City expects future growth to occur and the City's intent to designate those uses if the lands were to be incorporated into the City jurisdiction. Until that time, however, the applicable general plan for these unincorporated lands is the general plan or community/area plan of the County of Placer.

The City of Lincoln current city limits and SOI/planning area are shown on Figure 2-1 and Figure 2-3. Figure 2-3 also shows the current incorporated Lincoln city limits and the larger Lincoln Planning Area. Most of the Lincoln Planning Area outside of the city limits remains designated under

the Placer County General Plan as Agriculture, 80-acre minimum parcel size. As portions of the Lincoln Planning Area are annexed, they will be subject to a specific plan, which will provide a detailed land use plan that implements the City of Lincoln General Plan. This process is illustrated by the 2014 annexation of a 521-acre area as the Village 7 Specific Plan, shown on Figure 2-3.

2.4.1.2 Population, Housing, and Employment

As of 2014, there were 45,200 people and 18,100 housing units in the City of Lincoln, about 12 percent of county totals (State of California Department of Finance, E-5 Report, May 2014). There were about 6,700 jobs in the City of Lincoln in 2014, four percent of county totals (Hausrath Economics Group, based on U.S. Census Bureau *OnTheMap* Application, State of California Employment Development Department, and U.S. Census Bureau, American Community Survey). Lincoln was a growth center of national repute for a period after 2000; the population more than tripled over a 7-year period. More recently, growth moderated substantially with the onset of the recession in 2008. As the national economic recovery took effect, Lincoln, similar to the rest of western Placer County, began to see its existing housing inventory used up. As a result, new entitlements for large projects are once again being evaluated.

The stated goal of the 2008 City of Lincoln General Plan is for the city to become a self-sustaining community of 130,000 people—a population large enough to support the economic development required for fiscal sustainability. The City of Lincoln General Plan Lincoln Planning Area expands the city's SOI to the west and north in order to accommodate future growth. As a participant in the regional Blueprint effort led by the Sacramento Area Council of Governments, Lincoln has incorporated many smart growth principles into its general plan.

A growth scenario prepared for the PCCP shows Lincoln and its expanded SOI capturing 25 to 30 percent of the future growth in the Valley subarea over the 50-year permit term. An increase of 25,000 housing units in the City of Lincoln would accommodate about 67,000 people, bringing total population to around 113,000 over the next 50 years. During this period, growth in economic activity in the expanded city could support an additional 25,000 jobs.

2.4.1.3 General Plan Conservation and Open Space Policies

The City of Lincoln General Plan identifies three goals and nine policies that support efforts consistent with the PCCP. These policies within the Plan's Open Space and Conservation (OSC) Element advocate the protection and management of natural resources, wetlands, and wildlife habitat and encourage coordination on conservation planning with other local jurisdictions.

Goal OSC-1:

To designate, protect, and encourage natural resources, open space, and recreation lands in the city; protect and enhance a significant system of interconnected natural habitat areas; and provide opportunities for recreation activities to meet citizen needs.

Policy OSC 1.1, Protect Natural Resources

The City shall strive to protect natural resource areas, fish and wildlife habitat areas, scenic areas, open space areas, and parks from encroachment or destruction by incompatible development.

Policy OSC 1.2, Coordinate with Placer County for Open Space Preservation

The City shall coordinate with Placer County and its Placer Legacy program to ensure City issues are incorporated into future plans.

Goal OSC-2:

To cooperate with Placer County in preserving agricultural operations that are located outside the City's planning boundaries.

Policy OSC 2.3, Coordinate with Neighboring City/County Agricultural Objectives

The City shall support policies adopted by neighboring cities and Placer County to promote the viability of agriculture in the county.

Goal OSC-5:

To preserve and protect existing biological resources, including both wildlife and vegetative habitat.

Policy OSC 5.1, Protect Significant Vegetation

The City shall support the preservation of heritage oaks and threatened or endangered vegetative habitat from destruction. A heritage oak shall be defined as a tree with a diameter of 36 inches measured at a point 4.5 feet above grade level (i.e., diameter at breast height or DBH).

Policy OSC 5.2, Management of Wetlands

The City shall support the management of wetland and riparian plant communities for passive recreation, groundwater recharge, and wildlife habitats. Such communities shall be restored or expanded, where possible and as appropriate.

Policy OSC 5.3, Placer Legacy Open Space and Conservation Program

The City will continue to coordinate with Placer County and the Placer Legacy Open Space and Conservation Program to protect habitat areas that support endangered species and other special-status species.

Policy OSC 5.4, Encourage Planting of Native Vegetation

The City shall encourage the planting of native trees, shrubs, and grasslands in order to preserve the visual integrity of the landscape, provide habitat conditions suitable for native vegetation, and ensure that a maximum number and variety of well-adapted plants are maintained.

Policy OSC 5.5, New Development in Sensitive Areas

The City shall require that new development in areas that are known to have particular value for biological resources be carefully planned and where possible avoided so that the value of existing sensitive vegetation and wildlife habitat can be maintained.

Policy OSC 5.6, No Net Loss of Wetlands

The City will maintain a policy of no net loss of wetlands on a project-by-project basis, which may include an entire specific Plan Area. For the purpose of identifying such wetlands, the City will accept a map delineating wetlands that has been accepted by the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act of 1972. The term "no net loss" may include mitigation implemented through participation in an off-site mitigation bank or similar mitigation mechanism acceptable to the City and permitting agencies.

2.4.2 Placer County

Placer County has land use authority over 191,000 acres of unincorporated lands in western Placer County in Plan Area A, including the unincorporated communities of Granite Bay, Dry Creek, Sheridan, Newcastle, Penryn, North Auburn, the Sunset Industrial Area, and the Placer Vineyards, Riolo Vineyards, Bickford Ranch, and Regional University Specific Plan areas.

2.4.2.1 General Plan Land Use

The Placer County General Plan consists of the countywide general plan (2013) policy document and land use diagram as well as a set of more detailed community plans (and one area plan) covering specific areas of the unincorporated county. The 2013 countywide general plan provides a framework for development of the county and protection of its natural and cultural resources. The goals and policies contained in the countywide general plan are applicable throughout the county, except to the extent that County authority is preempted by cities within their individual corporate limits.

Figure 2-3 shows that the most of the unincorporated area of the valley is designated for agricultural use with a large minimum lot size. The large parcel agricultural designation continues in the foothills on the north in the Bear River and Raccoon Creek watersheds and gives way to rural-residential land use designations to the south. Figure 2-3 also shows four unincorporated areas that are represented by detailed specific plans: Placer Vineyards, Regional University, Riolo Vineyards, and Bickford Ranch. This existing Placer County General Plan land use diagram guides both the economic forecast used to generate growth scenarios for the PCCP and shows where there are opportunities for establishing the PCCP Reserve System on large parcels away from urban areas.

Community plans, adopted in the same manner as the countywide general plan, provide more detail on specific geographic areas within the unincorporated county. The goals and policies contained in the community plans supplement and elaborate upon, but do not supersede, the goals and policies of the countywide general plan. The following community plans in western Placer County were adopted: Auburn/Bowman, Dry Creek/West Placer, Newcastle/Ophir, Granite Bay, Horseshoe Bar/Penryn, Sheridan, and the Sunset Industrial Area.

2.4.2.2 Population, Housing, and Employment

As of 2014, there were about 65,000 people, 18 percent of the county's total population, and 25,000 housing units in unincorporated western Placer County (State of California Department of Finance, E-5 Report, May 2014; U.S. Census Bureau, 2010 Census). Most of these people live in Granite Bay and North Auburn as well as rural-residential development areas in the foothills beyond Lincoln and Newcastle. There were about 26,000 jobs in this part of the unincorporated area in 2014, 16 percent of county totals (Hausrath Economics Group based on U.S. Census Bureau *OnTheMap* Application, State of California Employment Development Department, and U.S. Census Bureau, American Community Survey). These jobs are concentrated along SR 49 (North Auburn) and in the Sunset Industrial Area. Although the cities in western Placer County have grown significantly over the last several years—adding 106,000 residents and 41,000 housing units since the 2000 census—there has been little growth in the unincorporated areas. Between 2000 and 2014, the population increased by only 11,000, and housing units increased by 8,300 throughout the entire unincorporated area, including those parts of the county east of Auburn and outside of the PCCP Plan Area.

Planned and proposed new development would accommodate substantial housing and job growth in unincorporated western Placer County over the next 50 years. The growth scenario prepared for the PCCP shows an increase of about 68,000 residential units, housing 178,000 people (just over 50 percent of the residential growth forecast for this area, including the growth projected for Roseville, Rocklin, and Auburn). The Sunset Industrial Area and other areas planned or proposed for non-residential, employment-generating development would attract more jobs to the unincorporated area. The PCCP growth scenario indicates an increase of 66,000 jobs in unincorporated western Placer over the 50-year permit term (37 percent of the total job growth projected for western Placer including the non-participating cities).

2.4.2.3 General Plan Conservation and Open Space Policies

Placer County's 2013 general plan includes goals, policies, and programs addressing land use and conservation of natural resources, agricultural lands, open space, wildlife habitat, and wildlife resources. These goals and policies cover subjects such as maintaining interconnected greenbelts and open spaces; stream, creek, and groundwater protection and enhancements; protection of unfragmented woodlands; and wetland and riparian protection. It is anticipated that within the permit term a new general plan will be adopted that will have additional goals and policies in support of PCCP implementation. Several current general plan policies that are incorporated into the PCCP are listed below. However, it is anticipated that new general plan policies developed will incorporate additional conservation measures that are presented in the PCCP (see Chapter 8, *Plan Implementation*).

Chapter 1 – Land Use

AGRICULTURAL LAND USE

Goal 1.H: To designate adequate agricultural land and promote development of agricultural uses to support the continued viability of Placer County's agricultural economy.

Policies

1.H.1. The County shall maintain agriculturally designated areas for agricultural uses and direct urban uses to designated urban growth areas and/or cities.

1.H.3. The County will maintain large-parcel agricultural zoning and prohibit the subdivision of agricultural lands into smaller parcels unless such development meets the following conditions:

a. The subdivision is part of a cluster project and such a project is permitted by the applicable zoning;

b. The project will not conflict with adjacent agricultural operations; and,

c. The project will not hamper or discourage long-term agricultural operations either on site or on adjacent agricultural lands.

OPEN SPACE, HABITAT, AND WILDLIFE RESOURCES

Goal 1.I: To establish and maintain interconnected greenbelts and open spaces for the protection of native vegetation and wildlife and for the community's enjoyment.

Policies

1.I.1. The County shall require that significant natural, open space, and cultural resources be identified in advance of development and incorporated into site-specific development project design. The Planned Residential Developments (PDs) and the Commercial

Planned Development (CPD) provisions of the Zoning Ordinance can be used to allow flexibility for this integration with valuable site features.

1.I.2. The County shall require that development be planned and designed to avoid areas rich in wildlife or of a fragile ecological nature (e.g., areas of rare or endangered plant species, riparian areas). Alternatively, where avoidance is infeasible or where equal or greater ecological benefits can be obtained through off-site mitigation, the County shall allow project proponents to contribute to off-site mitigation efforts in lieu of on-site mitigation.

Chapter 4 – Public Facilities and Services

DRAINAGE AND WATER QUALITY

Goal 4.E: To manage rainwater and stormwater at the source in a sustainable manner that least inconveniences the public, reduces potential water-related damage, augments water supply, mitigates stormwater pollution, and enhances the environment.

Policies

4.E.1. The County shall encourage the use of natural stormwater drainage systems to preserve and enhance natural features.

4.E.2. The County shall support efforts to acquire land or obtain easements for drainage and other public uses of floodplains where it is desirable to maintain drainage channels in a natural state.

4.E.3. The County shall consider using stormwater of adequate quality to replenish local groundwater basins, restore wetlands and riparian habitat, and irrigate agricultural lands.

4.E.10. The County shall strive to improve the quality of runoff from urban and suburban development through use of appropriate site design measures, including, but not limited to, vegetated swales, infiltration/sedimentation basins, riparian setbacks, oil/grit separators, rooftop and impervious area disconnection, porous pavement, and other best management practices (BMPs).

4.E.15. The County shall require that new development in primarily urban development areas incorporate low-impact development measures to reduce the amount of runoff, to the maximum extent practicable, for which retention and treatment is required.

FLOOD PROTECTION

Goal 4.F: To protect the lives and property of the citizens of Placer County from hazards associated with development in floodplains and manage floodplains for their natural resource values.

Policies

4.F.2. The County shall recognize floodplains as a potential public resource to be managed and maintained for the public's benefit.

4.F.5. The County shall attempt to maintain natural conditions within the 100-year floodplain of all rivers and streams except under the following circumstances:

a. Where work is required to manage and maintain the stream's drainage characteristics and where such work is done in accordance with the Placer County Flood Damage Prevention Ordinance, California Department of Fish and Wildlife (CDFW) regulations, and Clean Water Act provisions administered by the U.S. Army Corps of Engineers.

4.F.10. The County shall preserve or enhance the aesthetic qualities of natural drainage courses in their natural or improved state compatible with flood control requirements and economic, environmental, and ecological factors.

Chapter 5 - Recreation and Cultural Resources

PUBLIC RECREATION AND PARKS

Goal 5.A: To develop and maintain a system of conveniently located, properly-designed parks and recreational facilities to serve the needs of present and future residents, employees, and visitors.

Policies

5.A.1. The County shall strive to achieve and maintain a standard of 10 acres of improved parkland per 1,000 population. The standard shall be comprised of the following:

- 5 acres of improved active parkland per 1,000 population
- 5 acres of passive recreation area or open space per 1,000 population[2]

5.A.4. The County shall consider the use of the following open space areas as passive parks to be applied to the requirement for 5 acres of passive park area for every 1,000 residents.

a. Floodways

b. Protected riparian corridors and stream environment zones

c. Protected wildlife corridors

d. Greenways with the potential for trail development

e. Open water (e.g., ponds, lakes, and reservoirs)

f. Protected woodland areas

g. Protected sensitive habitat areas, providing that interpretive displays are provided (e.g., wetlands and habitat for rare, threatened, or endangered species)

Buffer areas are not considered as passive park areas if such areas are delineated by setbacks within private property. Where such areas are delineated by public easements or held as common areas with homeowner/property owner access or public access, they will be considered as passive park areas, provided that there are opportunities for passive recreational use.

Chapter 6 – Natural Resources

WATER RESOURCES

Goal 6.A: To protect and enhance the natural qualities of Placer County's rivers, streams, creeks, and groundwater.

Policies

6.A.4. Where stream protection is required or proposed, the County should require public and private development to:

[2] There is no precise definition that the Parks Division uses to distinguish active from passive recreation. Passive park areas can be linear (trail corridors); large open space areas, such as Hidden Falls; small habitat preserves that serve as open space amenities; and other features. Improved parklands include hardscape (parking lots, basketballs courts) and field/turf (baseball, soccer fields) areas. Each project is evaluated on a case-by-case basis, and some projects pay an in-lieu fee if they cannot meet their requirements on site.

a. Preserve stream zones and stream setback areas through easements or dedications. Parcel lines (in the case of a subdivision) or easements (in the case of a subdivision or other development) shall be located to optimize resource protection. If a stream is proposed to be included within an open space parcel or easement, allowed uses and maintenance responsibilities within that parcel or easement should be clearly defined and conditioned prior to map or project approval.

b. Designate such easement or dedication areas (as described in a. above) as open space.

c. Protect stream zones and their habitat value by actions such as 1) providing an adequate stream setback; 2) maintaining creek corridors in an essentially natural state; 3) employing stream restoration techniques where restoration is needed to achieve a natural stream zone; 4) utilizing riparian vegetation within stream zones and, where possible, within stream setback areas; 5) prohibiting the planting of invasive non-native plants (such as vinca major and eucalyptus) within stream zones or stream setbacks; and 6) avoiding tree removal within stream zone.

d. Provide recreation and public access near streams consistent with other general plan policies.

e. Use design, construction, and maintenance techniques that ensure development near a creek will not cause or worsen natural hazards (such as erosion, sedimentation, flooding, or water pollution) and will include erosion and sediment control practices such as 1) turbidity screens and other management practices, which shall be used as necessary to minimize siltation, sedimentation, and erosion and shall be left in place until disturbed areas and/or are stabilized with permanent vegetation that will prevent the transport of sediment off site, and 2) temporary vegetation sufficient to stabilize disturbed areas.

f. Provide for long-term stream zone maintenance by providing a guaranteed financial commitment to the County that accounts for all anticipated maintenance activities.

6.A.5. The County shall continue to require the use of feasible and practical BMPs to protect streams from the adverse effects of construction activities and urban runoff and to encourage the use of BMPs for agricultural activities.

6.A.8 The County shall support implementation of low-impact development site design and watershed process management requirements for new and redevelopment projects in accordance with the National Pollutant Discharge Elimination System (NPDES) Phase I and II programs, and applicable NPDES permits.

6.A.11. Where the stream zone has previously been modified by channelization, fill, or other human activity, the County shall require project proponents to restore such areas by means of landscaping, revegetation, or similar stabilization techniques as a part of development activities.

6.A.13. The County shall protect groundwater resources from contamination and further overdraft by pursuing the following efforts:

a. Identifying and controlling sources of potential contamination

b. Protecting important groundwater recharge areas

c. Encouraging the use of surface water to supply major municipal and industrial consumptive demands

d. Encouraging the use of treated wastewater for groundwater recharge

e. Supporting major consumptive use of groundwater aquifer(s) in the western part of the county only where it can be demonstrated that this use does not exceed safe yield and is appropriately balanced with surface water supply to the same area

6.A.15. The County shall encourage the protection of floodplain lands and where appropriate, acquire public easements for purposes of flood protection, public safety, wildlife preservation, groundwater recharge, access, and recreation.

WETLAND AND RIPARIAN AREAS

Goal 6.B: To protect wetland communities and related riparian areas throughout Placer County as valuable resources.

Policies

6.B.1. The County shall support the "no net loss" policy for wetland areas regulated by the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service (USFWS), and CDFW. Coordination with these agencies at all levels of project review shall continue to ensure that appropriate mitigation measures and the concerns of these agencies are adequately addressed.

6.B.2. The County shall require new development to mitigate wetland loss in both federal jurisdictional and non-jurisdictional wetlands to achieve "no net loss" through any combination of the following, in descending order of desirability: (1) avoidance; (2) where avoidance is not possible, minimization of impacts on the resource; or (3) compensation, including use of a mitigation and conservation banking program that provides the opportunity to mitigate impacts to special-status, threatened, and endangered species and/or the habitat that supports these species in wetland and riparian areas. Non-jurisdictional wetlands may include riparian areas that are not federal "waters of the United States," as defined by the Clean Water Act.

6.B.3. The County shall strive to identify and conserve remaining upland habitat areas adjacent to wetlands and riparian areas that are critical to the survival and nesting of wetland and riparian species.

FISH AND WILDLIFE HABITAT

Goal 6.C: To protect, restore, and enhance habitats that support fish and wildlife species so as to maintain populations at viable levels.

Policies

6.C.1. The County shall identify and protect significant ecological resource areas and other unique wildlife habitats critical to protecting and sustaining wildlife populations. Significant ecological resource areas include the following:

a. Wetland areas, including vernal pools

b. Stream zones

c. Any habitat for special-status, threatened, or endangered animals or plants

d. Critical deer winter ranges (winter and summer), migratory routes, and fawning habitat

e. Large areas of non-fragmented natural habitat, including blue oak woodlands, valley foothill and montane riparian, valley oak woodlands, annual grasslands, and vernal pool/grassland complexes

f. Identifiable wildlife movement zones, including, but not limited to, non-fragmented stream environment zones, avian and mammalian migratory routes, and known concentration areas of waterfowl within the Pacific Flyway

g. Important spawning and rearing areas for anadromous fish

6.C.5. The County shall require mitigation for development projects where isolated segments of stream habitat are unavoidably altered. Such impacts should be mitigated on-site with

in-kind habitat replacement or elsewhere in the Stream System through stream or riparian habitat restoration work where it is clear that off-site replacement provides greater functions and values than on-site replacement.

6.C.6. The County shall support preservation of the habitats of threatened, endangered, and/or other special-status species. Where County acquisition and maintenance is not practicable or feasible, federal and state agencies, as well as other resource conservation organizations, shall be encouraged to acquire and manage endangered species' habitats.

6.C.7. The County shall support the maintenance of suitable habitats for all indigenous species of wildlife, without preference to game or non-game species, through maintenance of habitat diversity.

6.C.8. The County shall support the preservation or reestablishment of fisheries in the rivers and streams within the county, whenever possible.

6.C.12. The County shall cooperate with, encourage, and support the plans of other public agencies to acquire fee title or conservation easements to privately owned lands in order to preserve important wildlife corridors and provide habitat protection of California Species of Concern and state or federally listed threatened or endangered plant and animal species or any species listed in an implementing agreement for a habitat conservation plan and natural communities conservation plan.

6.C.13. The County shall support and cooperate with efforts of other local, state, and federal agencies and private entities engaged in the preservation and protection of significant biological resources from incompatible land uses and development. Significant biological resources include endangered or threatened species and their habitats, wetland habitats, wildlife migration corridors, and locally important species/communities.

VEGETATION

Goal 6.D: To preserve and protect the valuable vegetation resources of Placer County.

Policies

6.D.3. The County shall support the preservation of outstanding areas of natural vegetation, including, but not limited to, oak woodlands, riparian areas, and vernal pools.

6.D.4. The County shall ensure that landmark trees and major groves of native trees are preserved and protected. In order to maintain these areas in perpetuity, protected areas shall also include younger vegetation with suitable space for growth and reproduction.

6.D.5. The County shall establish procedures for identifying and preserving special-status, threatened, and endangered plant species that may be adversely affected by public or private development projects.

6.D.6. The County shall ensure the conservation of sufficiently large, continuous expanses of native vegetation to provide suitable habitat for maintaining abundant and diverse wildlife.

6.D.7. The County shall support the management of wetland and riparian plant communities for passive recreation, groundwater recharge, nutrient catchment, and wildlife habitats. Such communities shall be restored or expanded, where possible.

6.D.14. The County shall require that new development avoid ecologically fragile areas (e.g., areas of special-status, threatened, or endangered species of plants and riparian areas). Where feasible, these areas should be protected through public or private acquisition of fee title or conservation easements to ensure protection.

OPEN SPACE FOR THE PRESERVATION OF NATURAL RESOURCES

Goal 6.E: To preserve and enhance open space lands to maintain the natural resources of the county.

Policies

6.E.1. The County shall support the preservation and enhancement of natural landforms, natural vegetation, and natural resources as open space to the maximum extent feasible. The County shall permanently protect, as open space, areas of natural resource value, including wetlands, riparian corridors, unfragmented woodlands, and floodplains.

6.E.2. The County shall support the maintenance of open space and natural areas that are interconnected and of sufficient size to protect biodiversity sustain viable populations, accommodate wildlife movement, and sustain ecosystems.

6.E.4. The County shall coordinate with local, state, and federal agencies and private organizations to establish visual and physical links among open space areas.[3] Where appropriate, these open space areas are to be connected by scenic corridors, wildlife corridors, and trails. Dedication of easements shall be encouraged, and in many cases, required as lands are developed and built.

Chapter 7 – Agriculture and Forestry

AGRICULTURAL LAND USE

Goal 7.A: To provide for the long-term conservation and use of agriculturally designated lands.

Policies

7.A.1. The County shall protect agriculturally designated areas from conversion to non-agricultural uses.

7.A.2. The County shall support appropriate efforts by public and private conservation organizations to use conservation easements as a tool for agricultural preservation.

Chapter 8 – Health and Safety

FLOOD HAZARDS

Goal 8.B: To minimize the risk of loss of life, injury, damage to property, and economic and social dislocations resulting from flood hazards.

Policies

8.B.1. The County shall promote flood control measures that maintain natural conditions within the 100-year floodplain of rivers and streams.

8.B.2. The County shall require that flood management programs avoid alteration of waterways and adjacent areas, whenever possible.

[3] Visual linkages are associated with scenic policies. Viewsheds, viewshed corridors (e.g., scenic highways), scenic vista points, and ridgeline and hillside impact standards are evaluated in terms of their ability to link open space areas through a contiguous relationship. Conservation actions may be for the purpose of ensuring that a specific viewshed or corridor is preserved to maintain a linkage of open space areas. This is a significant issue in the American River Canyon.

2.4.2.4 Placer Legacy

The Placer Legacy Open Space and Agricultural Conservation Program, or Placer Legacy Program (Placer County 2000), is a countywide, open space, agriculture, and habitat protection conservation program to preserve, protect, and enhance the cultural and natural integrity of Placer County for the benefit of its citizens. The program was developed to implement the goals, policies, and programs of the 1994 Placer County General Plan.

One Placer Legacy Program objective is to protect a diversity of natural habitats while fostering the economic stability and growth of the county. Other objectives include maintaining a viable agricultural segment of the economy; conserving natural features necessary for access to a variety of outdoor recreation opportunities; retaining important scenic and historic areas; preserving the diversity of plant and animal communities; protecting endangered and other special-status plant and animal species; separating urban areas into distinct communities; and ensuring public safety.

The Placer Legacy Program implements conservation actions throughout unincorporated Placer County to help achieve the general plan's goals and policies that address the following open space resources: scenic, cultural/historic, agriculture, recreation, urban separators and buffers, habitat, wildlife resources, and public safety (see also Section 1.3.2, *Placer Legacy Program*, and Section 1.3.3, *Coordinated Resource Management Plans*). To achieve these goals and policies of the Placer County General Plan, the Placer Legacy Program is implementing a comprehensive open space plan for Placer County that preserves the diversity of plant and animal communities in the county and addresses a variety of other open space needs, from agriculture and recreation to urban edges and public safety.

The PCCP's conservation strategy will assist with the overall implementation of the Placer Legacy Program by protecting in perpetuity the diversity of plant and animal communities in the Plan Area, including habitats and populations of endangered and other special-status species. Implementation of Placer Legacy Program conservation measures and activities (e.g., land preservation, restoration, enhancement, and other management activities) that are consistent with the PCCP's biological goals and objectives (see Chapter 5, *Conservation Strategy*) will contribute toward meeting this Plan's biological goals and objectives. Land preserved through the Placer Legacy Program that is intended to contribute to the PCCP's biological goals and objectives will be incorporated into the PCCP Reserve System.

2.4.2.5 Placer County Oak Woodland Management Plan

The Placer County Oak Woodland Management Plan (2003) provides a consistent management program for oak woodlands throughout the county and complimentary programs and policies, including (1) projects subject to an environmental assessment under the California Environmental Quality Act (CEQA), (2) projects subject to the Placer County Tree Ordinance, and (3) conservation projects evolving out of the Placer Legacy Program. The Placer County Oak Woodland Management Plan's goal was to provide mitigation for impacts on oak woodland communities and guidance on the conservation of oak woodland communities. The Placer County Oak Woodland Management Plan also takes into consideration other trees and plants associated with oak woodland–dominated natural communities and the value these communities provide to wildlife, air and water quality, and quality of life.

2.4.2.6 Western Placer County Groundwater Management Plan/Sustainable Groundwater Management Act Program

The Western Placer County Groundwater Management Plan (WPCGMP) is a planning tool that has assisted the City of Roseville, the City of Lincoln, PCWA, and the California American Water Company in an effort to maintain a safe, sustainable, and high-quality groundwater resource within a zone of the North American River Groundwater Sub-basin (Sub-basin) since 2007. Participants in the WPCGMP have identified a range of specific goals, objectives, and actions that collectively provide a "road map" for future implementation of by a governing body. As a "living document," the WPCGMP is intended to be periodically updated and refined to reflect progress made in achieving the WPCGMP's objectives and changed conditions in the region. The document outlines a series of required, recommended, and voluntary actions that will promote ongoing modification of the WPCGMP's depth and content groundwater balance.

In 2014, new legislation was passed, and in 2015, the Sustainable Groundwater Management Act Program was created. The former partners of the WPCGMP plus the County of Placer are developing a Groundwater Sustainability Agency to assume the responsibility of the evaluation and monitoring of groundwater levels within the Sub-basin. The formulation of this Groundwater Sustainability Agency will also include extensive outreach to all stakeholders within the Sub-basin before a Groundwater Sustainability Plan (GSP) can be developed. The Groundwater Sustainability Agency is to be formed in 2017, and the GSP must be approved by 2022. The Sub-basin is considered a high-priority basin with sustainable levels. The goal of the GSP is to maintain sustainability, including enforcement actions, for a 50-year planning timeframe and consider all current planning documents during that timeframe.

2.4.2.7 Coordinated Resource Management Plans

Coordinated Resource Management Plans (CRMPs) or Ecosystem Restoration Plans (ERPs) have been developed for the Dry Creek, Auburn Ravine/Markham Ravine/Raccoon Creek, and Pleasant Grove/Curry Creek (PG/CC) watersheds to help implement Placer Legacy Program conservation actions. The CRMP process is intended to synthesize data from a variety of planning efforts. It emphasizes four equally weighted aspects (i.e., water quality, sediment load, floodplain management, habitat restoration) while also integrating recreational opportunities and water supply needs. The conservation policies and actions of the Placer Legacy Program and the CRMPs are generally consistent with the goals and objectives of the PCCP and will help further conserve natural and semi-natural communities and biodiversity in Placer County.

2.4.2.7.1 Dry Creek CRMP

The Dry Creek watershed covers approximately 64,640 acres, extending westward from just south of Auburn to Steelhead Creek (also known as the Natomas East Main Drain). A portion of the watershed, Linda Creek, extends south into Citrus Heights. Major tributaries to Dry Creek include Antelope Creek, Secret Ravine, Miners Ravine, Strap Ravine, Linda Creek, Clover Valley Creek, and Cirby Creek. Natural resources within the Dry Creek watershed are overseen and regulated by a variety of local, state, and federal agencies with public trust interests in public safety, resource management, and environmental protection.

Development of the Dry Creek CRMP began in 1995 with the establishment of the Dry Creek Coordinated Resource Management Planning Group, now referred to as the Dry Creek Watershed

Council. The Dry Creek CRMP compiles available watershed resource data and the opinions and objectives of a wide variety of stakeholders. It is intended to identify management goals and implementation strategies and, through the use of adaptive management, will remain applicable to future planning and implementation efforts. The Dry Creek CRMP contains a list of policy recommendations intended to facilitate implementation of the watershed management plan as well as a list of priority assignments to guide program implementation. The Dry Creek CRMP stresses involvement of local agencies to help meet its goals. A number of projects have been implemented through the Dry Creek CRMP, and monitoring is occurring regularly, particularly during the fall Chinook salmon run.

A related program is the Dry Creek Greenway Vision Plan. The proposed Dry Creek Greenway would provide a continuous and coordinated system of preserved lands and habitat, with a connecting corridor of walking, equestrian, and bicycle trails in Placer County, from the Sacramento border to Dry Creek's sources and the Folsom Lake State Recreation Area. Linkages with the American River Parkway, Folsom Lake State Recreation Area, and the Ueda and Dry Creek Parkways in Sacramento County would create the most significant natural trail loop within the greater Sacramento metropolitan area. The Greenway area consists of Dry Creek and its major tributaries, such as Miners Ravine, Secret Ravine, Strap Ravine, Antelope Creek, Cirby Creek, Clover Valley Creek, and Linda Creek.

2.4.2.7.2 Auburn Ravine/Markham Ravine/Raccoon Creek ERP

Placer County, on behalf of the Auburn Ravine/Raccoon Creek CRMP, received a grant from the CALFED Ecosystem Restoration Program to prepare an ERP for watersheds located within northwestern Placer and southeastern Sutter Counties, with a particular focus on three watersheds in Placer County. An ERP is a document that identifies potential restoration opportunities for an identified area using an ecosystem-based approach. The ERP identifies the goals and objectives of the restoration effort, provides background information and baseline data on the watersheds, and discusses the specific ecosystem restoration goals, opportunities, and requirements to implement the ERP.

Three major watersheds—Auburn Ravine, Markham Ravine, and Raccoon Creek—are located within the Auburn Ravine/Markham Ravine/Raccoon Creek ERP planning area, but the ERP focuses mainly on Auburn Ravine and Raccoon Creek. The ERP implementation objectives focus on restoration and management of stream channel dynamics and riparian corridors.

Implementation of the ERP will help improve habitat for anadromous fish, including steelhead, fall-/late fall-run Chinook salmon, and other native fish species. In addition to improving fish habitat, the restoration of these watersheds will improve habitat conditions for numerous wildlife species that utilize the streams and adjacent riparian and upland habitats. These restoration activities will improve water quality and benefit downstream water users.

2.4.2.7.3 Pleasant Grove/Curry Creek ERP

In 2003, the Placer County Planning Services Division secured CALFED funding to facilitate and support the development of an ERP for the PG/CC watershed and identify strategies to preserve and restore valuable natural resources that can be implemented as planned development occurs. The ERP is intended to address several important aspects of ecosystem function (i.e., water quality, sediment load, floodplain management, habitat restoration) and provide a framework in which the

factors that affect ecological functions at a watershed scale in the PG/CC basin are considered in land use decisions in the watershed.

The PG/CC watershed encompasses portions of the cities of Lincoln, Roseville, and Rocklin and is bordered by the Auburn Ravine/Raccoon Creek watershed to the north and the Dry Creek watershed to the south and east. Curry Creek and Pleasant Grove Creek both flow into the Pleasant Grove Creek Canal, which flows north into the Cross Canal and then into the Sacramento River. The watershed is approximately 24 percent urbanized, with the remainder in agriculture, rural-residential, and natural habitat.

2.4.3 Placer County Water Agency

PCWA is an independent special district distinct from the County, which provides water to the residents and businesses of Placer County. PCWA was created under state legislation titled the Placer County Water Agency Act, adopted in 1957. PCWA has a broad range of responsibilities, including water resource planning and management, retail and wholesale supply of irrigation water and drinking water, and production of hydroelectric energy. Most surface water supplied by PCWA originates in the Sierra Nevada snowpack, primarily the Yuba-Bear and American River watersheds. PCWA is actively involved in numerous collaborative partnerships, watershed stewardship, surface and groundwater management, integrated water resource planning, and regional infrastructure projects.

PCWA's primary surface water supplies consist of water from the American River extracted by PCWA (Middle Fork Project or MFP), water purchased from Pacific Gas & Electric Company (PG&E) from the Yuba and Bear Rivers, and water from the American River purchased from the U.S. Bureau of Reclamation (Central Valley Project). PCWA also uses a limited amount of surface water from small creeks under pre-1914 water rights. PCWA has historically produced a limited quantity of groundwater from its two wells located in western Placer County and intends to provide water in a conjunctive-use fashion from this source.

PCWA's western water system serves areas from the community of Alta on the east, down the I-80 corridor, to the Sutter and Sacramento county lines on the west and south. The service area includes retail treated water deliveries to the communities of Alta, Monte Vista, Applegate, Colfax, Auburn, Loomis, and Rocklin and much of the surrounding unincorporated areas. PCWA also provides wholesale treated water to the City of Lincoln and the California American Water Company for use in its franchise area west of Roseville and south of Baseline Road as well as several relatively small mutual water companies throughout PCWA's western service area.

In addition to treated water service, PCWA provides irrigation water through its extensive canal system to individual customers and untreated water for treatment and resale by other retail water purveyors. Irrigation water, which comprises about two-thirds of PCWA's western water system deliveries, is delivered by contract through PG&E's Drum-Spaulding hydroelectric system and PCWA's MFP. The untreated water for resale to other retail water purveyors is from its MFP, which is delivered into Folsom Lake to the San Juan Water District, the city of Roseville, and Sacramento Suburban Water District.

The MFP serves as a multipurpose water supply and hydro-generation project designed to conserve and control waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP is located within the Middle Fork American River watershed, at elevations ranging from approximately 1,100 to 5,300 feet. The MFP seasonally stores and releases

water to meet consumptive demands within western Placer County and generate power for the California electrical grid. Water for consumptive purposes is released from the MFP and re-diverted at two locations: (1) the American River Pump Station, located on the North Fork American River near the city of Auburn, and (2) Folsom Reservoir. PCWA's water rights and water supply agreements currently allow for the consumptive use of up to 120,000 acre-feet of MFP water per year. Consumptive water supplied by PCWA is used to meet municipal, industrial, and agricultural demands.

PCWA operates an extensive water distribution system that includes 165 miles of canals, ditches, flumes, and several small reservoirs that carry about 65,000 acre-feet annually. Approximately 51 miles of the canal system are lined with gunite[4] or concrete and/or are contained in pipelines. The remaining canal sections are unlined. A significant amount of PCWA water irrigates agricultural land. The canals also convey water to eight treatment plants within PCWA service areas. PCWA provides treated domestic water to more than 150,000 people. PCWA operates four water treatment plants in Zone 1 of the western water system. The Zone 1 service area has 16 storage tanks, with about 49 million gallons of storage capacity, and 500 miles of treated water pipe.

There are other independent water districts and water purveyors within the PCCP Plan Area, including South Sutter Water District, the City of Roseville, Nevada Irrigation District (NID), Camp Far West Irrigation District, San Juan Water District, Citrus Heights Water District, and California American Water. These water districts and water purveyors are not participating in this Plan.

2.4.4 South Placer Regional Transportation Authority

SPRTA is a joint powers authority comprising the Cities of Lincoln, Rocklin, and Roseville and the County of Placer. SPRTA was formed for the purpose of implementing a regional transportation and air quality mitigation fee program to fund specified regional transportation projects.

In 2002, the Placer County Transportation Planning Agency began work on the environmental review and permitting for the Placer Parkway project on behalf of SPRTA. The Placer Parkway is to be an approximately 15-mile-long, high-speed transportation facility, which will connect SR 65 in western Placer County to SR 70/SR 99 in south Sutter County. Placer Parkway will link existing and planned development near some of the region's fastest-growing communities while improving access to the I-5 corridor, downtown Sacramento, and Sacramento International Airport. This project is described in more detail in Section 2.6.5, *Regional Public Programs*, below.

2.4.5 Placer Conservation Authority

The Permittees will vest the responsibility for implementing the Plan to the PCA, which will carry out day-to-day implementation of the Plan on their behalf. These Permittees will remain ultimately responsible for compliance with all the terms and conditions of the state and federal permits, as set forth in Chapter 8, *Plan Implementation*.

The PCA will be a joint exercise of powers agency formed by the County of Placer and the City of Lincoln. PCWA and SPRTA will provide input through advisory roles. The PCA Board of Directors will consist of two members of the Placer County Board of Supervisors and one councilmember from the City of Lincoln. PCWA will appoint one of its board members to a non-voting ex officio role on

[4] A mixture of cement, sand, and water applied through a pressure hose, producing a dense, hard layer of concrete.

the PCA Board of Directors. The County and the City will designate staff to support and advise the PCA on implementation of the PCCP's conservation strategy and provide a point of contact for the PCA.

The PCA will be responsible for overall implementation of the Plan, including the creation and long-term stewardship of the PCCP Reserve System. Chapter 8, *Plan Implementation*, describes the tasks of the PCA and specifies how the PCA will receive advice and direction on Plan compliance and implementation from the Resource Agencies and advice from the Independent Science Advisory Group and the public. The PCA may contract with another Permittee, with local organizations, or with private entities, including consultants and private mitigation banks.

2.4.6 Participating Special Entities

The permits allow entities that are not Permittees to participate in the Plan. The process is defined in Chapter 8, *Plan Implementation*, Section 8.9.4, *Take Authorization for Participating Special Entities*. The process defined there allows public agencies or private parties to receive incidental take authorization for defined activities by committing to comply with the PCCP and the permits under a binding agreement with the PCA. A variety of public agencies and private entities may seek to become Participating Special Entities over the life of the PCCP. The PCA will determine whether to extend incidental take authorization to potential Participating Special Entities on a case-by-case basis, in accordance with the PCCP and the permits. However, based on the interest expressed by the following three public agencies, the PCCP assumes that they will seek to become Participating Special Entities.

2.4.6.1 Western Placer Waste Management Authority

The Western Placer Waste Management Authority (Authority) operates the Western Regional Sanitary Landfill (WRSL), located near SR 65 between Roseville and Lincoln. The Authority is a joint powers authority formed by the Cities of Lincoln, Rocklin, and Roseville and the County of Placer, providing regionalized recycling and waste disposal services for the western portion of the county. It is expected that the Authority would become a Participating Special Entity, as described in Section 8.9.4, *Take Authorization for Participating Special Entities,* and that the activities described in Section 2.6.5.4, *Solid Waste Management Facility Programs,* would be covered under the PCCP.

2.4.6.2 Placer County Flood Control and Water Conservation District

The Placer County Flood Control and Water Conservation District (District) was established in 1984 by the state legislature as a special district, separate from County government, to address flood control issues arising with growth. The district boundaries are the same as Placer County boundaries. It is expected that the District would become a Participating Special Entity, as described in Section 8.9.4, *Take Authorization for Participating Special Entities*, and that the activities described in Section 2.6.6.2, *Flood Protection Projects,* would be covered under the PCCP.

2.4.6.3 City of Roseville

Some development in the Valley Potential Future Growth Area (PFG) may be annexed to the City of Roseville and subject to City of Roseville permitting. There is one potential annexation project located in Plan Area A that is currently included as a Covered Activity within the County's land use authority. The effects of the potential project have been evaluated as part of potential future growth

in Plan Area A and are included as part of the potential take proposed to be covered in the permits; the project does not conflict with the Plan's conservation strategy or the ability of the PCA to meet Plan goals and objectives. The potential project would therefore be eligible for take authorization under the permits and could receive take authorization through the County. The City of Roseville is currently evaluating the possibility of annexing the lands that comprise the potential annexation project. Any such annexation would not affect the boundaries of the PFG or the Reserve Acquisition Area (RAA). In the event the potential annexation project is annexed to the City of Roseville, which is a non-participating city, then the project's proponent will be eligible to secure incidental take coverage as a Participating Special Entity, if the PCA determines that the project meets the following conditions:

- The project's proponent has submitted to the PCA a complete Plan participation package for the project (see Chapter 6, *Program Participation and Conditions on Covered Activities*, Section 6.2.4, *HCP/NCCP Participation Package*), along with any environmental analysis that has been prepared to comply with CEQA or the National Environmental Policy Act (NEPA).
- The project complies with the terms and requirements of the permits, Plan, and implementing agreement.
- The project's proponent agrees to enter into an agreement with the PCA, binding the project proponent to such terms and requirements and to any fee amounts in addition to those required by the Plan that the PCA determines is necessary or appropriate to cover PCA staff time and a portion of the costs of conservation measures designed to contribute to the recovery of Covered Species.

If a potential annexation project meets these conditions, the PCA will enter into a Participating Special Entity agreement with the project's proponent and issue a certificate of inclusion. The agreement would be between PCA and the owners of the project site, and the rights and obligations of the agreement and the certificate of inclusion would run with the land in the event of any subsequent transfer of the land, provided any subsequent landowners agree in writing to the terms and conditions of the agreement and the certificate.

The application process and requirements for the potential annexation project described in this section are in place of, and not in addition to, the process and requirements for other Participating Special Entities described in Section 8.9.4.1, *Application Process for Participating Special Entities.*

2.5 Permit Coverage

Permit coverage is determined by (1) which entity is carrying out the activity, (2) where the activity occurs, (3) what the activity is, and (4) whether the activity is in compliance with certain conditions of the PCCP.

2.5.1 Entities Conducting Activities

The permits will cover incidental take resulting from activities undertaken directly by a Permittee as described here. All Permittees will be able to extend coverage to contractors, agents, and employees. The Permittees will be responsible for ensuring that their activities comply with the PCCP as set forth in Chapter 6, *Program Participation and Conditions on Covered Activities.*

The permits will also cover activities authorized by a Permittee. The County and the City will each have the ability to extend coverage to eligible third-party projects under their jurisdiction. The County and City will make compliance with relevant PCCP requirements a condition of their approval of these projects. Upon County or City approval, and subject to those terms and conditions, third-party projects will be covered by the incidental take permits held by the Permittees. See Chapter 6, *Program Participation and Conditions on Covered Activities*, for a description of the approval process for third-party projects.

Third-party projects and activities may only be covered by the permits if the project proponent is under the jurisdiction of the County or the City, and the County or the City has control over design, avoidance and minimization, and mitigation associated with the project (as described in Chapter 5, *Conservation Strategy*, and Chapter 6, *Program Participation and Conditions on Covered Activities*).

Any Permittee may partner with other federal or state agencies, (e.g., the U.S. Army Corps of Engineers or the California Department of Transportation) to develop the project, but the Permittee must have control over the aspects of the project described above in order to ensure the terms of this Plan are implemented.

Special districts and other entities in the Plan Area that are not subject to the jurisdiction of the Permittees may also obtain coverage under the Plan for activities described in this chapter through a process described in Chapter 8, *Plan Implementation*, Section 8.9.4, *Take Authorization for Participating Special Entities*.

Most projects will comply with and be covered by the PCCP and related permits by complying with the conditions of approval described in Chapter 6, *Program Participation and Conditions on Covered Activities,* and other relevant PCCP requirements. However, there will most likely be subsequent or supplemental environmental review under CEQA for many, if not most, Covered Activities in order to address potential project-specific environmental impacts other than effects on Covered Species.

Specific projects seeking permit coverage will follow a formal process for analysis and inclusion described in Chapter 6, *Program Participation and Conditions on Covered Activities*, Section 6.2, *Program Participation: Receiving Take Authorization under the Plan.* All Covered Activities must incorporate the relevant conditions on Covered Activities in order to avoid, minimize, or mitigate effects on Covered Species and natural communities. To be approved under the Plan, parties must demonstrate that conditions have been incorporated or will be incorporated properly into proposed projects. The descriptions of Covered Activities in this chapter have been written to be as consistent as possible with the conditions in Chapter 6, *Program Participation and Conditions on Covered Activities*. If any inconsistencies remain, the condition in Chapter 6, *Program Participation and Conditions on Covered Activities,* takes precedence over the description in this chapter.

Activities that do not fall clearly within the descriptions provided in this chapter will be evaluated on a case-by-case basis. If the Permittee determines that a specific type of project or activity is not included within the descriptions in this chapter, then it will not receive coverage under this Plan. In order to be covered under the Plan, the activity needs to meet all of the following criteria:

- The activity falls within the listed Covered Activities outlined in the Plan.
- The activity is within the PCCP Plan Area.
- The activity or project does not preclude achieving the biological goals and objectives of the Plan (see Chapter 5, *Conservation Strategy*).

- The activity or project is:
  - conducted by, or subject to the jurisdiction of, one of the Permittees; or
  - The activity or project is subject to an agreement between the Permittees and a Participating Special Entity that implements the activity or project (see Chapter 8, *Plan Implementation*, Section 8.9.4, *Take Authorization for Participating Special Entities*, for the mechanism for a non-permittee agency to receive coverage under the Plan).
- The effect of the activity falls within the range of effects evaluated in Chapter 4, *Effects of Covered Activities*.
- The activity or project does not preclude other pending Covered Activities, and the proposed maximum extent of take, as described in Chapter 4, *Effects of Covered Activities,* will not be exceeded through individual or collective implementation of projects foreseen by the PCCP.

All Covered Activities described in this chapter apply to all the requested permits (i.e., from CDFW, USFWS, National Marine Fisheries Service, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency [USEPA] and Regional Water Quality Control Board), with one exception. The use of pesticides, including herbicides and rodenticides, is not covered by the federal permit because USFWS has not authorized USEPA to certify their use.

2.5.2 Plan Area Components

The Plan Area encompasses the full geographic extent of the Covered Activities. Different parts of the Plan Area are subject to different Covered Activities. The Plan Area as a whole is made up of Plan Area A and Plan Area B. Plan Area A is the main focus of the PCCP and where all future growth and most of the Covered Activities will take place. Plan Area A will be covered by comprehensive permits. Plan Area B comprises several specific additional areas where only specific Covered Activities may occur. The Plan Area and its components are mapped on Figure 2-4. The Plan Area components and their extents are listed in Table 2-2 and the categories of Covered Activities are shown in Table 2-3.

Table 2-2. Plan Area Components

	Plan Area Component	Area (acres)
Plan Area A		
A1	Valley Potential Future Growth Area (Valley PFG)	46,769
A2	Valley Conservation and Rural Development (RAA and EXR)	53,929
	All Valley	**100,698**
A3	Foothills Potential Future Growth Area (Foothills PFG)	78,897
A4	Foothills Conservation and Rural Development (RAA and EXR)	30,237
	All Foothills	**109,134**
	All Plan Area A	**209,832**
Plan Area B		
B1	Permittee Activity in Non-participating City Jurisdiction	50,636
B2	PCWA Zone 1 O&M	6,315
B3	Raccoon Creek Floodplain Conservation	1,724
B4	Fish Passage Channel Improvement	559
B5	Big Gun Conservation Bank	52

Plan Area Component	Area (acres)
All Plan Area B	**59,286**
Plan Area B4	
Fish Passage Channel Improvement Reaches	
Channel Reach	**Length (miles)**
Auburn Ravine	8.1
Raccoon Creek	11.2
Cross Canal	7.7
East Side Canal	6.0
Total	**32.9**

Source: MIG|TRA 2015

EXR = Existing Reserves and Other Protected Areas
O&M = operations and maintenance
PCWA = Placer County Water Agency
PFG = Potential Future Growth Area
RAA = Reserve Acquisition Area

Table 2-3. Plan Area Components by Covered Activity Category

	Plan Area A Components				Plan Area B Components				
	Valley		Foothills						
Covered Activity Category	A1 Valley Potential Future Growth	A2 Valley Conservation and Rural Development	A3 Foothills Potential Future Growth	A4 Foothills Conservation and Rural Development	B1 Permittee Activity in NPC Jurisdiction	B2 PCWA O&M Zone 1	B3 Raccoon Creek Floodplain Improvement	B4 Fish Passage Channel Improvement	B5 Big Gun Conservation Bank
1. Valley Potential Future Growth	Yes	No	No	No	No	No	No	No	No
2. Valley Rural Development	No	Yes	No	No	No	No	No	No	No
3. Foothills Potential Future Growth	No	No	Yes	No	No	No	No	No	No
4. Foothills Rural Development	No	No	No	Yes	No	No	No	No	No
5. Regional Public Programs	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
6. In-stream Programs	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
7. Conservation Programs	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

Yes = Activity covered in this portion of the Plan Area

Locations are shown on Figure 2-4, *Plan Area Components.*

Potential Future Growth Area is designated on Figure 1-5.

Conservation and Rural Development includes Reserve Acquisition Area and Existing Reserves and Other Protected Areas, as designated on Figure 1-5.

NPC = non-participating city

O&M = operations and maintenance

PCWA = Placer County Water Agency

Plan Area A, General Coverage. Plan Area A is divided into components to further define the extent of Covered Activities, as shown on Figure 2-4.

A1. Valley PFG. Covered: All activities undertaken by or under authority of the Permittees and as described in this chapter, including public projects, private projects, and all aspects of forecasted future growth. Most of the future urban and suburban growth will occur in this area.

A2. Valley Conservation and Rural Development. Covered: All activities undertaken by or under authority of the Permittees and as described in this chapter, including public projects and private projects consistent with current land use designations. Existing reserves are located in this area and most of the Valley portion of the PCCP Reserve System will be established here. There will be minimal future growth.

A3. Foothills PFG. Covered: All activities undertaken by or under authority of the Permittees and as described in this chapter, including public projects, private projects, and all aspects of forecasted future growth. Most of the future growth will be at rural-residential density (i.e., 1 to 10 acres per dwelling unit).

A4. Foothills Conservation and Rural Development. Covered: All activities undertaken by or under authority of the Permittees and as described in this chapter, including public projects and private projects consistent with current land use designations. Existing reserves are located in this area and most of the Foothills portion of the PCCP Reserve System will be established here. There will be minimal future growth.

Plan Area B, Limited Coverage. Plan Area B components are listed in Table 2-2 and shown on Figure 2-4 and Figure 1-1.

B1. Permittee Activity in Non-participating City Jurisdiction. Covered: All public program activities undertaken by the Permittees in the incorporated area and SOI of the non-participating cities. Includes PCWA canals and new pipelines, a portion of Placer Parkway, the I-80/SR 65 interchange, O&M of miscellaneous County-owned facilities, and possible in-stream conservation actions related to fish passage improvement. Most of this area is already urban. Coverage in this area is for activities directly undertaken by a Permittee and does not include urban growth or private projects of any kind. These limited covered public activities will affect less than 1 percent of the 50,636-acre non-participating city land area.

B2. PCWA Zone 1 Operations and Maintenance. Covered: PCWA Zone 1 O&M for existing facilities in unincorporated Placer County east of Auburn plus adjacent Lake Theodor reservoir. Coverage does not include new PCWA construction. Figure 2-5 shows the 6,315-acre portion of PCWA Zone 1 that makes up component B2 and the network of existing canals that are the sole Covered Activity site there.

B3. Raccoon Creek Floodplain Conservation. Covered: Watershed protection and stream restoration activities along Raccoon Creek floodplain in a 1,724-acre portion of Sutter County would be undertaken pursuant to a joint resolution between Placer and Sutter Counties. Coverage in this area may include new acquisition by the PCA or by an entity such as a non-profit conservation group acting in concert with the PCA. Coverage does not include any development activities, flood control, or land conversion. Figure 2-6 shows the nominal 1,724-acre area under study. Actual activities will focus on portions of a corridor typically 200 feet on either side of the 3.8 stream miles of Raccoon Creek in component B3.

B4. Fish Passage Channel Improvement. Covered: Selective in-stream work on a portion of 33 miles of channels west of Placer County in Sutter County undertaken pursuant to a joint resolution between Placer and Sutter Counties. No PCA acquisition will be associated with this activity. Remediation work will address improvement of fish habitat only. Figure 2-7 shows the area where work may be done.

B5. Big Gun Conservation Bank. Covered: Conservation actions carried out in order to meet the conservation strategy in the PCCP for California red-legged frog in Placer County on the Big Gun mitigation bank east of Auburn. Figure 2-8 shows a 47-acre property managed by Westervelt Ecological Services and approved by USFWS. The PCA will purchase credits from the bank.

In the discussion of categories of Covered Activities that follows, the activities are associated with Plan Area A unless otherwise stated.

2.6 Categories of Covered Activities

This section describes the activities within the Plan Area that will be covered by the final permits and for which the Plan will provide avoidance, minimization, and mitigation (e.g., land acquisition, restoration, habitat creation) for impacts on Covered Species and natural communities. "Activities" include programs or actions that occur repeatedly in one location or throughout the permit area as well as projects, which are well-defined actions that occur once in a discrete location. Together, these programs, actions, and projects are the Covered Activities for which incidental take authorization from the Wildlife Agencies will be obtained.

The incidental take authorization depends on the Permittees' compliance with the PCCP and the terms and conditions of the permits. One of these conditions requires the Permittees to minimize and mitigate Covered Activity effects on Covered Species and natural communities by application of the conditions on Covered Activities in Chapter 6, *Program Participation and Conditions on Covered Activities*, and elsewhere in the Plan. Chapter 8, *Plan Implementation,* explains how the Permittees will integrate the conditions of the conservation plan into their normal land use authorization process. For most Covered Activities, the conditions will be imposed through local implementing ordinances and general plan policies. For large Covered Activities, the conditions will be determined and imposed on a project-by-project basis using project-specific environmental analyses.

A range of Covered Activities are addressed by this Plan. These activities are widespread and varied including urban and rural development, water management, conservation measures, facilities maintenance, and numerous other actions that are undertaken by the Permittees or by individuals or entities under their jurisdiction. All parties seeking coverage for activities and projects under the Plan must obtain approval from the Permittee with jurisdiction over the activity (see Chapter 6, *Program Participation and Conditions on Covered Activities*). Not all activities will be covered everywhere in the Plan Area. The relationship between a Covered Activity category and a Plan Area component is illustrated in Table 2-3. All activities described in this section have been analyzed in Chapter 4, *Effects of Covered Activities*, unless specifically identified as not covered.

To help organize and describe Covered Activities (and to subsequently analyze effects), seven categories of Covered Activities were developed. These are based on both geographic boundaries or features and program goals, as depicted on Figure 2-4, and described below.

1. Valley PFG
2. Valley Conservation and Rural Development
3. Foothills PFG
4. Foothills Conservation and Rural Development
5. Regional Public Programs
6. In-Stream Programs
7. Conservation Programs

The first four categories of Covered Activities encompass future growth and rural development in the Foothills and Valley in Plan Area A. They are defined geographically by mapped boundaries that reflect patterns of anticipated urban and rural-residential expansion and that implement the designation of the PFG and RAAs shown on Figure 1-5. The location and magnitude of growth for these four categories are described below and in Appendix M, *Growth Scenario Memo*.

The final three categories of Covered Activities occur throughout the Plan Area and overlap geographically with the other categories. These are defined primarily by similar habitat features (i.e., in-stream programs) or programmatic objectives (i.e., regional public programs and conservation programs).

The categories below broadly define the different types of activities covered by this Plan. In some cases, specific projects are identified as examples to illustrate the general category. All Covered Activities must incorporate the relevant conditions described in Chapter 6, *Program Participation and Conditions on Covered Activities,* in order to avoid or minimize impacts on Covered Species and natural communities. Part of the approval process for parties seeking coverage under the PCCP is demonstration that the conditions have been incorporated or will be incorporated properly into proposed projects. The descriptions of Covered Activities in this chapter have been written to be as consistent as possible with the conditions in Chapter 6, *Program Participation and Conditions on Covered Activities*. If any inconsistencies remain, the condition takes precedence over the description in this chapter. For complete details on the conditions on Covered Activities, see Chapter 6, *Program Participation and Conditions on Covered Activities*. If a future, unspecified project meets the guidelines for Covered Activities, as described above, as well as all permit requirements, as outlined in Chapter 6, *Program Participation and Conditions on Covered Activities*, then that project can be covered under the Plan.

The scenario of urban, suburban, and rural development and associated infrastructure to accommodate population and employment growth over the 50-year permit term is the driver for the vast majority of Covered Activities, accounting for 98 percent of overall estimated effect of Covered Activities under the PCCP. The effects on Covered Species and natural communities described in Chapter 4, *Effects of Covered Activities,* are based on estimates of land development associated with the growth scenario described in Appendix M, *Growth Scenario Memo*, and outlined here.

The growth scenario base year 2014 estimates incorporate the results of the 2010 census, the most current demographic and economic information available for Placer County and subareas of the

county, the effects of the Great Recession, and recent indications of recovery from that downturn. The 50-year growth projection is based on analysis of development potential in Placer County and the cities in the county and assumptions about long-term trends for economic growth and housing demand. The totals for the end of the permit term are the sum of the 2014 existing conditions and the 50-year growth increment. A series of tables present the results of this analysis.

Table 2-4A presents the existing conditions estimates for housing, population, and employment. There were approximately 109,000 people living in 40,000 households in Plan Area A in 2014. The non-participating cities account for about two times as much housing and population. Combined, this western Placer area represents about 80 percent of the housing in Placer County and almost 90 percent of the resident population.

Table 2-4. Placer County Conservation Plan Growth Scenario

Table 2-4A. Existing Housing and Employment (2014)

	Housing Units	Jobs
Valley	21,500	14,000
Foothills	21,200	19,000
All Plan Area A	**42,700**	**33,000**
Non-participating Cities	81,400	119,000
Western Placer Total	**124,100**	**152,000**

Sources: State of California Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties and the State, January 1, 2011 - 2014, with 2010 Benchmark,* May 2014; State of California Employment Development Department, *Annual Average Industry Employment, March 2013 benchmark,* September 19, 2014; U.S. Census Bureau, *American Community Survey 2008-2012 and 2010-2012;* U.S. Census Bureau, *OnTheMap Application* and *Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics*, 2010 and 2011 for Placer County areas; Placer County Planning Department; and Hausrath Economics Group.

Note:

Estimates for subareas of the county detailed in this table are based on 2010 census data and 2010 *OnTheMap* jobs by place of work estimates by census geographies and geographic information system analysis prepared by the Placer County Planning Department for the detailed geography at the eastern boundary of the Plan Area. 2014 estimates are based on California Department of Finance estimates for 2014 for the unincorporated county and the cities in the county; California Employment Development Department March 2013 benchmark estimates of county wage and salary employment; and U.S. Census Bureau *OnTheMap* 2011 estimates of jobs by place of work for the unincorporated county and cities in the county. The 2014 estimates for housing and population for the Plan Area and its subareas assume that western Placer represents the same percentage of county totals as it does in 2010 and that the distribution among subareas also remains the same. The 2014 employment estimate is derived by applying the 2010–2013 annual growth rate to 2013 Employment Development Department estimates, assuming the same distribution among jurisdictions as in 2011 and the same distribution among Plan Area A subareas as in 2010.

Table 2-4B presents the 50-year growth increment that is the basis for the estimates of land development associated with Covered Activities under the PCCP. The growth scenario for Plan Area A shows an increase of 93,000 housing units, almost three times as many as accommodated in the non-participating cities, representing more than 60 percent of the housing added in the county. New housing in the Valley subarea is 85 percent of the total increase over the 50-year permit term. The 50-year scenario also shows an increase of 91,000 jobs in Plan Area A, almost all of that in the Valley subarea. The non-participating cities see an increase of almost 70,000 jobs over the 50-year period.

Table 2-4B. 50-Year Growth Increment for PCCP Planning

	Housing Units	Jobs
Valley	79,000	89,000
Foothills	14,000	2,000
All Plan Area A	**93,000**	**91,000**
Non-participating Cities	33,000	68,000
Western Placer Total	**126,000**	**159,000**

Sources: Hausrath Economics Group; Sacramento Area Council of Governments "Inventory of Adopted and Proposed Land Use Plans," Attachment A, Table 2 (revised April 2, 2014); 2016 Metropolitan Transportation Plan/Sustainable Communities Strategy Update, *Draft Preferred Scenario*, April 16, 2015 (*Attachment C*, Sacramento Area Council of Governments Board of Directors, April 9, 2015); and various planning and environmental review documents prepared in Placer County and the cities in the county.

Note:

These projections prepared for the purposes of the Placer County Conservation Plan represent one possible scenario for long-term growth in Placer County, assuming continuation of long-term regional growth trends and planned development patterns. The scenario reflects future economic and population growth potential for Placer County and the cities in the county and assessment of development plans and proposals under consideration in Placer County and the cities as of April 2015. Among other factors, transportation costs, climate change, and potential market responses to those changes alter the 50-year growth scenario.

The 50-year growth increment for housing units and employment by place of work for western Placer (Plan Area A subareas and the non-participating cities) is derived from analysis of remaining development potential.

Table 2-4C presents the future scenario for housing, population, and employment at the end of the 50-year permit term. The growth scenario for the PCCP shows a three-fold increase in the number of housing units and a commensurate increase in population to a total of 358,000 residents. In 2014, Plan Area A encompasses 30 percent of the county's population; at the end of the permit term, the scenario shows 50 percent of the county's population living in there. The scenario also shows substantial employment growth—almost four times as many jobs as are located there in 2014.

Table 2-4C. Housing and Employment Totals at end of 50-year Permit Term

	Housing Units	Jobs
Valley	100,500	103,000
Foothills	35,200	21,000
All Plan Area A	135,700	124,000
Non-participating Cities	114,400	187,000
Western Placer Total	250,100	311,000

Sources: Hausrath Economics Group; Sacramento Area Council of Governments "Inventory of Adopted and Proposed Land Use Plans," Attachment A, Table 2 (revised April 2, 2014); 2016 Metropolitan Transportation Plan/Sustainable Communities Strategy Update, *Draft Preferred Scenario*, April 16, 2015 (*Attachment C*, Sacramento Area Council of Governments Board of Directors, April 9, 2015); and various planning and environmental review documents prepared in Placer County and the cities in the county.

Note:

These projections prepared for the purposes of the Placer County Conservation Plan represent one possible scenario for long-term growth in Placer County, assuming continuation of long-term regional growth trends and planned development patterns. The scenario reflects future economic and population growth potential for Placer County and the cities in the county and assessment of development plans and proposals under consideration in Placer County and the cities as of April 2015. Among other factors, transportation costs, climate change, and potential market responses to those changes alter the 50-year growth scenario.

The conditions for the end of the permit term are derived as follows:

1. The 50-year growth increment for housing units and employment by place of work for western Placer (Plan Area and the non-participating cities) is derived from analysis of remaining development potential.
2. For each geographic area, the 50-year increment is added to 2014 existing conditions for housing units and employment by place of work.
3. County totals for population and employment are calculated from the western Placer estimates assuming that in 50 years western Placer represents 90 percent of total population and household population in the county (up from the 87 percent estimated in 2014) and 95 percent of total employment in the county (up from the 92 percent estimated for 2014).

The estimates of land development to accommodate population and employment growth through the 50-year PCCP permit term are the basis for the PCCP effects analysis of Covered Activities. Table 2-5 summarizes the land development estimates by decade for the 50-year PCCP permit term for the Plan Area components depicted on Figure 2-4. The estimates of land development reflect development types and development intensities (number of dwelling units per acre and floor-area ratios for non-residential development) that are currently envisioned in City of Lincoln and Placer County general and specific plans, planning studies, and planning proposals as documented in the Sacramento Area Council of Governments land use inventory analysis for the 2016 Metropolitan Transportation Plan/Sustainable Communities Strategy Update (Draft Preferred Scenario, April 16, 2015) and the other City of Lincoln and Placer County sources cited above. Foothills/I-80 Corridor land development is also based on analysis of rural-residential development patterns. Estimates include an allowance for associated infrastructure and public facilities in the Plan Area over the 50-year permit term. The estimate for Plan Area B comes from activity in B1, Permittee Activity in Non-participating City Jurisdictions, and is described in Section 2.6.5, *Regional Public Programs*. The other Plan Area B activities are either conservation activities or O&M on existing facilities that do not have an associated permanent land conversion footprint and are not listed here.

Table 2-5. Land Development to Accommodate Growth for the 50-year Permit Term by 10-year Period (acres)

	Cumulative Land Area Developed, by 10-year Period (acres)				
Plan Area Component	**Year 10**	**Year 20**	**Year 30**	**Year 40**	**Year 50**
Plan Area A					
A1 Valley PFG [a]	2,027	5,377	10,606	15,683	19,545
A2 Valley Conservation and Rural Development [b]	250	320	400	480	570
A3 Foothills PFG [c]	1,999	3,997	5,996	7,993	9,993
A4 Foothills Conservation and Rural Development [c]	201	403	604	806	1,007
All Plan Area A	**4,477**	**10,097**	**17,606**	**24,962**	**31,115**
Plan Area B [d]					
B1 Permittee Activity in Non-participating City Jurisdiction	385	395	405	415	425
All Plan Area	**4,862**	**10,492**	**18,011**	**25,377**	**31,540**

Sources: Hausrath Economics Group and MIG|TRA Environmental Sciences.

[a] Area of land development reflecting City of Lincoln and Placer County general and specific plans (see Appendix M, *Growth Scenario Memo*, Table A.1) and a generalized factor of 15 percent additional land development to account for infrastructure, rights-of-way, and public facilities.

[b] Estimates for rural development in the Valley developed by MIG|TRA Environmental Sciences include allowance for public infrastructure.

[c] Foothills growth scenario estimates by Hausrath Economics Group adapted to available land and general plan land use designation by MIG|TRA Environmental Sciences.

[d] Estimate for Plan Area B is an allowance for public infrastructure.

NPC = non-participating city

PFG = Potential Future Growth Area

Land development estimates are presented cumulatively in 10-year increments by location. The timing of the land development scenario reflects that most short- to medium-term development in the Valley is expected to occur in the cities of Roseville and Rocklin that are not participating in the PCCP. As those cities approach buildout of their development potential, an increasing proportion of new development to accommodate growth in western Placer will occur in the unincorporated county and the City of Lincoln. In the Foothills, growth and land development are assumed to occur in equal increments over the permit term.

Almost all covered development activity will result in the conversion of agricultural or natural and semi-natural land to urban/suburban and rural residential use. This type of land conversion is the basis for the effects analysis presented in Chapter 4 and the proposed maximum effect on certain communities listed in Table 4-1 showing that just over 30,000 acres of agricultural or natural and semi-natural land would be converted for urban/suburban and rural-residential development.

Two-thirds of the land development occurs in the Valley where most of the population and employment growth is expected to occur. The Foothills and I-80 corridor unincorporated areas accommodate a relatively small amount of growth—17 percent of all new housing units—but the low-density development pattern means 33 percent of Plan Area A land development occurs there. Due to the distribution of potentially buildable parcels in the Foothills, some growth can be accommodated on land that is already in a disturbed or built-up condition. Therefore, the land

conversion area estimate for the Foothills (Table 4-1) is 1,400 acres less than the overall land development estimate shown in Table 2-5. Similarly, the development footprint allowance for infrastructure in Plan Area B1 is likely to include some already disturbed areas and the proposed maximum effect on land conversion there is set at 300 acres (see Table 4-1).

2.6.1 Valley Potential Future Growth Area (A1)

This category includes all ground- or habitat-disturbing projects and activities that occur in component A1, Valley PFG (see Figure 2-4). The Valley PFG comprises 46,769 acres made up by the City of Lincoln and a portion of the adjacent Lincoln SOI and unincorporated county area adjacent to the city of Roseville. Both public and private activities are included in this category. This category is intended to be as inclusive as possible to accommodate as many ground-disturbing activities associated with growth as possible. It includes rural and urban land uses and the use, construction, demolition, rehabilitation, maintenance, and abandonment of typical public facilities, consistent with the implementation of local general plans, community plans, area plans (collectively referred to as general plans), specific plans, and local, state, and federal laws. Acquisition of reserve lands and conservation activities may potentially occur in the Valley PFG, primarily in the Stream System, as defined in Chapter 1, *Introduction*, and where large blocks of high-quality Covered Species' habitat can be incorporated into the Reserve System.

Activities in the Valley PFG are based on designations in the general plans of the County and the City of Lincoln, as described in Section 2.4.1.1*, General Plan Land Use* (City of Lincoln), and Section 2.4.2.1*, General Plan Land Use* (Placer County). Covered urban uses, including those within the Valley PFG, are summarized in Table 2-6. Ongoing rural and agricultural uses are summarized in Table 2-7. Public agency programs, even if they take place within the Valley PFG, are described in Section 2.6.4, *Foothills Conservation and Rural Development (A4)*, below, and summarized in Table 2-8*,* as they are covered in the Valley PFG.

Table 2-6. Land Use Consistent with Urban and Suburban General Plan Designations

Category	Example Projects
Urban Development	Residential, commercial, office/professional, industrial, public/quasi-public
Transient Lodging	Hotels/motels and recreational vehicle parks
Service Uses	Banks and financial services, professional offices, medical services, day care facilities, educational facilities, and business support services
Public Facilities	New fire stations, police/sheriff stations and substations, community policing centers, communications facilities (including antennae, towers, and equipment facilities), public administration centers, convention centers, theatres, community centers, concert venues, community gardens, and concession buildings
Recreational Facilities (public/private)	Regional parks, neighborhood parks, dog parks, soccer fields, golf courses, indoor and outdoor sports centers, recreational centers, trails, golf courses, racetracks, campgrounds, and associated infrastructure including roads, bridges, parking areas, and restrooms. *Note: Public use of trails and other park facilities is not a Covered Activity.*
Funeral/Interment Services	Mortuaries, crematorium, columbaria, mausoleums, and similar services when in conjunction with cemeteries

Category	Example Projects
Other Urban/Suburban Uses	Activities consistent with the local general plan and zoning ordinances of Placer County or the City of Lincoln, which are similar in nature to the uses listed above
Land Use Consistent with Rural and Agricultural General Plan Designations	Urban and suburban general plan designations also allow land uses listed in Table 2-7.
Public Facilities Consistent with Rural and Agricultural General Plan Designations	Urban and suburban general plan designations also allow public facilities listed in Table 2-8.

The City of Lincoln and Placer County have developed several planning documents that outline strategies and projects in accordance with current general plans. To the extent that these plans are consistent with the goals of the PCCP, implementation of these planning documents will be covered. Examples of current planning documents in the Valley PFG include the following and can be found at http://www.ci.lincoln.ca.us/or www.placer.ca.gov/planning:

- City of Lincoln General Plan
- Placer County General Plan
- Dry Creek/West Placer Community Plan
- Sunset Industrial Area Plan
- Sheridan Community Plan
- Placer Vineyards Specific Plan[5]
- Regional University Specific Plan
- Riolo Vineyards Specific Plan
- The City of Lincoln's Bikeways Master Plan and the 2001 Placer County Regional Bikeway Plan (Placer County Transportation Planning Agency 2002)

Additional area plans, community plans, specific plans and updates to comprehensive general plans will be developed over the course of the permit term. The general plans, specific plans, and implementing zoning may be changed within Valley PFG (A1) over the course of the PCCP permit term to accommodate the growth scenario described in Appendix M, *Growth Scenario Memo,* by allowing the following:

- Changes in allowed land use type
- Increased land use intensity
- Increased residential density

2.6.2 Valley Conservation and Rural Development Area (A2)

This category includes all ground- or habitat-disturbing projects and activities that occur in the Valley in A2, Valley Conservation and Rural Development, component of the Plan Area. This

[5] See Section 8.9.5 for a description of how Placer Vineyards Specific Plan will be covered under the HCP/NCCP.

represents the Valley RAA and Existing Reserves and Other Protected Areas (EXR) but excludes the Valley PFG (see Figure 2-4). This 53,929-acre area is an arc of unincorporated county land around the west and north side of the Valley PFG. Covered Activities here include rural-residential uses and the few types of agriculture-related activities, which are subject to approval by the County or City. The Valley Conservation and Rural Development area is where most of the PCCP conservation objectives for the Valley will be implemented; PCA acquisition and management of reserve lands in the RAA is a Covered Activity described in Section 2.6.6, *In-Stream Activities*.

Activities in the Valley Conservation and Rural Development area must be consistent with designations in the general plans of the County and the City. Rural development activities covered by the Plan are summarized in Table 2-7. Public agency programs are described in Section 2.6.4, *Foothills Conservation and Rural Development (A4)*, below, and as summarized in Table 2-8*,* as they are covered as part of Valley Conservation and Rural Development activities.

Table 2-7. Land Use Consistent with Rural and Agricultural General Plan Designations

Category	Example Projects
Rural Residential	Single-family homes at a density less than one dwelling per 2.3 acres. This includes privately owned roads, bridges, driveways, emergency access roads, clearing land for a range of rural residential land use activities, and other features commonly associated with rural dwelling units and use of land in rural settings.
Public/Private Recreational Facilities	Neighborhood parks, dog parks, soccer fields, golf courses, indoor and outdoor sports centers, recreational centers, open space and passive recreation facilities, trails, golf courses, racetracks, campgrounds, and associated infrastructure including roads, bridges, parking areas, and restrooms as well as maintenance facilities
Private Facilities of Public Assembly	Churches, convention centers, theaters, rural recreational uses (e.g., equestrian facilities), community centers, concert venues, community gardens, and concession buildings
Transportation Facilities	New capital facility construction, roads, road widening, shoulder improvements, bike lane construction, bridge replacement/widening, culverts, transit facilities, and park and ride facilities
Agricultural Facilities and Uses	Plant nurseries, greenhouses, wine production, wineries, equestrian facilities, farm equipment sales, community centers, and outdoor retail sales. This may include nurseries, Christmas tree farms, ornamental plant nurseries, dairies, and feedlots, if a discretionary permit is required.
Food Production Facilities	Industrial/manufacturing uses associated with food/beverage production and agricultural support services
Agricultural Uses Requiring Conditional/Minor Use Permits	New intensive agriculture that requires a conditional/minor use permit consistent with local general plans, such as commercial equestrian facilities, dairy and swine operations, equestrian event facilities, and wineries
Fuel Load Modifications and Treatments	Fuel load modifications and treatments consistent with the Placer County Community Wildfire Protection Plan, Placer County Local Hazard Mitigation Plan, Placer County Strategic Plan for Biomass Utilization Program, local ordinances ,and Public Resources Code 4291
Vegetation Management	Fuel reduction (including hand and mechanized removal and controlled burns), tree removal and pruning, grazing activities, exotic vegetation control/removal, hazardous tree work, weed abatement, and algae control in ponds. Permittees may use herbicides and pesticides in accordance with best management practices described in Chapter 6, *Program Participation and Conditions on Covered Activities*,

Category	Example Projects
	but shall be responsible for ensuring no take of Covered Species occurs as a result of herbicide and pesticide uses.
Public Facilities	New fire stations, police/sheriff stations and substations, community policing centers, libraries, communications facilities, public maintenance facilities (park maintenance and transportation corporation yards) and public administration centers. Solid waste facilities including transfer stations and recycling centers.
Non-residential Development in Rural Areas	Telecom facilities and small utility facilities. Solar energy projects in rural areas are covered by the Plan as long as their effects on Covered Species and natural communities are consistent with the effects evaluation in Chapter 4, *Effects of Covered Activities*. Requires approval from the County or the City.
Other Rural Uses	Other rural uses, consistent with the local general plan and zoning ordinances of the County or the City, that are similar in nature to the uses listed above. Such proposed uses must share characteristics in common with the uses listed above and are not of greater intensity or density or generate more environmental effects.
Conservation Activities	Acquisition or operation of land for use as a biological reserve or mitigation bank

These general plans, specific plans, and implementing zoning may be changed over the course of the PCCP permit to allow changes in allowed land use type in A2, Valley Conservation and Rural Development, so long as the following terms are met:

- The land use remains rural or agricultural or compatible with rural or agricultural general plan designations
- Land use intensity is not increased
- Residential density is not increased

Activities that do not meet the criteria listed above are not prohibited by the Plan, but they are specifically not covered by the Plan. Project proponents who seek approvals or entitlements inconsistent with the above criteria cannot receive take coverage under the PCCP and must apply for take authorization directly from the relevant state or federal agencies.

2.6.3 Foothills Potential Future Growth Area (A3)

This category includes all ground- or habitat-disturbing projects and activities that occur in A3, Foothills PFG (see Figure 2-4). The 78,897 acres of the Foothills PFG comprise the I-80 corridor and the communities of Granite Bay, Penryn, Loomis, and Newcastle; the unincorporated area around the city of Auburn; and rural-residential lands east of Rocklin and Lincoln. The Foothills PFG boundary extends to the Placer/El Dorado county line; hence, area tabulations include 3,820 acres of Folsom Reservoir in which no Covered Activities take place.

Future growth in the Foothills is expected to be lower in magnitude and density than Valley future growth. There will be portions of the I-80 corridor and the outlying areas around Auburn and along SR 49 that will develop at urban densities with urban land use. However, most of the Foothills PFG outside the urban core is zoned for very low-density, rural-residential and agricultural development. It is expected that most of the land area subject to future growth will be rural residential (i.e., a density of one dwelling unit per acre to one dwelling unit per 10 acres). Acquisition of reserve lands

and conservation activities may occur in the Foothills PFG, primarily in the Stream System to benefit covered fish (see Section 2.6.6, *In-Stream Activities*).

Urban use activities that may occur in the Foothills PFG are summarized in Table 2-6. In addition to these urban and suburban activities, Covered Activities include ongoing rural and agricultural uses, as summarized in Table 2-7, and public agency programs described in Section 2.6.4, *Foothills Conservation and Rural Development (A4)*, below, and summarized in Table 2-8.

Table 2-8. Public Facilities Consistent with Rural and Agricultural General Plan Designations

Category	Example Projects
Water Supply Facilities	County, PCWA, and City water supply and conveyance facilities and appurtenances to meet the needs of residential, commercial, office/ professional public/quasi-public, and industrial uses
Stormwater Management Facilities	Storm water conveyance systems, low-impact development facilities, nonpoint source reduction, detention/retention facilities, outfall structures, and other drainage improvements
Wastewater-Management Facilities	Sewage-treatment plants, sanitary sewer systems and rehabilitation, force main and effluent line construction and maintenance, effluent discharge and reclaimed water line installation and maintenance, and pump station construction
Solid waste Management Facilities	Landfills, or transfer stations, material recovery facilities, small-scale energy production facilities (i.e., landfill gas utilization), and recycling centers
Public and Private Utilities	Transmission lines, telecommunications lines, and gas lines subject to authority of Permittees. *Note: Actions by PG&E, Sacramento Municipal Utilities District, and Northern California Power Agency that are not directly subject to the authority of Permittees will not be covered under these permits.*
Other	Other public programs as described in Section 2.6.5, *Regional Public Programs*

PCWA = Placer County Water Agency
PG&E = Pacific Gas & Electric Company

Current plans that apply to the Foothills include the following:

- Granite Bay Community Plan
- Horseshoe Bar/Penryn Community Plan
- Ophir General Plan
- Auburn/Bowman Community Plan
- Bickford Ranch Specific Plan
- Placer County General Plan

Additional area plans, community plans, specific plans, and updates to comprehensive general plans will be developed over the course of the permit term of this Plan. Activities in the Foothills PFG are based on designations in the Placer County General Plan and Community Plans. The general plan, specific plan, and implementing zoning may be changed over the course of the PCCP permit to allow the following in Foothills PFG (A3):

- Changes in allowed land use type

- Increased land use intensity
- Increased residential density

2.6.4 Foothills Conservation and Rural Development Area (A4)

This category includes all ground- or habitat-disturbing projects and activities that occur in the Foothills RAA and EXR, collectively termed Foothills Conservation and Rural Development (A4) (see Figure 2-4). This 30,237-acre area is north of the Foothills PFG and generally north and east of the intersection of Wise and Gladding Roads; it extends to an area north and west of the intersection of Hubbard and Bell Roads. The PCCP boundary extends to the Placer/Nevada county line; hence, area tabulations include 837 acres of Camp Far West Reservoir.

Most of the area consists of large parcels in woodland and rangeland and is currently zoned for large-parcel minimums. The category includes rural-residential uses and those agricultural activities that are subject to approval by the County. The Foothills Conservation and Rural Development area is where most of the PCCP conservation objectives for the Foothills will be implemented; PCA acquisition and management of reserve lands in the RAA is a Covered Activity described in Section 2.6.6, *In-Stream Activities.*

Covered rural development activities, including those within the Foothills Conservation and Rural Development category, are summarized in Table 2-7. Public agency programs are summarized in Table 2-8, as they are covered in the Foothills Conservation and Rural Development area.

Covered rural development activities are based on designations in the Placer County General Plan. The general plan and implementing zoning may be changed over the course of the PCCP permit to allow changes in allowed land use type in Foothills Conservation and Rural Development (A4) (see Figure 2-4), so long as the following terms are met:

- The land remains in rural or agricultural use or is compatible with rural or agricultural general plan designations
- Land use intensity is not increased
- Residential density is not increased

Activities that do not meet the criteria listed above are not prohibited by the PCCP, but they are specifically not covered by the Plan. Project proponents who seek approvals or entitlements inconsistent with the above criteria cannot receive take coverage under the PCCP and must apply for take authorization directly from the relevant state or federal agencies.

2.6.5 Regional Public Programs

Regional public programs provide and sustain the backbone infrastructure that supports public services and development within the Plan Area. Regional public programs involve O&M of existing facilities and construction and O&M for new facilities. These important public projects will serve the existing and future county and city residents during the permit term. The programs are typically funded through a variety of sources, and public projects are frequently listed as capital improvement programs in adopted plans or programs. Projects could be carried out by a public agency/utility district or private developer on behalf of a public agency/utility district.

All regional public programs in Plan Area A are covered under the Plan. Specific activities/projects in Permittee Activity in Non-participating City Jurisdiction (B1) and PCWA Zone 1 O&M (B2) are covered, as noted below. Regional public programs are divided into six categories by public facility provider such that similar activities are grouped together to guide the effects analysis in Chapter 4, *Effects of Covered Activities*:

1. Transportation
2. Wastewater
3. Water supply (surface and groundwater)
4. Solid waste management
5. Public parks
6. Utilities

All activities will follow the BMPs and avoidance/minimization measures described in Chapter 6, *Program Participation and Conditions on Covered Activities*.

2.6.5.1 Transportation Programs

Transportation programs provide, enhance, and maintain infrastructure that support existing development and new development.

Transportation program activities covered under this Plan may occur anywhere within Plan Area A and Permittee Activity in Non-participating City Jurisdiction (B1) (see Figure 2-4).

- County and City road projects, including new lanes, new connections, extensions, widening, and realignment projects. Projects may include trails for pedestrian and bicycle use.
- County and City roadway safety and operational improvement projects to roads, including shoulder widening and straightening of curves. Modifications to vertical and horizontal alignments. Improvements at intersections and driveway encroachments, including constructing new turning lanes, adding signals, and lengthening existing turning lanes. Also, intersection level-of-service improvements, grade separations, and sound wall installations. Projects may improve access for pedestrians and cyclists.
- County and City maintenance of new and existing transportation facilities, including appurtenant drainage and water quality infrastructure.
- New roads constructed in association with urban or rural development will usually be installed by the developer, and the County or City will assume ownership and maintenance.
- Metropolitan Transportation Plan 2035 and subsequent Metropolitan Transportation Plans (projects that are located in the Plan Area and under the jurisdiction of the Permittees).
- Other, yet-undesignated major regional transportation projects.

Two major transportation projects described below, Placer Parkway and its interchanges and the I-80/SR 65 interchange improvements, are already planned to occur within the permit term.

2.6.5.1.1 Placer Parkway – South Placer Regional Transportation Authority

The Placer Parkway is a new project for an east–west roadway linking SR 70/SR 99 in Sutter County to SR 65 in Placer County. The Placer Parkway project and its interchanges are covered under this Plan, both in Plan Area A and within Permittee Activity in Non-participating City Jurisdiction (B1) (see Figure 2-9). The overall development footprint for Placer Parkway with the Watt Avenue interchange is estimated to be 800 acres, with 559 acres in the Valley PFG, 184 acres in the Valley RAA, and 57 acres passing through the non-participating cities. This latter part is included in the overall estimate of 425 acres of land conversion for B1 in Table 2-5.

The construction of the Placer Parkway project is a two-phase process. The first phase selected the general roadway alignment within a corridor. The second phase will determine specific design details such as interchange placements and the number, location, and design of over-crossings as well as actual construction of the roadway.

The Tier I analysis for the Placer Parkway project was completed in 2008. A 500- to 1,000-foot-wide corridor in which the four- or six-lane Placer Parkway will be constructed has been selected. The Tier I analysis included a letter from USEPA and U.S. Army Corps of Engineers to the Federal Highway Administration with a statement of concurrence on the corridor most likely to contain the least environmentally damaging practicable alternative. The selected corridor will contain the roadway, the median, travel lanes, associated access ramps, and a no-development buffer zone. Additional information about this project can be found at http://pctpa.net/placerparkway/.

Subsequent to the adoption of the corridor, more detailed analysis will occur to identify the specific location for the roadway. That analysis is anticipated to occur predominantly from east to west in segments that contain logical termini. Phase I of Placer Parkway is currently being analyzed and will extend freeway access at SR 65 with the construction of a new roadway west to Foothills Boulevard North. The County is the lead agency for CEQA and the California Department of Transportation is the lead agency under NEPA. The County took action in September of 2015 on CEQA and it is anticipated that NEPA will be completed for Phase I in the following year.

2.6.5.1.2 I-80/SR 65 Interchange Improvements – South Placer Regional Transportation Authority

SPRTA plans improvements to the I-80/SR 65 interchange. The I-80/SR 65 interchange project is covered under this Plan in Permittee Activity in Non-participating City Jurisdiction (B1) (see Figure 2-9). I-80 is the principal east–west route in northern and central California and the only freeway crossing the Sierra Nevada range. SR 65 is an important regional route that serves both local and regional traffic. The I-80/SR 65 interchange is a freeway-to-freeway interchange, which was constructed in 1985 and requires improvements. The portion of the project that has already been completed is not part of this Plan. This transportation improvement project is in the early planning stages; therefore, the exact project footprint has not been identified. For purposes of this Plan, the overall development footprint is estimated to be up to 300 acres, of which about 80 percent (238 acres) are the existing freeway or other paved and disturbed land. The balance, 68 acres, may result in conversion of natural or semi-natural land. This is included in the overall estimate of 425 acres of land conversion for B1 in Table 2-5.

The purpose of the modifications to I-80/SR 65 and the interchange at their junction is to reduce congestion, improve traffic operations, and enhance safety. The interchange is experiencing operational problems caused by high peak-period traffic volumes. Traffic performance measures

such as vehicle hours of delay, average speeds, and travel times will continue to deteriorate as population and employment increase in western Placer County.

Several possible revisions for the interchange are under consideration, including the construction of a bi-directional, high-occupancy vehicle direct connector between I-80 and SR 65; replacement of the eastbound I-80 to northbound SR 65 loop-connector with a flyover connector; structure widening of the East Roseville Viaduct and replacement of the Taylor Road overcrossing; and widening of the southbound SR 65 to westbound I-80 and the westbound I-80 to northbound SR 65 connectors with associated auxiliary lanes and ramp realignments. Additional information about this project can be found at http://8065interchange.org/.

2.6.5.1.3 City of Lincoln Interchange Improvements

As part of the current general plan, the City of Lincoln anticipates the construction of three interchanges along SR 65 in Plan Area A, at the realigned Fiddyment Road and SR 65, Nicolaus Road and SR 65, and the realigned Wise Road and SR 65. These interchanges are planned to reduce congestion, improve traffic operations, and enhance safety as part of the development provided for in the general plan.

2.6.5.1.4 Road Maintenance

All routine road maintenance activities by Permittees that occur within Plan Area A and Permittee Activity in Non-participating City Jurisdiction (B1) are covered by this Plan. Routine road maintenance work means work performed regularly (i.e., every 1 to 5 years) in the Plan Area. The County and City perform routine maintenance work to maintain the functional and structural integrity of their road facilities. PCWA will perform routine maintenance on its facilities, including canal maintenance roads and roadway/parking lots associated with its facilities. Routine maintenance work, as described in this Plan, includes but is not limited to the following activities:

- Road signage maintenance or replacement.
- Traffic control device maintenance or replacement.
- Guardrail, fence, or crash cushion inspection, maintenance, or replacement. Median or shoulder barriers will be replaced with structures that are safe for vehicles and, where applicable, wildlife-friendly barriers will be used as specified in Chapter 6, *Program Participation and Conditions on Covered Activities*.
- Pavement maintenance or resurfacing, including replacement of striping and markers.
- Tree trimming or removal with the road right-of-way for safety.
- Debris collection and removal on roads, trash racks, and shoulders.
- Storm and natural disaster damage repair.
- Vehicle accident repair and cleanup.
- Weed control (the use of herbicides is not covered by the federal permit and therefore its use cannot result in take of federally listed species).
- Mowing of medians and shoulders for fire hazard reduction.
- Grading of shoulders (up to 20 feet from the edge of paved or unpaved roadways).

- Grading of existing public dirt roadways.
- Repair or replacement of retaining walls.
- Roadside drainage ditch clearing.
- Maintenance of water quality facilities (e.g., oil/grit separators or low-impact development features).
- Curb, gutter, and sidewalk maintenance, repair, retrofit, or replacement.

2.6.5.2 Wastewater Programs

The County and City operate and maintain multiple wastewater treatment facilities, lift stations, and a network of collection and distribution pipelines for untreated wastewater, treated effluent for disposal, and reclaimed water for irrigation and other municipal purposes. The County is responsible for O&M of the sewer system in the community of Sheridan. (Sheridan water supply O&M and projects are discussed below in Section 2.6.5.3, *Water Supply Programs.*) The County serves areas that include unincorporated portions of North Auburn, Granite Bay, Horseshoe Bar/Folsom Lake, Penryn, Loomis, western Placer County (Dry Creek), Livoti Tract, Sunset Industrial Area, and Sheridan.

The City of Lincoln's waste management activities are mainly in the established urban area but will be extended to serve new urban growth, including growth in unincorporated areas covered by the Plan. The City will also provide treatment of wastewater for the North Auburn, Bowman, Applegate, Christian Valley, and portions of the unincorporated communities in Meadow Vista through the Mid-Western Placer Regional Sewer Project. The Mid-Western Placer Regional Sewer Project will result in the closure of the County's Sewer Maintenance District 1 Wastewater Treatment Plant and conveyance of untreated wastewater to the City of Lincoln's Wastewater Treatment and Reclamation Facility. The maintenance of this regional pipeline, pump stations, and related infrastructure is considered a Covered Activity.

The PCCP will provide coverage for Permittee wastewater projects, including treatment plant construction or expansion (including installation of pipelines), O&M, effluent discharge, force main and effluent line construction and maintenance, discharge and reclamation line installation, and pump station construction.

Covered wastewater activities by Placer County may occur anywhere within Plan Area A or within Permittee Activity in Non-participating City Jurisdiction (B1). The wastewater projects now planned are listed in Table 2-9A.

Table 2-9A. Current Planned Wastewater Management Projects

Project Name	Description
Sewer Maintenance District 1 Service Area	
Auburn Ravine Force Main Rehab/Replacement	Pipe rehabilitation may be implemented via digging and replacing or with less invasive pipe lining technology. Potential environmental impacts include occasional work near creeks. An estimated 1.14 miles of pipe are expected to be lined or replaced. Also analyze other downstream trunk line restrictions.
State Route 49 Siphon Relief	This project could include the installation of 3,350 feet of parallel pipe and/or a pump station. May include excavation, compaction and paving.
Bell Road Lift Station	Panel and pump replacement.
Joeger Road Lift Station	Construct retaining wall, new control building, paving, new pumps and control panels.
Vineyard Lift Station	Evaluate lift station wet well and booster pumps.
Airport Lift Station	New wet well, pumps, panels, control building, lids, and generator.
Olive Grove Lift Station	Replace pumps and rails.
Rock Creek Realignment	Reroute approximately 1,600 feet of pipe adjacent to a creek. Abandon approximately 1,600 feet of sewer pipe installed in the 1960s. Reinstall approximately 1,600 feet along another route away from the creek bed. May include excavation, compaction and paving.
Sewer Maintenance District 2 Service Area	
Trunkline Upsizing	Upsize 7,500 linear feet of 18-inch sewer pipe and 6,000 linear feet of 21-inch pipe. May be implemented via digging and replacing or with less invasive pipe-bursting technology. Potential environmental impacts include occasional work near creeks.
Wexford Lift Station	Replace generator, add transfer switch and overflow storage.
Winterhawk Lift Station	Replace lids, pumps, rails, panels, generator and add storage.
Maintenance Yard at Plant 2	Construct a building at the maintenance yard for equipment storage and maintenance.
Sewer Maintenance District 3 Service Area	
Regional Sewer, Phase II (*Auburn Folsom Road, Loomis)*	Upsize approximately 10,150 linear feet of 10-inch sewer pipe in the Sewer Maintenance District 2 (Granite Bay) collection system to provide for growth in the Sewer Maintenance District 3 area. Install new or additional pumps in the existing pump station.

Project Name	Description
E Street, Sheridan	
Chlorine Contact Basin	Construct new concrete Chlorine Contact Basin.
Wastewater Treatment Plant Upgrade	Construct new storage and treatment ponds to provide for growth.
	Construct new wastewater treatment plant, including several concrete basins and buildings to house equipment to provide additional capacity.
	Construct significant upgrades to wastewater treatment plant with new technology appropriate for anticipated new water quality requirements.
Wastewater Treatment Plant Abandonment	Demolish existing wastewater treatment plant and construct a pump station and pipeline to Wheatland or Lincoln (approximately 4–8 miles), including a possible Bear River crossing.
Community of Sheridan	
Sheridan - Water System Improvements	Replacement and upsizing of several thousand feet of potable water supply piping. Conversion of old piping to convey reclaimed water. Replacement of fire hydrants and placement of additional fire hydrants.
	Installation of approximately 300 potable water meters. Installation of a water storage tank not exceeding 1 million gallons in volume.
Nader Road and Community of Sheridan	
Sheridan - Water Import Project	Construction of a raw water transmission pipeline from the Bear River or Raccoon Creek to Nader Road area to provide surface water for Nader Road and Sheridan area.
Sunset Whitney Service Area	
Sunset Whitney - SASUG Pipeline	Build a gravity sewer system, forcemain and pump station from Athens Road in Lincoln to either the Dry Creek wastewater treatment plant or the City of Lincoln's wastewater treatment plant.

2.6.5.2.1 Sewer Pipeline Operation and Maintenance

Pipeline O&M includes important activities within the Plan Area to prevent deterioration of infrastructure necessary for wastewater conveyance. The Placer County Environmental Engineering and Utilities Divisions operates and maintains five wastewater treatment facilities, 278 miles of pipe, and 42 lift stations in Placer County. Areas served include unincorporated portions of North Auburn, Granite Bay, Loomis, western Placer County (Dry Creek), Livoti Tract, Sunset Industrial Area, and Sheridan. Additionally, the City of Lincoln maintains its own sewer pipelines and wastewater treatment facilities, including the Mid-Western Placer Regional Sewer Project. For purposes of this Plan, routine maintenance work is defined as work performed regularly (i.e., every 1 to 5 years) to maintain the functional and structural integrity of facilities.

Maintenance activities will generally require trenching around existing pipelines and conducting repairs or replacing segments of pipeline. The pipelines are located in both urban and rural areas. The maintenance activities that are proposed for coverage under the Plan include the following:

- Mechanical root removal, including the use of a drain snaking rotor with an auger that cuts at the tree root incursion with a rotating blade.
- Rehabilitation, repair, and/or replacement of pipelines and components including, but not limited to, air release valves, piping connections, joints, and appurtenances. Activities may include excavation to access pipelines.
- Sewer pipe sliplining is a trenchless rehabilitation of existing pipelines. Sliplining is used to repair leaks or restore structural stability to an existing pipeline. Sliplining is completed by installing a smaller “carrier pipe” into a larger “host pipe,” grouting the annular space between the two pipes, and sealing the ends.
- Replacement/repair of buried service valves (including valves within creek embankments that may require excavation and minor bank stabilization activities).
- Maintenance of pipeline turnouts, including access to pipelines.
- Replacement/repair of appurtenances, fittings, manholes, and meters.
- Wastewater vault maintenance, which includes minor repairs and debris removal.
- Wastewater meter inspections and repairs.
- Maintenance of pump stations, operation yards, utility yards, and corporation yards.
- Facility access road repairs and maintenance, which is limited to existing roads.

2.6.5.3 Water Supply Programs

Permittees PCWA, the County (for the Sheridan community), and the City will supply present and future water users in the Plan Area and portions of the non-participating cities. The PCCP covers the collection and conveyance of raw water from surface and groundwater sources to treatment plants or directly to consumers. In most cases, distribution of treated water does not require incidental take coverage. Two raw water suppliers in Placer County, NID and the South Sutter Irrigation District, are not Permittees but could participate with the PCA in a project and would be covered.

2.6.5.3.1 Placer County Water Agency

The PCWA seeks coverage for O&M of its raw water distribution system, future capital improvement projects within the Plan Area, and future construction of PCWA water supply facilities to meet the needs of residential, commercial, public facility, and industrial construction within the Plan Area (e.g., new water supply, treatment and delivery infrastructure, O&M of new water supply, treatment, and delivery infrastructure).

PCWA O&M and planned capital improvement projects are described below and in Table 2-9B, *Water Supply Projects*. Covered PCWA water supply activities may occur anywhere within Plan Area A and Permittee Activity in Non-participating City Jurisdiction (B1) (see Figure 2-4 and Figure 2-9). PCWA O&M of existing facilities is covered in PCWA Zone 1 O&M (B2) (see Figure 2-5).

Table 2-9B. Water Supply Projects

Activity	Description
Placer County Water Agency	
Auxiliary Power Plant for Pumping American River Water Supply (Ophir)	This project includes construction of a power plant, either diesel generator on Maidu Drive, Auburn, or a co-generation plant at the future Ophir Water Treatment Plant.
Baltimore Ravine Pipeline (Auburn area)	This project includes construction of a pipeline from the future Werner Road Storage Tank to run through the Baltimore Ravine Specific Plan Area and connect to the Auburn Water System.
Duncan Hill Pipeline (Ophir area)	This project includes construction of a pipeline within Millertown, Voyiatzes, and Duncan Hill Roads to connect the Auburn Water System to Ophir Road.
Foothill Water Treatment Plant – Ophir Road Pipeline	This project includes a pipeline that would connect the Foothill Water Treatment Plant in Newcastle to the Ophir Road Pipeline.
Groundwater Wells Within Western Placer County (Various locations in western Placer County)	This project includes new groundwater wells within western Placer County and improvements to the existing Tinker and Sunset Industrial Wells.
Lincoln Phase 3 Pipeline and Metering Station (West of Sierra College Boulevard near Twelve Bridges)	This project includes approximately 5,000 feet of pipeline to convey water from the existing Lincoln Metering Station to a new metering station.
Loomis Basin Tank (6.5 million gallons) and Connecting Pipelines (Lake Forest Drive, Loomis)	This project includes construction of a 6.5-million-gallon treated water storage tank, booster pump station, altitude valve vault, detention basin, access road, and approximately 13,000 feet of 12- and 18-inch-diameter pipeline.
Ophir Water Treatment Plant and Treated Water Pipeline Project – PERMITTED – Impacts Mitigated. 404 Permit #200500769 (expired 4/15/2011). California Department of Fish and Game Permit #1600-2007-0076-R2 (expired 10/1/2012)	This project includes a new water treatment plant on Ophir Road adjacent to the Auburn Tunnel Pump Station site. This project includes new treated and raw water pipelines within Ophir Road associated with the Auburn Tunnel Pump Station and proposed Ophir Water Treatment Plant.
Raw Water Diversion	This project includes a diversion structure on Dry Creek in western Placer County.
Taylor Road Pipeline Phase 1 and 2 (Penryn)	This project includes construction of a pipeline within Taylor Road from the Penryn Tank to Sierra College Boulevard.

Activity	Description
Water System Facilities Center (Ophir/Newcastle area)	This project includes planning and acquisition of land in Ophir/Newcastle area to be used for a future PCWA Water Systems Facilities Center. The facilities center would include a warehouse, fabrication shop, crew building, administration building, vehicle/equipment wash area, and fuel station.
Werner Road Storage Tanks (Ophir)	This project includes construction of two treated water storage tanks on PCWA property.
West Placer Corporation Yards (various locations in western Placer County)	The project includes construction of a corporation yard, which would include a warehouse and lay-down area for storage of pipe and other construction equipment.
West Placer Pipeline, Storage Tanks and Distribution Pump Stations (various locations in western Placer County)	This project includes construction of pipelines, water storage tanks, and pump stations to distribute water to various new development in western Placer County. Most would be included in private development process.
West Placer Water Supply Projects	This project includes development of a regional water supply for western Placer county. Two are being considered: • Expanded American River Pump Station: Increase current diversion capability at the existing American River Pump Station located on the American River upstream of Folsom Reservoir. • Sacramento River Diversion: Develop a new diversion facility on the Sacramento River upstream of the confluence of the American River and Sacramento River. This would include construction of water supply infrastructure components, including new or expanded diversions from the Sacramento or American rivers, and new or expanded water treatment and pumping facilities, storage tanks, and major transmission and distribution pipelines. *The operational direct effects of West Placer Water Supply projects will not be a Covered Activity (and therefore, are not assessed in the PCCP). However, development projects within the Plan Area that will use this new water supply are covered by the PCCP. Therefore, the indirect impacts are covered by this Plan.*
Placer County – Sheridan Water Supply	
Sheridan – Water Supply and Distribution (*Camp Far West Road, Sheridan*)	Construct a new well, standby generator, and water tank for the Sheridan community water system.
Sheridan – Water System Improvements	*Community of Sheridan* Construct a new well, standby generator, and water tank for the Sheridan community water system.
Sheridan – Water System Improvements	*Community of Sheridan* Replacement and upsizing of several thousand feet of potable water supply piping. Conversion of old piping to convey reclaimed water. Replacement of fire hydrants and placement of additional fire hydrants.

Activity	Description
Sheridan – Water System Improvements	*Community of Sheridan* Installation of approximately 300 potable water meters. Installation of a water storage tank not exceeding 1 million gallons in volume.
Sheridan – Water Import Project	*Nader Road and Community of Sheridan* Construction of a raw water transmission pipeline from the Bear River or Raccoon Creek to Nader Road area to provide surface water for Nader Road and Sheridan area.
Sunset Whitney – SASUG Pipeline	Build a gravity sewer system, forcemain, and pump station from Athens Road in Lincoln to either the Dry Creek wastewater treatment plant or the City of Lincoln's wastewater treatment plant.

PCCP = Placer County Conservation Program
PCWA = Placer County Water Agency

PCWA Operations and Maintenance

PCWA uses a variety of canals, pipelines, and other infrastructure to distribute water to its customers throughout Placer County. The majority of PCWA's raw water distribution is facilitated by gravity flow through the canal system. Reservoirs provide flexibility in operations, allowing capture and storage of flow from portions of the upper system for release, as needed, to portions of the lower system. PCWA monitors regulating gates and staff gauges throughout the system and uses information collected to make water purchases and to adjust deliveries in accordance with water demands and meteorological conditions.

Most of the water supplied by PCWA comes from surface water sources. The majority of water deliveries to PCWA's raw water distribution system depend wholly on PG&E's hydropower operations of the Drum-Spaulding hydroelectric system. PG&E's Drum-Spaulding water supply originates in the upper Yuba River Basin, augmented by Bowman Lake and Lake Spaulding on the South Yuba River and Rollins Reservoir on the Bear River. Water is conveyed primarily via the Drum, Bear River, and Upper Boardman canals. PCWA has standing contracts with PG&E for more than 125,000 acre-feet of water per year delivered at designated points for subsequent conveyance by PCWA to defined service areas.

The American River Pump Station (ARPS) provides an additional source of raw water. ARPS is used to pump water from the North Fork American River into the Auburn Ravine Tunnel. The Auburn Ravine Tunnel discharges into Auburn Ravine, delivering water to downstream agricultural customers. Water can also be pumped out of the Auburn Ravine Tunnel to supply PCWA's water treatment plants.

The following O&M activities for raw water distribution are proposed for coverage under the Plan (a more comprehensive description can be found in Appendix E, *PCWA Natural Resource Management Plan*):

- Adjusting or replacing orifices at delivery points
- Yearly water delivery outages
- Delivery schedule changes and routine flow adjustments throughout the canal system through use of check boards, temporary weirs, valve controls, and debris removal
- Seasonal release of excess water at designated outlet locations for flood management during storm events

PCWA performs scheduled maintenance in the canal system as needed and cleans canals on an annual basis. Maintenance activities associated with canals include clearing debris and sediment, lining leaky canal sections, repairing damaged pipes and/or flumes, and controlling vegetative growth in the canals and on the canal berms. The use of pesticides, including herbicides and rodenticides, is not covered by the federal Endangered Species Act (ESA) permit. Canal cleaning is performed during the winter months and is scheduled a month or more in advance. Canal lining is conducted throughout the year. More details about PCWA canal maintenance can be found in Appendix E, *PCWA Natural Resource Management Plan*.

Other maintenance projects performed on an infrequent basis by PCWA include sediment removal from reservoirs and dams as well as reservoir and canal berm maintenance related to damage by muskrats, beavers, and otters.

From time to time, activities are necessary to ensure that water supplies are maintained and to prevent future problems from occurring. The maintenance activities described below are covered by the Plan. Water supplies to the Plan Area come from the Yuba, Bear, and American Rivers. The Clover Valley, Ben Franklin, Caperton, Whitney, McCrary, and Mammoth Reservoirs lie within the Plan Area. These reservoirs contribute to the streamflows in Clover Valley Creek, Antelope Creek, Secret Ravine, and Miners Ravine. Activities that are covered under the Plan include the following (more details about PCWA maintenance can be found in Appendix E, *PCWA Natural Resource Management Plan*):

- Periodic outages for canal cleaning, repair, or sediment removal.
- Repair and replacement of treated and raw water distribution facilities, including pipeline flushing and meter replacement. These facilities include pipelines, flumes, culverts, siphons, outlet structures, flow control structures, customer delivery points, pressure-reducing stations, and appurtenances; perform emergency repairs.
- Canal lining, usually with sprayed-on cementitious mortar (so-called shotcrete or gunite), and piping.
- Maintenance and operation of water supply, treatment, and delivery infrastructure, including water storage tanks, pump stations, connecting transmission lines, and their appurtenances.

PCWA Capital Improvement Projects

PCWA will undertake a number of capital projects for new surface and groundwater supply, treatment, storage, and delivery infrastructure over the term of the Plan (see Table 2-9B). These will include water supply projects, groundwater wells, transmission and distribution pipelines, metering station installations, water treatment and storage facilitates, corporation yards, facilities and administration buildings, and pump stations.

The largest of the capital improvement projects would be the West Placer water supply projects. This comprises the construction of water supply infrastructure components, including new or expanded diversions from the Sacramento and American Rivers, and new or expanded water treatment and pumping facilities, storage tanks, and major transmission and distribution pipelines.

The direct effects of operating the West Placer water supply projects are not a Covered Activity (and therefore not assessed in the PCCP). However, development projects and associated public infrastructure within the Plan Area that will use this new water supply are covered; therefore, the indirect effects in the Plan Area associated with the West Placer water supply projects (i.e., any growth-inducing effects of water supply expansion within the Plan) are covered by this Plan.

2.6.5.3.2 Sheridan Public Water System

O&M of Sheridan's public water system, construction of a raw water transmission pipeline and related infrastructure, and the diversion of water will be Covered Activities under the PCCP. Sheridan's water system consists of four public water wells (three for drinking water and one for fire protection), a 180,000-gallon storage tank, and a series of 4- and 6-inch distribution pipelines. The Placer County Environmental Engineering and Utilities Divisions operate and maintain this system and provide design support as needed. As the Sheridan community grows, it may be necessary to construct a raw water transmission pipeline from either Bear River or Raccoon Creek to provide surface water for the Nader Road and Sheridan areas. The necessary capacity and

resultant diversion from either of these surface water bodies will depend on the feasibility and need of the community in the Plan Area and will be evaluated as the need arises.

2.6.5.3.3 City of Lincoln Water System

The City of Lincoln has been partnering with NID to develop a water supply system for the provisioning of treated water to future customers within the City of Lincoln General Plan boundaries and the NID service district. In August 2005, the City of Lincoln and the NID had a preliminary study conducted to determine potential sites for the untreated water supply, water treatment plant, and finished water storage. This report was prepared by ECO:LOGIC Engineering (August 2005), and a subsequent report describing environmental constraints for each alternative was prepared in 2009. The preferred alternative was presented in the 2010 *Raw and Treated Water Pipelines Corridor Evaluation* (ECO:LOGIC Engineering 2010). The source of water for the proposed project is Lake Combie, with a pipeline proposed to connect at the Combie-Ophir turnout and carry raw water west to a reservoir and treatment plant to be located in the western portion of the NID service district. The Covered Activities from the proposed project would involve construction of approximately 16.3 miles of pipeline, raw water storage, and a water treatment plant and ongoing O&M of those facilities in Plan Area A.

2.6.5.4 Solid Waste Management Facility Programs

Solid waste management facility programs include O&M and expansion of existing facilities and construction of new facilities. Covered solid waste management facility program activities may occur anywhere within Plan Area A, and transfer stations built or operated by the County are covered in Permittee Activity in Non-participating City Jurisdiction (B1) (see Figure 2-4).

The PCCP will also provide coverage for post-closure maintenance activities and the future property use as open space, which may include public recreation (i.e., trails), agriculture, grazing, or other activities compatible with post-closure conditions that might be constructed in the future.

The solid waste management projects listed in Table 2-9C are expected to occur within permit term of the PCCP.

Table 2-9C. Solid Waste Management Projects

Activity	Description
Loomis Landfill – Gas System Upgrades	Replace and/or upgrade landfill gas components: blower, flare, piping, leachate and condensate collection and storage tanks; control and supervisory control and data acquisition system upgrades
Loomis Landfill – Decommission Landfill Gas Extraction System	Removal of flare, blowers, compressors, condensate; storage; remove piping; regrade and revegetate
Loomis Landfill – Abandon Groundwater Monitoring Wells	Grout well casings and remove upper well casings below grade
Loomis Landfill – Beneficial Use Project	Construct passive recreational facilities (parks, trail systems, minor structures/landscaping) on and/or around landfill property. Potential for environmental impact if work takes place near creek.
Western Regional Sanitary Landfill – Landfill Expansion	Revise final fill height of existing landfill near southeast corner of site. If eastern property is acquired, revise fill plan to include eastward expansion of landfill facilities.

2.6.5.4.1 Western Regional Sanitary Landfill

The Authority operates the WRSL, located near SR 65 between Roseville and Lincoln, as shown on Figure 2-9. The Authority is a joint powers authority formed by the Cities of Lincoln, Rocklin, and Roseville and the County, providing regionalized recycling and waste disposal services for the western portion of the county. It is expected that the Authority would become a Participating Special Entity, as described in Section 8.9.4, *Take Authorization for Participating Special Entities,* and the following activities would be covered under the PCCP.

The existing WRSL is currently permitted and operated as a Class II (designated waste) and Class III (nonhazardous Municipal Solid Waste) landfill. The landfill is permitted to accept 1,900 tons of waste per day. The landfill has a total capacity of 36,350,000 cubic yards. The currently permitted landfill is expected to be used for waste disposal through 2058.

The WRSL is designed with a liner system to prevent contamination of the underlying soil and groundwater. The liner system consists of a clay compound and plastic membrane liner, plus a liquid drainage and collection system. Refuse is compacted daily to maximize the amount of trash that can be placed in the landfill. This helps to prolong the life of the landfill and reduces the costs of expanding it or building a new one. The compact layers also provide a stable platform for subsequent landfill operations.

Daily operations at the landfill portion of the facility include placement and burying of refuse (waste) in designated areas of the site. Each day, accumulated refuse is covered with a layer of soil or alternative daily cover, which is made from a combination of soil and “fines” (dirt, grass, and small pieces of plastic and glass) from the Materials Recovery Facility (MRF). The cover serves to minimize landfill odors and prevents birds, rodents, and insects from being attracted to the refuse.

The decomposing refuse produces methane, a flammable, greenhouse gas. The methane gas is collected, which reduces the amount of gas in the atmosphere and protects against potential health hazards. The Western Placer Waste Management Authority has contracted with Energy 2001, which uses most of the gas to generate electricity. The Energy 2001 facility is currently capable of generating 4.8 megawatts, which are delivered back to the electrical grid. Maintenance of the control systems is ongoing and will continue through the 30-year landfill post-closure period, as required by state law. Lighting at the site allows for operations to occur before dawn and after dusk.

When the landfill reaches maximum capacity, it will be “capped” to prevent liquids from coming into contact with the refuse. The landfill cap will be similar to the layered construction of the liner system and includes a top layer of soil to support native grasses, helping the closed landfill to blend in with the natural surroundings.

The current landfill is expected to operate through 2058. Landfill expansion that could take place on two adjacent properties is likely to occur during the permit term and is a Covered Activity. The properties owned by the Authority are a 158-acre parcel east of the existing WRSL boundary and a 457-acre parcel west of Fiddyment Road (commonly known as the Lastufka property). The parcels are identified as Western Placer Waste Management Authority on Figure 2-9. In 1991 a conditional use permit was approved to expand the existing WRSL operations onto the Lastufka property.

A variety of covered solid waste activities could take place on the existing facility property or either of the two adjacent properties as a result of expansion. Such activities might include siting a new landfill; producing energy through landfill gasification, pyrolysis, anaerobic digestion, or other waste-conversion technology; relocating the compost facility or recycling centers or other drop-off

facilities; developing a solar array for on-site electricity demands; creating an alternative fuel and/or electric vehicle fueling station; providing pipeline compressed landfill gas/natural gas to third-party end users in and/or adjacent to the Sunset Industrial Area; or establishing a rail spur to establish off-site transport of recyclables and household hazardous waste.

2.6.5.4.2 Materials Recovery Facility

The MRF is a key element of the Authority's program to help Placer County communities meet California's Assembly Bill 341 mandated recycling goals of diverting at least 75 percent of the waste stream from landfills by 2020. Ongoing operations, relocation, or construction of a new MRF will be a Covered Activity.

The MRF is an integral part of the landfill operation. It is an enclosed, warehouse-style facility where municipal solid waste is accepted and sorted into recyclables and waste that will be buried. The MRF receives and sorts through both municipal and commercial waste to recover recyclable materials, including wood, green waste, metals, plastics, glass, paper, junk mail, phonebooks, magazines, scrap paper, paperboard, and cardboard. Materials that cannot be recycled and marketed are disposed of at the WRSL. The MRF was expanded in 2007 to ensure sufficient operating capacity and to meet projected population growth, increasing processing capacity to more than 2,000 tons of refuse per day.

The MRF is permitted to accept 1,750 tons per day and 1,014 vehicles per day. Hazardous wastes are illegal to dispose of with household garbage. These items are accepted at the MRF's Permanent Household Hazardous Waste Collection Facility, segregated using methods dictated by regulations, and shipped off site to an authorized disposal facility.

Yard waste is also separated from the waste stream and is converted to soil through a composting process. The MRF includes a paved pad used for preparing compost. The compost operation consists of grinding yard waste, composting it in windrows on a paved pad, regularly turning the compost, adding water, monitoring temperature and texture, and moving the finished compost to a stockpile.

2.6.5.4.3 The Loomis Landfill (Closed)

The Placer County Department of Public Works owns and operates the Loomis Landfill, a closed unlined Class III landfill on Ong Place near the intersection of King Road and Penryn Road. The facility includes a single 20-acre unlined landfill, associated access roads, drainage facilities, gas collection facilities, a gas flare station, a drain sump for extraction of leachate and impacted groundwater, and a former borrow area. The landfill operated from 1959 to 1979, accepting household, commercial and industrial refuse. The landfill stopped accepting all but inert wastes in 1979 and was closed in 1986.

The Loomis Closure Plan was adopted in 1996 and describes how corrective actions, final closure, and post-closure maintenance activities meet the requirements of the California Code of Regulations (CCR), Title 23, Chapter 15, administered by the Regional Water Quality Control Board, and CCR Title 27, subchapter 5, administered by the California Department of Resources Recycling and Recovery.

Corrective actions include installation of a low-permeability cover to reduce infiltration of rainwater, installation of a vegetative layer to protect the low-permeability cover to reduce erosion and to minimize cracking of the cover, and installation of an in-fill landfill gas control system to eliminate or reduce migration of landfill gas.

Post-closure maintenance activities describe the implementation of the post-closure maintenance plan at the Loomis Landfill to maintain the landfill for a period of not less than 30 years after final closure. The plan includes inspection, maintenance and monitoring activities for the final cover, drainage systems, vegetative cover, final grading, landfill gas collection system, leachate collection, and disposal.

Loomis Landfill was approved as closed by the Local Enforcement Agency by letter dated June 18, 1998. The minimum 30-year post-closure maintenance period will extend through 2028. The closure plan describes the post-closure land use of the site to be consistent with the surrounding terrain, land uses, and zoning. The site is planned to be maintained as open space, most likely as annual grassland, and may allow for recreation activities.

2.6.5.5 Public Recreation-serving Activities

Permittees' recreation-serving activities—establishing and maintaining public recreation facilities—are Covered Activities, although public use of the facilities is not. Public parks and recreation activities include construction of new parks, adaptation of existing public lands for enhanced recreational access, and O&M of all facilities. Many County and most City parks and trail facilities will be within, or close to, urban areas. Covered public parks and recreation-serving activities may occur anywhere within Plan Area A.

The effects of trail stream crossing are discussed in Section 2.6.6, *In-Stream Activities*. Passive forms of recreation may be allowed on some lands acquired for the Reserve System. Construction and maintenance of trail and other recreation facilities on the Reserve System are discussed in Section 2.6.7, *Conservation Programs.*

2.6.5.5.1 New Parks

The County and City parks will include trails, recreation facilities, and other park infrastructure, including restrooms, parking areas, maintenance facilities, restrooms, wildlife observation platform facilities, and educational kiosks. To the extent possible, recreational facilities will utilize existing infrastructure such as existing trails and fire or ranch roads.

The Auburn/Bowman, Dry Creek/West Placer, Granite Bay, and Horseshoe Bar/Penryn Community Plans, the Dry Creek Greenway Vision Plan, and the Placer County Regional Bikeway Plans propose trail networks that will be constructed over time. As each of these plans and the Placer County General Plan are updated, trail alignments will be modified as conditions warrant.

The existing Placer County Fairgrounds within the city of Roseville may relocate within western Placer County. A new fairground would include multiple venues for year-round use.

2.6.5.5.2 Park and Trail Maintenance

Both Placer County and the City maintain and manage park and open space areas as Covered Activities within this Plan. This includes trail and road maintenance, installation of fencing, facility maintenance, prescribed burns, pond maintenance (including draining and dredging), and invasive vegetation management. Vegetation management activities include the removal of exotic species, planting of native vegetation, and livestock grazing. Trail maintenance includes grading, clearing, brushing, erosion control, paving, re-paving, and trail restoration. If a park is to be included as part

of the Reserve System, details for maintenance will be provided within the Reserve Management Plan (Section 5.3.2.1, *Reserve Management Plans*).

2.6.5.5.3 Hidden Falls Regional Park

Hidden Falls Regional Park (Hidden Falls) is a 1,200-acre park located between north Auburn and the City of Lincoln. Expansion of park facilities will be included as a Covered Activity under the Plan (e.g., additional roads, trails, staging and parking area, maintenance and caretaker buildings, and a nature/education center). Trail connections to Placer Land Trust and Bear Yuba Land Trust properties are anticipated and will also be covered. Public uses of the parks are not covered. Hidden Falls currently features natural surface trails suitable for hiking, running, biking, and horseback riding. In addition to the more vigorous activities on the natural surface trails, park visitors are able to enjoy fishing, picnicking, wildlife viewing, photography, and other passive recreational pursuits. Other park amenities include a paved access road, 50-space paved parking lot, equestrian staging area, utilities, restrooms, a 60-foot emergency-access bridge over Deadman Creek, and a similar bridge over Raccoon Creek.

2.6.5.6 Utility Line Construction and Facility Maintenance

Numerous pipelines and cables in the Plan Area are maintained by the Permittees or by public or private utilities, natural gas companies, petroleum companies, or telecommunications companies acting under Permittee authority, including franchise and encroachment within Permittee-owned roadway or other rights-of-way. These private companies also operate and maintain electric substations, gas valve stations, radio broadcasting towers, and cellular telephone towers, among other facilities. Covered utility line construction and facility maintenance activities may occur anywhere within Plan Area A.

Public and private utility activities that are directly subject to the authority of a Permittee are Covered Activities. Public and private utility activities that are regulated by or subject to the authority of another entity such as the California Public Utilities Commission are not covered by this Plan. Some energy or water utilities may already have their own endangered species permits for their activities (e.g., PG&E is developing its own Habitat Conservation Plan (HCP) for O&M activities) and will therefore not require coverage under this Plan. A utility may request coverage under the Plan for routine maintenance and repair of existing utilities within the Plan Area as a Participating Special Entity (see Section 8.9.4, *Take Authorization for Participating Special Entities*).

Maintenance or repair of linear facilities may involve vegetation clearing (e.g., mowing, disking, herbicide spraying, tree trimming) or excavation of underground utility lines for inspection, maintenance, or replacement. The routine maintenance of utility lines in the Plan Area is a Covered Activity under this Plan, except for the use of pesticides, which is not covered by the federal permit. Coverage for utility line or facility maintenance that takes place in the Reserve System will be decided on a case-by-case basis and the Permittee may need to consult with the Resource Agencies as needed.

2.6.6 In-Stream Activities

In-stream activities are those occurring within streams—typically the top of the bank or the outer edge of the riparian canopy, whichever is more landward. This category addresses projects that occur within streams and may result in effects on a stream, reservoir, or on-stream ponds. This category includes O&M activities in the stream channel, along the streambank, and on adjacent lands at top-of-bank within the riparian corridor. Covered in-stream activities may occur anywhere within Plan Area A.

In-stream activities that are covered under this Plan include the following:

- Urban and rural development and public program activities described above under Sections 2.6.1, *Valley Potential Future Growth (A1)*, to 2.6.5, *Regional Public Programs*, that overlap with the Stream System and the adjacent riparian corridor, including transportation, water supply, wastewater management, and stormwater management.
- Bridge construction, replacement, and repair, including vehicular, train, and pedestrian bridges (see discussion in following section).
- Flood control and stormwater management, including water retention/detention facilities construction, streambed and channel debris and vegetative control and removal, channel lining of canals, canal realignment, culvert replacement, maintenance of access roads, beaver dam removal, stormwater conveyance facilities and outfall structures, erosion/sediment control, bank stabilization, and floodplain enhancement (see discussion in following section).
- Maintenance of existing flood protection and stormwater facilities such as drainage improvements, existing dams, armored creeks, bypass channels, and stormwater ponds. Maintenance includes trail repair, trash removal, installation of fences, accumulated sediment removal (primarily in reservoirs), road, culvert, and minor bridge repair.
- Natural resource protection such as bank stabilization projects, restoration to reduce erosion, and fish passage enhancements.
- Erosion control projects or storm damage prevention projects that do not create new permanent structures or hardscape on the creek bank or channel. This category includes temporary flood-fighting activities to prevent storm damage (e.g., temporary flood fighting would include sandbagging and earth-fill levees).
- Vegetation management for exotic species removal and native vegetation plantings, including the use of livestock grazing and prescribed burns.
- Reservoir fluctuations including drawdown and filling for maintenance or operational purposes (i.e., not associated with a capital project).
- In-stream gauge station monitoring (installation and maintenance).
- O&M of water system facilities that are located in-stream.
- Implementation of Resource Management Plans.
- Water utility/water supply O&M activities associated with habitat enhancement and restoration that will be conducted inside and outside the Reserve System are identified in Section 2.6.7, *Conservation Programs*.

- Implementation of the Riverine and Riparian Conservation and Management Strategies (Chapter 5, *Conservation Strategy*), including cleaning/removing sediment from gravel beds and augmenting gravel to streambeds, among other in-stream conservation activities.

As may be noted from this list, some in-stream projects are intended to mitigate, enhance, or restore stream and riparian functions. As of 2013, a number of restoration activities are already underway in the Plan Area, and more are expected in the future.

2.6.6.1 Bridge Construction and Replacement/Rehabilitation

Placer County and the City of Lincoln operate and maintain bridges within the Plan Area and have permit authority over privately constructed and maintained stream crossings. The existing distribution of stream crossings is shown on Figure 2-10.

The lifespan of a typical bridge is approximately 50 years. Most of the bridges within the Plan Area will be replaced or rehabilitated during the Plan's permit term. Similarly, as development within rural and urban areas progresses, new bridges will need to be constructed. It is estimated that there will be construction of up to 75 new bridges over the 50-year permit term. New and rehabilitated bridges will be designed and constructed consistent with federal and state guidelines. Bridge construction and replacement/rehabilitation activities covered by the Plan may occur anywhere within Plan Area A and Permittee Activity in Non-participating City Jurisdiction (B1).

New construction, repair, and replacement, including expansion, of all existing bridges conducted by Permittees within Plan Area A and Plan Area B1 are Covered Activities. Figure 2-10 shows the location of several planned major bridge projects. Other, yet-unplanned stream crossings will be associated with future growth, mainly in the PFG where the density of stream crossings will increase, similar to the density of crossings in the built-up portion of the non-participating cities, as shown on Figure 2-10.

In most cases, replacement bridges will be wider than the bridges they replace, in compliance with changing regulations. Some roads may be widened to accommodate growth in vehicular traffic, bicycles, and pedestrians. Road widening will require adding imported borrow and new asphalt, concrete, and aggregate base for pavement.

Where free-span bridges are not feasible, bridges will be built on pile foundation, cast-in-drilled-hole pile, or spread footing foundations. Excavation for foundations may be required. Where multiple span bridges are necessary, consideration will be made to locate the piers and foundations outside of the low-flow stream channel or away from other resources when feasible. Bridge repair and rehabilitation may be similar to bridge replacement in scope, often requiring roadway widening, new deck support structures, and seismic retrofitting.

Additional detail on estimated extent of bridge and culvert work is provided in Chapter 4, *Effects of Covered Activities*.

2.6.6.2 Flood Protection Projects

The Placer County Flood Control and Water Conservation District was established in 1984 by the state legislature as a special district, separate from County government, to address flood control issues arising with growth. The district boundaries are the same as Placer County boundaries. Covered flood protection project activities may occur anywhere within Plan Area A and Permittee Activity in Non-participating City Jurisdiction (B1). It is expected that the District would become a

Participating Special Entity, as described in Section 8.9.4, *Take Authorization for Participating Special Entities,* and the following activities would be covered under the PCCP.

The District has several projects planned to address flood protection. These projects have been identified through various programs that provide different funding mechanisms and guiding principles of how projects will be planned and designed. Table 2-9D provides a list of flood control projects, including flood protection capital projects, anticipated to occur within the Plan permit term. Those projects for which project descriptions are currently available are described below. For other projects, location is provided. It is assumed that these projects will contain the same design elements as those for which a project description has been developed.

Table 2-9D. Flood Control and Water Conservation Projects

Activity	Description
Scilacci Farms Regional Retention Project	Stormwater retention project with wetlands and agricultural conservation easements located north and south of Raccoon Creek immediately east of the Sutter county line. Refer to section 2.6.6.2.1, *Scilacci Farms*, for additional project details.
Regional Retention Projects within Cross Canal Watershed	Stormwater retention projects with wetlands and agricultural conservation easements within floodplain areas of streams within the general Cross Canal Watershed, including Pleasant Grove Creek, Curry Creek, Auburn Ravine, Markham Ravine, and Raccoon Creek.
Dry Creek Watershed Flood Control Plan – Regional Detention Projects	Both on- and off-channel stormwater detention projects located throughout the Dry Creek Watershed. Refer to Section 2.6.6.2.3, *Dry Creek Watershed Flood Control Plan*, for additional project details.
Dry Creek Watershed Flood Control Plan – Regional Floodplain Restoration Projects	Floodplain restoration/reconnection projects located throughout the Dry Creek Watershed. Refer to section 2.6.6.2.3, *Dry Creek Watershed Flood Control Plan*, for additional project details.
Dry Creek Watershed Flood Control Plan – Bridge/Culvert Replacement Projects	Bridge and culvert improvement projects throughout the Dry Creek Watershed
Dry Creek Watershed Flood Control Plan – Conveyance and Channel Improvement Projects	Improvements to underground conduits, artificial channels, and natural channels throughout the Dry Creek Watershed
ALERT Flood Warning System of Precipitation and Stream Level Gages	Installation, monitoring, and maintenance of remote stream data sensors throughout Dry Creek and Cross Canal Watersheds
Dry Creek Watershed Stream Channel Maintenance Program	Stream channel clearing and conveyance maintenance activities throughout flood-prone locations within Dry Creek Watershed
Operations, Monitoring and Maintenance activities at the District's Miners Ravine Off-channel Detention Basin Facility	Routine annual maintenance and monitoring as well as non-routine maintenance and operation activities at the District's facility located in Roseville, California

Source: Placer County

Flood Control O&M: Flood control O&M activities that occur throughout the Plan Area streams include, but are not limited to, installation, monitoring, and maintenance of remote stream data sensors; stream channel clearing; vegetation and debris removal; and conveyance maintenance activities.

Flood Control Capital Improvements: Many of the flood protection capital improvement projects incorporate design elements that provide on-site avoidance, minimization, and mitigation for both in-stream and riparian habitat. Enhancement and creation of riparian habitat is coupled with removal of invasive species and planting of native species. In-stream design elements could include fish passage improvement through the removal of fish barriers, placement of fish ladders, and other in-stream habitat enhancements. Additional design elements may be incorporated to protect in-stream water quality by reducing erosion, sedimentation, and turbidity as well as removing unauthorized storm drain outfalls. The plans described below have been prepared to prioritize projects within the watersheds.

2.6.6.2.1 Scilacci Farms

Changes in agricultural practices on the Scilacci Farms property are proposed to relieve flood pressures along levees in the Cross Canal. The 456-acre Scilacci Farms property currently consists of about 330 acres in rice production, 55 acres in wheat production, a remnant 39-acre riparian valley-oak and cottonwood-willow riparian forest, a 22-acre fallow rice field restorable to riparian forest, 7 acres of wetlands, and other miscellaneous agriculturally managed areas. The property provides valuable habitat for a variety of wildlife species, including amphibians, reptiles, birds, and mammals.

The proposed project would be to place the property under a conservation/flood control easement and manage the land for agricultural production, ecological function, and flood protection. In addition to achieving these goals the project will allow for the realization of important restoration goals on the property. Both oak woodland enhancement and riparian restoration would be part of this project. The easement and restoration work will provide ecological benefits, including flood protection, erosion control, and water quality enhancements. The Scilacci Farms project utilizes several of the strategies recommended in the ERP for the Raccoon Creek watershed.

2.6.6.2.2 Lakeview Farms Volumetric Mitigation Facility

As the City of Lincoln and Placer County grow, the need to ensure protection of life and property from flooding will increase. One of the capital flood control projects within the unincorporated portion of Placer County is the Lakeview Farms volumetric mitigation facility that will be constructed by the City of Lincoln.

The City of Lincoln has purchased 456 acres north of Waltz Road in the unincorporated portion of Placer County to construct an off-channel (off Raccoon Creek) retention facility for flood control purposes. The project is being constructed in phases to passively capture flood water during a 100-year event. Phase one of the project will be developed on 160 acres of rice fields to impound 1,030 acre-feet of stormwater, with phase two being developed on 160 acres retaining an additional 1,570 acre-feet of water. The site will function as a retention basin only in extreme (100+ year) storm events during the rainy season of December through April and will remain in rice production from approximately March through September.

Raccoon Creek's peak flows can range from several hundred cubic feet per second to more than 22,000 cubic feet per second in a 100-year event. Because the stream channel is generally shallowly incised and meandering, high-flow events are not contained within the channel and extensive overland flow occurs. It is common for flood waters of 1 to 2 feet to occur on the Lakeview Farm property. Raccoon Creek includes 33.3 river miles of channel between the Cross Canal and Dry Creek Dam. The flood reduction benefits of the planned improvements are difficult to quantify without hydrologic modeling. However, the recently completed Raccoon Creek ERP for the

watershed found that stormwater runoff from developed areas is a major source of water quality degradation in Raccoon Creek. By protecting this property from future development, stormwater runoff from the site will not increase and will not be a future source of water quality degradation.

2.6.6.2.3 Dry Creek Watershed Flood Control Plan

The purpose of the Dry Creek Watershed Flood Control Plan (2010) is to provide the District and other governmental agencies in both Placer and Sacramento Counties with the information and policies necessary to manage flood waters within the Dry Creek watershed, which includes Miners Ravine, Linda Creek, Secret Ravine, Antelope Creek, Cirby Creek, Clover Valley Creek, and main stem Dry Creek. The Plan evaluates existing flooding problems and identifies flood management options as well as a funding mechanism to achieve Plan recommendations.

Capital project elements within this Plan include on- and off-channel stormwater detention projects located throughout the watershed, floodplain restoration and re-connections, bridge and culvert improvement projects, and improvements to underground conduits and artificial and natural channels.

2.6.6.2.4 Cross Canal Watershed Flood Control Plan

The *Cross Canal Watershed Flood Control Plan (Auburn Ravine, Coon, and Pleasant Grove Creeks Flood Mitigation)* (1993) provides the District and other governmental agencies in Placer, Sutter, and Sacramento Counties with the information and policies necessary to manage floodwaters within the Cross Canal watershed, which includes Pleasant Grove, Curry Creek, Auburn Ravine, Markham Ravine, and Raccoon Creek. Activities associated with this plan will be covered under the HCP, including the following:

- Flood management
- Stormwater retention projects
- Conservation easements over existing agricultural and wetland areas compatible with periodic flooding that fall in Placer County

The plan evaluates existing flooding problems and identifies flood management options as well as a funding mechanism to achieve plan recommendations.

State and federal grant funding will support the District and its co-sponsors' efforts to acquire flood and habitat conservation easements to manage and improve the floodplain and associated natural communities within this watershed. The District's pursuit of flood and conservation easements on rice production lands will complement efforts on nearby agricultural lands, including a site protected by the California Department of Water Resources that also provides improved floodplain and riparian protection. These nearby properties include the 138-acre Lakeview Farms Conservation project, as well as the Lakeview Farms Natural Resources Conservation Service conservation easements that are part of a larger restoration effort within the Raccoon Creek watershed. Wetlands will be reconstructed to benefit waterfowl and migratory birds that are found in the area. Acquisition of flood and conservation easements in these areas will conserve agricultural lands adjacent to Auburn Ravine and Raccoon Creek in an area of increasing development pressure. The goals of the Cross Canal Watershed Flood Control Plan are as follows:

- Quickly and efficiently provide increased volumetric storage (retention) within the existing floodplain during a 100-year flood event

- Preserve and maintain wetlands
- Preserve open space, providing linkages with surrounding preserve areas
- Benefit migratory birds and wildlife
- Maintain habitat and connectivity for state and federal species of concern
- Provide flood control benefits quickly and at relatively low cost per acre-foot of storage

2.6.6.3 Streamside Trails and Crossings

The County and the City, as well as other non-profit entities (i.e., Placer Land Trust), lead or participate in programs to construct passive recreational trails in parks, as identified above (Section 2.6.5.5, *Public Recreation-serving Activities*). New trails are sited outside of the in-stream area to the extent possible to avoid effects on riparian vegetation and streams. However, some trails will need to cross streams and will require installation of bridges or other types of crossings. Trails may also be implemented as a component of other types of projects such as flood protection projects or levee reconstruction. In such cases, trails will generally be sited along maintenance roads or in other disturbed areas and will not result in additional effects beyond those attributed to the main project. Streamside trail projects will be a Covered Activity under this Plan. For more details on trail projects as a Covered Activity, please see Section 2.6.5.5, *Public Recreation-serving Activities*.

2.6.7 Conservation Programs

2.6.7.1 PCCP Management Activities

In addition to the projects described above, the Plan provides coverage for activities associated with implementation of the conservation strategy. The management activities that will be used on the Reserve System are described in detail in Chapter 5, *Conservation Strategy*. Implementation of the conservation strategy may occur anywhere in the Plan Area, but most of these activities will take place within the Reserve System assembled in Plan Area A. Some conservation activities may also occur outside of the Reserve System, specifically as associated with the in-stream conservation measures discussed above in Section 2.6.6, *In-Stream Activities,* and in Plan Area B Big Gun Conservation Bank (B5), for California red-legged frog (see Figure 2-8).

2.6.7.1.1 Habitat Enhancement, Restoration, Creation, Translocation, and Reserve Management

This category includes all management measures, including habitat restoration and creation, required by the Plan or other measures that might be necessary to achieve Plan biological goals and objectives. The PCCP's conservation strategy sets forth requirements for habitat enhancement, restoration, and creation. Enhancement and management actions that will be used within the Reserve System are described in detail in Chapter 5, *Conservation Strategy*.

Restoration and creation are an important component of the conservation strategy. Restoring and creating new wetlands will permanently affect existing, pre-restoration/creation habitat by converting that habitat (generally agricultural land, grasslands, or disturbed land cover) to wetlands and other natural communities (e.g., valley oak woodland). Habitat restoration and creation activities will generally be disruptive only in the short term. These activities may involve soil disturbance, removal of undesirable plants, and limited grading. All habitat restoration and creation

is expected to result in a net long-term benefit for Covered Species and natural communities. However, these activities may have temporary or short-term adverse effects and may result in limited take of Covered Species (see Chapter 4, *Effects of Covered Activities*). All habitat enhancement, restoration, and creation activities conducted within the Reserve System that are consistent with the requirements of the PCCP are covered by the permits. Habitat enhancement, restoration, and creation activities may also be conducted outside the Reserve System. If such activities occur and are consistent with this Plan, they are covered by the permits. Examples of such activities include restoration projects conducted as mitigation that require additional coverage beyond the self-mitigating aspects inherent to most restoration projects. Examples of habitat enhancement, restoration, creation, and reserve management activities include, but are not limited to, the following:

- Management measures identified in Chapter 5, *Conservation Strategy*, intended to maintain, enhance, restore, and create habitat for Covered Species (additional details provided below).
- Vegetation management, including management of invasive plants, using livestock grazing, mowing, manual labor, and/or prescribed burning. Pesticide use is permitted under the Plan only to achieve biological goals and objectives (e.g., exotic plant or exotic animal control), in accordance with label instructions, and in compliance with state and local laws. Pesticide use is proposed for coverage only under the Natural Community Conservation Planning Act, not the ESA. Implementation of integrated pest management programs established by the local jurisdictions is only a Covered Activity if pesticides are used to achieve exotic plant or exotic animal control. Any pesticide use must comply with USEPA's Pesticides: Endangered Species Protection Program.
- Collection of cysts from covered branchiopods (i.e., Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp) for depositing in a cyst bank with Wildlife Agency approval.
- Relocation of Covered Species from affected sites and within the Reserve System where effects are unavoidable and relocation has a high likelihood of success. This is expected to occur in very limited circumstances subject to Wildlife Agency review and approval, except for collection of seeds and cysts of covered vernal pool plants and branchiopods, respectively (see above bullet points). See Chapter 6, *Program Participation and Conditions on Covered Activities*, for details.
- Demolition or removal of structures, roads, or man-made livestock ponds to increase public safety or to restore habitat.
- Control of introduced predators (e.g., feral cats and dogs, pigs, non-native fish, bullfrogs).
- Management activities for burrowing owls such as population augmentation, and owl relocation for conservation purposes.
- Surveys and monitoring for mitigation and restoration/habitat enhancement projects.
- Use of motorized vehicles for patrolling, maintenance, and resource management activities in the Reserve System.
- Use of mechanized equipment for construction, maintenance, and resource management projects in the Reserve System.
- Installation of wells, canals, irrigation lines, and other water conveyance facilities, the water from which will be used to fill stock ponds, troughs, and other storage facilities for cattle.

- Travel through the Reserve System by habitat managers or Wildlife Agency personnel. Off-trail travel will be kept to the minimum amount necessary to perform maintenance, management, or patrol activities.
- Fire management including prescribed burning, mowing, and fuel-break establishment and maintenance (see Section 2.6.7.1.3, *Fuel Management,* below).
- Collection and processing (e.g., chipping for transportation, trimming, and bucking of logs) of waste biomass materials that result from fuel management activities.
- Hazardous materials remediation, such as appropriate closure of underground storage tanks, soil remediation, cleanup of illegal dumping, etc.
- Repair of existing facilities damaged by floods, landslide, or fire.
- Restoration and enhancement projects in vernal pool grasslands, streams, riparian areas, wetlands, and uplands.
- Fish passage enhancements including removal of fish barriers, such as low-flow crossings and development of fish screens.

2.6.7.1.2 Monitoring and Research

Biologists will need to conduct surveys for all Covered Species, natural communities, and other resources within the Reserve System on a regular basis for monitoring, research, and adaptive management purposes. These surveys may require physical capture and inspection of specimens to determine, identify, and mark individuals, or measure physical features, all of which may be considered take under the ESA or the California Endangered Species Act (CESA). Surveys for Covered Species will also be conducted on private land being considered for acquisition for the Plan. Although these surveys are not expected to require as much handling of individuals, take may still occur. Surveys for all Covered Species will be conducted by qualified biologists. All such survey activity consistent with this Plan is covered by the ESA and NCCP permits.

Research conducted by biologists on Plan reserves in support of the Plan is covered by the permits as long as the research projects have negligible effects on populations of Covered Species. Research on Plan reserves unrelated to the Plan is not covered by the permits because the nature and effects of these future research projects cannot be predicted at this time and these researchers will not be bound by the terms of the permits. Such researchers would be granted access to Reserve System properties on a case-by-case basis and such access will be conditioned on compliance with the terms of this Plan.

2.6.7.1.3 Fuel Management

Each Reserve System unit will have a fire management component included within the PCCP reserve management plans (see Chapter 5, *Conservation Strategy*, Section 5.3.2.2.1, *Content of Reserve Unit Management Plans*). The fire management component will describe site-specific conditions and actions required to (1) reduce existing fuel loads, (2) re-introduce fire as a natural process of the ecosystem (if permissible), (3) minimize environmental effects and protect sensitive resources, and (4) enhance and/or restore natural community characteristics.

Preservation of reserve lands in perpetuity will require that they be managed to reduce their susceptibility to catastrophic wildfire as well as to meet the ecological objectives of this Plan.

Dr. Richard R. Harris, a registered professional forester and ecologist, prepared fuel management guidelines for the PCCP. Appendix F, *Fuel Management,* outlines several policies, procedures, and prescriptions for managing wildfire risk in conservation reserves through treatment of fuels. Specifically, it recommends that each reserve area have a fire management component included within the required management plans.

Reduction of fuels has three main purposes: (1) reduce fire severity within reserves, (2) reduce the ability for a fire to spread from a reserve to adjacent lands, and (3) reduce the ability for a fire to spread from adjacent lands to a reserve. Wildfire presents a significant threat to the sustainability of current and future conservation reserves. Wildfires that may start on conservation reserves pose a threat to adjacent properties.

Fuel treatments will be aimed at preventing or at least impairing the spread of a fire and reducing fire severity. Fuel treatment zones include property boundaries, public roads, and the interior of reserve parcels. In oak woodlands, shaded fuel breaks may be used along roads, at property boundaries, and within parcels to impair fire spread. Fuel breaks can be used at the periphery of vernal pool grasslands. Fuel treatments in riparian woodlands should focus on the interface between the upland and riparian vegetation.

Within the Reserve System, oak woodlands have the highest inherent wildfire risk. Overly dense riparian woodlands are second in degree of risk. Vernal pool grasslands have a relatively lower risk because only one fuel type is present (generally no shrubs or trees), terrain is generally shallowly sloped, and the vegetation is adapted to fire.

Several approaches will be used to reduce fuels. The choice of approach is affected by environmental constraints, costs, and other social and ecological considerations. The highest priority in the Reserve System is to protect natural and semi-natural communities and Covered Species and their habitats. Any fuel treatment must meet this requirement. BMPs will be included in fuel treatments to prevent or minimize impacts on streams, cultural resources, wetlands, soils, wildlife, and PCCP Covered Species or other special-status species (see Chapter 6, *Program Participation and Conditions on Covered Activities*). The strategy should emphasize avoidance of effects.

2.6.7.1.4 Recreation

The PCCP will develop limited recreation opportunities within the Reserve System according to the requirements in Section 5.3.2.2.1, *Content of Reserve Unit Management Plans*, and Chapter 6, *Program Participation and Conditions on Covered Activities*, Reserve Management Conditions 1 through 3. These activities are expected to be minimal but may include trails and associated infrastructure. The PCCP limits future reserves (not including jump-start lands) to 70 miles of trails, with an average width of 6 feet (50 acres). All trails and recreation facilities will be constructed to minimize effects on Covered Species and vegetation communities and in compliance with the guidelines in Chapter 5*, Conservation Strategy,* Section 5.3.2.1, *Reserve Management Plans*).

Recreational uses will only be allowed within the Reserve System if the PCA determines that they are consistent with the biological goals and objectives of the Plan and are consistent with a reserve unit management plan approved by the Wildlife Agencies. Allowed uses will be specified in the reserve unit management plan and may include hiking, non-motorized bicycle riding, walking, horseback riding, fishing and hunting, wildlife observation, photography, and environmental education and interpretation on designated trails at appropriate sites or other similar low-intensity activities.

2.6.7.1.5 Reserve System Infrastructure

This category also includes construction, maintenance, and use of facilities needed to manage the Reserve System including, but not limited to, reserve field offices, maintenance yards, maintenance sheds, workshops, storage space (e.g., for machinery, vehicles) carports, driveways, roads, bridges, fences, gates, wells, stock tanks, stock ponds, and a native plant nursery to support restoration and enhancement projects. All Reserve System management structures will be constructed to minimize effects on Covered Species and vegetation communities and in compliance with the guidelines in Chapter 5, *Conservation Strategy*, Section 5.3.2.1, *Reserve Management Plans*, and conditions on Covered Activities described in Chapter 6, *Program Participation and Conditions on Covered Activities*. Facilities existing at the time of land acquisition will be used whenever feasible.

2.6.7.1.6 Emergency Activities

An emergency is a situation involving disasters, casualties, national defense, or security emergencies and includes response activities that must be taken to prevent imminent loss of human life or property (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). The Wildlife Agencies will not obstruct an emergency response decision made by the Permittees when human life is at stake. Responses to changed circumstances within Plan reserves that may affect populations of Covered Species are covered under this Plan. Foreseeable emergency activities include, but are not limited to, the following:

- Firefighting of small wildfires or structure fires
- Evacuation of injured persons or livestock
- Minor hazardous materials remediation (including remediation and cleanup of illegal dumping prior to acquisition)
- Repair of existing facilities damaged by floods or fire
- Use of motorized vehicles for conducting activities

2.6.7.2 PCCP In-stream Conservation Activities

The Plan provides coverage for projects and activities associated with implementation of the conservation strategy. In-stream conservation activities are covered anywhere they may occur in Plan Area A or Plan Area B, Permittee Activity in Non-participating City Jurisdiction (B1); Raccoon Creek Floodplain (B3); or Fish Passage Channel Improvement (B4). Components B3 and B4 are located in Sutter County, just west of Placer County (see Figure 2-6 and Figure 2-7). Raccoon Creek in Placer County and those Sutter County plan components are currently under study to identify the effect of hydrology, water quality, channel geomorphology, and riparian vegetation on salmonids.

PCCP in-stream conservation activities may occur on private and public lands outside the Reserve System. As discussed in Chapter 5, *Conservation Strategy*, these actions will require agreements to be reached with landowners to allow the installation and maintenance of the conservation measures. Measures that are implemented outside the Reserve System will occur primarily along stream and riparian areas.

In-stream conservation activities are listed below (see Chapter 5, *Conservation Strategy,* for details). Note that there is overlap between in-stream conservation measures and those that will occur outside of the stream in the surrounding Stream System.

- Stream barrier removal or modification.
- Vegetation management, including mechanical removal of invasive weeds in streams.
- Installation of woody debris or rocks to enhance aquatic habitat in streams.
- Gravel augmentation and gravel cleaning conducted to enhance or restore spawning sites for Covered Species.
- Actions to address invasive animal species or invasive plant species control beyond vegetation management.
- Restoration of in-stream and riparian habitats.
- Surveys and monitoring for mitigation and restoration/habitat enhancement projects.
- Monitoring of Covered Species (i.e., salmonids, California red-legged frog, foothill yellow-legged frog, western pond turtle) and natural communities.
- Landowner outreach and education programs that target landowners along streams. Willing landowners may receive technical assistance from the PCA to reduce erosion and sedimentation into nearby streams.

2.6.7.2.1 Stream Barrier Modification Projects

The PCCP conservation strategy provides for removal of fish passage barriers (Table 3-4) and other projects that improve fish passage. These projects are based on recommendations from the *Anadromous Fish Screening and Passage Opportunities in Western Placer County and Southern Sutter County* report (Bailey 2005) and will include removal of the following passage impediments:

- Hemphill Dam, including the construction of a fish ladder and/or removal of the dam and restoration of the riparian zone (NID owned)
- Cottonwood Dam, including riparian restoration (privately owned)
- Culvert at Doty Ravine on Garden Bar Road (County owned)
- Nelson Lane Dam
- Raccoon Creek and Waltz Road dam near the Sutter county line

The removal or modification of these passage impediments will require the cooperation of private entities or public agencies that are not currently Permittees of this HCP/NCCP. In the event these facilities cannot be modified or removed because they are not under the control of the Permittees, alternative fish passage improvements will be recommended to the Wildlife Agencies for Doty Ravine, Raccoon Creek, Auburn Ravine, or salmonid streams in the Dry Creek watershed.

Other dams and diversion structures that could be removed or modified include the Lincoln Ranch Duck Club Dam, Coppin Dam, Davis Dam, New Moore Dam, Tom Glenn Dam, and Aitken Ranch Dam. The PCA may work with the NID to improve fish passage at its facilities, including the NID Doty Ravine south diversion structure, Camp Far West Canal, and Goldhill Dam.

2.6.7.2.2 In-channel Habitat Improvement

When opportunities exist, the PCA will remove or modify in-channel features within, and outside of, the Reserve System to restore in-stream habitat. Potential restoration measures include removal of fish passage barriers (discussed above); removal of features such as riprap, dikes, and levees and the setting back and/or stabilization of creek banks; and the re-establishment of historical stream morphology.

In-channel conservation measures may include the removal of anthropogenic features (e.g., concrete, earthen, or otherwise engineered channels) as well as measures that modify specific elements of in-channel habitat. Methods to improve in-channel habitat include removing non-native vegetation and revegetating with native plants to influence physical processes; installing large woody debris and other in-stream structural elements, such as rocks and boulders, to improve channel complexity and to promote woody debris recruitment and enhance rearing habitat; and augmenting gravel within potential spawning grounds.

Channel restoration may entail reconstruction of a channel or incremental process restoration (installation of a natural structural feature to induce change in a channel). Channel restoration guidelines and designs are presented in Flosi et al. (1998) and Circuit Rider Productions (2004). Channel restoration can also be used to restore bank stability and reduce bank erosion, thereby improving aquatic habitat and water quality.

Together, these enhancement and restoration techniques can serve to slow the movement of floodwaters, allow the deposition of sediment to improve channel and bank formation processes, reduce sediment loading in river and stream systems, and improve habitat for Covered Species, including the restoration of complex rearing habitat for covered fish species.

The reduction of fine sediment input to streams is a high priority in Auburn Ravine, Raccoon Creek, Doty Ravine, Miners Ravine, Secret Ravine, and the main stem of Dry Creek and a medium priority in Bear River, Pleasant Grove Creek, and Curry Creek (County of Placer 2002; ECORP 2003; Foothill Associates 2006). The PCA will focus gravel cleaning and replenishment in high- and medium-priority streams. The PCA will identify specific stream reaches with degraded spawning habitat where cleaning or replenishment of gravels is the only feasible means to enhance habitat. These measures are not anticipated to occur regularly under the Plan and would only be used as a temporary action to maintain habitat until the reach can be restored.

Gravel cleaning can be used to enhance and restore gravel beds that are already impaired due to excess fine sediment load. Gravel replenishment can be used in streams deficient in spawning gravel due to dams or other artificial structures that prevent gravel recruitment or transport. The use of gravel cleaning or replenishment measures will likely result in additional maintenance requirements, because natural processes will not maintain post-cleaning conditions.

Gravel cleaning and replenishment can be effective where the cause and source of excessive fines, including upland sources such as unpaved roads and land grading activities, have been controlled or remedied.

The PCA will employ invasive animal control measures for in-stream invasive species (e.g., carp, bullhead, bullfrog) on an as-needed basis. The need to control invasive species and methods to be used will be site-specific and evaluated within a monitoring and adaptive management framework. The PCA will develop an Invasive Species Control Plan for the Reserve System, and each reserve management plan will include a section on management of invasive plant and animal species.

Methods of invasive control will depend on site-specific conditions, including type of waterway and time of year, and will be done in close coordination with fish and wildlife agencies to avoid harm to non-target species.

2.6.7.2.3 Riparian Restoration

The PCA will restore 330 acres of riparian habitat and an estimated additional 876 acres of riparian habitat to reestablish, reconnect, and expand existing riparian woodland; improve habitat for and contribute to the recovery of Covered Species that use riparian habitat; slow the movement of floodwaters; allow the deposition of sediment to improve channel and bank formation processes; and reduce sediment loading in river and stream systems. Details of the site selection process and methods are presented in Chapter 5, *Conservation Strategy*, Section 5.3.1.5.4, *Riverine and Riparian Complex Natural Communities*.

2.6.7.3 Non-PCCP Placer County Conservation Programs

Placer County administers ongoing conservation and resource management programs (e.g., management of wildfire fuel) that are separate from but complementary to the PCCP. The actions conducted by Placer County to implement the Placer Legacy Program and the Auburn Ravine/Raccoon Creek ERP, Dry Creek CRMP, Pleasant Grove/Curry Creek ERP, and Dry Creek Greenway Vision Plan are similar to many of those that will be conducted by the PCA to implement the PCCP conservation strategy (see Section 2.4, *Permittees, Plans, Policies, and Programs,* for description of CRMPs). These actions will occur primarily outside the Reserve System.

2.6.7.3.1 Placer Legacy Program and Resource Management Plans

The County implements conservation programs that complement the PCCP, including the Placer Legacy Program and coordinated resource management plans. The resource management plans focus on in-stream and riparian management and are discussed in more detail in Section 2.6.6, *In-Stream Activities.*

Placer County, in coordination with its public and private partners, will implement the goals and objectives of the Placer Legacy Program throughout the 50-year term of the Plan's permits.

The Placer Legacy Program uses four main vehicles to obtain its goals objectives: land preservation, stewardship programs, public education, and restoration and enhancement. Conservation of agricultural lands is primarily accomplished through fee title acquisition, conservation easements, and Williamson Act agreements. Stewardship programs focus on agricultural product marketing, tax/estate planning assistance, sustainable practices education, and financial incentives. In addition, the County promotes stewardship by providing a long-term planning framework that is scientifically and geographically based as well as by assisting public and private land owners with federal and state agency permit applications and consultations.

The act of acquiring land or promoting stewardship does not have direct, on-the-ground consequences that require coverage by the PCCP. Such actions have complemented and will continue to complement the implementation of the biological goals and objectives of the PCCP. However, the Placer Legacy Program's restoration and enhancement actions will have environmental effects that are covered by this Plan.

Many Placer Legacy Program activities will be conducted in concert with PCA implementation of the PCCP. The Placer Legacy Program may, however, carry out activities independent of the PCCP that generally fall under the following categories:

- Introduction of recreation such as hiking, bicycling, and horseback riding to previously inaccessible natural areas that support grassland, oak woodland, and riparian habitats
- Creation of urban trails and trail connections as well as the building of interpretive nature and cultural appreciation centers
- Restoration of riparian and in-stream habitats to benefit salmonid spawning, rearing, and migration life stages in the Raccoon Creek, Auburn Ravine, and Dry Creek watersheds
- Protection and enhancement of floodplains to maximize water and sediment detention and restore natural stream morphology, including levee pull-backs, floodplain restoration, protection of floodplains from incompatible encroachment, bank stabilization, and other activities that protect existing natural floodplains or restore natural conditions to floodplains that have been modified (typically for agricultural production)
- Establishment of buffers and management of fuel loads to reduce wildfire potential
- Restoration and enhancement of degraded forests in oak woodland and riparian habitats
- Development of on-site water management storage features such as ponds and swales to promote water conservation and improve water quality
- Coordination of water delivery agencies to ensure the adequacy of future water deliveries for agriculture and native species habitat
- Encouragement of the use of rice decomposition water to improve waterfowl habitat
- Acquisition of property for scenic, historical, or agricultural conservation values

2.6.7.3.2 Community Wildfire Protection Plan

The 2012 Placer County Community Wildfire Protection Plan is the result of a community-wide planning effort that included extensive field data gathering, compilation of existing documents and geographic information system data, and scientific analyses and recommendations designed to reduce the threat of wildfire-related damages to values at risk. The Community Wildfire Protection Plan provides a comprehensive analysis of wildfire-related hazards and risks in the wildland-urban interface areas covered by the greater Auburn area, Foresthill/Iowa Hill, Lincoln, and Placer Sierra Fire Safe Councils. The wildland-urban interface is the area where human development and activity meets and intermixes with undeveloped, “wild” vegetation. The Plan defines specific fire hazards in designated areas, assesses the values at risk, and identifies and prioritizes specific projects to protect local communities. Any fuel management activities, which include the creation of fire breaks, and fuel treatment and restoration, conducted by the County on private or public lands would be considered a Covered Activity (private landowners clearing fuel on their own property is not covered). This activity would be consistent with the Community Wildfire Protection Plan. The Community Wildfire Protection Plan integrates with the 2014 Placer County Strategic Plan for Biomass Utilization.

2.6.7.4 Resource Management Plans

This Plan integrates three watershed plans, including the Dry Creek CRMP, the Auburn Ravine/Markham Ravine/Raccoon Creek ERP, and the Pleasant Grove/Curry Creek ERP, into the conservation strategy. These watershed management plans were designed to help control pollution, manage stormwater, and restore and enhance Stream System habitats and uplands that surround them. The 2002 Auburn Ravine/Markham Ravine/Raccoon Creek ERP, the 2004 Pleasant Grove/Curry Creek ERP, and the 2003 Dry Creek CRMP are comprehensive, ecosystem-based plans for the restoration and enhancement of riparian and in-stream habitats in western Placer County watersheds. These plans were created in coordination with public and private stakeholders, including Placer County, water districts, non-profit conservation interests, agencies, and landowners. These plans provide guidance for riparian and stream restoration and enhancement actions outlined in the Placer Legacy Program (Placer County 2012).

The PCA will use these restoration and resource management plans to help guide stream and riparian acquisition, enhancement, and restoration actions. The Placer Legacy Program's restoration and enhancement activities implemented by Placer County will occur on lands within and outside of the Reserve System. Although these plans pre-date the preparation of a conservation strategy for the PCCP, they nevertheless provide a watershed-level focus that is valuable; they represent stakeholder interests that are consistent with the spirit of state and federal guidance on the preparation of HCPs and NCCPs. As such, these Plans have informed the development of the PCCP conservation strategy (Chapter 5, *Conservation Strategy*) and monitoring and adaptive management program (Chapter 7, *Monitoring and Adaptive Management Program*) and will be used by the PCA to help guide PCCP acquisition, enhancement, and restoration actions for riverine and riparian systems. In no case will these plans supersede the conservation strategy of the PCCP. Their implementation is intended to both inform and be covered by the PCCP and will supplement the conservation actions carried out by this Plan.

The primary goal of these resource management plans is to improve riparian and aquatic habitat quality and connectivity for native biota. The main objectives of these plans are to protect, restore, and enhance riparian habitat; improve salmonid spawning and rearing habitat; restore the natural hydrography and morphology when and where possible; remove and/or modify in-stream barriers to salmonid migration; and improve water quality.

Those projects that are implemented as a result of the Auburn Ravine/Markham Ravine/Raccoon Creek ERP, Pleasant Grove/Curry Creek ERP, or the Dry Creek CRMP planning process will be covered by the Plan. Construction or restoration activities associated with implementation of these plans may have temporary effects, but overall these projects will provide a net benefit to Covered Species and natural and semi-natural communities by improving ecosystem integrity, resiliency, and connectivity. The general types of projects that are expected to be implemented include the following:

- Control and/or removal of non-native, invasive riparian plant species
- Creation, expansion, and enhancement of riparian forest and willow scrub natural communities to maximize ecosystem functions such as shade and bank stabilization
- Management of the riparian natural community adjacent to grazing areas to reduce sedimentation and fecal contamination

- Enhancement of floodplain structure to reflect natural stream morphology and improve flood control
- Control of invasive animal species such as bullfrogs, beavers, and bass to minimize adverse effects on threatened and endangered species
- Enhancement and restoration of Swainson's hawk nesting and foraging habitat
- Enhancement and restoration of valley elderberry longhorn beetle habitat
- Removal or modification of barriers to salmonid immigration and emigration between spawning habitat and the American and Sacramento Rivers
- Modification of water diversion structures to minimize juvenile salmonid entrapment
- Improvement of salmonid spawning and rearing habitat by increasing or encouraging the formation of runs, riffles, and pools and reducing the concentration of finely sized sediment
- Public education programs and partnerships with wastewater treatment plants to help reduce pollutant loads to streams and increase the use of biofiltering techniques such as vegetated buffers and off-channel storage ponds in existing and future streamside development and agriculture
- Management of upland activities to reduce peak runoff flows and sediment and contamination loads
- Utilization and enforcement of BMPs and Smart Growth principles to improve water quality and minimize surface runoff discharge

2.7 Activities not Covered by this Plan

The Plan strives to cover a broad range of present and future activities over the permit term. Certain other activities are not appropriate for coverage under this Plan because of a lack of information, the speculative nature of the project, existing permits, acquisition of permits under a separate program, or the risk that the project or activity is incompatible with the Plan's conservation strategy. Categories of activities not covered by the Plan are listed below.

1. **Non-participating Cities.** Any ground-disturbing activities within the jurisdictions of Auburn, Loomis, Rocklin, and Roseville that are not specifically undertaken by a Plan Permittee are not covered.[6]
2. **Pesticide/Herbicide/Rodenticide Application for the Federal Permits.** Pesticide, herbicide and rodenticide uses are not activities permitted by USFWS and will not be covered under this Plan for the federal permits. All applicable injunctions stipulated during Plan implementation (i.e., 2006 California red-legged frog stipulated injunction) will be adhered to until formal consultation between USEPA and USFWS regarding the effects of pesticides on listed species is concluded. This activity is covered under the state permit.
3. **Routine and Ongoing Agricultural Activities.** Routine agricultural activities are defined broadly as activities that occur in the normal course of existing farming or ranching operations,

[6] The potential exception to this is the City of Roseville's annexation area (see Figure 8-3 *Potential Roseville Annexation Area*) as described in Section 8.9.4.2, *Potential Roseville Annexation Area*.

including crop planting, crop harvesting, livestock management, and pesticide application. These activities are not covered by the Plan. Routine and ongoing agricultural activities that do not go through a County or City permitting process (e.g., a grading and/or building permit) would not be subject to local approval and therefore cannot be covered by the Plan. New intensive agricultural activities such as cut-flower nurseries, Christmas tree farms, ornamental plant nurseries, dairies, and feedlots are not covered by this Plan unless these activities receive permits from the County and City.

4. **Expansion of Cultivated Agriculture into Natural Lands**. The expansion of cultivated agriculture into natural lands (as defined by the natural land cover types described in Chapter 3, *Physical and Biological Setting*, is not covered by this Plan unless it is associated with an approved rural development project that is covered by this Plan (e.g., the expansion requires a grading permit). This category typically applies to new large-scale agricultural operations such as row crops, vineyards, orchards, disking for winter grains, or pastures. If such agricultural projects do not require grading permits, they would typically not require local approvals by the Permittees and therefore cannot be covered by the Plan.

5. **Timber Harvest Operations.** Most timber harvesting occurs within the Sierra east of the Plan Area and is rare in western Placer County. Timber Harvest Plans are regulated through state and federal agencies and are not included as a Covered Activity.

6. **Quarries and other mining**. Quarries and other mining were considered for inclusion in this Plan. At the time of Plan development, no specific projects were proposed for inclusion. Because of the potentially extensive effects associated with quarries and mining and the lack of understanding about what future projects might be proposed, the mining of sand or other aggregate material, or the mining of precious metals or other minerals is not covered by this Plan.

7. **Municipal Power Generation.** PG&E, PCWA power generation on the behalf of the Middle Fork Project Finance Authority, Roseville Electric, Northern California Power Agency (generating power for multiple agencies), and Sacramento Municipal Utility District activities for power generation and transmission, including municipal wind and large-scale solar.[7]

8. **Present Projects with Their Own Endangered Species Act and California Endangered Species Act Permits**. Several development or infrastructure projects in the Plan Area in development during the preparation of the PCCP have obtained their own permits under the ESA and CESA, as applicable. These projects will be bound by the terms of their separate permits and not by the PCCP and will obtain incidental take coverage from those permits and not from the PCCP.[8]

9. **Land Use Intensification in the Valley or Foothills Conservation and Rural Development Components of Plan Area A.** County and City General Plans, specific plans, and implementing zoning may be changed over the course of the Plan's permit term to allow changes in allowed land use type so long as the land use remains rural or agricultural or is compatible with rural or agricultural general plan designations, land use intensity is not increased, and residential density is not increased. Activities that do not meet these criteria are not prohibited by the Plan but are not specifically covered by the Plan. Applicants who seek entitlements in Valley

[7] Some solar power generation may be covered if ancillary to a Covered Activity associated with public facilities/services, residential, commercial, industrial, and other associated development in the PFG.

[8] Note that Placer Vineyards Specific Plan will be covered under the HCP/NCCP as described in Section 8.9.5.

Conservation and Rural Development (A2) or Foothills Conservation and Rural Development (A4) that are inconsistent with the criteria must apply for take authorization outside of the coverage provided by the PCCP.

10. **Any Private Development that Otherwise Complies with CESA or ESA.** The PCA, as the Implementing Entity, can determine that a proponent of a project under the jurisdiction of a Permittee will not be required to comply with the conditions in Chapter 6, *Program Participation and Conditions on Covered Activities*, or pay any fees if the proponent of the activity provides written confirmation to the PCA that CDFW and USFWS (and/or the National Marine Fisheries Service) have determined that the activity is not subject to the CESA and ESA, has already received the necessary take authorizations under the CESA and ESA, or has otherwise complied with the CESA and ESA. Under these circumstances, an activity will be deemed to be in compliance with the CESA and ESA by the PCA and thus be exempt from conditions in Chapter 6 of the PCCP and fees if the proponent provides the following:

    a. A letter(s) from USFWS, the National Marine Fisheries Service, and CDFW that specifically refers to the activity and states that the activity is not likely to result in take of any federally or state-listed species individually or cumulatively, will not preclude successful implementation of the conservation strategy for all covered species, and the results for full protocol surveys, approved by CDFW, for state-listed species with the potential to occur on the site showing that no such species or species habitat occurs on the site; or

    b. A copy of an incidental take permit issued by CDFW for the activity and copies of incidental take statements or incidental take permits issued by USFWS and/or the National Marine Fisheries Service that authorize the proposed Covered Activity; or

    c. A combination of the letters as described in (1) above and/or incidental take authorizations described in (2) from all Wildlife Agencies with jurisdiction.

11. **Minor Activities.** Certain minor projects and activities are not subject to Plan requirements and are not covered by the Plan or the permits because they are not expected to have adverse effects on Covered Species.[9]

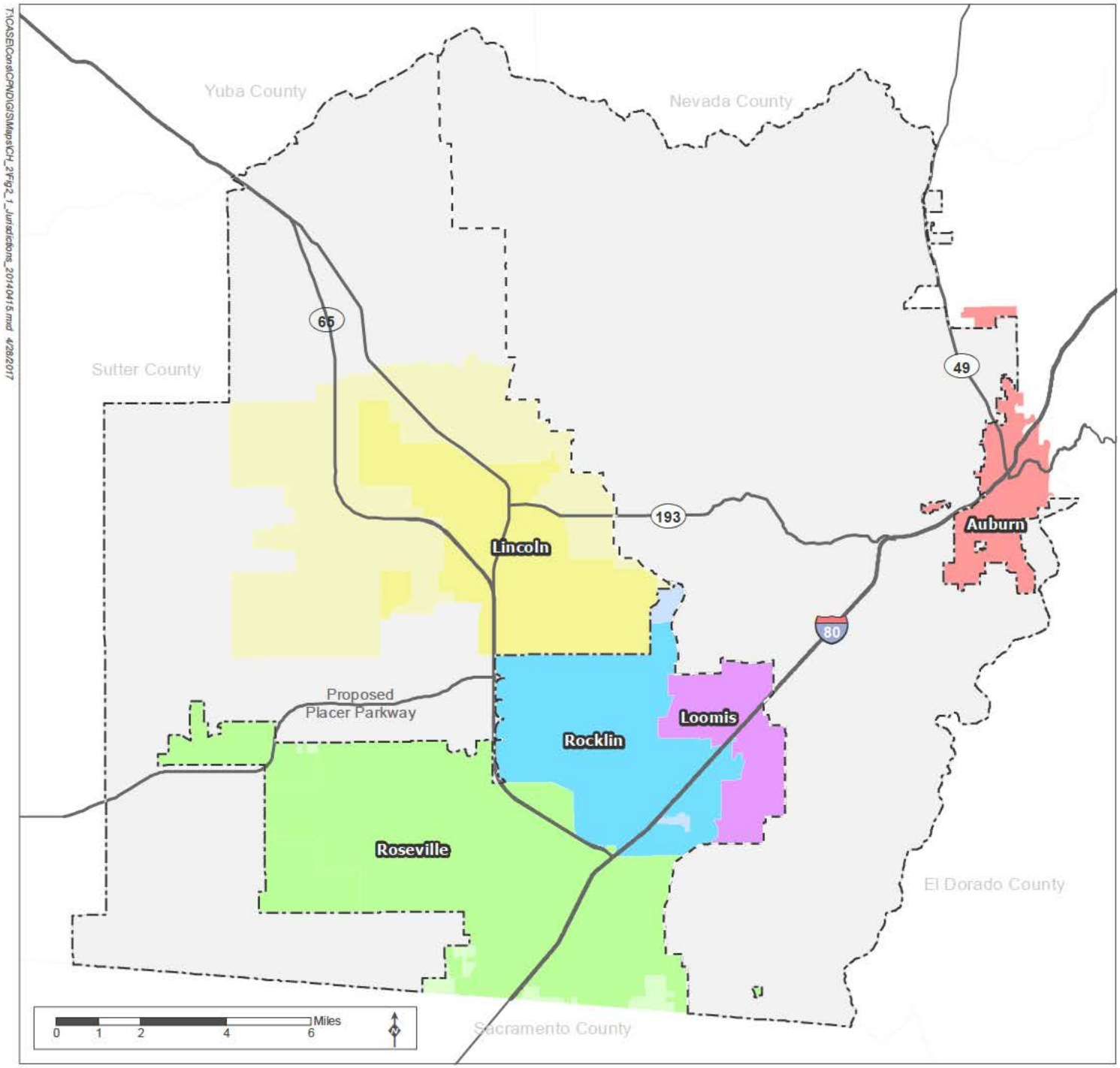
    a. **Activities that Do not Require a Construction Permit.** Private development that does not require a development permit, grading permit, building permit, or other construction permit. For purposes of this section, construction permits do not include: ministerial permits for activities that will cause less than 500 square feet of ground disturbance; setback verification permits; sign permits; plumbing/mechanical/electrical building permits; private/public well permits; septic system permits; underground storage tank permits; tree permits; administrative approvals of antennas; temporary outdoor event permits where no ground disturbance occurs; permits for building remodel additions under 500 sq. ft.; or permits for design review remodels under 500 sq. ft.

    b. **Activities on Existing Non-natural Lands.** Activities entirely within managed water or urban land cover types (see Section 3.4.11, *Managed Open Water*; Section 3.4.13, *Urban*; and Section 6.2.4.3, *Item 3: Community and Constituent Habitat Types on Site and Baseline LandCover Map Consistency*).

[9] These activities must still comply with CESA, FESA, FGC 1600 et seq and other local, state and federal laws and permitting requirements.)

c. **Activities on Existing Small Parcels.** Private activities on existing small parcels equal to or less than 20,000 square feet existing at the time of Plan adoption.

d. **Small Additions to Improved Properties.** Private development improvements of less than 5,000 square feet of new impervious surface to existing improved sites, regardless of parcel size. Includes new structural improvements and installation of roads, sidewalks, hardscape, and other impervious surfaces.



Source: Placer County, 2014

Permitees

- Placer County
- City of Lincoln
- City of Lincoln Sphere of Influence

Non-Participating Cities

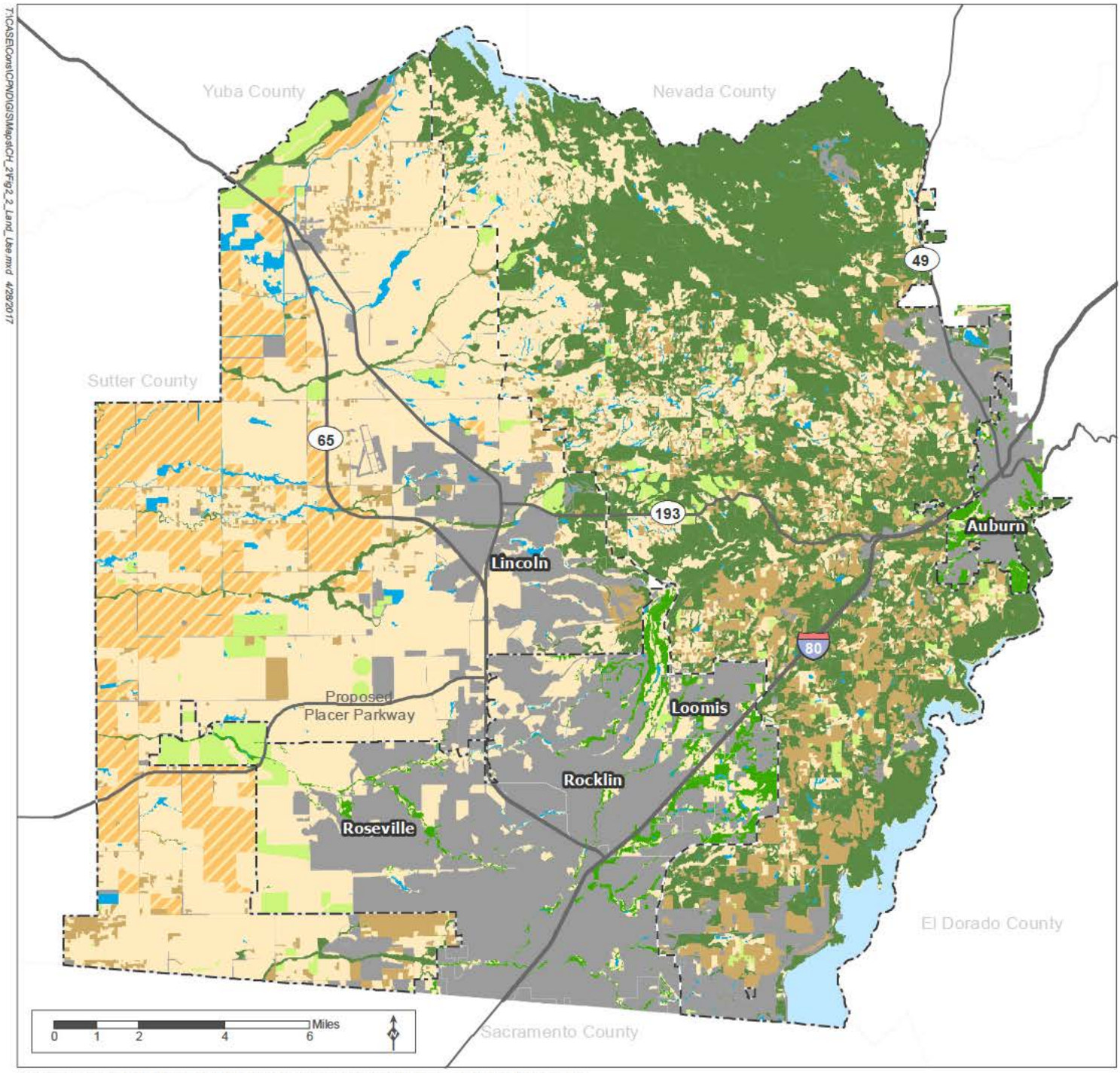
- City of Auburn
- Town of Loomis
- City of Roseville / Sphere of Influence
- City of Rocklin / Sphere of Influence

- Major Road
- Plan Area A
- Valley/Foothill Divide

MIG | TRA

Figure 2-1 Western Placer County Jurisdictions

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; JSA 2004, North Fork 2009, California Department of Fish and Game 2009, Salix 2011, TRA 2014

Land Use

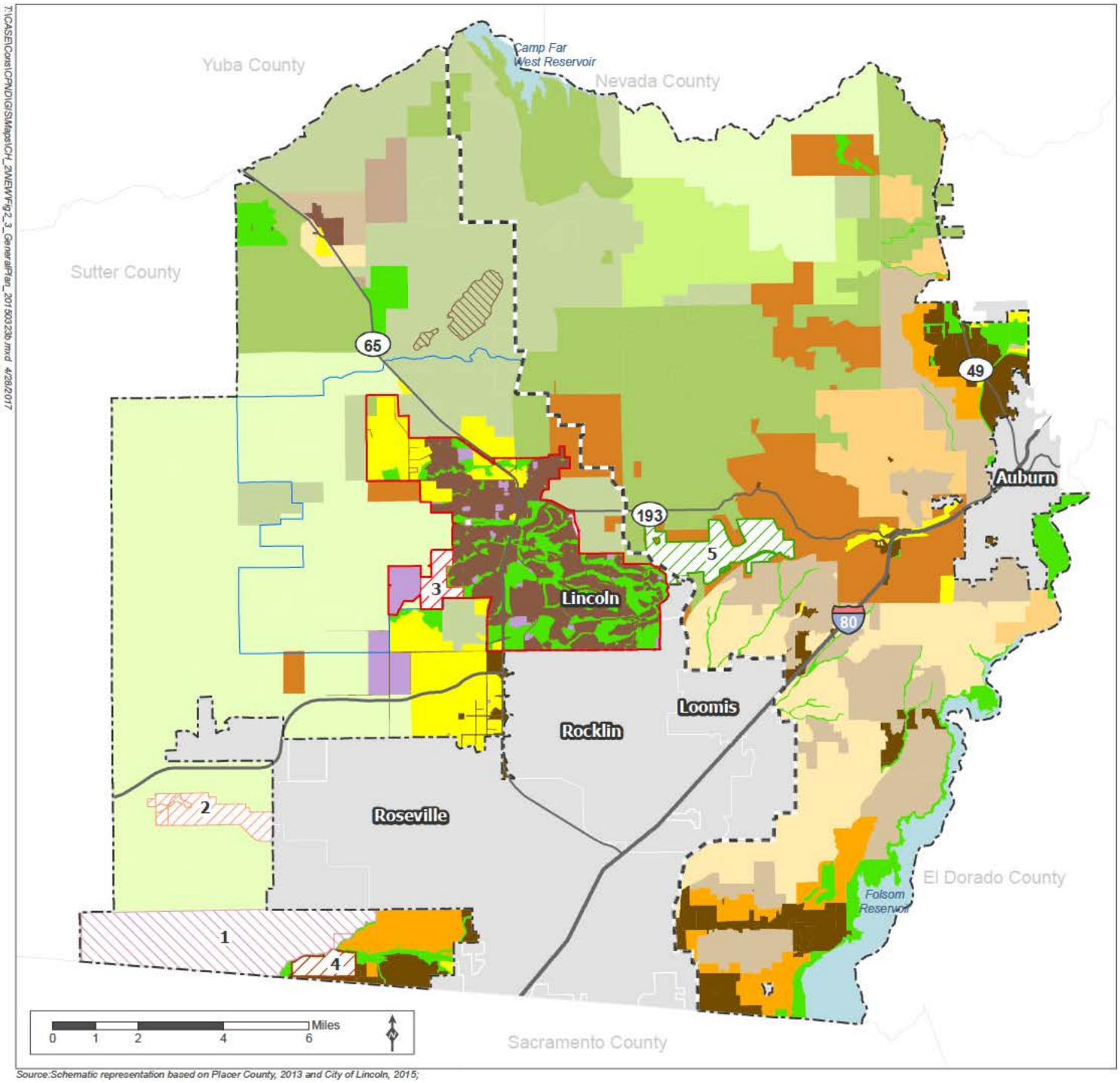
- Field/Orchard
- Rangeland
- Rice
- Woodland
- Wetland
- Reservoir
- Rural Residential
- Urban/Suburban

- Valley/Foothill Divide
- Plan Area A
- Non-Participating City

MIG | TRA

Figure 2-2 Land Use in Western Placer County

Placer County Conservation Program - Western Placer County HCP/NCCP



Source:Schematic representation based on Placer County, 2013 and City of Lincoln, 2015;

Agricultural or Timberland

- Agricultural or Timberland 80 Ac. Min.
- Agricultural or Timberland 40 Ac. Min.
- Agricultural or Timberland 20 Ac. Min.
- Agricultural or Timberland 10 Ac. Min.

Rural Residential

- Rural Residential 10.1-20 Ac./DU
- Rural Residential 4.61-10.0 Ac./DU
- Rural Residential 2.31-4.6 Ac./DU
- Rural Residential 1.1-2.3 Ac./DU
- Rural Residential 1-10 Ac/DU
- Recreation
- Conservation
- Open Space
- Water Influence

Urban and Suburban

- High Density Residential 10.1- 20.1+ DU/Ac.
- Medium Density Residential 5.1-10.0 DU/Ac.
- Low Density Residential 1.1-5.0 DU/Ac.
- Commercial
- Professional Office
- Highway
- Public
- Industrial

Specific Plan

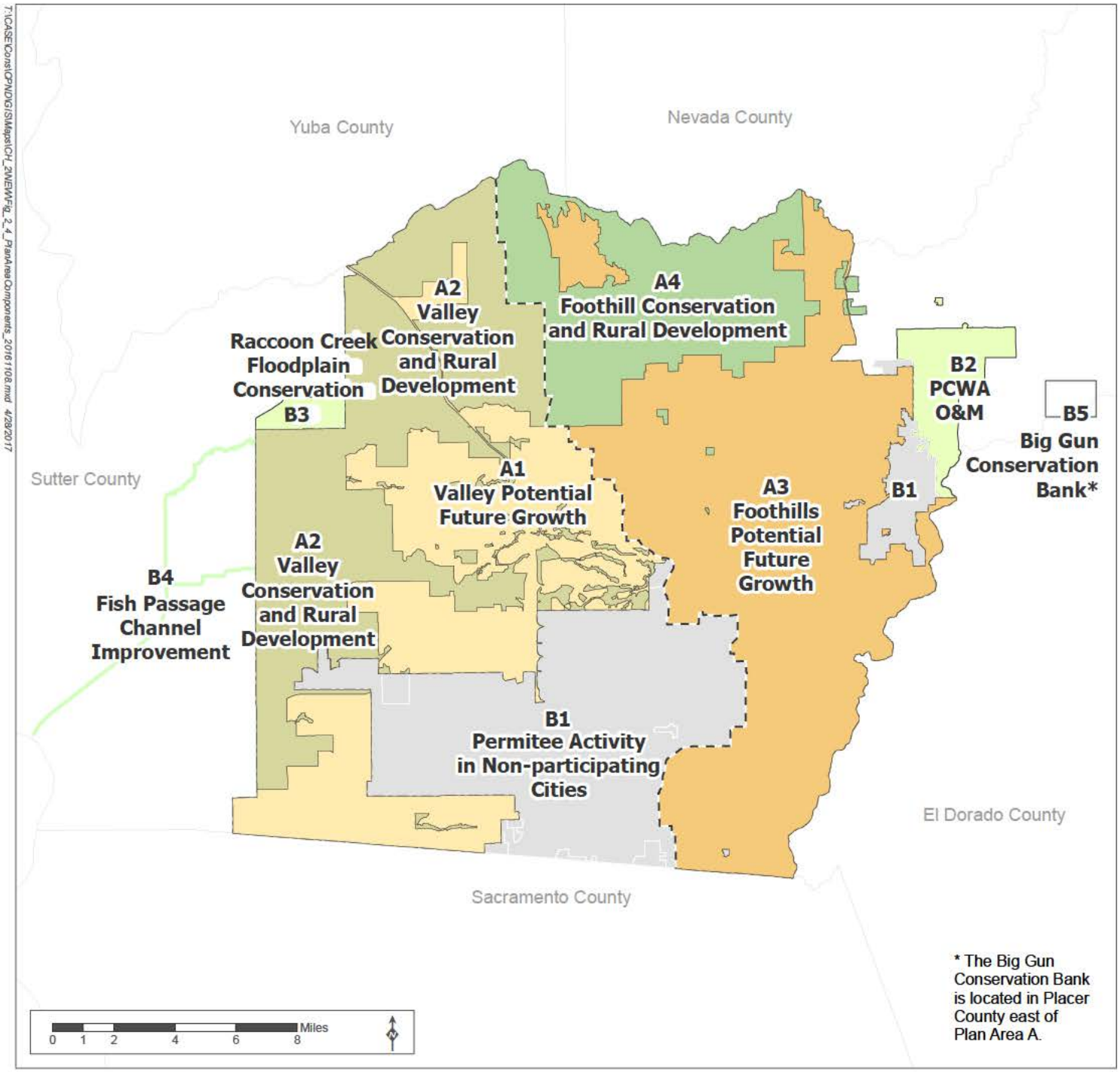
1. Placer Vineyards Specific Plan
2. Regional University Specific Plan
3. Lincoln Village 7 Specific Plan
4. Riolo Vineyards Specific Plan
5. Bickford Ranch Specific Plan

- Vested Mining Area
- City of Lincoln Boundary
- Lincoln Planning Area
- Valley/Foothill Divide
- Major Road
- Non-Participating City
- Plan Area A

MIG | TRA

Figure 2-3 Permittee General Plan Land Use Designations

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA 2015

Plan Area A

- A1. Valley Potential Future Growth
- A2. Valley Conservation and Rural Development
- A3. Foothills Poten ial Future Growth
- A4. Foothill Conservation and Rural Development

Plan Area B Components

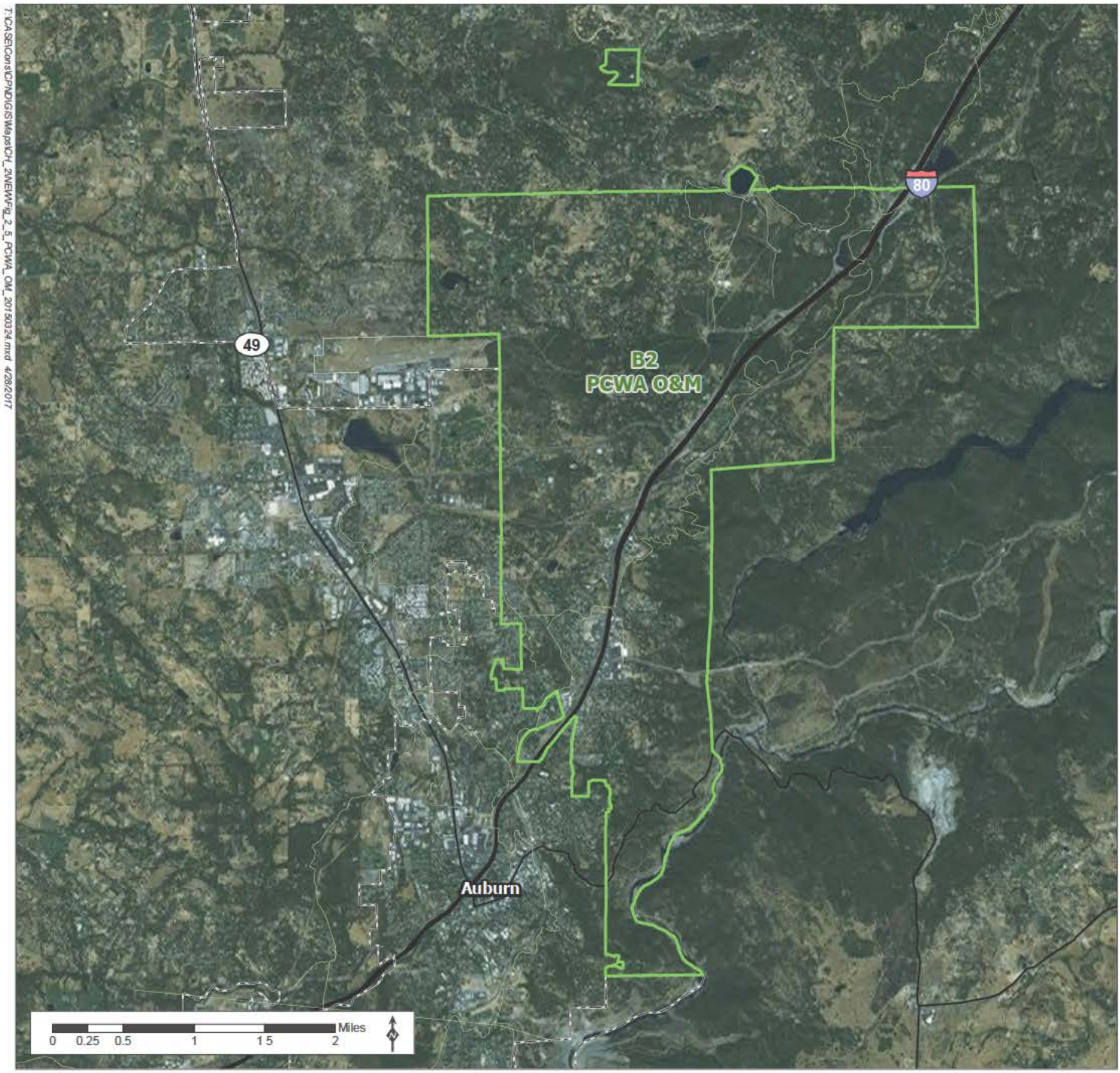
- B1. Permittee Ac ivity in Non-Participa ing Cities: Public program or conservation ac ivities undertaken by the Permittees.
- B2. PCWA O&M: PCWA Zone 1: Operations and Maintenance (O&M) for exis ing facilities east of Auburn plus adjacent Lake Theodore reservoir.
- B3. Raccoon Creek Floodplain Conservation: Watershed protection and stream restoration activi ies along Raccoon Creek floodplain in a portion of Sutter County.
- B4. Fish Passage Channel Improvement: Fish Passage Channel Improvement: Selective in-stream work on a portion of 33 miles of channels west of Placer County in Sutter County.
- B5. Big Gun Conservation Bank: Conservation actions for California red legged frog in Placer County on the Big Gun mitigation bank east of Auburn.

– – Valley/Foothill Divide

MIG | TRA

Figure 2-4 Plan Area Components

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA 2015

PCWA Zone 2

B2. PCWA O&M: PCWA Zone 1: Operations and Maintenance (O&M) for existing facilities east of Auburn plus adjacent Lake Theodore reservoir.

PCWA Canal

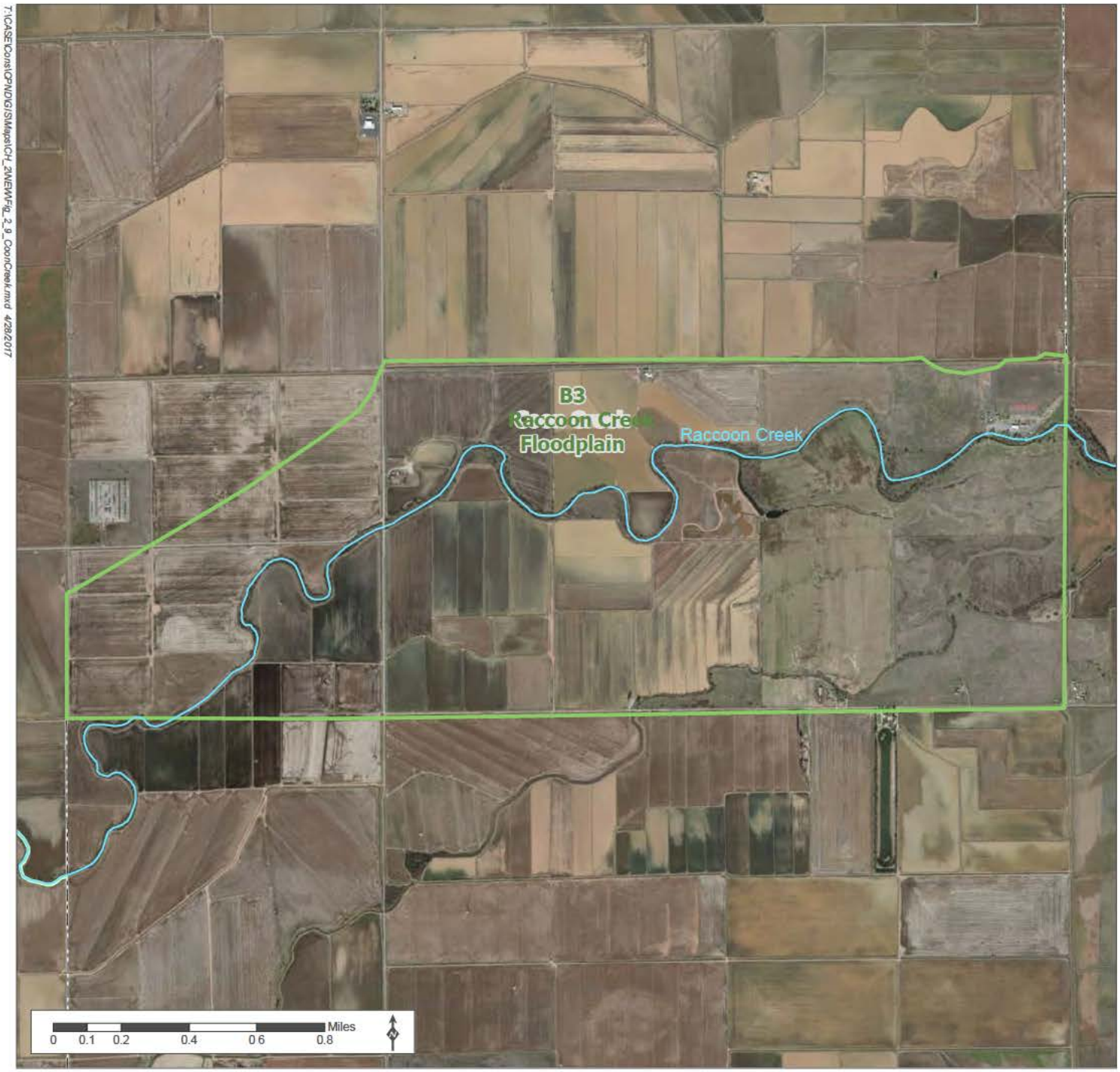
Valley/Foothill Divide

Plan Area A

MIG | TRA

Figure 2-5 Subarea B2 Site - PCWA Operations and Maintenance

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA 2015; USGS

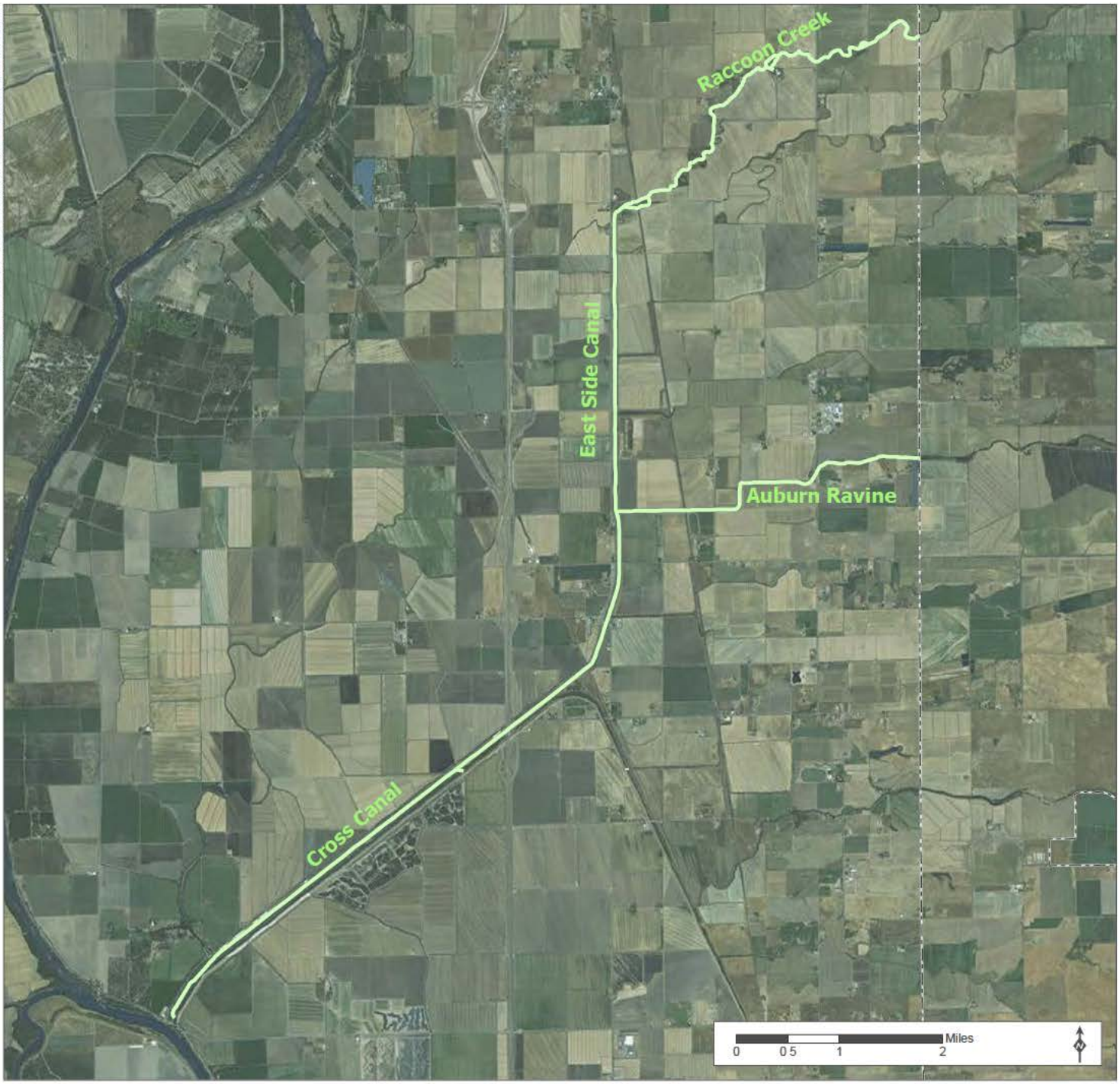
B3. Raccoon Creek Floodplain Conservation: Watershed protection and stream restoration ac ivities along Raccoon Creek floodplain in a por ion of Sutter County.

Plan Area A

MIG | TRA

Figure 2-6 Subarea B3 Site - Raccoon Creek Floodplain

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA 2015

B4. Fish Passage Channel Improvement: Selective in-stream work on a portion of 33 miles of channels west of Placer County in Sutter County.

Plan Area A

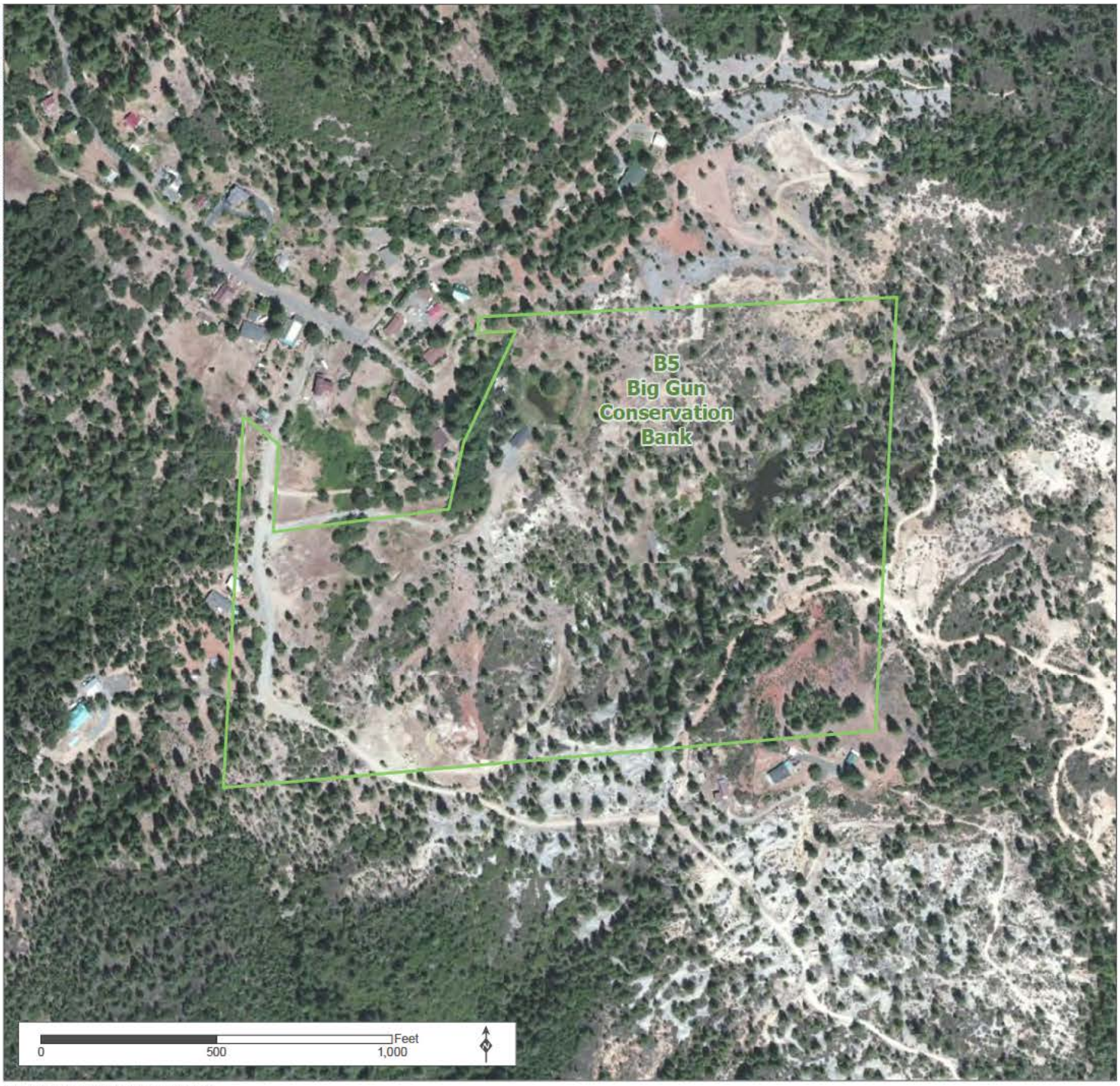
Channel Reach	Length (mi)
Auburn Ravine	8.1
Raccoon Creek	11.2
Cross Canal	7.7
East Side Canal	6.0
Total	32.9

MIG | TRA

Figure 2-7 Subarea B4 Site - Fish Passage Improvement

Placer County Conservation Program - Western Placer County HCP/NCCP

T:\CASE\ConstCP\NDIGIS\Maps\CH_2NEW\Fig_2_8_BigGun_20150324.mxd 4/28/2017

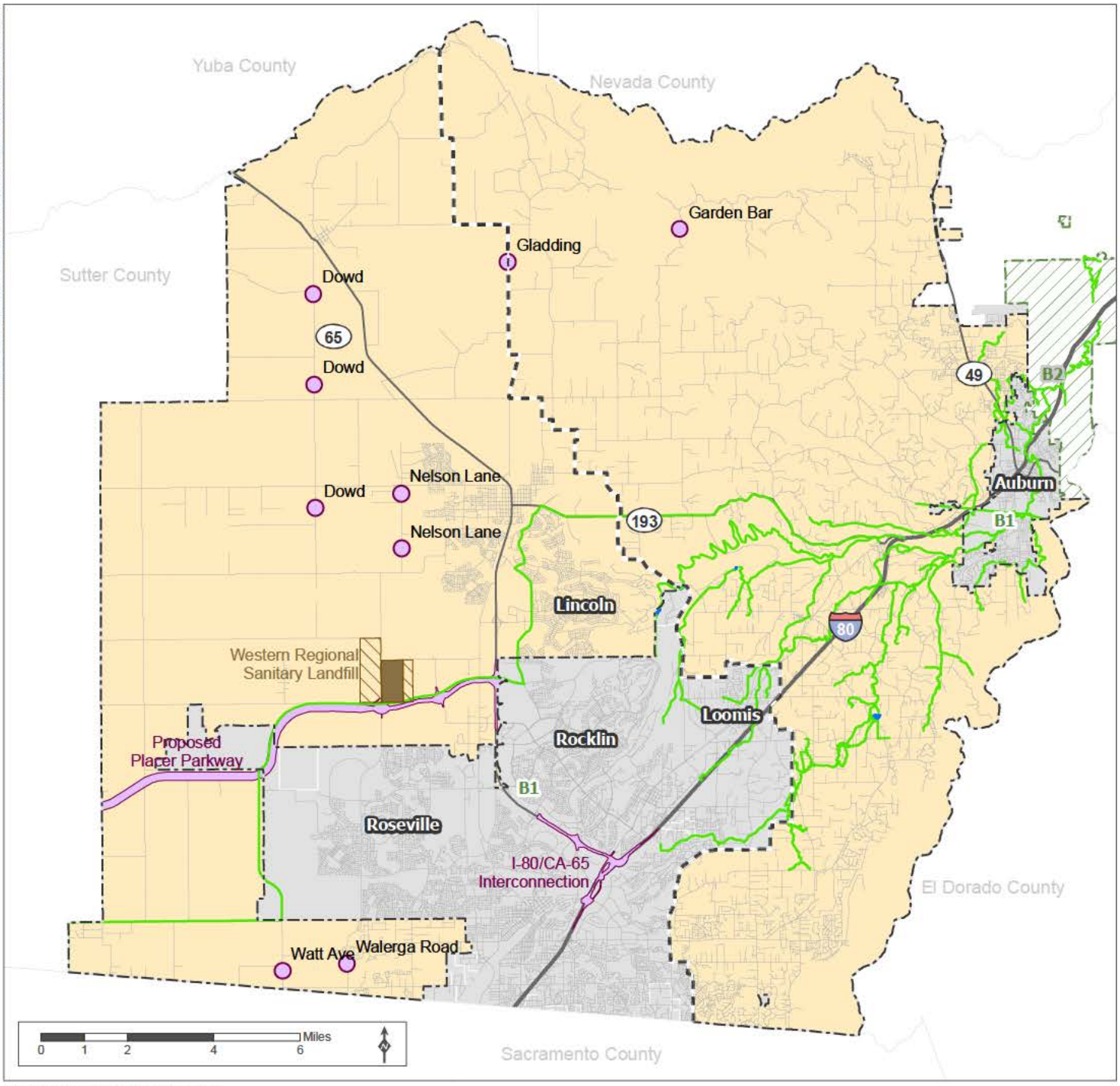


Source: Placer County, 2014; MIG | TRA 2015

Big Gun Conservation Bank

Figure 2-8 Subarea B5 Site - Big Gun Conservation Bank

Placer County Conservation Program - Western Placer County HCP/NCCP



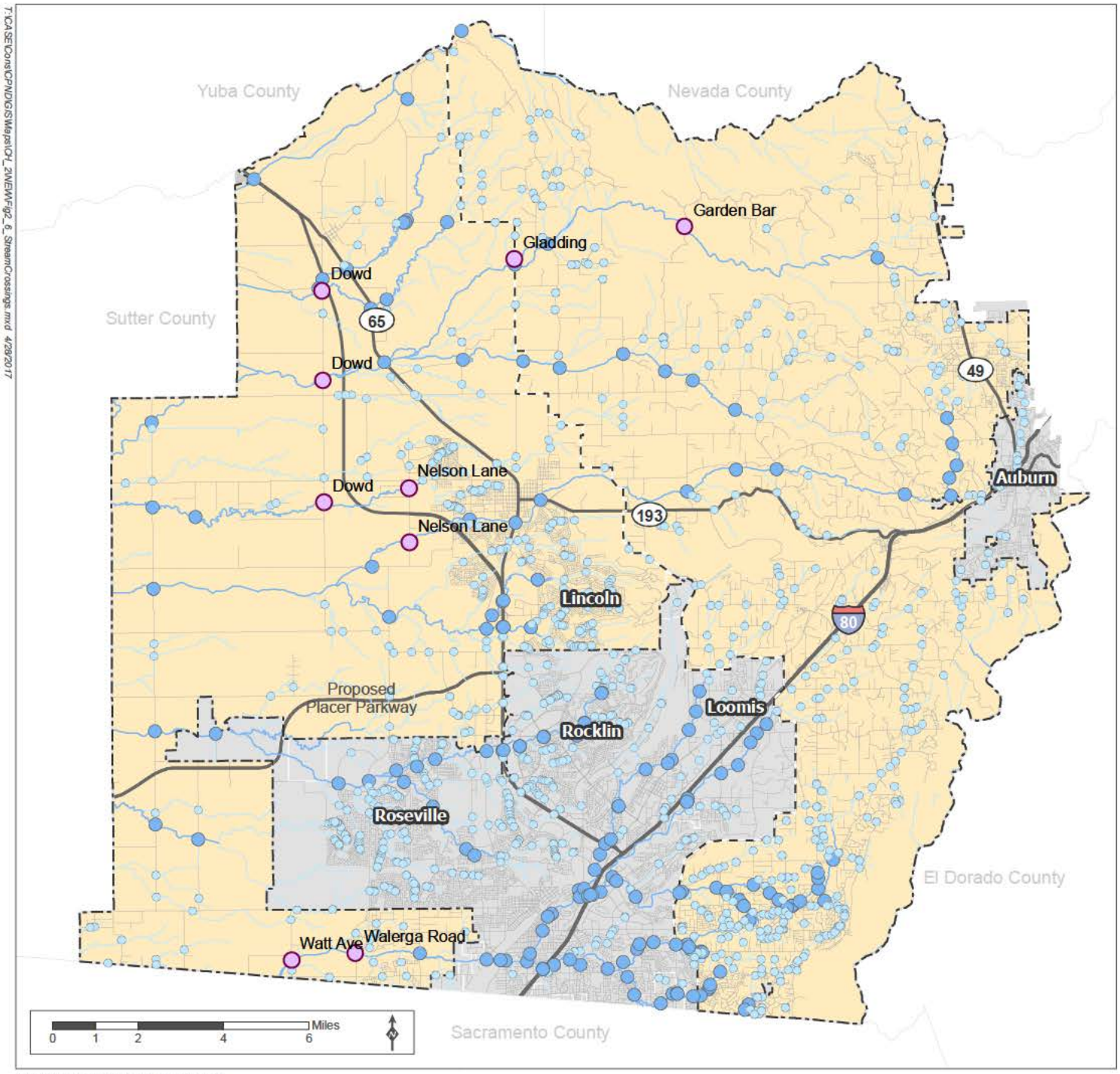
Source: Placer County, 2014; TRA 2014; PCWA

- Transportation Project
- Major Bridge Project
- Western Regional Sanitary Landfill
- Western Placer Waste Management Authority
- PCWA Conveyance/Transmission
- PCWA Reservoir
- Valley/Foothill Divide
- Plan Area A
- Area B1 Non-Participating City
- Area B2 PCWA O&M

MIG | TRA

Figure 2-9 Public Projects

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA 2015

- Major Bridge Project
- **Stream/Road Intersection**
  - Minor Stream
  - Major Stream
- **Stream**
  - Minor Stream
  - Major Stream
- Valley/Foothill Divide
- Road
- Major Road
- Plan Area A
- B1. Permittee Activity in Non-Participating Cities: Public program activities undertaken by the Permittees.

MIG | TRA

Figure 2-10 Stream Crossings

Placer County Conservation Program - Western Placer County HCP/NCCP

Chapter 3
Physical and Biological Setting

3.1 Introduction

The Plan Area comprises western Placer County and a portion of adjacent Sutter County (see Figure 1-1). Plan Area A is nearly 210,000 acres in land area, roughly 22 miles square, bordered on the west by Sutter County, on the north by Yuba and Nevada Counties, on the east by El Dorado County, and on the south by Sacramento County. Plan Area B includes specific Covered Activity sites to the immediate east and west of Plan Area A (see Section 2.5.2, *Plan Area Components,* and Figure 2-4).

This chapter describes the physical and biological setting of the Plan Area upon which the effects analysis (Chapter 4, *Effects of Covered Activities*) and conservation strategy (Chapter 5, *Conservation Strategy*) are based.

The *physical setting* section includes a discussion of the following:

- Topography
- Geology and soils
- Climate
- Nitrogen deposition
- Fire
- Streams and watersheds
- Hydrologic modifications

The *biological setting methodology* defines communities, land-cover types, and habitat constituents, which are the basic units of the Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP or Plan) analysis, and explains how they are mapped and quantified in the Plan. The methodology describes how Covered Species habitat is modeled.

The chapter describes the *biological communities in the Plan Area* used in the analysis, including, where applicable, the following:

- Land-cover types
- Constituent habitats
- Historical extent and composition
- Common wildlife associations
- Covered species associations
- Ecosystem functions
- Natural disturbance
- Threats

The chapter concludes with an overview of *trends and foreseeable change* that are likely to alter the physical and biological setting over the course of the 50-year permit.

As explained in Chapter 2, Section 2.5.2, *Plan Area Components*, nearly all of the natural community land conversion, loss of habitat, and take of Covered Species will occur within the 209,832-acre Plan Area A. Plan Area B comprises several specific additional areas where only specific Covered Activities may occur as mapped on Figure 2-4. Plan Area B includes Permittee activities in the non-participating cities, Placer County Water Agency (PCWA) operations and maintenance (O&M) activities in Zone 1, fish channel passage improvements, and conservation within the Big Gun Conservation Bank. The natural community and land-cover mapping approach is focused on Plan Area A, where most effects occur.

3.2 Physical Setting

3.2.1 Topography

The Plan Area is a portion of the Sacramento Valley and Sierra Nevada foothills and lies within the Great Valley geomorphic province. As a whole, Placer County represents an elevation transect from the Sacramento Valley to the crest of the Sierra Nevada. The Plan Area occupies the lower elevations of that transect (see Figure 3-1).

Elevations in Plan Area A range from approximately 40 feet above sea level (asl) in the extreme western part of the county to 1,600 feet asl in the Bear River watershed north of Auburn.

Plan Area B activity sites vary:

- B1, Permittee Activity in Non-participating City Jurisdiction, includes Roseville, Rocklin, and Loomis, which range from elevations of 50 to 500 feet, and Auburn, which is at an elevation of 1,000 to 1,500 feet.
- B2, PCWA Zone 1 O&M, extends from Auburn east to Lake Theodore at an elevation of 2,300 feet.
- B3, Raccoon Creek Floodplain Conservation, is at an elevation of 60 to 80 feet.
- B4, Fish Passage Channel Improvement, runs from the cross canal confluence with the Sacramento River at an elevation of 20 feet to the point where it meets the Raccoon Creek floodplain at an elevation of 60 feet.
- B5, Big Gun Conservation Bank, is at an elevation of 3,500 feet.

Elevation, slope, and aspect strongly determine soils and climate and hence influence vegetation and land use. The Plan uses topography to break Plan Area A into the two principal analysis zones: the Valley and the Foothills. The Valley/Foothills divide reflects the slope transition from the flat Valley to the lower Foothills that falls roughly along the 200-foot contour. The Valley analysis zone extends to the east to include all of the City of Lincoln. The Valley/Foothills divide line is shown on maps as an important point of reference.

The alluvial plain of the Valley is essentially flat, rising only 150 feet in nearly 8 miles. Slopes in the lower Foothills and along the Interstate 80 corridor are generally gentle to moderate, facing west

and southwest. In the Bear River and Raccoon Creek watersheds, the Foothills terrain is steeper and more sharply dissected, reflecting its different geology.

3.2.2 Geology and Soils

The geology of the Plan Area influences landforms and soil types, which in turn influence vegetation, plant species distribution and hence the distribution of wildlife species. For example, the vernal pool branchiopods covered by the Plan are closely associated with vernal pool ecosystems that are restricted to particular soil types and geologic substrates with the impervious hard pan that allows pools to form despite low rainfall.

The generalized geology of the Plan Area reflects its transition from the Sacramento Valley bottom to the Sierra Nevada foothills (see Figure 3-2). The low-elevation Valley is composed of Quaternary alluvium and sandstone sediments derived from the Sierra Nevada. Weathering of Sierra Nevada granite and other igneous rock produces sediments, ranging from very fine clay to course sand, which are deposited according to the hydrologic regime, usually in layers of different permeability. The Foothills are older, tertiary rocks (granitic granodiorite on the south and metamorphic mafic rocks on the north,[1] with a mixed band of igneous rocks along the fault zones that parallel State Route (SR) 49 and define the eastern edge of the Plan Area). Although mafic rock weathers faster and the resulting soils differ, both formations give rise to the dense clays that accumulate on the Sacramento basin floor.

Soil conditions are generally correlated with landforms. On the Valley terraces, most soils are well drained, moderately deep to deep over an impermeable claypan or hardpan, with a sandy loam or loam surface layer and a dense clay subsoil. The soils on alluvial bottoms are very deep, with a sandy loam or loam surface layer and a sandy loam to clay subsoil.

At higher elevations in the Foothills, the soils are generally well-drained sandy loams and loams derived from metamorphic and volcanic parent materials.

The soil survey of western Placer County establishes numerous named associations that vary by texture and composition (U.S. Department of Agriculture 1980). Several soil types potentially significant to the conservation strategy are described here.

3.2.2.1 Hydric Soils

Several soil types in the Valley have dense subsurface clay and hardpan layers that impede water percolation and are hence are seasonally saturated. These are termed *hydric soils* and they often support wetlands, especially when found in topographic depressions that hold water longer into the dry season. Most of the Valley soils formed above Quaternary sedimentary deposits show hydric properties and differ mainly in the character of the soils that overlie the hard pan. They tend to form vernal pool and other seasonal wetlands wherever local topography and hydrology are favorable.

[1] Igneous rock is of volcanic origin or crystallized from molten magma and thrust upward. Mafic rock is igneous rock rich in magnesium and iron (named from constituent *ma*gnesium and *f*errous silicates); by contrast, granite is igneous rock dominated by aluminosilicate and quartz and is termed felsic (from *fel*dspar and *si*lica).

3.2.2.2 Drainageway Alluvial Soils

Drainageways that correspond to the major stream courses and their immediate floodplain have greater depth to the hard pan or are effectively incised through it. The soils are well drained and range from sandy loams to fluvents, a kind of alluvial soil where soil structure development is prevented by repeated deposition of sediment in periodic floods. The xerofluvents mapped for western Placer on Figure 3-2 are usually dry at the surface during summer in this Mediterranean climate, but the depth to groundwater is shallow enough that they tend to support riparian vegetation. Drainageway alluvial soils will guide Valley riparian and valley oak restoration.

3.2.2.3 Mehrten Formation Soils

Mehrten formation soils can support distinct biotic communities. The Mehrten formation is derived from ancient volcanic mudflows, some 4 to 10 million years old (Helley and Harwood 1985 in Jones & Stokes Associates 2004) that arose in the Sierra Nevada and flowed down the eastern foothills to the Central Valley. The mudflows now remain as high-standing flat-topped ridges. The underlying volcanic rock is impermeable or very slowly permeable; vernal pools form in the depressions (Smith and Verrill 1998 in Jones & Stokes Associates 2004). In western Placer County, northern volcanic mudflow vernal pools are restricted to the Mehrten formation.

Mehrten soils are limited to a band east of SR 65 in Roseville, Rocklin, and southeastern Lincoln. Although Mehrten formation soils cover approximately 4,200 acres of Plan Area A, nearly all of these lands have already been converted to urban and suburban development, with the few remaining patches of this soil type already incorporated into existing reserves. Mehrten soils are not specifically addressed by the Plan's conservation strategy.

3.2.2.4 Serpentine Soil Formations

Many of California's rare plants and unusual natural communities occur on serpentine soils, a chemically hostile substrate that helps better adapted native plants to resist competition with non-native invasive species. In Placer County, serpentine soils are found in small patches around Foresthill, between Auburn and Colfax, and in isolated areas of the Tahoe National Forest. There is a band of ultramafic rock mapped as peridotite and patches of derivative serpentine soils running north from the city of Auburn, east of SR 49, at the edge of Plan Area A, but the Plan Area has no significant extent of serpentine soils, and none of the Covered Species are associated with serpentine soil communities. Serpentine soils are not specifically addressed by the Plan's conservation strategy.

3.2.2.5 Foothills Soil Associations

The more varied geology and topography of the Foothills give rise to numerous soil types that vary in texture, depth, and slope and contribute to the general mosaic of oak woodland. Although soil types may play a role in reserve management planning, they do not direct the overall Foothills conservation strategy.

3.2.3 Climate

Western Placer County is located within the Sacramento Valley Air Basin, which is relatively flat and bordered by mountains to the east, west, and north. The climate is characterized by hot, dry summers and cool, rainy winters, sometimes with periods of dense and persistent low-level fog that

are most prevalent between winter storms. The extreme summer aridity of the Mediterranean climate is caused by sinking air of subtropical high-pressure regions. In the case of the Sacramento Valley, the ocean has less influence than in the coastal areas, giving the interior Mediterranean climate more seasonal temperature variation (Ahrens 2003).

Because the Plan Area covers the transition from the low elevations of the Sacramento Valley to the Sierra Nevada foothills, there is a corresponding transition in climate. Most precipitation here results from air masses that move in from the Pacific Ocean during the winter months, from west or northwest. Rainfall increases as the air mass is pushed upward and cools; therefore, the lower western edge of the Plan Area is dryer than the higher eastern edge.

Figure 3-3 shows the climate at three locations: Sacramento Executive Airport, Lincoln Airport, and Auburn Airport. The western edge of the Plan Area is most similar to data from the Sacramento station, 15 miles to the south. The Lincoln station is generally representative of the Valley. The eastern edge of Plan Area A is at the Auburn station. The normal annual precipitation, which occurs primarily from November through April, ranges across the Plan Area from 18 inches on the west to 36 inches on the east.

Temperature is less variable across the Plan Area. Winter temperature averages 49 degrees Fahrenheit (°F). During the summer months, average daily temperatures range from 58°F to more than 91°F, and daily high temperatures can exceed 110°F (Western Regional Climate Center 2013).

The inland location and surrounding mountains shelter the area from much of the ocean breezes or morning cloud cover that keep the coastal regions moderate in temperature. The predominant wind direction and speed is from the south-southwest at 10 miles per hour. The Plan Area has nearly 250 sunny days per year.

The heat and summer sun, and typically less than an inch of rainfall from May to August, cause rapid drying of open water. The climate, coupled with the extensive hardpan underlying Valley soils, creates the vernal pool condition. When rain fills the pools in the winter and spring, the water collects and remains in the depressions. In the springtime, the water gradually evaporates until the pools become completely dry in the summer and fall.

The counterpart to rainfall is evapotranspiration, which is the loss of water to the atmosphere by the combined processes of evaporation from soil and plant surfaces and transpiration from plants. Reference evapotranspiration[2] for the Plan Area is shown as a dashed line on Figure 3-3. These monthly data are from the California Irrigation Management Information System compiled for Zone 14, which includes the Mid-Central Valley. Reference evapotranspiration reflects a standardized grass or alfalfa surface, which is relevant to grassland in the Plan Area.

Using Lincoln rainfall as typical of the Valley, the evapotranspiration graph shows that monthly rainfall begins to exceed potential for water loss through evapotranspiration beginning in November and falls below evapotranspiration at the end of March. Simply, there will be a net accumulation of rainfall in grassland beginning in November and a net loss beginning in April such that the rainfall accumulated over the winter will be depleted by the end of May. Over the course of the summer, net evapotranspiration amounts to a deficit of 32 inches of water, which is why the Valley grassland

[2] Reference evapotranspiration is a representation of the environmental demand for water loss through evapotranspiration of a standardized plot of grass.

turns brown and seasonal wetlands and vernal pools dry up completely through the course of the summer, even in an average rainfall year.

All of the natural communities and the Covered Species habitat addressed in the Plan depend on rainfall, and all of them are, to some degree, adapted to the range of normal variation. The local climate is driven mainly by conditions in the Pacific Ocean and affected by global cycles, such as the warming ocean surface during El Niño southern oscillation events. These cycles routinely produce wide variation in rainfall. Over the period from 1949 to 2006, annual rainfall for Sacramento, which is representative of conditions in the Plan Area, ranged from 6.25 to 33.44 inches, with an average of 17.63 inches. The wet year was nearly double average rainfall, and the dry year was about one third of average rainfall. This extreme variation is clear in the historical record, even before the likely effects of climate change, discussed in Section 3.5, *Trends and Foreseeable Change*.

3.2.4 Atmospheric Nitrogen Deposition

Plant growth depends on the availability of fixed nitrogen, an essential nutrient. Although nitrogen is abundant in the atmosphere, it is present in the air in a form that cannot be used directly by most plants and must be converted to nitrate, nitrite, or ammonia. In addition to the natural nitrogen cycle, these more available forms of nitrogen are also produced as a result of air pollutant emissions.

The magnitude of this nitrogen source in the atmosphere, the ways in which it is deposited in ecosystems, and the effect on ecosystems has been studied only relatively recently. Work conducted for the California Energy Commission and the U.S. Forest Service is summarized in Weiss (2006) and Fenn (2009). Although the study of the nitrogen deposition phenomenon is recent, it is important to note that nitrogen deposition from air pollutant emissions and its biological effects inevitably accompanied the rapid rise of vehicular pollution resulting from California's rapid growth, beginning in the 1950s.

Nitrogen emission's effects on ecosystems are considered mainly at a regional scale, although more local, roadside effects have been measured. Atmospheric computer models are able to estimate the air emissions of nitrogen oxides and ammonia, predict their transport downwind, model the chemical reactions that take place in the atmosphere, and estimate the amount of available nitrogen that will be deposited. Regional scale model results are reported in Weiss (2006), based on a 36-kilometer grid, and reported in Fenn (2009), based on a 4-kilometer grid.

Atmospheric nitrogen deposition in western Placer County is modeled to fall in the range of 6 to 8 kilograms per hectare per year (kg/ha/yr) in Weiss (2006). The finer grid reported in Fenn (2009) shows most of the Western Valley in the Plan Area in the range of 9 to 11 kg/ha/yr, declining to 7 to 9 kg/ha/yr around Lincoln and rising abruptly in the Foothills at the eastern edge of Plan Area A. Modeled nitrogen deposition in the Plan Area is typical of the Sacramento Valley; it is somewhat greater than deposition modeled for most of the San Francisco Bay Area and half of the deposition rate modeled for the San Joaquin Valley.

The cumulative extent of atmospheric nitrogen deposition is appreciable. The 9 kg/ha/yr, which is typical of the Plan Area, corresponds to 10 pounds of nitrogen per acre per year. By comparison, fertilizer application rates for intensive agriculture in California averaged 161 pounds of available nitrogen per acre across all crops, reported in Rosenstock et al. (2013). Even on irrigated pasture, nitrogen fertilizer application may be 40 to 80 pounds per year. Although atmospheric inputs are less than intentional agricultural inputs, they occur everywhere on the landscape, and the effect on native ecosystems may be pronounced.

The effects on natural communities of additional nitrogen from atmospheric deposition have been well documented. Nitrogen deposition and saturation[3] can have several detrimental effects, including the leaching of nutrients (e.g., calcium) from the soil, which can cause a decrease in plant function; loss of fine root biomass; decreases in symbiotic mycorrhizal fungi; and promotion of invasive plant species at the expense of native plant biodiversity (U.S. Fish and Wildlife Service 2005; Weiss 2006). The potential effects of nitrogen deposition may be limited by proximity to nitrogen emitting sources.

The understory of oak woodlands and vernal pools are susceptible to invasion by annual grasses (U.S. Fish and Wildlife Service 2005). Increases in nitrogen deposition will most likely lead to an increase in the extent and intensity of invasion by annual grasses, given the well-documented responses of annual grasses to nitrogen deposition (Weiss 2006).

Annual grasses can be a major threat to native vernal pool species (see Section 3.4.3, *Vernal Pool Complex*, for more details on the impacts of invasive species on vernal pools), particularly in ungrazed pools (Marty 2005). Non-native plants may compete with native plants for water, nutrients, light, and sites for germination. Oak woodlands and savanna have understory grasslands, which are now dominated by non-native annual grasses. The widespread lack of oak regeneration is a major threat to the long-term persistence of oak woodlands. Research on the causes of reduced regeneration has yet to identify a particular causal mechanism; however, annual grasses have been implicated in suppressing oak seedling regeneration (e.g., Gordon and Rice 2000).

Although the study of the nitrogen deposition phenomenon is recent, it is important to note that nitrogen deposition from air pollutant emissions and its biological effects inevitably accompanied the rapid rise of vehicular pollution resulting from California's rapid growth, beginning in the 1950s. Plan Area vegetation shows the effects of decades of this additional available nitrogen input.

3.2.5 Wildfire

Western Placer County consists of a mosaic of natural vegetation, agricultural fields, and various intensities of developed land. Altogether, the landscape is susceptible to natural and human-caused wildfires that can cause widespread destruction of natural resources and human assets. Most of the natural vegetation types are adapted to relatively frequent wildfire.

Prior to European settlement, fire return intervals in oak woodlands ranged from 2 to 8 years (California Department of Forestry and Fire Protection 2011). This resulted in low-intensity fires that rarely, if ever, resulted in significant mortality of mature trees. Policies for suppressing wildfire, which have been in effect over the past 100 years, have all but eliminated any wildfire occurrence in the oak woodlands. Fire history data for western Placer County, shown on Figure 3-4, map relatively few fires in the oak woodland in the Foothills over the past several decades. Most of the wildfires have been in the lower elevation grasslands (approximately 8,000 acres east and west of SR 65 between 1970 and 2008) (California Department of Forestry and Fire Protection 2011). Examples of recent grassland fires include the 960-acre Gladding Fire in 2008, which affected the Placer Land Trust parcel on Doty Ravine, and the 50-acre fire in 2013 at Maidu Park in Roseville. High winds and excessive fuels that accumulated in the riparian zones because of a preponderance of Himalayan blackberry and other exotic plants exacerbated the severity of these fires.

[3] Saturation occurs when the level of nitrogen supply exceeds the ecosystem biotic demand for N (plant uptake and microbial immobilization), representing a breakdown of biotic controls over N-cycling and exports (Weiss 2006).

Grasslands are especially susceptible to wildfire for three reasons: (1) they are generally composed of introduced annual grasses; (2) the fuel loads may be high because of the curtailment of historic management practices, including grazing and prescribed fire; and (3) the senescence and drying of grassland fuels coincide with the occurrence of severe fire weather (hot and dry, late summer and fall).

The density of grassland fuels is largely dependent on the quantity and timing of annual rainfall. When wet springs, which are conducive to high productivity, are followed by hot, dry summers, the potential for wildfire increases. Fire weather conditions become critical from late July through October when the average temperature may be 85°F to 95°F, the winds are southwest at 0 to 7 miles per hour, and relative humidity is 20 to 25 percent (California Department of Forestry and Fire Protection 2011). Under these conditions, the ignition potential and the likelihood of a fire growing into a significant event are high.

Although most recent fires have been in grassland vegetation, the risk of severe fire in the oak woodlands has increased dramatically over the past several decades. The oak woodlands of western Placer County are often extremely dense because fire suppression has contributed to the buildup of excessive fuels. Understories of brush and grasses create ladder fuels that connect ground fires to canopies and can lead to stand-replacing crown fires. The current oak woodland landscape also consists of dense thickets of small trees that were established after clearing for agriculture or orchards, followed by abandonment and subsequent woodland regrowth. These so-called “dog-hair” stands are very susceptible to stand-replacing wildfire, meaning a fire so intense that the soil structure and seedbed are destroyed and trees and shrubs are killed so that there can be no stump sprouting or regeneration.

The resulting pattern of wildfire threat is reflected in the Fire Resource and Assessment Program mapping shown on Figure 3-5 (California Department of Forestry and Fire Protection 2005). Fire threat is derived from a combination of fire frequency and expected fire behavior under severe weather conditions. Fire frequency is derived from 50 years of fire history data. Fire behavior is derived from fuels and terrain data. In the Valley, irrigated agricultural land, particularly rice, is not mapped with respect to fire and is considered an area with essentially zero fire threat. The immediate surrounding grasslands are considered areas with a low threat of fire damage or escalation to a catastrophic fire, even though they have a fairly high frequency of actual wildfire occurrence. Fire threat increases at the transition of grassland into foothill woodland; much of the natural communities of the Foothills are considered areas with a high fire threat.

3.2.6 Streams and Watersheds

The Plan Area is located on the west slope of the Sierra Nevada in the Lower Sacramento River Basin. Streams drain from northeast to the southwest, eventually reaching the Sacramento River, or in the case of Dry Creek, drain first to the American River before reaching the Sacramento River. Major streams in the Plan Area (Figure 3-6) have extensive natural floodplains in the valley floor.

The Sacramento and American River tributaries define a series of sub-basins. Western Placer County falls within four sub-basins at U.S. Geological Survey (USGS) Hydrologic Unit Code (HUC) Level 8. To provide better resolution of planning issues, the Plan further divides the Raccoon Creek/Auburn Ravine watershed into four watersheds: Raccoon Creek, Markham Ravine, Auburn Ravine, and Pleasant Grove Creek. This results in seven planning watersheds:

The four HUC-8 sub-basins and seven planning watersheds are as follows:

Upper Bear River HUC-8

1. Bear River

Raccoon Creek/Auburn Ravine HUC-8

2. Raccoon Creek
3. Markham Ravine
4. Auburn Ravine
5. Pleasant Grove Creek

Lower American River HUC-8

6. Dry Creek

Upper American River HUC-8

7. American River

This watershed breakdown of the Plan Area meets the Plan's needs by providing a useful balance of data detail and data aggregation. Watersheds are shown on Figure 3-7. Table 3-1 and Table 3-2 show the areal extent and the length of stream miles in the planning watersheds, respectively. Table 3-2 includes the length of the main stem of the stream or river and all of its tributaries. The northern watersheds are mainly in the Valley and the Foothills, while the watersheds from Pleasant Grove south are mainly in the non-participating cities.

Table 3-1. Western Placer Watersheds – Land Area (acres)

Watershed	Plan Area A Valley	Plan Area A Foothills	NPCs	All Western Placer
1 Bear River	18,625	15,020	-	33,645
2 Raccoon Creek	14,143	37,967	284	52,394
3 Markham Ravine	16,127	1,050	-	17,177
4 Auburn Ravine	25,133	17,223	3,703	46,059
5 Pleasant Grove	15,341	-	24,378	39,719
6 Dry Creek	11,552	28,047	20,920	60,519
7 American		9,869	1,351	11,220
All Watersheds	**100,921**[a]	**109,177**[a]	**50,636**	**260,734**

Source: MIG|TRA (7/24/2014)
NPCs = non-participating cities
[a] Acreage comes from a hybrid of different GIS data and does not exactly match Plan Area acreage totals.

Table 3-2. Western Placer Watersheds –Length (stream miles)

Watershed	Plan Area A Valley	Plan Area A Foothills	NPCs	All Western Placer
1 Bear River	50	52		102
2 Raccoon Creek	47	90		137
3 Markham Ravine	43	4		47
4 Auburn Ravine	79	30	8	117
5 Pleasant Grove	40		95	135
6 Dry Creek	34	91	57	182
7 American		16	2	18
All Watersheds	**294**	**282**	**162**	**738**

Source: MIG|TRA (7/24/2014)
NPCs = non-participating cities

Because the Valley and most of the non-participating cities are in the lower-slope, downstream portion of the watersheds, 31 percent of the streams there are mapped as major streams (major streams are defined as Strahler order 3 or greater), whereas 21 percent of total stream length is mapped as major in the higher-elevation Foothills. Conversely, 34 percent of streams in the Foothills are mapped as perennial; only 16 percent of streams in the Valley are mapped as perennial. The watershed descriptions below and in Section 3.2.8, *Hydrologic Modifications,* explain that the distinction between perennial and intermittent is often not meaningful because of the non-seasonal presence of irrigation water.

Western Placer County is covered by a network of streams and artificial canals, as shown on Figure 3-6, with the length of hydrologic features listed in Table 3-3. Altogether, 738 miles of streams are mapped in western Placer County. Information on the seasonality and volume of flow in the streams is lacking. A rough guide to the size of the stream is given by its Strahler stream order. The Strahler system traces the dendritic form of a watershed, assigning order 1 to the smallest tributaries in the headwaters, assigning order 2 to a stream after the junction of order 1 tributaries, assigning order 3 to a stream formed by the junction of lower order tributaries, and so on. Although simple in principle, the application of the stream order classification depends on uniform mapping of the low-order tributaries in the upper reaches of the watersheds. Current Placer County mapping indicates that roughly one-quarter of the streams are Strahler order 3 or higher and considered major streams in the Plan.

Table 3-3. Western Placer Streams, Canals, and Reservoirs (Miles)

Hydrologic Feature	Valley	Foothills	NPCs	All Western Placer
Streams	294	282	162	738
Major Streams	*90*	*58*	*50*	*198*
Minor Streams	*204*	*224*	*112*	*540*
Canals	87	194	22	303
Reservoir Streamline		25		25
Reservoir Shoreline		35		35

Source: Placer County 2007; MIG|TRA (7/24/2014)

Note: Major Streams are mapped as Strahler stream order 3 or greater.
Canals are artificial features and include both supply and drainage channels.
Reservoir Streamline is where a stream passes through a reservoir maximum pool extent.
Reservoir Shoreline is the shoreline of a reservoir at maximum pool extent.

NPCs = non-participating cities

Western Placer County has an unusual extent of artificial canals. Some 303 miles of irrigation supply and drainage canals are mapped. The supply canals take advantage of the abundant Sierra Nevada runoff in the Bear and American Rivers and connect to a series of small reservoirs in the Foothills. The drainage canals are found in the Foothills and Valley. For the Valley, they are used to deal with rainfall and irrigation water drainage in the flat alluvial plain. For the Foothills, they provide a significant amount of irrigation water for ponds, irrigated pasture, landscaping, and crop production. Although the canals are not natural hydrologic features, they are occasionally the source of perennial seeps that create small pockets of wetland habitat in the Foothills and serve some aquatic habitat functions in the Valley.

Plan Area A includes two major reservoirs: Camp Far West Reservoir on the Bear River to the north and Folsom Reservoir on the American River to the southeast. Table 3-3 lists the length of the shoreline and the length of the streams that flow through the reservoir at maximum pool size. The river streamline through the reservoir only partially appears in the upper reaches when the reservoir is partially full.

Rainfall, and the subsequent groundwater release, is the primary water source for surface flows in the winter and spring. Agricultural and urban runoff, water deliveries for irrigation, and wastewater treatment plant (WWTP) effluent can comprise significant portions of total streamflow in the spring, summer, and fall. Some watersheds that were once seasonally intermittent are now perennial. Irrigation also transfers water between watersheds. For example, Auburn Ravine receives water imports from the Bear, Yuba, and American Rivers and is used by Pacific Gas & Electric Company (PG&E), Nevada Irrigation District (NID), and PCWA as a conveyance feature.

Unless noted, the watershed descriptions below are based on the Jones & Stokes Associates (2005) *Assessment of Habitat Conditions for Chinook Salmon and Steelhead in Western Placer County, CA*. For each watershed, seasonal flows are discussed in the context of salmonid habitat, if present.

3.2.6.1 Bear River Watershed

Headwaters for the Bear River are in the vicinity of Emigrant Gap and Lake Spaulding in Nevada County. The Bear River forms the northern Placer County boundary as it flows southwesterly to a point approximately 8 miles north of Auburn where it turns west and flows to its confluence with

the Feather River in the vicinity of Nicolaus in Sutter County. The Bear River is the second-largest tributary to the Feather River.

The Bear River planning watershed comprises the Placer County side of the Lower Bear and Middle Bear HUC-10 watersheds. Most of those watersheds are in Yuba and Nevada Counties such that the Plan Area portion makes up only 29 percent of the whole watershed.

The Bear River historically experienced high winter flows and low summer flows, but today the timing of flow and volume is highly regulated by releases from reservoir storage and diversions. Camp Far West is the largest storage reservoir on the Bear River. The exportation of water diverted from the Bear River watershed is made through the conveyance facilities of NID and PG&E. These diversions supply nearly all of the water imported to the Raccoon Creek watershed and a substantial percentage of the flows imported to the Auburn Ravine watershed. The flow is diverted for irrigation, power generation, and domestic supply in the Auburn and Mount Pleasant area. The upstream diversions from the Bear River basins have depleted the streamflow downstream from the Sutter Irrigation District Diversion Dam, which is 1 mile downstream of Camp Far West Reservoir. Minimum flow releases are 25 cubic feet per second (cfs) in the spring and 10 cfs during the rest of the year. Bear River flows below the dam range between 0 and 40 cfs from June to December. Currently, winter flows during wet years are similar to unimpeded flows, averaging 2,500 to 5,200 cfs. Summer flows are currently 30 to 50 percent less than the unimpaired flows (National Marine Fisheries Service 2001).

The diversion dam is the upstream limit of anadromous fish migration in the Bear River. Anadromous fish have access to the Bear River from its confluence with the Feather River upstream for 15 miles. Habitat for Chinook salmon and steelhead is limited by inadequate streamflow and the high incidence of fine sediment, which is partially attributable to the relatively low gradient and reduced streamflow. During heavy rain events, flow spills from Camp Far West Reservoir, and Chinook salmon and steelhead may migrate through and spawn in the lower Bear River (National Marine Fisheries Service 2001).

Yankee Slough is a part of the Bear River watershed and flows into the Bear River drainage downstream of SR 65 and outside of the Plan Area in Sutter County. Yankee Slough originates north and east of the unincorporated township of Sheridan in the lower Sierra foothills. Yankee Slough flows perennially due to irrigation runoff. Yankee Slough historically flowed into the American River basin, once a massive marsh complex that is now principally rice fields and urban neighborhoods.

Little or no riparian vegetation is present on much of Yankee Slough in Placer County. Outside the Plan Area, Yankee Slough is mostly channelized and serves as drainage facility for agricultural runoff. Some of the largest perennial freshwater marshes in Placer County are along Yankee Slough east of SR 65. There is no evidence that anadromous fish are present within the Yankee Slough watershed.

3.2.6.2 Raccoon Creek Watershed

Raccoon Creek originates east of Auburn near Meadow Vista and flows westward. It is intercepted by the East Side Canal in Sutter County just west of the county line. The East Side Canal then flows into the Cross Canal where it is joined by flows from Markham Ravine and Auburn Ravine. Pleasant Grove Creek enters the Pleasant Grove Creek Canal, which joins the East Side Canal, at a confluence in Sutter County where it then becomes the Cross Canal. The Cross Canal joins the Sacramento River

immediately downstream of the confluence of the Feather and Sacramento Rivers near Verona. Raccoon Creek historically flowed into the American River basin.

The Raccoon Creek planning watershed corresponds to 58 percent of the Raccoon Creek HUC-10 watershed, with a portion extending east of Plan Area A in Placer County and a portion extending west in the Sutter County where it meets the Pleasant Grove Creek-Cross Canal watershed.

In Raccoon Creek, most of the streamflow present during the late spring through early fall consists of imported water en route to downstream agricultural diversions (Placer County 2002). Raccoon Creek historically had little or no summer flow in the lower reaches. The creek currently receives a daily discharge of around 2 cfs from the Placer County Sewer Maintenance District (SMD) #1 WWTP. The SMD-1 effluent flows will cease in September 2015 following the construction of a sewer pipeline that will convey flows from the SMD-1 service area for treatment at the Lincoln WWTP on Auburn Ravine. NID discharges an additional 7.5 cfs during the summer and fall (i.e., about April 15 through October 15). Flow in Raccoon Creek is controlled by releases from Orr Creek Reservoir, operated by NID. The last downstream diversion receiving NID deliveries of water is near Gladding Road. Streamflow is managed to have no excess flow (i.e., essentially dry at Lincoln Boulevard at the old alignment for SR 65) (Placer County Planning Department 1999 in Jones & Stokes Associates 2005).

The natural flow pattern for small foothill streams is a gradual decline in flow during the spring, summer, and early fall, until the first rainstorms begin in late fall. Flow is an essential component of fish habitat. Low-flow conditions can result in lack of depth for adult fish passage, minimal flow over redds,[4] increased siltation of redds and reduced levels of oxygen to the eggs, and reduced space for juvenile rearing.

In the lower reaches of Raccoon Creek, runs are the most dominant channel structure element, followed by low-gradient riffles, glides, dammed pools, mid-channel pools, lateral scour pools, and channel confluence pools (Jones & Stokes Associates 1996 in Jones & Stokes Associates 2005). There are minimal amounts of in-stream cover (i.e., woody debris and undercut banks) and overhead cover (i.e., riparian vegetation). Streamside vegetation is sparse in many places due to grazing by livestock. Channel instability and resultant bank cutting may also prevent the establishment of vegetation. Stream channel substrates consist predominantly of cobble, gravel, sand, and silt- and clay-sized particles.

Doty Ravine originating west of Auburn is the main tributary to Raccoon Creek. The streambed in the headwaters consists primarily of gravel and cobbles with some larger granitic boulders. Doty Ravine upstream of Gladding Road flows through oak woodland and is bordered by rural-residential and ranch lands. Downstream of Gladding Road, the bordering lands experience higher livestock use, and the ravine is considered highly disturbed (Placer County 2002).

Doty Ravine receives water from deliveries by NID as well as natural runoff. Import of NID deliveries and conveyance down Doty Ravine is generally completed by October. Winter flows can exceed several thousand cfs, but during the irrigation season the flows generally average less than 20 cfs and are usually substantially less (Placer County 2002). All irrigation water is diverted at the Doty South Diversion Dam (DSDD) west of Crosby Herold Road. Downstream of the DSDD, flow in the

[4] A redd is a depression in the gravel of the river created by the salmonid fish males in which the females lay their eggs. After fertilization, the females cover the eggs with gravel.

stream accretes from leakage at the DSDD, groundwater, and agricultural runoff. During the non-irrigation season, the flows are around 5 to 6 cfs.

3.2.6.3 Markham Ravine Watershed

The following section was taken from the Auburn Ravine and *Raccoon Creek Ecosystem Restoration Plan* (Placer County 2002).

The Markham Ravine watershed is almost entirely on the Valley floor, originating in the low elevation hills northeast of the City of Lincoln and emptying into the East Side Canal approximately 1 mile north of Auburn Ravine in Sutter County. Because of the nearly flat terrain and the extensive history of drainage and irrigation modifications, watershed boundaries here are indistinct in the lower reaches. The Markham Ravine planning watershed comprises the northern portion of the Pleasant Grove Creek-Cross Canal HUC-10 watershed.

In its headwaters, the channel of Markham Ravine is poorly defined. Near Lincoln Boulevard, the channel becomes more distinct and passes through industrial, light industrial and rapidly urbanizing areas located in the northern portion of Lincoln. West of the City of Lincoln, the channel passes through a mixture of farms and ranches, including pastures for grazing as well as rice and other grain farming. In this reach of Markham Ravine, streamflow is artificially augmented by irrigation return flows and urban runoff. There are no effluent discharges into the ravine. The presence of relatively permanent flow allows the establishment of riparian and wetland vegetation. Beavers are very active west of Lincoln, resulting in small impoundments forming seasonal and perennial marshes.

3.2.6.4 Auburn Ravine Watershed

Auburn Ravine originates on the north side of the city of Auburn and flows west to its confluence with East Side Canal in Sutter County and thence into the Cross Canal and the Sacramento River. The elevation of the basin ranges from 30 to 1,600 feet asl. The Auburn Ravine planning watershed includes the entire HUC-10 Auburn Ravine watershed and a portion of the Pleasant Grove Creek-Cross Canal HUC-10 watershed.

In its headwaters, Auburn Ravine is characterized by a high-gradient, incised channel with steep-sided banks. Large boulders and cobbles dominate the substrate. The channel includes scour pools, waterfalls, and high-velocity chutes. Riparian vegetation is abundant. In its middle reaches downstream to the City of Lincoln, the stream's gradient decreases substantially, and the substrate is characterized by sand, gravel, and cobbles. Pools and riffles are common, and trees and shrubs dominate the riparian zone. The channel contains large woody debris and bank erosion increases relative to the upper reach.

Within the city limits of Lincoln, Auburn Ravine has a very a low gradient and sandy substrate. Riparian vegetation is characterized by a relatively open tree canopy with an understory dominated by blackberries and shrubs.

Downstream from the City of Lincoln, rice farms and livestock ranches border the stream. In some places, Auburn Ravine is contained within levees and riparian vegetation may be absent. Stream channel substrate is mostly clay and fine sediments, with occasional pieces of large woody debris. Grazing and channel maintenance activities restrict the development of riparian vegetation. The lower 2.5 miles of Auburn Ravine was rerouted and leveed to flow into the East Side Canal.

Winter flow in Auburn Ravine is dominated by runoff from rainfall events and effluent from the City of Auburn WWTP, which contributes discharge year-round. Winter flows range from less than 3 cfs to an estimated 100-year flow event that exceeds 14,000 cfs.

Summer flows are high relative to natural conditions because of the effects of water imports. Auburn Ravine receives water imports from the Bear, Yuba, and American Rivers by NID, PCWA, and PG&E, creating above-normal spring and summer flow conditions. NID, PG&E, and PCWA use Auburn Ravine as a water conveyance feature. In addition to water imports, NID and PCWA customers indirectly affect Auburn Ravine hydrology through customer return flows (remaining portions of customer water deliveries that return to drainages). In September or October, flow is substantially decreased as irrigation demands diminish or cease. Flow during the fall may often be less than 3 cfs. Auburn Ravine's artificially high flow in the summer months provides more, and substantially different, aquatic habitat compared with what would exist under natural flow conditions. Reduced flow in September and October substantially reduces the area of aquatic habitat relative to habitat available in the summer.

3.2.6.5 Pleasant Grove Creek Watershed

The Pleasant Grove watershed and its constituent Curry Creek are located in western Placer County, including the western portions of the cities of Roseville and Rocklin and eastern Sutter County. Both of these creeks empty into the Pleasant Grove Creek Canal, which drains to the Sacramento River via the Cross Canal.

The Pleasant Grove planning watershed comprises the southern portion of the Pleasant Grove Creek-Cross Canal HUC-10 watershed and the Placer County portion of the Curry Creek HUC-10 watershed. Altogether, the Markham Ravine, Auburn Ravine, and the Pleasant Grove planning watersheds cover more than 90 percent of the total watershed area that feeds into the Cross Canal.

The watershed is composed of five major drainages: Curry Creek, Lower Pleasant Grove Creek, Kaseberg Creek, South Branch Pleasant Grove Creek, and Upper Pleasant Grove Creek. In general, slopes are very flat, less than 5 percent, particularly in the lower watershed. These creeks were historically dry or very nearly dry in the summer months but are now mostly perennial because of urban runoff and agricultural irrigation return flows. The Pleasant Grove WWTP, operated by the City of Roseville, also augments natural streamflow, on average, by 11 cfs per day.

The dominant land-cover types within the watershed are annual grassland, urban and suburban, and agriculture. Urban and suburban land uses within the watershed are currently confined to unincorporated Placer County, the cities of Roseville and Rocklin, and the town of Loomis, but significant growth in urban and suburban land uses is expected in the next 10 to 20 years, including non-residential development in the unincorporated Sunset Industrial Area. Current development in the watershed is resulting in the conversion of agricultural and grasslands to suburban land uses, predominantly low- to medium-density residential communities with associated neighborhood or community commercial.

The Pleasant Grove Creek watershed was historically dominated by agriculture, and that is still the dominant land use in the lower portions. Rice farming in the lower watershed is very active, with farmers growing white, wild, and organic rice. Agriculture in the middle portion of the watershed involves primarily rice farming and cattle ranching on unirrigated grasslands.

3.2.6.6 Dry Creek Watershed

The following section is based on the *Dry Creek Watershed Coordinated Resource Management Plan* (ECORP Consulting 2003) and the *Assessment of Habitat Conditions for Chinook Salmon and Steelhead in Western Placer County, CA* (Jones & Stokes Associates 2005).

The Dry Creek planning watershed includes the northeastern corner of the much larger Lower American HUC-8 watershed, comprising portions of the Dry Creek and Steelhead Creek HUC-10 watersheds. The Dry Creek planning watershed ranges from the unincorporated community of Newcastle (near Auburn) to Sacramento County.

Major tributaries to Dry Creek include Antelope Creek, Secret Ravine, Miners Ravine, Strap Ravine Creek, Linda Creek, Clover Valley Creek, and Cirby Creek. The gradient of the main stem of Dry Creek is low, generally less than 1 percent. The channel is well defined with sandy substrate and bordering riparian vegetation.

The middle portion of the Dry Creek watershed has been subject to extreme development pressure by relatively recent growth, primarily within the cities of Roseville and Rocklin. The lower portions of the watershed are experiencing similar growth at this time. The upper watershed is largely composed of rural-residential property in the unincorporated area of the Loomis Basin and Penryn and some suburban growth in unincorporated Granite Bay. Urbanization has exacerbated flooding in the lower watershed, particularly in Sacramento County.

Water quality concerns have arisen because of the perceived increase in sedimentation and potential contamination from non-point sources.[5] Given these concerns, the Dry Creek Conservancy (2012) has collected a large amount of physical and biological data on the watershed. The Office of Environmental Health Hazard Assessment is currently analyzing the data, including data on water quality indicators, to gain a better understanding of the stressors in the watershed (Office of Environmental Health Hazard Assessment 2015).

As with most of the streams in the Plan Area, late summer flows in Dry Creek are largely urban runoff and releases from WWTPs. The City of Roseville's Dry Creek WWTP drains into Dry Creek west of Interstate 80.

3.2.6.7 American River Watershed

The North Fork American River defines the southeast border of the county and, with the South Fork in El Dorado County, forms Folsom Lake. No part of North Fork American stream habitat will be managed as part of the Plan because most of this land is managed by the California Department of Parks and Recreation. The Middle Fork of the American River is outside the Plan Area; however, a portion of the Middle Fork's watershed includes Plan Area B5, the Big Gun Conservation Bank for California red-legged frog near the unincorporated town site of Michigan Bluff, 21 miles east of Auburn.

3.2.7 Stream System

Two metrics are used to describe streams and associated aquatic resources in the Plan Area: riverine/riparian complex and the Stream System. Riverine/riparian complex is a natural

[5] Non-point source is a source of water pollution that comes from many diffuse sources (e.g., land runoff, precipitation, drainage), as opposed to a point source, which comes from a discernible, confined, and discrete conveyance such as a pipe, ditch, channel, etc.

community comprising the riverine/riparian land-cover type and riverine and riparian constituent habitats with estimated acreages, similar to other Plan Area communities such as aquatic/wetland complex (see Section 3.4.5, *Riverine/Riparian Complex*). Riverine/riparian complex also includes a linear mapping of streams (see Section 3.3.1.2.5, *Mapping Streams*). The Stream System overlays land cover and is not classified as a natural or semi-natural community.

Rather, the Plan uses the Stream System to (1) spatially identify all areas that occur within the 100-year floodplain or a variable-width buffer (Table 3-4 and Figure 3-8), (2) to identify where certain conditions on Covered Activities apply (see Chapter 6, *Conditions on Covered Activities*), and (3) to determine fees for effects on the Stream System (see Chapter 9, *Cost and Funding*). For the purposes of Plan implementation, the Stream System must be clearly defined.

The Stream System is the stream channel itself (wet or dry) and the surrounding areas as follows:

1. Any area subject to flooding in a 100-year event as defined by the Federal Emergency Management Agency (2005) or as determined by hydrologic analysis based on an engineering site survey (whichever is more accurate), or the area in #2 below, whichever is greater.
2. The outermost limit of a variable-width buffer measured outward from the edge of the Ordinary High Water Mark (OHWM) on streams mapped in the National Hydrography Dataset (NHD) (so-called blueline streams) as listed in Table 3-4. The OHWM corresponds to the waterline of the full channel when in non-flood condition and is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (33 Code of Federal Regulations 328.8(e)).
3. The area within 50 feet of streams not named on Table 3-4, but which are shown as "blueline" streams on USGS quad maps as specified in California Public Resources Code Section 4528 and as located on the NHD.
    a Defining streams not shown on the NHD will be added:
        1) To provide hydraulic continuity between mapped streams in the upper watershed and mapped streams in the lower watershed. This is necessary because land alteration may have erased original stream traces;
        2) If the watercourse is artificial (such as canals, channels, and flood water conveyances) and the watercourse serves in lieu of a natural stream to maintain hydraulic continuity with the watershed above, and where the channel is in an unlined, earthen condition;
        3) If the stream is determined to be perennial; or
        4) If the stream is determined to provide habitat for salmonids.
    b Defining streams will be truncated at the point where the watershed falls below 40 acres in extent in order to avoid defining the Stream System around minor drainages.
    c The 50-foot boundary may be adjusted based on site survey.

Figure 3-9 shows a schematic profile of the Stream System as determined by a variable-width boundary (See Table 3-4) or, the Federal Emergency Management Agency 100-year floodplain, whichever is greater.

Minor drainages at the headwaters of watersheds may have small creeks and may show riverine or riparian vegetation, but these small streams are not included in the Stream System, and any riverine or riparian vegetation present is defined as part of the riverine and riparian complex (Section 3.4.5, *Riverine/Riparian Complex*). The Stream System boundary does not apply to streams that are neither named in Table 3-4, nor meet the criteria listed above. In addition, there are two major reservoirs in the Plan Area, Folsom and Camp Far West, which are not considered to be in the Stream System because they are not affected by the HCP/NCCP Covered Activities.

Figure 3-10 schematically depicts the Stream System as mapped for streams in the Plan Area. This figure shows either the greater of the 100-year event floodplain, as defined by the Federal Emergency Management Agency, or the boundary for all stream reaches specified in Table 3-4, with a 50-foot boundary for all NHD blueline streams not named in Table 3-4. The Stream System boundaries on Figure 3-10 are depicted as extending from the stream line, rather than the OHWM, because the location of the OHWM was not available at this scale of mapping. Figure 3-10 does not show canals, as determination of inclusion of canals in the Stream System will be based on the results of site surveys.

Chapter 6, *Program Participation and Conditions on Covered Activities*, Section 6.2.4.5, *Item 5: Mapping the Stream System and Salmonid Streams*, and Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System,* provide information for how to identify the Stream System for purposes of avoidance and fees.

Table 3-4. Boundary Widths for Specified Stream Reaches

Stream ID[a]	Stream Name Listed from North to South and from West to East	Stream System Boundary in feet Measured from OHWM
1	Bear River downstream of Camp Far West Dam	600
2	Bear River upstream of Camp Far West Reservoir	400
3	Yankee Slough downstream of Sheridan Lincoln Blvd. crossing	200
4	Yankee Slough upstream of Sheridan Lincoln Blvd. crossing	100
5	Yankee Slough North Fork to Riosa Road	100
6	Raccoon Creek downstream of the Doty Ravine Confluence	600
7	Raccoon Creek between the Doty Ravine Confluence and McCourtney Road	300
8	Raccoon Creek between McCourtney Road and Garden Bar Road	200
9	Raccoon Creek upstream of Garden Bar Road	100
10	Orr Creek	100
11	Dry Creek tributary to Raccoon Creek	100
12	Rock Creek	100
13	Deadman Canyon	100
14	Doty Ravine downstream of Caps Ravine	300
15	Doty Ravine upstream of Caps Ravine	100
16	Caps Ravine	100
17	Sailors Ravine	100
18	Markham Ravine downstream of Dowd Road	200

Stream ID[a]	Stream Name Listed from North to South and from West to East	Stream System Boundary in feet Measured from OHWM
19	Markham Ravine between Dowd Road and Sheridan-Lincoln Blvd	100
20	Markham Ravine North Fork	100
21	Auburn Ravine downstream of Moore Road crossing	600
22	Auburn Ravine between Moore Road and Lincoln Blvd	400
23	Auburn Ravine between Lincoln Blvd and Fowler Road	300
24	Auburn Ravine between Fowler Road and Auburn WWTP	200
25	Auburn Ravine upstream of Auburn WWTP	100
26	North Ravine	100
27	Dutch Ravine	100
28	Orchard Creek downstream of State Route 65	200
29	Orchard Creek upstream of State Route 65	100
30	Ingram Slough	100
31	King Slough	100
32	Pleasant Grove Creek – west of Reason Farms	400
33	Curry Creek downstream of Baseline Road	200
34	Curry Creek upstream of Baseline Road	100
35	Dry Creek downstream of Cook-Riolo Road	400
36	Dry Creek from Cook-Riolo to Roseville City Limits	300
37	Secret Ravine	200
38	Secret Ravine North Tributary	100
39	Secret Ravine South Tributary	100
40	Secret Ravine along Boardman Canal	100
41	Miners Ravine downstream of King Road	200
42	Miners Ravine upstream of King Road	100
43	Linda Creek below Barton Road	200
44	Linda Creek above Barton Road	100
45	Strap Ravine	100
46	Antelope Creek upstream of Loomis Town Limits	100
47	Mormon Ravine	100
	USGS Blueline Streams not Specified Above	50

Notes:
[a] Named streams cross-referenced to the stream ID numbers are also shown on Figure 3-8.
OHWM = Ordinary High Water Mark
USGS = U.S. Geological Survey
WWTP = wastewater treatment plant

3.2.8 Hydrologic Modifications

Urbanization and water supply projects throughout the county and elsewhere in the Sierra Nevada have altered the natural hydrology of many streams and watersheds. Hydrologic effects vary and

range from increased peak flows to reduced or augmented summertime flows. As a watershed urbanizes, the amount of impervious surface increases and the proportion of precipitation that is surface runoff also increases. This changes the timing and magnitude of peak flows in receiving channels. In addition to increasing the potential for downstream flooding, increased peak flows also have the capacity to erode channels.

Although some of the stream channels in the upland areas of western Placer County are still natural, most of the tributaries within the Valley floor area of the watershed have been significantly modified to accommodate floodflows, deliver irrigation water, and reduce channel erosion in support of agricultural production. Many types of control structures have been installed, including earthen levees, floodwalls, culverts, and, to a limited extent, engineered channels. These structures were historically focused on conveying 100-year stormflows and preventing flooding in new development adjacent to these stream corridors.

Concrete dams, seasonal flashboard dams, and diversions are significant barriers and hazards to movement for fish, including the covered salmonids, in the Plan Area. To facilitate water deliveries to users, seasonal flashboard dams are installed in the Plan Area, particularly in Auburn Ravine, from mid-April to October. Although the flashboard dams are not in place during most of the fall-/late fall-run Chinook salmon upstream migration, or any of the upstream California Central Valley steelhead migration, downstream migrating fish (adults and juveniles) and rearing juveniles may be affected by the dams and entrained at unscreened diversions. There are ongoing efforts to improve fish passage throughout the salmonid watersheds in Placer County by evaluating barriers to migration and remediating these barriers. For example, in 2015, the South Sutter Water District (SSWD) installed two cone fish screens on the 80 cfs gravity diversion at the entrance of the Pleasant Grove Canal along Auburn Ravine. The installation of the fish screens will help to prevent listed and other migratory or resident fish species in Auburn Ravine from being diverted into the Pleasant Grove Canal, which is used to provide irrigation water to SSWD customers. Similarly, in 2012, NID constructed a series of step pools to facilitate migrating salmonids that had their passaged impeded by a irrigation water gaging facility. The Plan and other conservation efforts will continue to improve fish passage, both in migration and out migration, over the term of the permit (see Table 3-5 for a summary of the barriers to fish passage in western Placer County).

Table 3-5. Summary of Barriers to Fish Passage in Western Placer County

Barriers to Fish Passage	Watershed	Characteristics	Assessment	Recommended Action	Location
Hemphill Dam	Auburn Ravine	Seasonal flashboard dam; elevated sill, sloped apron; unscreened diversion	Significant barrier/ impediment; diversion needs screen	Dam: replace apron with pool-and-chute fishway; diversions: screen with vertical or oblique screen on bank	Located on Auburn Ravine within the Turkey Creek Golf Course approximately 1.5 miles upstream of the SR 193 crossing
Cottonwood Dam	Dry Creek; Miners Ravine	Dam in the residential subdivision of Hidden Valley, has a rectangular notched weir, but remains a barrier to fish passage	Significant barrier/ impediment	Remove dam and restore riverine and riparian habitat	Hidden Valley subdivision, Granite Bay
Doty Ravine at Garden Bar Road	Doty Ravine; Raccoon Creek	Perched 12-foot culvert	Significant impediment	Replace with natural bottom culvert with grade control or open-span bridge with fish passage baffles	The Garden Bar Road crossing of Doty Ravine in the Raccoon Creek watershed
Nelson Lane Dam	Auburn Ravine	Seasonal flashboard dam	Minor impediment	Dam: concentrate flow; diversions: screen if needed	Located on Auburn Ravine approximately ¼ mile downstream of the Nelson Lane crossing
Gaging Station at Raccoon Creek at Waltz Road near Sutter County	Raccoon Creek	Additional study needed	Likely a minor impediment during low flows – additional study needed	Additional study needed	Raccoon Creek near Waltz Road close to the Placer – Sutter County line
Lincoln Ranch Duck Club Dam	Auburn Ravine	Seasonal flashboard dam	Seasonal barrier/ impediment; unscreened diversion	Dam: excavate sump; extend pump; vortex weirs; diversions: screen if needed	Located on Auburn Ravine approximately 1 mile upstream of the Brewer Road crossing
Coppin Dam	Auburn Ravine; Raccoon Creek	Seasonal flashboard dam and unscreened diversion	Seasonal barrier/ impediment	Screen diversion; possibly remove or provide fish passage	Located on the Cross Canal near the downstream end of the "engineered" portions of Auburn Ravine in Sutter County

Barriers to Fish Passage	Watershed	Characteristics	Assessment	Recommended Action	Location
Davis Dam	Auburn Ravine	Seasonal flashboard dam	Minor barrier; seasonal operation	Possibly remove or provide fish passage	Located on Auburn Ravine between the Pleasant Grove Road crossing and the Union Pacific Railroad tracks in Sutter County
Tom Glenn Dam	Auburn Ravine	Seasonal flashboard dam	Minor barrier; seasonal operation	Possibly remove or provide fish passage	Tom Glenn Dam is located on Auburn Ravine just east of Pleasant Grove Road in Sutter County
Ophir Tunnel Cataract	Auburn Ravine	Natural cataract	Significant impediment	Backwater lower portion with concrete sill series	Located upstream of Lozanos Road on Auburn Ravine. Note that this is above NID 1 Dam, an impassable impediment.
NID Doty Ravine south diversion structure	Doty Ravine	Concrete dam	Seasonal barrier	Screen diversion and add fish passage ladder	Located on Doty Ravine approximately ¼ to ½ mile downstream of Crosby Herold Road
Camp Far West Canal dam	Raccoon Creek	Concrete dam with head gate	Significant barrier/ impediment	Fish ladder construction; screen intake	Located approximately 1 mile downstream of the confluence of Orr and Dry Creek, which combine to form Raccoon Creek. Note that the waterfall on Raccoon Creek is an impassable barrier such that salmonids may never access this dam.
NID 1 Dam	Auburn Ravine	12 foot	Additional study needed	Additional study needed	2 miles upstream from Gold Hill Road

Source: Bailey and Buell (2005), except for gaging station at Raccoon Creek at Waltz Road and NID 1 Dam; Raccoon Creek Watershed Assessment (cbec, inc., eco engineering, and H.T. Harvey Associates 2017)

NID = Nevada Irrigation District

SR = State Route

Channelization has complex effects that vary from stream to stream. Generally, current flood control methods emphasize methods other than structural approaches to reducing hydrologic impacts of development. These include the use of retention basins, bypass channels, and other means of minimizing impacts of urbanization on peak flows.

3.2.8.1 Water Deliveries and Diversions

Western Placer County has an extensive network of some 300 miles of canals, as shown on Figure 3-6 and listed in Table 3-3. Figure 3-7 shows the connections between Plan Area streams and the canal system to the west of the Plan Area. Inter-basin transfers artificially augment streamflow in most western Placer County watersheds. Water is delivered to the various watersheds for agriculture, domestic, and commercial use. The main entities involved in the delivery of water in western Placer County include the SSWD, NID, PG&E, and the PCWA. Auburn Ravine receives a large amount of water from the Bear, Yuba and North Fork American River through PG&E, NID, and PCWA. PG&E delivers Bear, Yuba, and North Fork American River water to Auburn Ravine just upstream of the City of Auburn WWTP at the Wise Powerhouse and at Lozanos Road Bridge. NID delivers Yuba and Bear River water to Auburn Ravine for downstream diversions at the Auburn Ravine One Canal and the Hemphill Canal. PCWA diverts Middle Fork American River water to Auburn Ravine through the Auburn Tunnel (Placer County 2002).

The upper half of the Raccoon Creek basin has a complex network of irrigation canals, which are managed by NID, that carry water imported from the Bear River. NID uses Orr Creek, or sometimes Rock Creek in dry years, to transport imported water from Bear River downstream to agricultural users. During the irrigation season, flows in Orr Creek average about 40 cfs above natural flows. The primary NID diversion on Raccoon Creek takes place at the Camp Far West Canal. Doty Ravine, the main tributary of Raccoon Creek, receives NID deliveries through the Auburn Ravine I and Gold Hill II/Sailor's Ravine canal system. The management objective on Doty Ravine is to divert all irrigation water at the DSDD, located just west of Crosby Herold Road (Placer County 2002).

For the Dry Creek watershed, PCWA, San Juan Suburban Water District, and the City of Roseville are the major water resource management agencies. Water supplies from outside of the Dry Creek watershed are augmenting Dry Creek flows and may dominate them during the dry season (ECORP Consulting 2003).

3.2.8.2 Wastewater Treatment Plants

Some of the water imported into Auburn Ravine is the discharge from WWTPs operated by the Cities of Auburn and Lincoln. Lincoln's current permit allows a dry-weather flow discharge of 4.2 million gallons per day (mgd), with current dry-weather flows averaging 2.8 mgd. The City's permit allows for expansion up to 8.4 mgd. The actual level of discharge will vary and may be less than the permit limits, depending upon the City's level of beneficial use of reclaimed water during the course of the year.

The Placer County WWTP SMD-1, located near Joeger Road in Auburn, off SR 49, discharges treated effluent into Rock Creek, a tributary of Orr Creek, which is a tributary to Raccoon Creek. The effluent discharge from SMD-1 is approximately 1.3 mgd, or about 2 cfs, which is a significant portion of total flow only in the fall when NID imports to Raccoon Creek stop (Placer County 2002). This facility was to be decommissioned by September 2015, and all effluent was to be conveyed to the City of Lincoln for treatment at the regional WWTP on Auburn Ravine. Because of constraints associated with the

installation and function of the force main pipeline, the decommissioning will not take place until 2016. The overall project is known as the Mid-Western Placer Regional Sewer Project.

Dry Creek receives treated effluent from the Roseville Dry Creek WWTP. The design capacity is 18 mgd. Treated effluent contributes relatively little to flows during wet-weather months; however, they can represent a high proportion of dry-weather flows (more than 50 percent of total flow at Vernon Street Bridge) (ECORP Consulting 2003).

The Placer County SMD-3 facility was a minor discharger of municipal wastewater for the Loomis Basin/Granite Bay area. This facility was decommissioned in November 2014, and all effluent is being transferred to the existing SMD-2 collection system in Granite Bay for treatment at the Dry Creek WWTP in Roseville. The site is being reclaimed.

3.3 Biological Setting Methodology

This section describes the methodology used to characterize the biological setting of the Plan Area. The methodology involves classifying land use, land cover, and habitats in a way that supports the analysis of effects and development of the conservation strategy. The analysis requires knowing what biological resources are present, where they are located, and how much is present.

The Plan identifies potential habitat in two ways: by digitally mapping land-cover types in a geographic information system (GIS) (Section 3.3.1.2, *Mapping*) and by estimating the amount of a habitat associated with a land-cover type (Section 3.3.1.3, *Estimating Constituent Habitats*). Because certain habitat elements important to Covered Species occur at too fine a scale to map programmatically, their extent is estimated (in acres) as a percentage of a land-cover type. Habitats whose extent is estimated are called *Constituent Habitats* (see Section 3.3.1.1, *Definitions*).

3.3.1 Communities, Land Cover, and Constituent Habitat

3.3.1.1 Definitions

The Plan uses the terms *community*, *land-cover type*, and *constituent habitat* to classify and describe the biological setting of the Plan Area. The term *complex* is used to characterize some land-cover types and define communities. Although these terms have general meaning, they have a specific use in the Plan.

Community. The Plan uses the term *community* to mean land-cover types that are grouped together because of similarity in vegetation type, vegetation structure, ecological function, and current land use. This Plan recognizes four types of communities: natural communities, semi-natural communities (e.g., rice, field crop), other agriculture (e.g., orchards and vineyards), and urban (non-natural) communities. Communities are composed of land-cover types (Table 3-6) and, in some cases, constituent habitats (Table 3-7).

Table 3-6. Communities and Land-cover Types

Community Name	Land-cover Type
Natural Communities	
Grassland	Annual grassland
	Pasture
Vernal Pool Complex (VPC)	VPC – high density
	VPC – intermediate density
	VPC – low density
Aquatic/Wetland Complex	Marsh Complex
	Pond
Riverine/Riparian Complex	Riverine/riparian
Oak Woodland	Blue oak woodland
	Foothill chaparral
	Interior live oak woodland
	Mixed oak woodland
	Oak-foothill pine woodland
	Oak savanna
	Rock outcrop
Valley Oak Woodland	Valley oak woodland
Semi-natural Communities	
Rice Agriculture	Rice
Field Agriculture	Alfalfa
	Cropland
	Eucalyptus
Other Agriculture	
Orchard and Vineyard Agriculture	Orchard
	Vineyard
Urban (Non-natural) Communities	
Managed Open Water	Canal
	Reservoir
	Urban open water
Rural Residential	Rural residential
	Rural residential forested
Urban	Urban and suburban
	Urban golf course
	Urban park
	Urban riparian
	Urban wetland
	Urban woodland
	Barren/industrial
	Road

Source: MIG|TRA (9/8/2015)

Complex. A mosaic of wetland land-cover types that are difficult to map as separate units. For example, ponds and sloughs often have a mixture of open water, emergent marsh, and seasonal wetland that varies throughout the year. Rivers and streams often have a riparian or marshy edge. These are better mapped and/or described as complexes with an explanation of what types are included in the complex.

This approach allows the Plan to map vernal pool complex, aquatic/wetland complex, and riverine/riparian complex. Vernal pool complex includes individual pools that cannot be mapped, vernal pool constituent habitats (i.e., vernal pools, seasonal wetlands, and seasonal swales), and the surrounding uplands. Riverine/riparian complex includes streams and their surrounding riparian corridor containing a mosaic of open water riverine and riparian habitat. Aquatic/wetland complex includes open water lacustrine, freshwater marsh, and seasonal fringe wetland. The mosaic of vegetation, wetland, and open water for these complexes varies through the year as the amount of open water is reduced and freshwater marsh expands to take its place, as freshwater marsh dries up and becomes seasonal wetland, and as the winter riverine channel gives over to summer riparian vegetation. Not only are these resources variable in time, but they are usually too small in extent to map reliably.

Constituent Habitat. The Plan uses the term *constituent habitat* to describe habitat elements within land-cover types that cannot be exhaustively mapped and measured using aerial photography. Constituent habitats include wetlands and riparian vegetation that require actual ground-level access and detailed cartography that is not available uniformly throughout Plan Area A, or the Plan Area as a whole. The analysis of these constituent wetland and riparian habitats is based on estimates of their presence in the various land-cover types. The constituent habitats identified for this Plan are listed in Table 3-7, along with the natural communities with which they are most commonly associated. Table 3-8 shows with which land-cover types each constituent habitat type may be associated. Note that the constituent habitats may be found in different land-cover types across different communities. Table 3-8 demonstrates both major and minor associations between land cover and constituent habitat. A major association is where a land-cover type is estimated to have more than 1 percent of the land area present as the constituent habitat.

Table 3-7. Habitat Constituents and their Primary Associated Community Types

Community	Constituent Habitat
Vernal Pool Complex (VPC)	Vernal Pool Wetland Seasonal Wetland in VPC Seasonal Swales
Aquatic/Wetland Complex	Fresh Emergent Marsh Lacustrine Non-vernal Pool Seasonal Wetland
Riverine/Riparian Complex	Riverine Riparian

Source: ICF (9/8/2016)

Table 3-8. Habitat Constituents Associations with Land Cover

	Land-cover Associations	
Constituent Habitats	**Major: Constituent Habitat is Present on More than 1% Land-cover Type**	**Minor: Constituent Habitat is Present on Less than 1% Land-cover Type**
Vernal Pool Seasonal Wetland in VPC Seasonal Swales	VPC – high density VPC – intermediate density	VPC – low density Annual Grassland [a] Pasture [a] Marsh Complex [a] Oak Savanna [a] Rural Residential [a]
Fresh Emergent Marsh Lacustrine Non-vernal Pool Seasonal Wetland	Marsh Complex Pond	VPC – high density VPC – intermediate density VPC – low density Annual Grassland Pasture Riverine/Riparian Valley Oak Woodland Oak Savanna Eucalyptus
Riverine Riparian	Riverine/Riparian	VPC – high density VPC – intermediate density VPC – low density Annual Grassland Pasture Marsh Complex Pond Valley Oak Woodland Oak Savanna

Source: MIG|TRA (1/18/2015)
[a] In the Valley only (not in the Foothills)
VPC = vernal pool complex

For example, seasonal depressions as small as 10 feet across may function as vernal pool wetlands and may constitute Covered Species habitat. Ponds this small—1/500 of an acre—cannot be reliably mapped over the 100,000-acre scale of the Valley where they may occur. Instead, various land-cover types are assigned a nominal vernal pool wetland density. In the case of the land-cover type vernal pool complex intermediate density, vernal pool wetlands (based on U.S. Army Corps of Engineers delineation) are assigned a 2.0 percent presence. Thus, in 100 acres of mapped vernal pool complex intermediate land cover, the Plan estimates that 2 acres of wetlands would be delineated as vernal pools in an actual on-the-ground wetland survey.

Land-cover Type. The Plan uses the term *land-cover type* to describe the basic mapping units. Land-cover type is the dominant feature of the land surface discernible from aerial photographs and defined by vegetation, water, or human uses. As explained in the mapping methodology section (Section 3.3.1.2, *Mapping*), the land-cover types in the Plan are modeled after the California Wildlife

Habitat Relationship (CWHR) used by the California Department of Fish and Wildlife (CDFW). The land-cover types incorporate some CWHR definitions for components of natural communities but add other definitions to describe the mosaic of agricultural and urban uses. The entire Plan Area A land cover is mapped using aerial photography. The assignment of land-cover types to specific communities used in the Plan is shown in Table 3-6. Table 3-9 and the species accounts (Appendix D, *Species Accounts*) provide a description of the land-cover type modeled as habitat for each species.

Natural Community. A natural community is a collection of species that co-occur in the same habitat or area and interact through trophic and spatial relationships. For the purposes of the Plan, communities are typically characterized by reference to one or more dominant species (Lincoln et al. 1998), vegetation, or characteristic wetland feature. The Plan recognizes six natural communities in the Plan Area (Table 3-6).

Other Agriculture. The Plan defines other agriculture as a community with little or no value for wildlife (agricultural communities with potential value for wildlife are defined as semi-natural communities below). The Plan recognizes two land-cover types as other agriculture: orchard and vineyard. These land-cover types have little to no value for Covered Species.

Semi-natural Community. The Plan defines semi-natural communities to distinguish agricultural land with some value to wildlife from more intensively managed agricultural land with little or no value to wildlife. For the purposes of the Plan, a semi-natural community is a community that has been intensively managed for agricultural uses with soil disturbance and planting that may retain habitat values for native wildlife. The Plan recognizes two semi-natural, agricultural communities: rice and field agriculture. Field agriculture includes alfalfa; croplands such as grain, vegetables, corn, and oats (see Section 3.4.9.1, *Land-cover Types*, for more details); and eucalyptus stands. Orchards and vineyards are described as "Other Agriculture," not as semi-natural communities. Note that with the exception of rice for giant garter snake, the Plan mitigates effects on semi-natural communities modeled as habitat for Covered Species through protection and management of natural communities, not agricultural lands (see Chapter 5, *Conservation Strategy*, Section 5.2.6.5, *Agriculture and Other Open Space*).

Urban (Non-natural) Community. These are communities dominated by human development (e.g., urban woodland) and manipulation (e.g., reservoir). The Plan recognizes three urban (non-natural) communities: managed open water, rural-residential, and urban. These communities may provide habitat for Covered Species in limited circumstances (see Table 3-9 and Appendix D, *Species Accounts*).

Table 3-9. Modeled Habitat for Covered Species

Community/ Land-cover Type/ *Constituent Habitat*[a]	Covered Species									
	Swainson's Hawk	California Black Rail	Western Burrowing Owl	Tricolored Blackbird	Giant Garter Snake	Western Pond Turtle	Foothill Yellow-legged Frog	California Red-legged Frog	Valley Elderberry Longhorn Beetle	Vernal Pool Fairy Shrimp/ Tadpole Shrimp
Grassland										
Annual Grassland	F	-	N	F	U	U	-	U	-	-
Pasture	F	-	N	F	U	U	-	U	-	-
Vernal Pool Complex (VPC)										
VPC High Density	F	-	N	F	U	U	-	U	-	A
VPC Intermediate Density	F	-	N	F	U	U	-	U	-	A
VPC Low Density	F	-	N	F	U	U	-	U	-	A
Vernal Pool Constituent Habitats	-	-	-	-	-	-	-	-	-	A
Aquatic/Wetland Complex										
Marsh Complex	-	-	-	N	A	A	-	A	-	-
Fresh Emergent Marsh	-	Y	-	-	-	-	-	-	-	-
Pond	-	-	-	-	A	A	-	A	-	-
Riverine/Riparian Complex										
Riverine/Riparian	N	-	-	-	A	A	Y	A	Y	-
Oak Woodland										
Blue Oak Woodland	-	-	-	-	-	U	-	U	-	-
Foothill Chaparral	-	-	-	-	-	U	-	-	-	-
Interior Live Oak Woodland	-	-	-	-	-	U	-	U	-	-
Mixed Oak Woodland	-	-	-	-	-	U	-	U	-	-
Oak Savanna	-	-	N	-	-	U	-	U	-	-
Oak-Foothill Pine Woodland	-	-	-	-	-	U	-	U	-	-
Rock Outcrop	-	-	-	-	-	-	-	-	-	-
Valley Oak Woodland										
Valley Oak Woodland	N	-	N	-	-	U	-	U	Y	-

Community/ Land-cover Type/ *Constituent Habitat*[a]	Covered Species									
	Swainson's Hawk	California Black Rail	Western Burrowing Owl	Tricolored Blackbird	Giant Garter Snake	Western Pond Turtle	Foothill Yellow-legged Frog	California Red-legged Frog	Valley Elderberry Longhorn Beetle	Vernal Pool Fairy Shrimp/ Tadpole Shrimp
Rice Agriculture										
Rice	-	-	-	-	A	-	-	-	-	-
Field Agriculture										
Alfalfa	F	-	N	F	U	-	-	-	-	-
Cropland	F	-	N	F	U	-	-	-	-	-
Eucalyptus	N	-	-	-	-	-	-	-	-	-
Orchard and Vineyard Agriculture										
Orchard	-	-	-	-	-	-	-	-	-	-
Vineyard	-	-	-	-	-	-	-	-	-	-
Managed Open Water										
Canal	-	-	-	-	A		-	-	-	-
Reservoir	-	-	-	-	-	-	-	-	-	-
Urban Open Water	-	-	-	-	-	-	-	-	-	-
Rural Residential										
Rural Residential	-	-	-	-	-	-	-	-	-	-
Rural Residential Forested	-	-	-	-	-	-	-	-	-	-
Urban[b]										
Urban and Suburban	-	-	-	-	-	-	-	-	-	-
Urban Golf Course	-	-	-	-	-	-	-	-	-	-
Urban Park	-	-	-	-	-	-	-	-	-	-
Urban Riparian	N	-	-	-	-	A	-	A	-	-
Urban Wetland	-	-	-	-	-	A	-	A	-	-
Urban Woodland	N	-	-	-	-	U	-	U	-	-
Barren/Industrial	-	-	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-	-	-

Community/ Land-cover Type/ *Constituent Habitat*[a]	Covered Species: Swainson's Hawk	California Black Rail	Western Burrowing Owl	Tricolored Blackbird	Giant Garter Snake	Western Pond Turtle	Foothill Yellow-legged Frog	California Red-legged Frog	Valley Elderberry Longhorn Beetle	Vernal Pool Fairy Shrimp/ Tadpole Shrimp

Source: MIG|TRA (12/05/2016)

Table Notes:

[a] Only constituent habitats directly incorporated in Covered Species modeling are listed here.

[b] Urban land-cover types included as modeled habitat are not used in estimates of Covered Species take or creation of new habitat.

Habitat Codes:

N = Nesting
F = Foraging
Y = Year-round habitat
A = Aquatic
U = Upland

Covered Species Notes (Source: Appendix D, *Species Accounts*):

Species	Habitat Code	Habitat Description
Swainson's Hawk	N	Nesting, Valley
	F	Foraging, Valley
California Black Rail	Y	Year-round habitat, all Plan Area Fresh emergent marsh constituent of marsh complex (see Section 3.3.1.3, *Estimating Constituent Habitats*).
Western Burrowing Owl	N	Potential nesting and over-wintering, Valley
Tricolored Blackbird	N	Nesting, Valley and Foothills below 300 feet elevation
	F	Foraging in the Valley and in the Foothills below 300 feet elevation
Giant Garter Snake	A	Aquatic, Valley below 100 feet elevation
	U	Upland, within 200 feet of aquatic habitat
Western Pond Turtle	A	Aquatic, all Plan Area
	U	Upland habitat, within 150 feet of aquatic habitat
Foothill Yellow-legged Frog	Y	Year-round habitat, Foothills above 500 feet elevation Modeled by stream reach as well as by areal extent of land-cover type
California Red-legged Frog	A	Aquatic, Plan Area above 200 feet elevation
	U	Upland, within 1 mile of aquatic habitat

Covered Species Notes (Source: Appendix D, *Species Accounts*):

Species	Habitat Code	Habitat Description
Valley Elderberry Longhorn Beetle	Y	Year-round, Valley, Foothills below 650 feet elevation
Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp	A	Aquatic, Valley Vernal pool constituent habitats are not mapped as a land cover. Rather, their presence is estimated within the landscape (see Section 3.3.1.3, *Estimating Constituent Habitats*).
	U	Upland, Vernal Pool Complex Valley
Conservancy Fairy Shrimp		The Plan does not model habitat for Conservancy fairy shrimp because its known distribution is highly restricted in the Plan Area to a single vernal pool and because the type of vernal pool this species typically occurs in (e.g., generally large and turbid pools; Helm 1998; U.S. Fish and Wildlife Service 2007) is not found in the Plan Area.
Steelhead and Chinook Salmon		Spawning/rearing and migration/rearing habitats are modeled by stream reach, not by land-cover type.

3.3.1.2 Mapping

One of the primary sources of data for this Plan is a detailed map of land-cover types within Plan Area A maintained in GIS. Land cover was not mapped for Plan Area B because nearly all of the Covered Activities and conservation actions will occur in Plan Area A, and information for Plan Area B was not readily available. A land-cover type is defined as the dominant character of the land surface discernible from aerial photographs, as determined by vegetation, water, or human uses. Land-cover types are the most widely used units in analyzing ecosystem function, habitat diversity, natural communities, wetlands, streams, and habitats used by Covered Species. The land-cover data were used to project urban, suburban, and rural-residential growth, assess take and other effects, and develop the conservation strategy for the Plan. Data sources, mapping standards, and the classification and interpretation of land-cover types are discussed below.

3.3.1.2.1 Data Sources

The Plan represents an intensive effort to gather biological data on western Placer County. Preparation of the Plan required an inventory of biological and natural resources to compile detailed information on the status, extent, and distribution of Covered Species and their habitats and major ecosystems.

- The *Placer County Natural Resources Report* (Jones & Stokes Associates 2004) provided comprehensive maps and compilations of data on habitat and land-cover types, covered and other special-status species, and sensitive natural communities. The descriptions of the communities and land-cover types presented in Section 3.4, *Plan Area Communities,* are based on the *Placer County Natural Resources Report.*
- The Science Advisors prepared a report that described the major land-cover types of western Placer County and associated conservation issues, including conservation planning and reserve design principles relevant to the Plan Area (Brussard 2004).
- Thomas Reid Associates (now MIG|TRA Environmental Sciences [MIG|TRA]) and Placer County staff compiled scientific and other GIS data. MIG|TRA compiled a GIS-based land-cover map from numerous sources for the Plan. These sources included the following:
    - Jones & Stokes Associates (2004) land-cover mapping for the Foothills portion of the Plan Area
    - North Fork Associates (2009) land-cover and vernal pool mapping for the Valley portion of the Plan Area
    - Salix (2012) characterization of density and disturbance for vernal pool grassland complexes below 200 feet asl
    - CDFW Vegetation Classification and Mapping Program—2009 vegetation mapping to expand the Foothills rural-residential districts
    - Jurisdiction boundaries, cities, and city Spheres of Influence (Placer County GIS)
    - *Placer County General Plan* (Placer County 2013) and related community plans
    - *City of Lincoln General Plan* (City of Lincoln 2008)
    - Placer County Assessor's Parcel Database (Placer County GIS)

- Jones & Stokes Associates (2002) land-cover mapping (Placer County GIS)
- Eric Beckwitt (2002) watershed analysis and supporting GIS data
- Light Detection and Ranging (LIDAR) data, Central Valley floodplain evaluation and delineation (California Department of Water Resources 2009)

3.3.1.2.2 Land-cover Type Classification

The land-cover type classification is based on the CWHR habitat classification system (California Department of Fish and Game 2011). The CWHR system was selected over other habitat classifications because it is widely used by land managers and wildlife biologists throughout California and is the most easily understood by decision makers and the general public.

During the initial vegetation mapping by Jones & Stokes Associates (2004), the CWHR system was slightly modified to reflect conditions in Placer County and was named the Placer County Wildlife Habitat Relationship (PCWHR) system. The PCWHR is similar to the CWHR, except that some land-cover types were expanded for mapping purposes. For example, the CWHR "urban" land-cover type was divided into eight subtypes to distinguish among areas that are surrounded by native ecosystems and areas that are entirely developed (Jones & Stokes Associates 2004).

As the effects analysis proceeded (see Chapter 4, *Effects of Covered Activities,* for full discussion of the effects analysis), further modifications were made to the PCWHR. Some classes were further divided to distinguish between naturalized and highly disturbed conditions. Other classes were condensed when it was found that they were not consistently mapped or were present in such a small amount that they were not meaningful for regional planning such as the springs and seeps small patch ecosystem. The name for some classes was changed to avoid essential confusion between a land-cover type and a wetland type that is not mapped directly and would be determined by delineation. Because the Plan uses the terms Valley and Foothills to refer to geographic subareas, those terms were omitted from land-cover type names where practical.

The intent of the mapping was to evaluate Plan Area A, where almost all impacts and conservation occur. The term "land-cover type" applies more broadly than "wildlife habitat relationship" and is used in the Plan. Land cover was not mapped for Plan Area B because nearly all of the Covered Activities and conservation actions will occur in Plan Area A. Impacts in Plan Area B were assessed separately from those in Plan Area A. All classes of land-cover types used in the Plan, as well as their community associations, are listed in Table 3-6.

3.3.1.2.3 Mapping Land Cover

Initial land-cover mapping began when Jones & Stokes Associates mapped PCWHR habitat types occurring in western Placer County in 2002. All patches of vegetation and land cover 0.1 acre or larger were mapped using 2002 aerial photographs. Botanists drew lines delineating land cover based on visible signatures—differences in color tones and textures—on the underlying photographs. The drawings were electronically scanned and imported into a GIS. Jones & Stokes Associates botanists and wildlife biologists conducted field surveys in 38 watersheds in Plan Area A from February 27 through May 4, 2003. Time and access limitations did not permit all watersheds to be surveyed with equal intensity or precision. The resulting natural resources report described the natural communities mapped within each watershed (see the natural resources report [Jones & Stokes Associates 2004] for further discussion of the methodology).

Land-cover mapping in the Valley was updated in 2006 and 2012 in conjunction with refined vernal pool mapping using May 2005 and April 2011 aerial photography, as described below. Because the new imagery allowed a broader and more detailed evaluation of low-density vernal pool presence, the new mapping replaced the original Jones & Stokes Associates 2002 map for most of the Valley, including the area from Lincoln to the west.

The Jones & Stokes Associates 2002 map was retained for the Foothills with one modification. The original mapping identified as "rural-residential" or "rural-residential forested" any portion of the Foothills where the estimated dwelling density was greater than one unit per 10 acres. As the effects assessment methodology for the Foothills was developed, it became necessary to discern the characteristics of the natural land that was remaining in this very low-density residential development and would be altered by the direct effects of covered rural development. California Department of Fish and Game (now California Department of Fish and Wildlife) 2009 vegetation mapping of the Sierra Nevada foothills was used to fill in the detail for some 12,300 acres (47 percent) mapped by Jones & Stokes Associates 2002 as rural-residential and rural-residential forested.

3.3.1.2.4 Mapping Vernal Pool Complexes

In conjunction with the Placer County Planning Services Division, North Fork Associates (Jeff Glazner) initially mapped vernal pool complexes along the Valley floor of western Placer County in 2002 using 1999 and 2000 aerial photography. A spring 2002 aerial photo was also used to evaluate spring/wet conditions for potential vernal pool complexes. Vernal pools and vernal pool complexes were then identified, based on a two-dimensional interpretation of these sub-meter aerial photographs. To reflect more current conditions in 2006, the original vernal pool mapping was updated along with the overall land-cover map.

North Fork Associates remapped vernal pool complexes in the Valley floor of western Placer County in 2009 using high-resolution photography from summer 2007 and fall 2008 and evaluated disturbance and restoration potential along with density.

In 2009, Placer County convened a number of vernal pool and wetland experts to evaluate the mapping conducted to date and provide input to improve the mapping. A meeting was coordinated by Dr. Michael Barbour of the University of California, Davis that included various members of the academic community and resources agencies. Several vernal pool experts, including Carol Witham (California Native Plant Society), Dr. Bob Holland, and Dr. Michael Barbour, indicated that the vernal pool complexes were "under mapped" in the Plan Area (Snow pers. comm.; Glazner pers. comm.).

In 2011, new aerial photography was commissioned by Placer County that showed the correct seasonal period. This new photography, from April 11, 2011, occurred when the wetlands were drying down and the low-moisture areas, which were beginning to dry out, were most visible against the more mesic, green grasslands. As a result, the overall vegetation was highly interpretable with use of the aerial photography (Glazner pers. comm.). The 2012 mapping was completed by Jeff Glazner (currently with Salix Consulting) with use of this new aerial photography. The 2012 GIS data were integrated into the land-cover GIS to analyze the effects of Covered Activities and develop the conservation strategy. The following describes the methods used to remap vernal pool complexes.

All land-cover types that could support vernal pools in western Placer County below the 200-foot contour were identified through photo interpretation. Once identified, all land-cover types and

vernal pool complexes were digitized at a scale of 1 inch equal to 200 feet utilizing ArcGIS 9.3. The final data were produced in survey feet, North American Datum 1983, State Plane California Zone II.

The majority of vernal pools occurred in the annual grassland and pasture land-cover types. Vernal pools are often clustered in hydrologically connected complexes. For the purpose of this mapping effort, a complex was defined as a grouping of two or more vernal pools that occur in relatively high density and separate from other complexes. Each polygon of vernal pools was mapped by drawing a tight line around the outer pools of the complex. Where available, wetland delineation data were used to draw the boundaries around complexes. This mapping methodology is based on the vernal pool complex description from the Science Advisory Team (ECORP Consulting 2004).

Air photo interpretation for vernal pools was used to map vernal pool complexes based on density. Hydrological information for identifying linked vernal pools complexes could be inferred in some locations but was not definitive. The edge of a complex was generally drawn to minimize the perimeter length while remaining roughly 250 feet from the majority of the pools within the complex.

Individual vernal pools and other vernal pool constituent habitats are not easily discerned from aerial imagery and cannot be mapped directly. Vernal pool land cover was grouped into three main categories based on estimated density of vernal pools and vernal pool seasonal wetlands:

- High density (more than 5 percent)
- Intermediate density (1 to 5 percent)
- Low density (wetlands present but density less than 1 percent)

These density levels reflect the wetland density found within the vernal pool complex community type. The methods described below in Section 3.3.1.3, *Estimating Constituent Habitats*, characterizes the density of specific wetland constituent habitats (i.e., vernal pool wetland, seasonal wetland in vernal pool complex, and seasonal swales) for each vernal pool complex density class, as shown in Table 3-10.

Highly altered landscapes that may have previously supported vernal pools but have been altered beyond any historic landform were scored or categorized as having no vernal pools present. These landscapes were typically leveled, irrigated pasture.

In general, rice lands were assumed to no longer support vernal pools and vernal pool complexes. Some fallow rice lands (e.g., contoured versus laser-leveled rice lands) or rice lands that are no longer in production show residual topography and vernal pool signatures and were included as vernal pool complexes when corroborated by several photographic sources.

3.3.1.2.5 Mapping Streams

This Plan maps streams in three ways: (1) the Stream System (see Section 3.2.7, *Stream System*, for a description and definition of the Stream System); (2) an areal mapping of riverine/riparian complex land-cover types, as described in Sections 3.3.1.2, *Mapping*, and 3.4.5.1, *Land-cover Types*; and (3) a linear mapping of riverine/riparian complex. This section describes the linear mapping of streams for riverine/riparian complex.

The stream lines were derived from 2007 Placer County data and based on a manual digitization of USGS 7.5-minute quadrangle maps. Because the natural drainages of western Placer County have

been altered so extensively, the mapped trace of the streams is occasionally discontinuous. The more significant discontinuities were corrected manually, but the Stream System mapping as a whole is approximate and is suitable for a regional-scale analysis. Site evaluation or other aspects of Plan implementation, which are dependent on the location of a stream and the order of a stream, its OHWM, and 100-year floodplain will need to be verified by field inspection.

The original USGS map differentiation of intermittent or perennial streams does not always match current conditions, as explained in Section 3.2.8, *Hydrologic Modifications*, and is not used. The natural drainages of western Placer County often intersect the system of canals, and natural drainages are used as part of the water-delivery system with irrigation water inlets and turnouts from and back into the canal system (see Table 3-3 for the extent of streams, canals, and reservoirs in the Plan Area). In the flatter portions of the Valley, streams have been channelized and often intersect drainage ditches, irrigation supply, and irrigation return water channels.

3.3.1.2.6 LIDAR

LIDAR is a remote sensing technology that measures distance by illuminating a target with a laser and analyzing the reflected light. When mounted on aircraft, LIDAR can be used to make high-resolution maps. LIDAR data for the Valley were supplied by the California Department of Water Resources (Photo Science, Inc., from Lexington, Kentucky, published the data in 2009 for the California Department of Water Resources' Central Valley Floodplain Evaluation and Delineation).

The detailed topography map resulting from LIDAR analysis was used to develop a preliminary method of discerning the presence of topographic depressions that would indicate vernal pools or other seasonal wetlands. The LIDAR analysis was used in conjunction with the qualitative assessment of density and disturbance in the vernal pool mapping to evaluate the character of lands currently or formerly in rice cultivation. The methodology was also used to demonstrate the feasibility of applying the baseline consistency evaluation described in Chapter 6, *Program Participation and Conditions on Covered Activities,* Section 6.2.4.3, *Item 3: Community and Constituent Habitat Types on Site and Baseline Land-cover Map Consistency.*

3.3.1.3 Estimating Constituent Habitats

Wetlands, riverine, and riparian habitat features have regulatory significance and are important for Covered Species. Their occurrence in the Plan Area is usually in small patches or distributed in a mosaic that cannot consistently be mapped using the programmatic land-cover type mapping methodology.

These features usually occur in association with certain land-cover types; therefore, they are termed "constituent habitats." Their presence in Plan Area A is estimated by applying a density factor to land-cover mapping. The density factors were derived by comparing mapped land-cover type to a collection of in-field wetland delineation results in 11,242 acres of land in the Valley. The crosswalking of delineated wetlands and riverine or riparian features to land cover was done by the consultant team and used to derive the proportion of constituent habitats by land-cover type (Tables 3-10 and 3-11).

The wetland delineation sample is based on a collection of 10 wetland delineation reports from the records of Placer County and Salix Consulting. The delineation results were prepared by others and followed established U.S. Army Corps of Engineers wetland identification methodology (Environmental Laboratory 1987). The individual reports cover properties ranging in size from a

few tens of acres to more than 4,000 acres apiece. The delineation properties are not a random sample of the Valley: three quarters of the delineation area falls in the Potential Future Growth Area (PFG) such that the sample represents 18 percent of the PFG total area and 6 percent of the total Reserve Acquisition Area (RAA).

The delineation sample is from the Valley and is therefore composed largely of vernal pool complex (77 percent) and grassland (11 percent). For vernal pools, most (91 percent) of all delineated vernal pools are within areas mapped as vernal pool complex community. Half of all delineated vernal pools fall in areas designated as the land-cover type vernal pool complex—high density, even though that land-cover type makes up only 9 percent of the total delineation sample area. Similarly, 88 percent of the area delineated as fresh emergent marsh is located in areas mapped as marsh complex land-cover type.

The proportion of each constituent habitat within a land-cover type was assessed using the delineation sample (see Table 3-10). While most constituent habitats are associated with the corresponding natural community (e.g., vernal pool constituent habitats with vernal pool complex natural community), in some cases, constituent habitats are present in areas other than the primary associated community type. For example, although most delineated vernal pools are found in areas mapped as vernal pool complex, vernal pools are also found in areas mapped as annual grassland or rural residential. The Plan estimates the presence of potential vernal pool constituent habitat that may occur outside of areas mapped as vernal pool complex.

Planning team biologists derived the factors used in the analysis by taking into account typical conditions and the relative representativeness of some of the properties in the survey sample. Factors for the Foothills were based partially on the results for the Valley sample for those constituent habitats that extend upward into the Foothills and partially on experience with typical conditions in the Foothills, inspection of the land-cover mapping, and aerial photography there. The resulting density estimates are discussed under individual natural community section in Section 3.4, *Plan Area Communities,* and listed in Table 3-10, Table 3-11, and Table 3-12.

Table 3-10. Proportion of Vernal Pool Complex Constituent Habitats by Land-cover Type (Plan Area A)

Community and Land-cover Type	Proportion of Constituent Habitat			
	Vernal Pool Wetland	Seasonal Wetland in VPC	Seasonal Swales	Vernal Pool Totals
Vernal Pool Complex (VPC)				
VPC – High Density	4.5%	4.0%	2.0%	10.5%
VPC – Intermediate Density	2.0%	2.0%	1.5%	5.5%
VPC – Low Density (Valley)	0.2%	0.6%	0.8%	1.6%
VPC – Low Density (Foothills)	0.1%	0.3%	0.4%	0.8%
Grassland				
Annual Grassland	0.1%	0.1%	0.1%	0.3%
Pasture	0.1%	0.1%	0.2%	0.4%
Aquatic Wetland Complex				
Marsh Complex	0.4%	0.1%	0.2%	0.7%
Rural Residential				
Rural Residential	0.1%	0.6%	0.1%	0.8%

Source: MIG|TRA (10/22/2014)

Table 3-11. Proportion of Aquatic/Wetland Complex Constituent Habitats by Land-cover Type (Plan Area A)

Community Land-cover Type	Proportion of Constituent Habitat			
	Fresh Emergent Marsh	Lacustrine	Non-vernal Pool Seasonal Wetland	Aquatic/ Wetland Totals
Aquatic/Wetland Complex				
Marsh Complex	30.0%	10.0%	20.0%	60.0%
Pond	2.0%	70.0%	-	72.0%
Vernal Pool Complex (VPC)				
VPC –High Density	0.1%	0.1%	-	0.2%
VPC – Intermediate Density	0.1%	0.1%	-	0.2%
VPC – Low Density	0.1%	0.1%	-	0.2%
Grassland				
Annual Grassland	0.1%	0.1%	0.1%	0.3%
Pasture	0.2%	0.1%	0.2%	0.5%

Source: MIG|TRA (10/22/2014)

Table 3-12. Proportion of Riverine/Riparian Complex Constituent Habitats by Land-cover Types (Plan Area A)

	Proportion of Constituent Habitat		
Community Land-cover Type	**Riverine**	**Riparian**	**Riverine/Riparian Totals**
Riverine/Riparian	10.0%	60.0%	70.0%
Vernal Pool Complex (VPC)			
VPC – High Density	1.0%	-	1.0%
VPC – Intermediate Density	0.6%	-	0.6%
VPC – Low Density	0.2%	-	0.2%
Grassland			
Annual Grassland	0.1%	-	0.1%
Pasture	0.2%	-	0.2%
Aquatic/Wetland Complex			
Marsh Complex	5.0%	-	5.0%
Valley Oak Woodland	0.2%	-	0.2%
Oak Woodland			
Oak Savanna	0.2%	-	0.2%

Source: MIG|TRA (10/22/2014)

3.3.1.4 Limitations of Data

Data from many sources were compiled into GIS and used to guide the development of the conservation strategy and effects analysis. The regional scale GIS data are subject to factors limiting accuracy:

1. The land-cover mapping is largely based on interpretation of air photos and there will be errors in land-cover classification, and
2. The various layers representing roads, parcel lines, streams and floodplains are based on digitization of paper maps produced by others and show variance in registration of typically 100 feet and up to 300 feet.

As a consequence, any analysis that is based on overlaying a map of Covered Activities or the Stream System with land-cover mapping will have errors in assigning land cover. These are potentially errors of *inclusion* and errors of *exclusion*. For example, comparing a Covered Activity footprint with land cover may conclude that it overlaps and affect a vernal pool complex when in fact the vernal pool complex falls outside of the boundary and the erroneous inclusion is due to misregistration. Conversely, the GIS analysis may exclude vernal pool complex from the footprint when, in fact, vernal pools are found in the Covered Activity site.

Stream network mapping is based on manual on-screen digitization of USGS 7.5-minute quadrangle maps done by Placer County in 2009. This technique is likely to produce position errors of 100 feet, which contributes to registration error for the Stream System. The USGS mapping is inconsistent in the headwaters and so the Strahler stream order identification is incomplete. The more significant downstream discontinuities were corrected manually. The Stream System mapping as a whole is approximate and is suitable for a regional scale analysis.

The constituent habitat factors are considered to be representative of Plan Area A, but are subject to several sources of potential error. The factors are derived from a delineation survey sample, which is not a random sample; rather the sample is concentrated in areas that were being appraised for development. The factors entail overlay of delineation results in GIS with land-cover type mapping and the overlay will be subject to registration error as described above. Registration error will be greater where land cover is mapped in small or narrow patches, such as those that are associated with riverine and riparian habitats. The factors are representative of the conditions under which the delineations were conducted and future surveys may produce different results if prevailing climatic conditions are different.

Although the mapping data are sufficient for the regional scale analysis, implementation must be supported by in-field surveys at a later date. At the scale of any individual project site, mapping errors may be appreciable. Chapter 6, *Program Participation and Conditions on Covered Activities*, Section 6.2, *Program Participation: Receiving Take Authorization under the Plan,* describes the process whereby individual projects will be covered by the Plan. Part of the Plan participation process involves site-specific mapping and wetland delineation where necessary. Except where future conditions fail consistency with the baseline, as described in Section 6.2.4.3, *Item 3: Community and Constituent Habitat Types on Site and Baseline Land-cover Map Consistency*, it is expected that the field survey results will replace the regional scale estimates.

3.3.2 Covered Species

The Plan provides incidental take coverage for 14 species or distinct populations:

Birds

1. Swainson's hawk
2. California black rail
3. Western burrowing owl
4. Tricolored blackbird

Reptiles

5. Giant garter snake
6. Western pond turtle

Amphibians

7. Foothill yellow-legged frog
8. California red-legged frog

Fish

9. Central Valley steelhead
10. Central Valley fall-/late fall-run Chinook salmon

Invertebrates

11. Valley elderberry longhorn beetle
12. Vernal pool fairy shrimp

13. Vernal pool tadpole shrimp

14. Conservancy fairy shrimp

Covered Species regulatory status and criteria for inclusion in the Plan are shown in Table 1-1. Detailed species accounts for each Covered Species are provided in Appendix D, *Species Accounts.*

3.3.2.1 Ecology and Distribution

The species accounts summarize ecological information, distribution, status, population trends, habitat associations, and threats to each Covered Species in the Plan Area (Appendix D, *Species Accounts*). The accounts represent the best available scientific data for each species. The species accounts are not intended to summarize all biological information known about a species. Rather, each account summarizes scientific information that is relevant to this Plan. The biological data in these accounts form the basis for the effects analysis (Chapter 4, *Effects of Covered Activities*) and conservation strategy (Chapter 5, *Conservation Strategy*) in this Plan.

3.3.2.2 Habitat Distribution Models

3.3.2.2.1 Overview

Regional HCP/NCCPs are required to assess the effects of Covered Activities on Covered Species and identify either the amount of take of a Covered Species that will be permitted or, using habitat as a proxy for occurrence of a species, the amount of habitat loss that will be permitted. Take of Covered Species is assessed in area (acres) of modeled habitat for terrestrial Covered Species and as stream length for covered salmonids (see Chapter 4, *Effects of Covered Activities*). Modeled habitat identifies habitat suitable for each Covered Species. The habitat model is summarized in Table 3-9 and is described in the species accounts for each species (Appendix D, *Species Accounts*). The resulting modeled habitat is shown along with known species occurrences in the species map series, *Species Modeled Habitat and Occurrence Maps.*

The habitat distribution models were used to analyze effects on Covered Species and help develop the conservation strategy. Land-cover types are the basic unit of evaluation for modeling habitat, analyzing potential effects, and developing conservation strategies for Covered Species. Most Covered Species are associated with one or more land-cover types. These land-cover associations, plus other habitat features (e.g., elevation), were used to develop habitat distribution models for all but one of the terrestrial Covered Species.

Habitat for Conservancy fairy shrimp was not modeled because its known distribution is highly restricted in the Plan Area to a single vernal pool and because the type of vernal pool this species typically occurs in (e.g., generally large and turbid pools) (Helm 1998; U.S. Fish and Wildlife Service 2007) is not found in the Plan Area. Vernal pools were mapped for the Plan at the coarse scale of the vernal pool complex, which is appropriate for regional conservation planning. Mapping at this scale, however, did not distinguish between types and sizes of pools.

Habitat distribution models were developed for all Covered Species to predict where within Plan Area A Covered Species occur or could occur based on known habitat requirements. Habitat distribution models have been developed on a regional scale using regional data. The models are intended for use in regional planning and do not necessarily provide accurate site-specific species information. Surveys for species may be required if the a proposed project site occurs on modeled

habitat for select species to assess presence and apply appropriate conditions on Covered Activities (see Chapter 6, *Program Participation and Conditions on Covered Activities*, Section 6.2.4.7, *Item 7: Results of Applicable Species Surveys*, and Section 6.3.5, *Conditions to Minimize Effects on Specific Covered Species*).

Habitat distribution models are described in detail in the respective species accounts (Appendix D, *Species Accounts*). Methods used for all models are described below.

3.3.2.2.2 Model Structure and Development

The habitat models described in the species accounts were designed to estimate the extent and location of habitat characteristics of each species and to be repeatable and scientifically defensible, while remaining as simple as possible. The models are spatially explicit, GIS-based "expert opinion models" based on identification of land-cover types that provide important habitat for these species. Land-cover types were identified as suitable habitat based on the known or presumed habitat requirements and use patterns of each species. When supported by appropriate data, the models also incorporate physical parameters such as elevation limitations and distances from wetland or open water habitats that reflect an estimated extent of habitat use (e.g., the extent of upland habitat used by California red-legged frog, defined as being within a certain distance from aquatic habitat).

Determinations of suitable land-cover types and additional physical parameters were based on available data from peer-reviewed scientific literature, survey reports, and environmental documents. Local survey data were used whenever possible to evaluate model parameters. When data were inconclusive or contradictory, conservative values were assumed in estimating suitable habitat.

Habitat was modeled for the Covered Species to distinguish different types of habitat used for different life history functions. For example, western pond turtles use aquatic habitats primarily for foraging, thermoregulation, and avoidance of predators, use upland habitat for nesting, and use aquatic and upland habitat for overwintering (see Appendix D, *Species Accounts*, for the types of habitat modeled, the land-cover types that comprise the models for each Covered Species, and the rationale for each species habitat model).

Habitat functions were divided into general categories for terrestrial species (see below for discussion of the salmonid habitat models).

Birds

Nesting habitat indicates habitat types used for nesting. For example, tricolored blackbirds nest in fresh emergent marsh, and this land-cover type is included in the habitat model for tricolored blackbird nesting habitat. Western burrowing owl occurs primarily in the Plan Area during the non-breeding season. Potential nesting habitat was modeled to identify where western burrowing owl may nest in Plan Area A, because western burrowing owl has the potential to expand its breeding population in Plan Area A as part of the western burrowing owl conservation strategy (see Chapter 5, *Conservation Strategy*, Section 5.3.2.5.2, *Western Burrowing Owl*).

Foraging habitat is used by individuals to acquire food. If a species uses different land-cover types for foraging and nesting, these habitats are distinguished in the model.

Overwintering habitat includes foraging, roosting, and movement habitats used during the non-breeding season. Western burrowing owl occurs primarily in the Plan Area during the non-breeding season.

Year-round habitat characterizes habitats where individuals of a Covered Species can be found year-round. California black rail individuals breed and forage in the same habitat throughout the year.

Reptiles and Amphibians

Aquatic habitat is the primary habitats used by giant garter snake, western pond turtle, foothill yellow-legged frog, and California red-legged frog for feeding and breeding (except for western pond turtle, which nests in adjacent upland habitat; see below).

Upland habitat indicates upland habitats used by species that are also associated with aquatic habitats for nesting, aestivating, or movement between aquatic habitats. For example, western pond turtles dig nests in the ground on unshaded slopes in sunny upland habitats, generally within 1,400 feet of aquatic habitats and California red-legged frogs move through oak woodland land-cover types to disperse between aquatic habitats. California red-legged frog may also aestivate in upland habitats during the dry summer months.

Year-round habitat for foothill yellow-legged frog is the complex of riverine and riparian habitats where the species remains all year.

Invertebrates

Year-round habitat for valley elderberry longhorn beetle is the complex of riparian habitats where the species remains all year.

Wetland habitat for vernal pool branchiopods is the actual vernal pool constituent habitats where the covered branchiopods occur throughout the year (as adults during the wet season and cysts during the dry season).

Vernal pool complex for vernal pool branchiopods includes wetland habitat and the upland area surrounding the vernal pool wetland that is an essential part of the hydrology and ecology of the vernal pool wetland habitat, even though the covered branchiopods are never physically present there.

Fish

The habitat model for Central Valley steelhead uses the spawning, migration, and rearing habitat identified by National Marine Fisheries Service (2014) in the Recovery Plan for Central Valley steelhead. National Marine Fisheries Service used the observations and survey data synthesized in the Auburn Ravine and Raccoon Creek Ecosystem Restoration Plan (Placer County 2002) and the Dry Creek Coordinated Resource Management Plan (ECORP Consulting 2003) to identify the location of spawning, migration, and rearing habitat.

The habitat model for Central Valley fall-/late fall-run Chinook salmon uses the spawning, migration, and rearing habitat defined for Central Valley steelhead in the Recovery Plan for Central Valley steelhead (National Marine Fisheries Service 2014) for Central Valley fall-/late fall-run Chinook salmon. Life history requirements are similar enough between these two species to generalize the application of modeled habitat for Central Valley steelhead to Central Valley fall-/late fall-run Chinook salmon at the level of scale and precision of this habitat model. Occurrence data for Central

Valley fall-/late fall-run Chinook salmon used to develop this model were generally consistent with the Central Valley steelhead model.

3.3.2.3 Covered Species Occurrences

Documented occurrences of Covered Species were used to inform development of the Covered Species models, as well as the effects analysis, and guide the development of the conservation strategy. Species-habitat relationships (based on land-cover types) were used to supplement occurrence data for Covered Species and predict the where within the Plan Area A Covered Species occur or could occur. The known species occurrences are shown in the Species Map series (Appendix D, *Species Accounts*).

3.3.2.3.1 Data Sources

The following sources provided data on the occurrences of Covered Species in and adjacent to the Plan Area:

- Bailey, Randy. 2003. *Streams of Western Placer County Aquatic Habitat and Biological Resources Resource Assessment.* Prepared for the Placer County Planning Department. Bailey Environmental: Lincoln, CA.
- California Natural Diversity Database (CNDDB) (California Department of Fish and Wildlife 2016).
- Dry Creek Conservancy annual salmonid surveys from 2003 to 2012.
- eBird. 2015. eBird is an online database of bird distribution and abundance (web application). eBird, Cornell Lab of Ornithology, Ithaca, New York. Data through September 2015.
- ECORP Consulting. 2003. *Dry Creek Watershed Coordinated Resource Management Plan.*
- Garrison, B. 2005. *Spears Ranch 2005 Wildlife Study Results*. California Department of Fish and Game, Rancho Cordova. PowerPoint presentation of survey data.
- Helm Biological Consulting. 2012. *Federally Listed Large Branchiopod Occurrences in Western Placer County, California*.
- Information Center for the Environment. 2016. *Tricolored Blackbird Portal.* Survey provided locations of tricolored blackbirds in the Plan Area. University of California, Davis. Available: http://tricolor.ice.ucdavis.edu/.
- Jones & Stokes Associates. 2004. *Placer County Natural Resources Report, A Scientific Assessment of Watershed, Ecosystems, and Species of the Phase I Planning Area.* Prepared for the Placer County Planning Department: Auburn, CA.
- Jones & Stokes Associates. 2005. *Assessment of Habitat Conditions for Chinook Salmon and Steelhead in Western Placer County, California.* Prepared for the Placer County Planning Department.
- Navicky, James. 2008. *Summary of 2004 and 2005 Fish Community Surveys in Auburn Ravine and Raccoon Creek (Placer County).* Memorandum to Fish Files. California Department of Fish and Game, Region II Office: Rancho Cordova, CA.
- Placer County. 2002. *Auburn Ravine/Raccoon Creek Ecosystem Restoration Plan.*

- Placer County. 2007. *Final Environmental Impact Report: Patterson Sand and Gravel Mine Expansion Project.* Prepared by Resource Design Technology, Inc., El Dorado Hills, CA.
- Rech, C. 2005. *Spears Ranch – Western Pond Turtle Reconnaissance Surveys*. September. California Department of Fish and Game, Sacramento, CA.
- Restoration Resources. 2005. *Redwing Preserve, Habitat Conservation Development Plan.*
- Restoration Resources. 2010. *Silvergate Mitigation Bank Listed Vernal Pool Branchiopod Wet Season Survey 90-day Report.*
- Restoration Resources. 2011. *Redwing Preserve Listed Vernal Pool Branchiopod Wet-Season Survey 90-day Report.*
- U.S. Department of Transportation, Federal Highway Administration, and the California Department of Transportation. 2006. *Final Environmental Impact Statement/Report, Lincoln Bypass, Placer County, State Route 65.*
- Wildlands. 2008 to 2013. *Vernal Pool Branchiopod Survey*. Annual reports from 2008 to 2013.

Personal Communication

- McKenzie, Gregg. Restoration Resources. August 19, 2011.
- Wages, Justin. Placer Land Trust. September 11, 2013.

All occurrence records were documented after 1980 and assumed to be extant unless located on sites that have obviously been converted to other land uses. In many cases, the location of occurrences was not precise enough to conclusively determine from aerial photographs if a site had been converted to other land uses. These occurrences are displayed as either precise locations or general locations, as described in more detail in Section *3.3.2.3.2, Data Precision and Limitations*, below.

3.3.2.3.2 Data Precision and Limitations

CNDDB records represent the best available statewide data, but are limited in their use for conservation planning. CNDDB records rely on field biologists to voluntarily submit information on the results of surveys and monitoring. As a result, the database is biased geographically toward areas where surveys have been conducted or survey efforts are greater (many areas have not been surveyed at all). The database may also be biased toward species that receive more survey effort. For example, there have been more surveys for California red-legged frog than other special-status wildlife because it is a listed species. Similarly, there are occurrence surveys for vernal pool fairy shrimp and tadpole shrimp in areas where development is anticipated and land use entitlements are being considered but less so on the privately owned range land that is present in the RAA.

Data are reported to the CNDDB with varied precision. Some occurrences are very well documented with explicit locations (e.g., geographic coordinates) while others are reported with more general location information. CNDDB staff members qualitatively place each occurrence record into categories: specific, non-specific, and by measurement categories (80 meters, one-fifth mile, etc.) (California Department of Fish and Wildlife 2016).

For the purposes of this Plan, CNDDB data have been mapped as either general or precise. Precise occurrences are mapped as points and are labeled as *precise location* in the habitat distribution models in the species accounts. Precise locations are those that have specific recorded coordinate

data, can be located on a standard USGS 7.5-minute quadrangle map, and have been categorized as specific by the CNDDB.

General occurrences are those that have been classified by the CNDDB as non-specific. Sometimes the location of the species as reported to CNDDB has been documented by the observer in very general terms, or the precise location of the occurrence may be unclear or lacks information that does not allow it to be mapped accurately. General occurrences are mapped as points and are labeled as *general location* in the habitat distribution models in the species accounts.

The Plan also uses data collected by the Cornell Lab of Ornithology, which organizes and analyzes bird occurrence data reported by the birding community into an online database (eBird 2015). These data are mapped as general occurrences, with their source noted, in the habitat distribution models in the species accounts.

In addition to the CNDDB and eBird, the Plan also uses data collected by project-specific surveys (such as those required by environmental impact reports), routine surveys conducted on mitigation banks, and those reported by local experts. These data are collected by various sources and have been recorded with varied precision. They have been qualitatively categorized and mapped for the purposes of the Plan as either general or precise. These records are periodically checked against CNDDB records to ensure duplicate records of the same occurrence are not mapped. Each time the occurrence data were updated, new CNDDB and eBird data replaced the old data, to ensure that duplicates were not included. Locations of occurrences were mapped; the records for overlapping occurrences were checked to determine whether they were duplicate records by comparing observation date, description of location, and other information provided.

3.4 Plan Area Communities

This section provides a brief historical context for the present condition in Plan Area A and defines the communities as used in the Plan. The communities are characterized by the following:

- Land-cover types mapped to represent the community
- Constituent habitats associated with the community, if any
- Historical extent and composition
- Common wildlife associations
- Covered Species associations
- Ecosystem function
- Natural disturbance
- Threats

The communities, land-cover types, and constituent habitats are the basic units for characterizing the vegetation, wetlands, and current land use of Plan Area A landscapes. The Plan uses the location and spatial extent of the communities, land-cover types, and constituent habitats to develop the conservation strategy (Chapter 5, *Conservation Strategy*). The effects of implementation of Covered Activities on the communities, land cover, and constituent habitats are presented in Chapter 4, *Effects of Covered Activities*. The land-cover types and associated constituent habitats are summarized in Table 3-6 and Table 3-7. Figure 3-11 shows the present distribution of communities

across Plan Area A, and Table 3-13 shows their present land area in the Valley and Foothills. Table 3-14 shows the amount of constituent habitats in Plan Area A, the Valley, and the Foothills. The distribution of the communities across the planning watersheds is shown in Table 3-15 for Plan Area A, the Valley, and the Foothills. As explained in Section 3.3.1.2, *Mapping*, mapping for the present condition of land-cover types, and hence for the communities that they constitute, is a composite of aerial photo interpretation based on images ranging in time from 2002 to 2011.

Table 3-13. Acres of Communities and Land-cover Types

Community	Land-cover Types	All Plan Area A	Valley	Foothills
Natural Communities				
Grassland		34,760	10,264	24,496
	Annual Grassland	21,887	1,565	20,323
	Pasture	12,873	8,699	4,174
Vernal Pool Complex (VPC)		45,065	44,278	788
	VPC – High Density	10,138	10,138	-
	VPC – Intermediate Density	13,818	13,818	-
	VPC – Low Density	21,109	20,322	788
Aquatic/Wetland Complex		3,433	1,969	1,464
	Marsh Complex	2,370	1,544	826
	Pond	1,063	425	638
Riverine/Riparian Complex		6,685	2,424	4,262
	Riverine/Riparian	6,685	2,424	4,262
Oak Woodland		50,870	1,763	49,107
	Blue Oak Woodland	9,937	966	8,971
	Foothill Chaparral	217	-	217
	Interior Live Oak Wood	535	-	535
	Mixed Oak Woodland	20,351	442	19,908
	Oak Savanna	8,674	355	8,320
	Oak-Foothill Pine Wood	11,037	-	11,037
	Rock outcrop	119	-	119
Valley Oak Woodland		1,364	184	1,180
	Valley Oak Woodland	1,364	184	1,180
Semi-natural Communities				
Rice Agriculture		19,580	19,580	-
	Rice	19,580	19,580	-
Field Agriculture		2,757	1,162	1,594
	Alfalfa	176	176	-
	Cropland	2,512	970	1,542
	Eucalyptus	70	17	53
Other Agriculture				
Orchard and Vineyard Agriculture		2,618	1,685	933
	Orchard	2,522	1,685	837
	Vineyard	96	-	96

Community	Land-cover Types	All Plan Area A	Valley	Foothills
Urban (Non-natural) Communities				
Managed Open Water		5,317	513	4,804
	Canal	145	145	-
	Reservoir	4,804	-	4,804
	Urban Open Water	368	368	-
Rural Residential		18,871	4,823	14,049
	Rural Residential	15,568	4,434	11,134
	Rural Residential Forested	3,303	388	2,915
Urban		18,510	12,053	6,457
	Urban and Suburban	14,777	9,487	5,289
	Urban Golf Course	914	434	481
	Urban Park	375	36	340
	Urban Riparian	104	3	101
	Urban Wetland	21	4	17
	Urban Woodland	77	6	70
	Barren/Industrial	764	605	158
	Road	1,477	1,477	-
Grand Total		**209,832**	**100,698**	**109,134**

Source: MIG|TRA (11/12/2014)

Table 3-14. Estimated Acres of Constituent Habitats in Plan Area A Extrapolated from Survey Results

	All Plan Area A	Valley	Foothills
Vernal Pool Complex (VPC) Constituent Habitats			
Vernal Pool	790	789	1
Seasonal Wetland in VPC	845	842	2
Seasonal Swales	602	599	3
Vernal Pool Total	*2,237*	*2,230*	*6*
Aquatic/Wetland Complex Constituent Habitats			
Fresh Emergent Marsh	1,112	633	479
Lacustrine	1,061	507	555
Non-vernal Pool Seasonal Wetland	677	378	299
Aquatic/ Wetland Total	*2,850*	*1,517*	*1,333*
Riverine/Riparian Complex Constituent Habitat			
Riverine	868	565	304
Riparian	4,651	1,454	3,196
Riverine/Riparian Total	*5,519*	*2,019*	*3,500*

Source: MIG|TRA (11/12/2014)

Table 3-15a. Acres of Communities in Plan Area A by Watershed

Community	1. Bear River	2. Raccoon Creek	3. Markham Ravine	4. Auburn Ravine	5. Pleasant Grove	6. Dry Creek	7. American	All Community
Natural Communities								
Vernal Pool Complex	10,502	6,070	5,288	8,427	8,366	6,413	-	45,065
Grassland	3,764	15,731	2,102	6,461	713	5,203	788	34,760
Aquatic/Wetland Complex	940	929	574	476	128	359	26	3,433
Riverine/Riparian Complex	660	1,821	357	1,992	92	1,637	125	6,685
Oak Woodland	10,400	18,560	199	8,223	166	9,450	3,872	50,870
Valley Oak Woodland	128	143	13	211	12	769	88	1,364
Subtotal Natural	*26,393*	*43,255*	*8,534*	*25,790*	*9,477*	*23,831*	*4,899*	*142,179*
Semi-natural Communities								
Rice Agriculture	2,433	3,397	4,725	4,304	4,160	561	-	19,580
Field Agriculture	93	486	4	1,526	125	412	111	2,757
Subtotal Semi-natural	2,526	3,883	4,729	5,830	4,285	973	111	22,337
Other Agriculture								
Orchard and Vineyard Agriculture	1,307	493	48	324	-	374	71	2,618
Subtotal Other Agricultural	*1,307*	*493*	*48*	*324*	*-*	*374*	*71*	*2,618*
Urban (Non-natural) Communities								
Managed Open Water	912	28	52	212	27	92	3,995	5,317
Rural Residential	1,037	2,608	952	3,462	454	9,803	556	18,871
Urban	1,364	1,828	2,860	6,690	977	4,560	230	18,510
Subtotal Urban	*3,313*	*4,464*	*3,864*	*10,364*	*1,458*	*14,455*	*4,781*	*42,698*
Grand Total	**33,540**	**52,094**	**17,174**	**42,309**	**15,220**	**39,633**	**9,862**	**209,832**

Source: MIG|TRA (2/12/15)

Table 3-15b. Communities in the Valley Sorted by Watershed (acres)

Community	1. Bear River	2. Raccoon Creek	3. Markham Ravine	4. Auburn Ravine	5. Pleasant Grove	6. Dry Creek	7. American River	All Community
Natural Communities								
Grassland	1,006	3,312	1,580	2,413	713	1,240		10,264
Vernal Pool Complex	10,151	5,633	5,288	8,427	8,366	6,413		44,278
Aquatic/Wetland Complex	799	242	499	264	128	37		1,969
Riverine/Riparian Complex	532	503	232	767	92	299		2,424
Oak Woodland	213	30	18	1,252	166	83		1,763
Valley Oak Woodland	126	6	6	12	12	22		184
Subtotal Natural	*12,827*	*9,726*	*7,622*	*13,134*	*9,477*	*8,094*	-	*60,882*
Semi-natural Communities								
Rice Agriculture	2,433	3,397	4,725	4,304	4,160	561		19,580
Field Agriculture	12	82	2	912	125	29		1,162
Subtotal Semi-natural	*2,445*	*3,479*	*4,727*	*5,216*	*4,285*	*590*		*20,742*
Other Agriculture								
Orchard and Vineyard Agriculture	1,295	222	40	9		119		1,685
Subtotal Other Agricultural	*1,295*	*222*	*40*	*9*		*119*		*1,685*
Urban (Non-natural) Communities								
Managed Open Water	104	28	52	212	27	90		513
Rural Residential	820	224	822	831	454	1,671		4,823
Urban	1,102	459	2,860	5,683	977	972		12,053
Subtotal Urban	*2,026*	*711*	*3,734*	*6,726*	*1,458*	*2,733*	-	*17,389*
Grand Total	18,594	14,138	16,123	25,085	15,220	11,536	-	100,698

Source: MIG|TRA (2/12/15)

Table 3-15c. Communities in the Foothills Sorted by Watershed (acres)

Community	1. Bear River	2. Raccoon Creek	3. Markham Ravine	4. Auburn Ravine	5. Pleasant Grove	6. Dry Creek	7. American River	All Community
Natural Communities								
Vernal Pool Complex	351	437	-	-	-	-	-	788
Grassland	2,758	12,419	521	4,048	-	3,963	788	24,496
Aquatic/Wetland Complex	141	687	75	212	-	323	26	1,464
Riverine/Riparian	128	1,319	126	1,226	-	1,338	125	4,262
Valley Oak Woodland	2	137	7	198	-	747	88	1,180
Oak Woodland	10,186	18,530	182	6,971	-	9,367	3,872	49,107
Subtotal Natural	*13,566*	*33,529*	*911*	*12,656*	-	*15,737*	*4,899*	*81,297*
Semi-natural Communities								
Rice Agriculture	--	-	-	-	-	-	-	-
Field Agriculture	80	403	2	614	-	383	111	1,594
Subtotal Semi-natural	*80*	403	2	614	-	383	111	1,594
Other Agriculture								
Orchard and Vineyard Agriculture	12	271	8	316	-	255	71	933
Subtotal Other Agricultural	*12*	*271*	*8*	*316*	-	*255*	*71*	*933*
Urban (Non-natural) Communities								
Managed Open Water	808	-	-	-	-	1	3,995	4,804
Rural Residential	217	2,384	129	2,631	-	8,132	556	14,049
Urban	263	1,369		1,007	-	3,588	230	6,457
Subtotal Urban	*1,287*	*3,753*	*129*	*3,638*	-	*11,721*	*4,781*	*25,310*
Grand Total	14,946	37,956	1,050	17,223	-	28,096	9,862	109,134

Source: MIG|TRA (2/12/15)

The organization of the communities is as follows:

- Natural Communities
  - Grassland
  - Vernal Pool Complex
  - Aquatic/Wetland Complex
  - Riverine/Riparian Complex
  - Valley Oak Woodland
  - Oak Woodland

- Semi-natural Communities
  - Rice
  - Field Crop
- Other Agriculture
  - Orchard and Vineyard
- Urban and Non-natural Communities
  - Managed Open Water
  - Rural-Residential
  - Urban

As shown in Table 3-8, the constituent habitats have a primary community association. There is also a minor association with other community types. In the discussion below, the constituent habitats are introduced with their primary community association:

- Vernal Pool Complex Community
  - Vernal Pool Wetland
  - Seasonal Wetland in Vernal Pool Complex
  - Seasonal Swales
- Aquatic/Wetland Complex Community
  - Fresh Emergent Marsh
  - Lacustrine
  - Non-vernal pool Seasonal Wetland
- Riverine/Riparian Complex Community
  - Riverine
  - Riparian

3.4.1 Past Vegetation and Land Use

The "potential" natural vegetation of California, as mapped by Kuchler (1977), reflects the presumed condition prior to European settlement. Figure 3-12 shows that the Plan Area was grassland in the Valley and oak woodland in the Foothills. Immediately west, Sierra Nevada springtime snowmelt formed a vast marsh around the Sacramento River. Upslope to the east, the oak woodlands of the Foothills transition to the mixed conifer of the Sierra Nevada.

For at least the last 1,000 years, native tribes in California's broad Central Valley and the surrounding foothills practiced an early agriculture, burning the grasslands to maintain habitat for game and to encourage growth of edible wild plants, especially oak trees for the acorns, which was a staple food.

European settlement of the area began in the 1840s, bringing ranching and wheat farming. The introduction of cattle began a dramatic change to the extensive grasslands as the native perennial bunch grass was rapidly replaced by European annual grasses already adapted to grazing pressure.

The discovery of gold in the American River basin in 1848 led to the Gold Rush, which transformed the area in just a few years. The gold, which had accumulated in sedimentary deposits at the base of the Sierra Nevada, was easily found in sand or gravel deposits. Miners washed away the gravel, leaving the heavier gold, in a process known as "placer mining," named after the Spanish word for such deposits. To more easily work the riverbeds, miners would divert the flow into flumes or side channels. By 1853, much of the easily worked gold fields had been exhausted, and attention turned to extracting gold from more difficult locations. Hydraulic mining used a high-pressure jet of water to wash down ancient streambeds and hillsides in the gold fields. Work in the streambed, water diversion, and hydraulic mining changed streams in the Foothills and produced immense amounts of sediment that affected rivers downstream all the way to the San Francisco Bay.

Agriculture in the area grew in parallel with the expanding population and included wheat, hay, and orchard crops. Completion of the railroad by 1870 linking the area to San Francisco and the east provided access to a market for perishable fruit and stimulated orchard production. The waterworks initially established to support gold mining were adapted to orchard irrigation. The foothill woodlands were cleared to make way for orchards and for fuel. The ceramics manufacturer, Gladding-McBean, founded in 1875, took advantage of abundant kaolin clay deposits there.

By 1920, rice cultivation was expanding in the Sacramento Valley. The extensive hardpan beneath the fertile valley soils and the availability of irrigation water from stream diversions stimulated development of what is now Placer County's principal agricultural product. Pasture, dry-farming wheat, and hay continued, as documented in 1937 aerial photography of the Valley.

Placer County's population in 1940 was 28,108 persons, most of whom were located in western Placer County. After World War II, the county grew but more slowly than the major California population centers; by 1970, the census showed 77,306 persons. Population then increased rapidly with suburban growth in Roseville, Lincoln, and along the Interstate 80 corridor; the population in 2010 had reached 348,432, a more than fourfold increase in only four decades.

The history of mining, agriculture, and population growth shows in the present-day landscape. Although the natural communities still contain important representatives of native species and retain much of their original ecosystem function, all of the natural communities addressed in this Plan have been significantly affected by the history of human activity. There is no portion of the Plan Area present in a pristine, unaltered condition.

3.4.2 Grassland

The grassland community in the Plan is defined as annual grassland and pasture land-cover types. Although vernal pool complex lands are also grasslands, they are treated as a separate defined community to focus on the conservation issues of covered vernal pool species. The present distribution of the grassland community, as well as grasslands mapped as vernal pool complex is shown on Figure 3-13. The areal breakdown is shown in Table 3-12.

3.4.2.1 Land-cover Types

3.4.2.1.1 Annual Grassland

The original native grassland prairies mapped as California Prairie on Figure 3-12 have been replaced by non-native annual grasslands associated with European cattle grazing in western Placer County and throughout most of lowland California. Annual grasslands are most extensive in the Central Valley but also occur in low valleys or gentle slopes of the Sierra Nevada, Coast Ranges, Transverse Ranges, and Peninsular Ranges (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

In western Placer County, annual grasslands occur naturally at the lower elevations below 300 feet asl. Annual grasslands in the Valley are dominated by non-native grasses and forbs, with few trees. Although Table 3-12 reports only 1,565 acres of annual grassland land-cover type in the Valley, nearly all of the 44,278 acres mapped as vernal pool complex also functions as annual grassland. Taken together, nearly half of the Valley landscape is in some form of annual grassland. In the Valley, there are still a few remnant examples of native grasslands, often found around the edges of wetlands or moist bottomlands. These are patchy with poorly defined boundaries and cannot be mapped from aerial photography.

Foothill grasslands comprise mostly open annual grassland–oak woodland/savanna with widely scattered blue oaks (*Quercus douglasii*), interior live oaks (*Quercus wislizenii*), and valley oaks (*Quercus lobata*). Annual grasslands occur in the understory of open mixed oak, blue oak, interior live oak, and valley oak woodlands, in openings in oak–foothill pine woodland and foothill chaparral land-cover types. Where tree canopy exceeds an estimated 5 percent, land cover was mapped as savanna. Nearly all of 8,320 acres of oak savanna mapped in the Foothills functions ecologically as annual grassland. Taken together, roughly one-quarter of the Foothills landscape is annual grassland.

Species characteristic of annual grassland include slender wild oat (*Avena fatua*), ripgut brome *(Bromus diandrus*), soft chess (*Bromus hordeaceus*), medusa-head (*Elymus caput-medusae*), and foxtail barley (*Hordeum jubatum*). Red-stemmed filaree (*Erodium cicutarium*) is a dominant forb. Dominant non-native forbs include rose clover (*Trifolium hirtum*), bur clover (*Medicago polymorpha*), little hop clover (*Trifolium dubium*), storksbill (*Erodium botrys*), and dovefoot geranium (*Geranium molle*).

Despite the dominance of introduced species, dry annual grasslands are still home to many native plant species, particularly native bulbs and early- and late-season annual wildflowers, such as California poppy (*Eschscholzia californica*), popcornflower (*Plagiobothrys* spp.), fiddlenecks (*Amsinckia* spp.), brodiaeas (*Brodiaea* spp.), Ithuriel's spear (*Triteleia laxa*), winecup clarkia (*Clarkia purpurea*), johnny-tucks (*Triphysaria eriantha*), common madia (*Madia elegans*), cream cups (*Platystemon californicus*), and goldfields(*Lasthenia* spp.). On poor, rocky soils, both native Foothill bunchgrasses and forbs are more abundant than in the long-grazed open grasslands of the county's lowest elevations. Characteristic grasses here include natives, such as California melic (*Melica californica*), squirreltail (*Elymus elymoides*), one-sided bluegrass (*Poa secunda*), purple needlegrass (*Stipa pulchra*), and blue wildrye (*Elymus glaucus*) as well as non-natives, such as soft chess, hedgehog dogtail (*Cynosurus echinatus*), and ripgut brome.

3.4.2.1.2 Pasture

The pasture land-cover type covers a range of grazing intensity and irrigation practices. Areas mapped as pasture are differentiated from annual grassland and vernal pool complex lands in that they show more extensive terrain modification to accommodate irrigation and from mechanical tilling for planting. Pasture lands are included in the grassland community rather than in the field crop community because merely discontinuing irrigation converts pasture lands into annual grassland.

Irrigated pastures occur throughout western Placer County. In the lower Foothills and Valley they tend to be located on floodplains, are more extensive in size, and are used for intensive cattle rearing. Cumulatively, pasture and foothill grazing lands contribute to make cattle and calves the second-most important agricultural product in Placer County, valued at $14,994,000 in 2014. In the Valley, 8,700 acres are mapped as pasture. In the Foothills, pastures tend to be small irrigated fields for small-scale livestock rearing, usually associated with rural-residential areas.

Vegetation in irrigated pasture is generally a mixture of perennial grasses and legumes that form a dense ground cover. Native plant species are nearly absent from irrigated pastures because they are unable to compete with the vigorous pasture species and non-native wetland species, such as perennial ryegrass (*Festuca perennis*), fescues (*Festuca* spp.), dallisgrass (*Paspalum dilatatum*), orchard grass (*Dactylis glomerata*), velvet grass (*Holcus lanatus*), Bermuda grass *(Cynodon dactylon*), curly dock (*Rumex crispus*), barnyard grass (*Echinochloa crus-galli*), and white clover (*Trifolium repens*). Himalayan blackberry (*Rubus armeniacus*) is common and invasive in irrigated pastures in western Placer County; other potentially occurring noxious weeds include bull thistle (*Cirsium vulgare*), Bermuda grass, perennial pepperweed (*Lepidium latifolium*), nimblewell (*Muhlenbergia schreberi*), and Johnson grass (*Sorghum halepense*). Native species in irrigated pastures are generally found only in wetland settings.

3.4.2.2 Constituent Habitats

Prior to modification, most of the Valley pasture land would have been annual grasslands and, because of the pervasive underlying hardpan, most of it could have functioned as a vernal pool complex. Some elements of vernal pool constituent habitats are found associated with pasture lands, usually around the edges where irrigation water ponds exist on the remaining hardpan soil substrate. Table 3-10 lists a low-density occurrence for vernal pool constituent habitats in Valley grasslands (0.3 percent) and pasture lands (0.4 percent).

In the Valley and in the Foothills, the grassland community is also associated with small amounts of aquatic/wetland (0.3 to 0.5 percent) and riverine/riparian (0.1 to 0.2 percent) constituent habitats, as shown in Table 3-11 and Table 3-12. The presence of these constituent habitats is due to wetlands created as a result of flood irrigation on small pastures and where grassland is mapped in the Stream System and incorporates portions of riverine waters.

3.4.2.3 Historical Extent and Composition

At low elevations, grassland was most likely always the dominant vegetation community, kept open by native grazers, such as tule elk (*Cervus canadensis nannodes*) and pronghorn (*Antilocapra americana*); drought; and fire (Barry et al. 2006). Prior to European settlement, native grasslands in western Placer County occurred largely as treeless prairies dominating the floor of the Central Valley (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004) (Figure 3-12). Open

grassland/oak savannas in Placer County were once dominated by perennial bunchgrasses, such as purple needlegrass, with other native annual and perennial forbs (Bartolome 1981 in Jones & Stokes Associates 2004).

Today, this former prairie is overwhelmingly dominated by introduced annual grasses, and native perennial bunchgrasses have become quite rare. Where the grassland is tilled and planted or where it is irrigated, it becomes pasture. Extensive pasture and dry farming for hay are visible in 1937 aerial photography of the Valley.

The boundaries of the grassland ecosystem have also shifted eastward from those of the original prairie in western Placer County (Ornduff 1974 in Jones & Stokes Associates 2004). Woodland on some flatter areas in the lower Foothills has been cleared to create grazing land and is now annual grassland in small patches scattered throughout the Foothills, as seen on Figure 3-13.

3.4.2.4 Common Wildlife Associations

Annual grasslands provide abundant food and cover for high numbers of rodents and other small mammals. Consequently, several raptors, including red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), Swainson's hawk, and American kestrel (*Falco sparverius*), thrive in annual grasslands. Other characteristic wildlife species include western yellow-bellied racer (*Coluber constrictor mormon*), California whipsnake (*Masticophis lateralis lateralis*), gopher snake (*Pituophis catenifer*), western kingbird (*Tyrannus verticalis*), western bluebird (*Sialia mexicana*), western meadowlark (*Sturnella neglecta*), black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), and American badger (*Taxidea taxus*). Exotic and invasive animal species characteristic of annual grasslands in the county include wild turkey (*Meleagris gallopavo*), European starling (*Sturnus vulgaris*), house mouse (*Mus musculus*), black rat (*Rattus rattus*), and wild pig (*Sus scrofa*).

Some birds that typically forage in the county's irrigated pastures include great blue heron (*Ardea herodias*), great egret (*Ardea alba*), Canada goose (*Branta canadensis*), American kestrel, California quail (*Callipepla californica*), western kingbird, American crow (*Corvus brachyrhynchos*), western meadowlark, Brewer's blackbird (*Euphagus cyanocephalus*), and red-winged blackbird (*Agelaius phoeniceus*).

3.4.2.5 Covered Species Associations

Covered Species associated with the grassland community are Swainson's hawk, western burrowing owl, tricolored blackbird, giant garter snake, western pond turtle, and California red-legged frog (see Appendix D, *Species Accounts*). Grasslands in the Valley are foraging habitat for Swainson's hawk; in the Valley and lower Foothills (up to an elevation of 300 feet), grasslands are foraging habitat for tricolored blackbird. Grasslands are used as overwintering and potential breeding habitat in the Valley by western burrowing owl.

Grasslands, where adjacent to aquatic habitat, serve as upland basking, cover, and refuge habitat for giant garter snake in the Valley below an elevation of 100 feet. Grasslands provide upland habitat throughout the Plan Area A for western pond turtle and California red-legged frog. Western pond turtle uses grassland upland habitat for nesting, cover, and refuge. California red-legged frogs disperse through grasslands and may use burrows and other forms of shelter for refuge.

3.4.2.6 Ecosystem Functions

The key characteristics of grassland habitat that contribute to its ecosystem functions are a high cover of herbaceous vegetation and a low-to-absent cover of woody vegetation. Grasslands in Placer County function as a dominant natural community, linking small and large patches of all other natural communities in the landscape such as oak woodland, riparian and aquatic communities. Vernal pools, cliffs, and seeps are contained within the larger matrix of grasslands, and in some cases, the functions and threats to the integrity of these land-cover types depends on the integrity of the grasslands.

Grasslands provide important upland habitat for a variety of amphibians dependent on adjacent aquatic habitats such as ponds and seasonal wetlands. These amphibians move through grasslands during the rainy season to disperse to other aquatic sites, and may aestivate within grasslands during the dry season.

Grasslands are important for burrowing rodents such as ground squirrels and gophers. Rodent burrows, in turn, provide habitat for a variety of other species, including western burrowing owls. The diverse and abundant rodent community supports an assemblage of raptors that feed on them.

Annual grasslands at low livestock stocking rates also help maintain water quality through soil retention and by filtering out sediment and nutrients from runoff. More intensively grazed lands, in particular irrigated pasture lands, which are used to maintain cow calf operations during the dry summer, tend to add nutrients to groundwater and can be a source of nitrate pollution.

3.4.2.7 Natural Disturbance

Annual grassland in contemporary California is essentially defined by annual vegetation adapted to intensive grazing. Domestic grazing animals may provide the same ecological functions as the native grazing animals (e.g., mule deer [*Odocoileus hemionus*], elk, and pronghorn antelope) that formerly grazed the Central Valley in pre-European times. Grazing can reduce cover of non-native grasses, impair invasive plants, and reduce thatch. Ground squirrels provide important natural disturbances by creating burrows that are used by several amphibian species as well as western burrowing owls.

Wildfires are a predominant disturbance in the grassland community, which has adapted to periodic low-intensity fire. Figure 3-4 shows that large fires occur frequently in the Valley.

3.4.2.8 Threats

Grasslands continue to be altered in California as a result of agricultural, residential, and industrial development. In the absence of grazing, or as a result of disking or very heavy grazing, weedy, non-native annual grasses can out-compete the desired native species (Freckman et al. 1979 in Jones & Stokes Associates 2004).

Heavy grazing by domestic livestock has shifted the species composition and extent of grasslands in the Sierra Nevada foothills. Year-round heavy grazing favors introduced annual grasses at the expense of native perennial bunchgrasses (Heady 1977 in Jones & Stokes Associates 2004). It has been estimated that non-native species constitute 70 to 80 percent of the biomass of California's pastures and annual grasslands (Ornduff 1974 in Jones & Stokes Associates 2004).

The dominance of annual grasses has also changed the fire and moisture regime in many areas, because annual grasses dry earlier and burn hotter and more frequently than native perennial

bunchgrasses. Large amounts of standing dead material can be found in late summer in years of abundant rainfall and under light to moderate grazing pressure (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). Little soil moisture remains available for native perennial species after seed set in annual grasslands (Heady 1977 in Jones & Stokes Associates 2004).

Noxious weeds that occur in annual grasslands of western Placer County include yellow star-thistle (*Centaurea solstitialis*), Italian thistle (*Carduus pycnocephalus*), and medusa-head. Other invasive plants that may occur include barbed goatgrass (*Aegilops triuncialis*), tree-of-heaven (*Ailanthus altissima*), spotted knapweed (*Centaurea stoebe* ssp. *micranthos*), artichoke thistle (*Cynara cardunculus*), wild fennel (*Foeniculum vulgare*), perennial pepperweed, perennial ryegrass, Russian thistle (*Salsola* spp.), and puncture vine (*Tribulus terrestris*). Exotic and invasive animal species that are characteristic of annual grasslands in the county include wild turkey, European starling, house mouse, black rat, and wild pig.

3.4.3 Vernal Pool Complex

Vernal pool complex is defined as a separate community in the Plan to focus analysis and conservation on the totality of habitat for covered vernal pool species. Vernal pools form in seasonally flooded depressions in annual grasslands under a combination of specific climatic, soil, hydrologic, and topographic conditions. The covered vernal pool branchiopods carry out their entire lifecycle in vernal pool wetlands, but the wetlands depend on the surrounding upland areas and together constitute the vernal pool complex. Because vernal pools form in grassland, the description of the grassland community in Section 3.4.2, *Grassland,* applies here as well. The present distribution of vernal pool complex lands is shown on Figure 3-13 and the amount is listed in Table 3-12.

Lands mapped as vernal pool complex include small amounts of wetlands other than vernal pools. Table 3-11 and Table 3-12 (discussed below under their primary community association) show that the vernal pool complex natural community type includes small percentages (1 percent or less) of aquatic/wetland and riverine constituent habitats.

Conversely, it is expected that vernal pool–type constituent habitats will also occur with other communities and land-cover types. Although the presence of vernal pool constituent habitat is what distinguishes vernal pool complex from the other grasslands, it is expected that vernal pool–type constituent habitats occur in other community types. Some of the wetlands associated with aquatic/wetland complex are also likely to function ecologically as vernal pools and would be delineated as vernal pool constituent habitats. In the Valley, the rural-residential land-cover type often includes open areas away from structures that include vernal pool–type constituent habitats. The vernal pool complex natural community consists of delineated vernal pool areas and their associated uplands.

3.4.3.1 Land-cover Types

The vernal pool complex community comprises three vernal pool complex land-cover types—high, intermediate, and low. Figure 3-13 shows that vernal pool complex lands at different densities are scattered broadly across the Valley and extend only a short distance into the Foothills. The present distribution of vernal pool complex lands appears universally across the alluvium and sandstone mapped on Figure 3-2 and the California Prairie mapped on Figure 3-12.

Vernal pool complex natural community is interspersed in the landscape with grassland, field agriculture, and rice agriculture, as can be seen on Figure 3-11. As discussed below in Section

3.4.3.3, *Historical Extent,* the changing pattern of historical land use is responsible for the changing distribution of vernal pool complex lands in the Valley. Present vernal pool complex lands show the effect of land use practice. Table 3-16 characterizes vernal pool complex land cover (i.e., density class) by three levels of disturbance: minimal, moderate, and high. Disturbance is caused primarily from past agricultural uses such as disking or overgrazing. As a generalization, areas mapped as vernal pool complex – high density are the least disturbed, while intermediate- and low-density vernal pool complex show greater amounts of disturbance.

Table 3-16. Relative Disturbance in each Vernal Pool Complex Land-cover Type

		Vernal Pool Disturbance Level		
Vernal Pool Complex (VPC) Land Cover	**All VPC (acres)**	**Minimal Disturbance**	**Moderate Disturbance**	**High Disturbance**
VPC – High Density	10,138	61%	33%	6%
VPC – Intermediate Density	13,818	54%	26%	20%
VPC – Low Density	20,322	41%	31%	28%
Total	**44,278**	**21,874**	**13,317**	**9,088**

Source: MIG|TRA (3/10/2015)

Conditions necessary for vernal pool formation include a Mediterranean climate, a restrictive subsurface layer impermeable to water infiltration on which a shallow water table is perched during the wet season, and a microtopographic pattern of shallow depressions in a level landscape. This set of characteristics distinguishes vernal pools from other seasonal wetlands and perennial wetlands (Jokerst 1990 in Jones & Stokes Associates 2004). Vernal pools occur in undulating topography and may be isolated from one another, but more often, they are interconnected by swales or ephemeral drainages in vernal pool complexes that may extend for hundreds of acres. These swales are part of the vernal pool complex, although often they do not remain saturated long enough to develop the unique plants and animals that characterize vernal pools. Pools may also be hydrologically connected by subsurface water flows. Direct rainfall is the primary water source, but overland runoff and groundwater may also contribute to vernal pool hydrology (Jokerst 1990 in Jones & Stokes Associates 2004). Size and depth of vernal pools vary. Vernal pools are ecologically integrated with the surrounding uplands, typically annual grassland habitats that form the watershed of the complex.

Vernal pools are classified on the basis of physical, geographical, and biological factors (Sawyer and Keeler-Wolf 1995 in Jones & Stokes Associates 2004). Several types of restrictive soil layers have been described (Smith and Verrill 1998 in Jones & Stokes Associates 2004), two of which occur in western Placer County: hardpans and volcanic flows. Hardpans are formed when silica minerals are leached, redeposited, and then cemented lower down the soil profile. They occur on alluvial terraces on the east side of the Central Valley. Northern hardpan vernal pools are most common in the Southeastern Sacramento Valley Vernal Pool Region where they occur in complexes of many small pools and swales among mima mounds on soils of the Pentz-Pardee-Red Bluff, Redding-Corning, and San Joaquin series (U.S. Fish and Wildlife Service 2005). Northern volcanic mudflow vernal pools (Holland 1986; Sawyer and Keeler-Wolf 1995 in Jones & Stokes Associates 2004) occur on the Exchequer soils that formed on the lahars (mudflows) of the Mehrten Formation. Placer County contains most of the small number of volcanic mudflow vernal pools in the southeastern portion of

the Sacramento Valley (California Department of Fish and Game 2001 in Jones & Stokes Associates 2004; U.S. Fish and Wildlife Service 2005).

The strong seasonal rainfall of a Mediterranean climate, concentrated in the winter and spring months, fills the pools for a portion of winter and spring. The pools dry out in summer, and the prolonged dry period allows vernal pool branchiopod species to complete the second, diapause portion of their life cycle and prevents the establishment of species typical of permanent wetlands and marshes. The mild winter and spring temperatures allow plants and animals to grow and reproduce when the pools are full. As such, vernal pools support a distinctive community of plants adapted to the annual cycle of flooding and desiccation; a number of plant species are endemic to vernal pools in California.

Pools are typically dominated by short-lived, annual native plants (Holland 1976 in Jones & Stokes Associates 2004) that can complete their life cycles during the inundation and drying phases that characterize the habitat. Seeds remain dormant throughout the dry summer and germinate after winter rains. Vernal pool plant species differ in their tolerance to inundation; this varying tolerance causes the characteristic zoning evident as concentric rings around vernal pools. Species that are tolerant of longer periods of inundation occur in the centers of pools, while less tolerant species grow around the margins. Because of the extreme growing conditions in vernal pools, few non-native plants are able to survive, and 75 to 95 percent of plant species in vernal pools are native (Holland and Jain 1988; Jokerst 1990 in Jones & Stokes Associates 2004). In contrast, non-native species dominate the surrounding annual grasslands, comprising 90 percent of the biomass (U.S. Fish and Wildlife Service 2003 in Jones & Stokes Associates 2004).

Native plants typical of vernal pools include several species of downingias (*Downingia* spp.), goldfields, popcornflowers, woolly marbles (*Psilocarphus* spp.), buttercups (*Ranunculus* spp.), and clovers (*Trifolium* spp.) as well as common hedgehyssop (*Gratiola ebracteata*), Great Valley button thistle (*Eryngium castrense*), common spike-rush (*Eleocharis macrostachya*), mesamints (*Pogogyne* sp.), quillwort (*Isoetes* spp.), purslane speedwell (*Veronica peregrina* ssp*. xalapensis*), and white navarretia (*Navarretia* sp.). Non-native species found in vernal pools in western Placer County include perennial ryegrass, small quaking grass (*Briza minor*), soft chess, hawkbit (*Leontodon saxatilis* ssp*. longirostris*), hyssop loosestrife (*Lythrum hyssopifolium*), and cut-leaved geranium (*Geranium dissectum*) (Jones & Stokes Associates 2002 in Jones & Stokes Associates 2004).

3.4.3.1.1 Vernal Pool Complex – High Density

As described above in section 3.3.1.2.4, *Mapping Vernal Pool Complexes*, vernal pool land cover was grouped into three main categories, one of which is vernal pool complex – high density. This land-cover type is a mapping unit that represents the mosaic of vernal pool wetlands, seasonal wetlands, swales, and uplands. This land-cover type contains, on average, more than 5 percent density of "vernal pools." For the purposes of establishing high-, intermediate-, and low-density land-cover types, vernal pools were identified using the bounded wetland and include both vernal pool wetland and seasonal wetland constituent habitat. Areas mapped as vernal pool complex – high density are estimated on average to comprise 4.5 percent vernal pool wetlands, 4.0 percent seasonal wetlands, and 2.0 percent seasonal swales, for a total of 10.5 percent of vernal pool constituent habitats (Table 3-10).

3.4.3.1.2 Vernal Pool Complex – Intermediate Density

As stated above, this land-cover type includes a suite of vernal pool habitat types. It contains 1 to 5 percent wetland density within the vernal pool complex natural community. Areas mapped as vernal pool complex – intermediate density have roughly half of the wetland density as vernal pool complex – high density.

3.4.3.1.3 Vernal Pool Complex – Low Density

This land-cover type contains less than 1 percent wetland density within the vernal pool complex natural community. The vernal pool complex – low density land-cover type is intended to capture the large amount of Valley annual grasslands and pasture lands that retain small but appreciable vernal pool ecological function. In the Valley, areas mapped as vernal pool complex – low density are most likely, on average, to show 0.2 percent delineated vernal pools and larger amounts of seasonal wetlands or seasonal swales. In the Foothills, the fringe of grasslands on the extreme western edge adjoining the Valley has topographic conditions that may allow a very low density of vernal pool–type constituent habitats. Of over 25,000 acres of grassland and pasture mapped in the Foothills, about 3 percent of it is considered to be vernal pool complex – low density, with a wetland factor half of that of the Valley.

3.4.3.2 Constituent Habitats

Three constituent habitats associated with vernal pool complex may function as vernal pools and may be habitat for covered vernal pool species: vernal pool wetland, seasonal wetland in vernal pool complex, and seasonal swales.

The likely presence of these constituent habitats in an area is estimated by applying the presence factors shown in Table 3-10 to the land-cover types there. The vernal pool complex community is the primary association for vernal pool constituent habitats. However, other communities and land-cover types may contain vernal pool complex constituent habitats including, but not limited to, those displayed in Table 3-10.

3.4.3.2.1 Vernal Pool Wetland

Vernal pools are a unique type of seasonal wetland. They have a perchedepiaquic moisture regime (wetted from the top down) and are sometimes difficult to differentiate from other types of seasonal wetlands; hydrology and flora are used to make the distinction. To be considered a vernal pool, the wetland must be a shallow depression, almost always between 3 inches and 16 inches measured vertically from the lowest point in the pool to the spillway. Vernal pools are found in depressions that have a shallow impervious layer such as a clay pan or indurated hardpan (an aquatard). The aquatard layer perches water and prevents percolation so that water loss from vernal pools occurs only through evaporation and evapotranspiration. Vernal pools are inhabited by a suite of specialized plants such as Vasey's coyote thistle (*Eryngium vaseyi*), slender popcornflower (*Plagiobothrys stipitatus*), Fremont's goldfields (*Lasthenia fremontii*), and downingia (*Downingia* spp.), which are able to tolerate several months of inundation and anaerobic conditions followed by months of hot, dry weather. Vernal pools are sometimes difficult to separate from other types of seasonal wetlands; hydrology and flora are used to make the distinction.

3.4.3.2.2 Seasonal Wetland in a Vernal Pool Complex

Seasonal wetland is a general term for seasonally saturated wetlands that are not defined as vernal pools or other specific wetland types. They are often depressional or bermed wetlands that have wetland hydrology lasting until early or mid-spring but become dry before emergent marsh species can become established. Seasonal wetlands often support the same species as wetland swales in addition to generalist species such as hyssop loosestrife (*Lythrum hyssopifolia*), rushes (*Juncus* spp.), and Italian ryegrass. Wetlands defined as seasonal wetlands in a vernal pool complex for the purpose of the HCP/NCCP are seasonal wetlands that occur within the vernal pool/grassland matrix but do not typically inundate for a long enough period to support typical vernal pool flora. They often consist of wetland features that were historically vernal pools but have been degraded as a result of past activities such as agricultural disking.

3.4.3.2.3 Seasonal Swales

Wetland swales are conveyance systems that occur on sloped topography. Water may flow during rainy periods in wetland swales, but not with enough intensity or duration to create the bed-and-bank morphology that defines riverine systems. Wetland swales are usually dominated by species that can occur in either wetlands or uplands, such as Italian ryegrass (*Lolium perenne [Festuca perennis]*) and curly dock (*Rumex crispus*). Upland swales lack extended soil saturation and have an upland flora that is not dominated by plant species dependent on wetlands or typical of vernal pools. Seasonal swales in a vernal pool complex are those that convey water within the vernal pool/grassland matrix.

3.4.3.3 Historical Extent

In California, vernal pools occur in the Central Valley, in coastal valleys and terraces, the Modoc plateau, and on coastal mesas of Southern California. The largest concentration of vernal pools is found along the eastern edge of the Central Valley. Although originally widespread, it is estimated that close to 90 percent of California's vernal pools have been lost to agricultural development and urbanization (Holland 1978 in Jones & Stokes Associates 2004). More recent mapping estimate a loss of about 13 percent of vernal pool habitat in the Central Valley between 2005 and a baseline mapping period of 1967-1995. Placer County experienced some of the highest losses during this period: approximately 17,000 acres (or 35 percent) of vernal pool habitat mapped in 1994 was lost by 2005 (Holland 2009).

Available aerial photography illustrates this progressive loss and also shows that vernal pool complex lands reappear after changes in land use. The oldest aerial photography available in western Placer County dates from 1937. Although the imagery is of lower resolution than contemporary imagery, photo interpretation can identify areas that were likely rice cultivation, pasture, or vernal pool complex at the time. Because of the relevance of prior historical records of vernal pool presence in designing restoration projects, the 1937 data were compared with the current vernal pool complex map of the landscape 80 years later.

It appears that the presence of vernal pool complex at any point in time is dependent on current land use and the retention of the original undulating topography overlying hardpan. Thus, although there are areas that were mapped as vernal pool complex in 1937 and in 2011, there are also large areas that were mapped differently. Some areas that did not appear to support vernal pools in 1937 had vernal pools in 2011 and vice versa. The 1937 photography provides context for the condition

of vernal pool complex in western Placer County, but it is not considered to be a sole determinant of the potential for restoration.

3.4.3.4 Common Wildlife Associations

In addition to the wildlife associated with annual grasslands, vernal pool wetlands in vernal pool complexes are important habitat for migratory birds, including sandpipers and herons, as well as waterfowl (Jokerst 1990; Silveira 1998 in Jones & Stokes Associates 2004), and vernal pool complexes are important to the continuity of wetland habitats along the Pacific Flyway (U.S. Fish and Wildlife Service 2003 in Jones & Stokes Associates 2004). Other birds, such as raptors (hawks, falcons, and kites) and a variety of songbirds, use vernal pool complexes for foraging and as water sources. Burrowing owls may use burrows in mima mounds in the surrounding annual grasslands (U.S. Fish and Wildlife Service 2003 in Jones & Stokes Associates 2004). Many wildlife species use both the vernal pools and the surrounding annual grassland habitat of the vernal pool complex. For example, many of the typical vernal pool annual plants are pollinated by bee species that nest in the surrounding uplands and forage in annual grasslands when the pools dry out.

Vernal pools provide habitat for animals that can tolerate the extreme range of conditions that characterize these ecosystems. Many are specialized animals that are able to complete their life cycles in the short period during which pools are wet. These include crustaceans, such as fairy shrimp, clam shrimp, tadpole shrimp, seed shrimp, and daphnia (Order: Cladocera), and other invertebrates, such as water beetles, water boatmen (Family: Corixidae), and aquatic larvae of fly and dragonfly (Order: Odonata) species. Vernal pool branchiopod communities have evolved in the absence of aquatic predators such as fish and non-native bullfrogs (*Lithobates catesbeiana*), which cannot survive in vernal pools because of the long period of desiccation.

The aquatic habitat of vernal pools supports amphibians that use the pools for breeding. Western spadefoot toad (*Spea hammondii*) has been found in vernal pool complexes in the non-participating city of Roseville and may occur in the vernal pool complexes in the Plan Area, though there are no known occurrences to date. Pacific chorus frogs (*Pseudacris sierra*) and California toads (*Anaxyrus boreas halophilus*) may be common in vernal pool complexes in the Plan Area.

3.4.3.5 Covered Species Associations

Vernal pool complex uplands function as habitat for the following Covered Species: Swainson's hawk, western burrowing owl, tricolored blackbird, giant garter snake, western pond turtle, California red-legged frog, and vernal pool branchiopods (see Appendix D, *Species Accounts*).

Because of the presence of vernal pool wetlands, vernal pool complex lands provide habitat for covered vernal pool branchiopod species such as vernal pool fairy shrimp, vernal pool tadpole shrimp, and Conservancy fairy shrimp. These aquatic invertebrate species have evolved accelerated reproductive maturity and high reproductive rates in response to the extreme environmental conditions that occur in vernal pools. They can survive the desiccation phase in the form of cysts, which can withstand high temperatures during the summer and remain viable in the soil for more than 10 years (Belk 1998 in Jones & Stokes Associates 2004).

3.4.3.6 Ecosystem Functions

Similar to other wetlands, vernal pools moderate seasonal flooding during storm events by collecting water (California Natural Resources Agency 2009). Also, similar to other wetlands, vernal

pools remove contaminants from the water, including dissolved elements and compounds from agricultural and urban runoff (Leidy and White 1996; California Natural Resources Agency 2009). Although depressional wetlands without inlets and outlets, such as vernal pools, may be hydrologically isolated through obvious surface water connections, most appear to be linked to other waters and wetlands through groundwater or, especially in the case of vernal pools, periodic surface flows (Winter et al. 2001; Whigham and Jordan 2003) and slow-moving shallow soil-water flows (Leibowitz 2003).

Vernal pools are important habitat for migratory birds, and in the spring, migrating waterfowl are often observed feeding and resting in Central Valley vernal pools. Recent studies suggest that the protein-rich invertebrates and crustaceans, as well as the roots and leaves of vernal pool plants, provide important seasonal food sources for waterfowl as well as other bird species (California Natural Resources Agency 2009). The large freshwater branchiopods serve as an especially important source of protein and energy for migratory waterfowl (Eriksen and Belk 1999 in Jones & Stokes Associates 2004).

Other birds, such as raptors (hawks, falcons, and kites) and a variety of songbirds, use vernal pool complexes for foraging and as water sources. Burrowing owls may use burrows in mima mounds in the surrounding annual grasslands (U.S. Fish and Wildlife Service 2003 in Jones & Stokes Associates 2004). Many wildlife species use both the vernal pools and the surrounding annual grassland habitat of the vernal pool complex. For example, many of the typical vernal pool annual plants are pollinated by native bee species that nest in the surrounding uplands and forage in annual grasslands when the pools dry out.

Fish cannot occur in vernal pools, because vernal pools are dry for part of the year. This reduced-predator environment is essential for breeding and foraging success of many native amphibian species, which feed on the invertebrates that can live in the vernal pools.

3.4.3.7 Natural Disturbance

Vernal pools are often in areas where livestock have grazed for many decades or more; California ranchers and vernal pools have coexisted for over a century, with several generations of ranchers utilizing the landscape (California Wetlands Information System 2007). At some level, grazing can be beneficial as it can reduce cover of non-native grasses, control invasive plants, and reduce thatch. Some vernal plants such as Bogg's Lake Hedge-hyssop (*Gratiola heterosepala*) have been observed aggregated in groups in cattle hoof prints (Mason and Bacigalupi 1954 in Jones & Stokes Associates 2004).

Flooding is an important disturbance that not only fills vernal pools but also temporarily links them. Seed capsules of some vernal pool plant species such as legenere (*Legenere limosa*) can disperse by floating to hydrologically connected areas (Holland 1983 in Jones & Stokes Associates 2004).

The origin of mima mounds that characterize some of the hardpan vernal pool complexes in western Placer County is controversial, but many theories point to natural disturbances such as erosion, deposition, clay swelling, or soil movement by fossorial rodents (Cain 1974; Collins 1975; Hallsworth et al 1955; Reed and Amundson 2007).

3.4.3.8 Threats

Vernal pool complex lands are subject to the same threats as annual grassland, but the vernal pool ecosystem is particularly susceptible to development and fragmentation, modification to inundation and hydro period due to changes in the hydrology of surface flows and perched groundwater flows, conversion to intensive agricultural uses, tilling or disking of soils, intensive grazing by livestock, non-native vegetation (including annual grasses and noxious weeds), effects from recreational use, effects to water quality, non-native predators, and decreased pollination and dispersal of vernal pool species due to effects on adjacent uplands (U.S. Fish and Wildlife Service 2005).

Virtually all of the existing vernal pool complexes and annual grasslands in the Valley have been managed for various forms of agriculture, primarily grazing and dry pasture. More intensive agricultural practices, including disking and laser leveling, have also affected the vernal pool landscapes in the Plan Area, some of which still show signatures of remnant vernal pools in wet season aerial photographs. Although the Plan's landscape-level assessment of disturbance to vernal pool complexes does not identify specific causes of disturbance, it does reflect the effects these threats have had on vernal complexes as a whole in Plan Area A and shown in Table 3-16.

Vernal pool complexes are extremely vulnerable to development and fragmentation because they occur on level or gently rolling terrain that is accessible and suitable for development (Cheatham 1976 in Jones & Stokes Associates 2004). Although agricultural conversions—including conversion to orchards, vineyards, rice, "ranchettes," "hobby farms," fallow agricultural land, irrigated pasture—account for most of the total loss of vernal pool throughout the Valley, in Placer County, there is a relatively high proportion of loss due to conversion to urban development (Holland 2009).

Surface flows to and from vernal pools can be affected by manipulation of nearby terrain due to land disturbance. If poorly planned, such manipulations can result in the loss of hydrological connections that sustain the vernal pools, and can lead to a reduction in hydroperiod. Reduced hydroperiod can cause decreased native plant and invertebrate taxa richness. This is because pools with short hydroperiods tend to be occupied solely by species with rapid development cycles; the pools dry up before longer-lived species are able to complete their life cycles (King et al. 1996). This shift in hydrology can also have important implications for the threatened and endangered species that might otherwise inhabit the vernal pools. For example, vernal pool tadpole shrimp requires habitats that are wet for at least 7 weeks (Gallagher 1996 in Jones & Stokes Associates 2004); adult tadpole shrimp are left exposed to predation and desiccation when their habitat dries up before they are able to complete their life cycle.

Alternatively, vernal pools can be subject to increased periods of inundation due to nearby irrigation, outfall discharge, or runoff from development (California Department of Fish and Wildlife 2016). Increased periods of inundation can reduce habitat suitability for the vernal pool fairy shrimp because they are commonly found in only the smaller, shorter-lived pools (Eriksen and Belk 1999).

In many vernal pool habitats, especially those on duripan or claypan in the Central Valley, perched aquifers keep most water on or near the surface. These perched aquifers buffer the vernal pools against water loss due to evapotranspiration (Williamson et al. 2005; Rains et al. 2006 in U.S. Fish and Wildlife Service 2007). In these vernal pools, the perched groundwater and the seasonal surface water hydrologically connect the uplands, vernal pools, and streams at the catchment scale. These vernal pools have naturally longer hydroperiods, meaning that they remain inundated for longer periods, than if they were recharged only by precipitation. In fact, for some vernal pools, the greater

watershed can supply 25 to 60 percent of the water needed to fill pools to the margin. Accordingly, changes in adjacent land use may have considerable effects to vernal pools by affecting both surface flows and the perched groundwater, although the degree to which such changes affect pools is poorly understood (Rains et al. 2006 in U.S. Fish and Wildlife Service 2007).

Vernal pool hydrology can be altered by non-native grasses and invasive plants. Non-native annual grasses and invasive plants reduce the cover of native vernal pool plants, most of which are forbs. When non-native grasses and invasive plants dominate pool edges, they sequester light and soil moisture, promote thatch build-up, and shorten hydroperiods. As the increased thatch layer decomposes, oxygen becomes depleted and sediment toxicity can increase (Lee 2007 in U.S. Fish and Wildlife Service 2007). Depletion of dissolved oxygen can cause complete mortality of gill-breathing aquatic organisms (Horne and Goldman 1994 in U.S. Fish and Wildlife Service 2007; Rogers 1998).

Although the mechanism responsible for hydroperiod reduction due to non-native grasses and invasive plants is not documented, it is thought to be due to the overall increase in vegetative matter, and a subsequent increase in evapotranspiration (Marty 2005). Livestock grazing as a substitute for grazing by native wildlife is an important tool for reducing the cover of non-native grasses, invasive plants, and the resulting thatch and decreasing evapotranspiration. However, in many areas, cattle grazing has been discontinued in anticipation of land use changes (Martz pers. comm. in U.S. Fish and Wildlife Service 2007). Vernal pool inundation has been reduced by 50 to 80 percent in the southeastern Sacramento Valley when grazing is discontinued (Marty 2005). Therefore, the change in vernal pool hydroperiod due to loss of grazing is noted as an emerging threat for vernal pool species, especially in the Sacramento Valley (Martz pers. comm. in U.S. Fish and Wildlife Service 2007).

Although grazing is an important tool for vernal pool management, overgrazing can threaten vernal pools by increasing sedimentation and nutrient inputs (U.S. Fish and Wildlife Service 2007). The proportion of non-native plants may be higher in vernal pools subject to heavy livestock grazing (Jones & Stokes Associates 2002 in Jones & Stokes Associates 2004). In addition, excessive organic waste oxidizes the water, which can reduce the amount of oxygen available for gill-breathing invertebrates (Rogers 1998 in U.S. Fish and Wildlife Service 2005). Cattle can trample rare vernal pool plants (Griggs 2000) and vernal pool fairy shrimp, which appear to be easily crushed (Hathaway et al. 1996). The impacts of overgrazing seem to be greatest in the warm spring months when the cattle walk into the drying pools to soak their hooves in the mud and escape the bites of the heel-fly (Griggs 2000) and when the cattle may be attracted to the green plants in and around a vernal pool after the upland grasses have begun to turn brown (Barry 1998).

Prescribed fire is being employed at some sites to substitute for, and supplement, prescribed grazing to reduce invasive plants and non-native annual grasses. However, the benefits of prescribed burning can be ephemeral (Marty 2005). In vernal pools where vegetative material is relatively sparse, fairy shrimp cysts do not appear to be negatively affected by fire, but in regions where thatch has built up or vegetative material is dense, fire may have deleterious effects on cyst viability (Wells et al. 1997 in U.S. Fish and Wildlife Service 2007). In addition, application of fire retardant can contaminate pools, leading to temporary losses of chydorids, daphnids, ostracods, and rotifers within vernal pools (Angeler et al. 2006).

Water quality in vernal pools may be degraded over large portions of the Central Valley due to pesticide overspray and residues. The runoff and precipitation that fill the pools can include pesticides (i.e., herbicides, insecticides, fungicides). Toxic levels of some compounds accumulate in

aquatic stream sediments within the Central Valley (Weston et al. 2005; Amweg et al. 2005) and, therefore, may also be a problem in vernal pools. In addition, herbicides are sometimes used on some preserved vernal pool habitats to control invasive plant species (e.g., Center for Natural Lands Management 2004 in U.S. Fish and Wildlife Service 2007).

Pesticides that are found in vernal pools due to atmospheric deposition have been found to be toxic to some vernal pool branchiopods (U.S. Fish and Wildlife Service 2007). Herbicide formulations, although presumably less toxic to invertebrates than insecticides, may lead to retarded growth and concomitant reductions in fecundity for exposed wildlife, particularly fairy shrimp (Brausch et al. 2006). Pesticide effects can be accentuated by the effects of the surfactants formulated with the active ingredient (U.S. Fish and Wildlife Service 2007).

Bullfrogs, fish, and crayfish (Families: Astacoidea and Parastacoidea) have been noted as potential threats to vernal pool species at several national wildlife refuge holdings (California Department of Fish and Wildlife 2016). Predation of vernal pool branchiopods by non-native bullfrogs potentially increases the threat of predation beyond that found naturally. Bullfrogs require permanent water for breeding; however, during the rainy season juvenile bullfrogs disperse readily into vernal pool complexes from permanent waters and can spend several weeks or more at pools consuming aquatic invertebrates. In such cases, bullfrogs have been documented to selectively prey on macro-crustaceans (e.g., vernal pool tadpole shrimp and California clam shrimp [*Cyzicus californicus*]) and coleopterans (beetles), even when other prey is more abundant (U.S. Fish and Wildlife Service 1994; Balfour and Morey 1999).

Under natural conditions, California streams and rivers sustained wide annual fluctuations in water volume and generally were not permanent in nature, thereby preventing influxes of non-native aquatic species (Moyle and Light 1996). Opportunities for bullfrog dispersal into vernal pool ecosystems have increased as permanent-water habitat has been created in canals, in streams augmented by urban runoff and irrigated agriculture, and in stock ponds and other impoundments. All of the major stream drainage systems in western Placer County contain irrigation water, urban runoff or a combination of the two. Vernal pool branchiopods lack predator-avoidance mechanisms and are continuously moving their phyllopods, so they may be particularly susceptible to predation by bullfrogs and other visual predators. Bullfrogs also prey upon adult and tadpole stages of native amphibians, including those of endangered species. Vernal pools in reserves that are close to permanent waters may be invaded by other non-native predators, such as mosquitofish (*Gambusia affinis*) and non-native game fish.

Off-trail use that crosses through vernal pools and the uplands around the pools (hiking, bicycling, horse-back riding, and vehicle use) can damage vernal pools by causing erosion and crushing or displacing organisms in the pools. These activities are especially damaging since they alter pool topography and hydrology, destroy vegetation and crush organisms in the pools. Because vernal pool fairy shrimp cysts appear to be easily crushed (Hathaway et al. 1996), the species is particularly susceptible to off-trail vehicle disturbance (U.S. Fish and Wildlife Service 2007). Although these activities are not prevalent in western Placer County today, they have contributed to the overall decline of the species.

Some protected lands may be affected by management decisions that could favor one federally listed vernal pool species over another. One example is the interaction between the vernal pool tadpole shrimp and the vernal pool fairy shrimp. Tadpole shrimp prey upon fairy shrimp but require large

and deep pools with long hydroperiods. Large vernal pools with long hydroperiods may support large populations of vernal pool tadpole shrimp.

3.4.4 Aquatic/Wetland Complex

The aquatic/wetland complex community consists of aquatic vegetation and wildlife that is not primarily riverine or riparian (i.e., 5 percent of aquatic/wetland is attributed to the riverine-type constituent habitat) and not primarily associated with vernal pools. The complex is defined by the two mapped land-cover types shown on Figure 3-14 and listed in Table 3-12:

- Marsh Complex
- Pond

The aquatic/wetland complex community has strong wetland associations with aquatic/wetland constituent habitat. Therefore, most of the discussion of this community appears under constituent habitats. The aquatic/wetland complex natural community consists of delineated aquatic areas as described below and their associated uplands.

3.4.4.1 Land-cover Types

3.4.4.1.1 Marsh Complex

The marsh complex land-cover type is a mapping unit that represents the mosaic of wetlands and uplands found around year-round water. This mapping unit merges areas that were previously mapped in the PCWHR system as fresh emergent wetland and seasonal wetland because it was found that the boundary between those two types varied, depending on the season of the aerial photography, and was not reproducible.

3.4.4.1.2 Pond

The pond land-cover type is a mapping unit that represents small patches of open water and most closely represents lacustrine ecosystems, which are considered a constituent habitat and discussed below. Nearly all of the ponds in the Plan Area are artificial impoundments, and therefore, the pond land-cover type includes small reservoirs, stock ponds, and off-stream impoundments.

The pond land-cover type is distinct from the reservoir land-cover type, which the Plan includes in the managed open water community. The distinction reflects the marked difference in ecological function and the value of small ponds as habitat for Covered Species. Ponds in the Plan Area typically occur on relatively flat land and are shallow, with a perimeter that expands or contracts substantially based on the water depth. This variable fringe of the pond creates conditions that allow the formation of the area mapped as the marsh complex land-cover type. Because of the close spatial and ecological relationship between ponds and marsh complex they are included together in the conservation strategy as the aquatic/wetland complex community.

Early land-cover mapping for the Plan defined the lacustrine PCWHR type and attempted to map features as small as 0.1 acre. However, aquatic features less than 0.1 acre, such as small stock ponds, are found throughout the Plan Area, and these shallow features could not be mapped as lacustrine ecosystems due to limitations of scale in the aerial photography. For this reason, the current land-cover type classification uses the term *pond* and considers it to be part of the aquatic/wetland complex, which is more reliably mapped in Plan Area A.

3.4.4.2 Constituent Habitats

The key constituent habitats for the aquatic/wetland complex are listed below.

- Fresh Emergent Marsh
- Lacustrine
- Non-vernal Pool Seasonal Wetland

The likely presence of these constituent habitats in an area is estimated by applying the presence factors shown in Table 3-11 to the land-cover types there. The aquatic/wetland complex community is the primary association for aquatic/wetland constituent habitats. However, other communities and land-cover types may contain aquatic/wetland constituent habitats including, but not limited to, those displayed in Table 3-11. For example, urban wetlands may contain non-vernal pool seasonal wetlands, even though they are not used in Table 10 to calculate presence of this constituent habitat. This is because urban wetlands contain only a very low proportion of non-vernal pool seasonal wetlands.

3.4.4.2.1 Fresh Emergent Marsh

Fresh emergent marsh is distinguished from deepwater aquatic habitats and wet meadows or grassland habitats by the presence of tall, perennial grass-like plants that are rooted in soils and permanently or seasonally flooded or inundated. The boundary between fresh emergent marsh and deepwater (i.e., lacustrine and riverine) habitats is roughly a depth of 6 feet (Cowardin et al. 1979 in Jones & Stokes Associates 2004). Fresh emergent marsh ecosystems can occur in basins or depressions at all elevations, aspects, and exposures, but they are most common on level to gently rolling topography (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). They are often associated with small human-made ponds and natural drainageways that are enhanced by intentional or unintentional releases of irrigation water. Fresh emergent marsh can also occur as a fringe around reservoirs where the slopes are gentle enough to create a rim of shallow water and where water levels do not fluctuate widely; this condition is mapped as the pond land-cover type.

Unmaintained roadside and agricultural ditches can also support these ecosystems. Small marshes can also be found along low-gradient reaches of rivers and streams in backwater areas or ponded overflow channels. In the Foothills, flood irrigation often creates small wetlands that form around drainageways or small basins.

The hydric soils that characterize fresh emergent marshes are typically clayey, silty, or peaty and often have a sulphur-like odor caused by the anaerobic conditions that develop in saturated soil conditions (Environmental Laboratory 1987 in Jones & Stokes Associates 2004). Cattail (*Typha* spp.) and common tule (*Schoenoplectus acutus* var*. occidentalis*) marshes often exhibit this characteristic.

Plant species composition of fresh emergent marsh ecosystems can vary both between marshes and within a given marsh depending on the basin contours that influence the depth and duration of flooding (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). For example, deeper portions of a marsh are generally dominated by taller species, primarily cattails and bulrushes. Near the upper edge of the marsh zone, grasses, sedges, and rushes measuring 1 to 3 feet tall and occasional tree or shrub species are more common. In western Placer County, characteristic species include broadleaf cattail (*Typha latifolia*), common tule, common spikerush, common rush (*Juncus effusus*), Baltic rush (*Juncus balticus*), floating water-primrose (*Ludwigia peploides*), lanceleaf water-

plantain (*Alisma lanceolatum*), and water pepper (*Persicaria hydropiperoides*). Goodding's black willow (*Salix gooddingii*) and sandbar willow (*Salix exigua*) are woody plants that tolerate flooding and are occasionally found around the margins of fresh emergent marshes.

Fresh emergent marshes are found throughout California at all elevations, but they are most common below about 7,500 feet. Fresh emergent marsh ecosystems are recognized throughout California as important natural communities because of their limited extent compared to historical distributions, their importance to dependent plant and wildlife species, and threats facing remaining wetland areas. The state's most extensive wetlands are in the Sacramento Valley, San Joaquin Valley, Klamath Basin, Sacramento–San Joaquin Delta region, and Imperial Valley–Salton Sea (Holland 1986; Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

In western Placer County, fresh emergent marsh occurs at a range of elevations throughout the Valley and the Foothills. Most individual occurrences of fresh emergent marsh in the county are less than 1 acre in extent; some larger, restored fresh emergent marshes exist in the western part of Plan Area A near Sheridan.

3.4.4.2.2 Non-vernal Pool Seasonal Wetland

Non-vernal pool seasonal wetlands are a constituent habitat for the aquatic/wetland complex community. Seasonal wetlands are defined as isolated wetlands and swales that pond water or have saturated soil during the rainy season. Seasonal wetlands are typically not found in well-defined depressions but occur in a variety of topographic situations, such as shallow basins in annual grassland or along ephemeral drainageways and swales. They also occur as transitional zones between fresh emergent marsh and annual grassland in small shallow valleys that are gradually exposed as water levels fall during the dry season.

Where seasonal wetlands occur within vernal pool complexes, they form hydrological complexes composed of vernal pools, swales, and seasonal wetlands within an upland grassland matrix. This condition is considered to be part of the vernal pool constituent habitat and an attribute of the vernal pool complex community, not the aquatic/wetland complex community.

Seasonal wetlands occur throughout the Plan Area of western Placer County. Individual seasonal wetlands are typically small, and most occur within grazed annual grassland and irrigated pasture ecosystems. Some larger areas occur adjacent to fresh emergent marshes in agricultural settings in the western part of the Plan Area.

Seasonal wetlands support a lower diversity of plant species than adjacent fresh emergent marsh and have a higher proportion of non-native species. Typical plant species characteristic of seasonal wetland ecosystems in western Placer County include Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), perennial ryegrass, curly dock, Baltic rush, and hyssop loosestrife. During the summer, seasonal wetlands may support late-season upland plants such as common spikeweeds (*Centromadia* spp.), tarweeds (*Hemizonia* spp.), vinegar weed (*Trichostema lanceolatum*), and turkey-mullin (*Eremocarpus setigerus*).

3.4.4.2.3 Lacustrine

Lacustrine ecosystems are defined as inland natural ponds and lakes as well as artificial features such as stock ponds or small reservoirs. The relatively calm waters of lakes and ponds contrast sharply with those of riverine ecosystems. The oxygen content of lakes is relatively low compared to

that of running water due to a combination of decomposition occurring at the bottom of lakes and the comparatively smaller quantity of water in direct contact with air. The gradations of oxygen, light, and temperature in lakes, along with currents and wave action (seiche), greatly influence the vertical distribution of lake and reservoir organisms (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

Phytoplankton are the tiny suspended photosynthesizing organisms, such as diatoms, desmids, and filamentous green algae, that dominate deepwater (6.6 feet deep) aquatic habitats (i.e., too deep for emergent plants). Because these tiny organisms alone carry on photosynthesis in open water, they are the basis upon which the rest of limnetic life depends (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). The plants found in the littoral zone[6] vary with elevation and water depth, with a distinct zonation apparent from the shoreline to the deeper water of the littoral zone.

3.4.4.3 Historical Extent

Figure 3-12 shows the vast band of tule marsh that stretched along the Sacramento River and ended only a few miles west of Placer County. Fresh emergent marshes have decreased dramatically in the Sacramento Valley and Placer County since the turn of the century due to drainage and conversion to agriculture (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

Natural lakes did not occur in the foothill and Central Valley region of the Sierra Nevada due in large part to the absence of glaciated landscapes; essentially all the lakes and ponds in the Foothills are artificial (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

3.4.4.4 Common Wildlife Associations

3.4.4.4.1 Fresh Emergent Marsh

Compared to some other terrestrial large-patch ecosystems in western Placer County, fresh emergent marshes support a relatively low number of vertebrate species. This is because most reptiles and small mammals (i.e., most rodents) avoid flooded areas and permanently saturated soils. In contrast, many species, including large numbers of birds, such as ducks, waders (e.g., herons and egrets), shorebirds, and blackbirds (including tricolored blackbird), are drawn to marshes, mudflats, and other wetland habitats (Jones & Stokes Associates 2003; Zeiner et al. 1990 in Jones & Stokes Associates 2004).

Characteristic waterbirds that nest in fresh emergent marshes in western Placer County include Canada goose, mallard (*Anas platyrhynchos*), (*Anas cyanoptera*), gadwall (*Anas strepera*), Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), American coot (*Fulica americana*), common gallinule (*Gallinula galeata*), killdeer (*Charadrius vociferus*), and Wilson's snipe (*Gallinago delicata*). These species are joined by a host of migratory waterfowl in fall and spring, with many remaining in the county throughout the winter and spring. Typical migratory and wintering waterfowl include American wigeon (*Anas americana*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), green-winged teal (*Anas crecca*), ring-necked duck (*Aythya collaris*), bufflehead (*Bucephala albeola*), common goldeneye (*Bucephala clangula*), and ruddy duck (*Oxyura jamaicensis*) (Jones & Stokes Associates 2003).

[6] The littloral zone is the area near shore where sunlight penetrates to the sediment, allowing aquatic plants to grow.

Amphibians in these habitats include Sierra newt (*Taricha sierrae*) (in the Foothills), California toad, and Sierran treefrog (*Pseudacris sierra*). Western pond turtle, valley garter snake (*Thamnophis sirtalis fitchi*), and Sierra garter snake (*Thamnophis couchii*) (in the Foothills) are reptiles that utilize fresh emergent marshes in western Placer County. The most common mammals in these habitats are a variety of foraging bats, vagrant shrew (*Sorex vagrans*), dusky shrew (*Sorex monticolus*), ornate shrew (*Sorex ornatus*), American beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicus*).

3.4.4.4.2 Seasonal Wetland

Similar to fresh emergent marshes, non-vernal pool seasonal wetlands support a relatively low number of vertebrate species compared to many other land-cover types in western Placer County. This is because many small mammal species (e.g., most rodents) avoid seasonally flooded areas and saturated soils. In contrast, many species, including large numbers of waterbirds, are drawn to seasonal wetland ecosystems (Zeiner et al. 1990 in Jones & Stokes Associates 2004). Characteristic waterbirds that visit seasonal wetlands in western Placer County include snowy egret (*Egretta thula*), black-crowned night-heron (*Nycticorax nycticorax*), white-faced ibis (*Plegadis chihi*), Canada goose, mallard, cinnamon teal (*Anas cyanoptera*), American wigeon, gadwall, killdeer, and Wilson's snipe.

3.4.4.4.3 Lacustrine

Seasonally, reservoirs, irrigation and stock watering ponds, and other artificial water bodies provide important habitat for many wildlife species, especially waterfowl, shorebirds, and other migratory waterbirds (Jones & Stokes Associates 2003 in Jones & Stokes Associates 2004). Lacustrine ecosystems in western Placer County are used as wintering grounds or temporary stopover for resting and foraging waterfowl during migration. Typical waterfowl species include Canada goose, snow goose (*Chen caerulescens*), greater Swhite-fronted goose (*Anser albifrons*), mallard, northern pintail, American wigeon, gadwall, cinnamon teal, green-winged teal, canvasback (*Aythya valisineria*), and ruddy duck. Other waterbirds that frequent lacustrine ecosystems include great blue heron, green heron (*Butorides virescens*), great egret, snowy egret, pied-billed grebe (*Podilymbus podiceps*), western grebe (*Aechmophorus occidentalis*), common loon (*Gavia immer*), and American white pelican (*Pelecanus erythrorhynchos*). Shorebirds (such as spotted sandpiper (*Actitis macularia*), western sandpiper (*Calidris mauri*), least sandpiper (*Calidris minutilla*), killdeer, and Wilson's phalarope (*Phalaropus tricolor*) and swallows—such as northern rough-winged swallow (*Stelgidopteryx serripennis*), tree swallow (*Tachycineta bicolor*), violet-green swallow (*Tachycineta thalassina*), and cliff swallow (*Petrochelidon pyrrhonota*)—are also common visitors to lacustrine ecosystems.

3.4.4.5 Covered Species Associations

The aquatic/wetland community provides habitat for several Covered Species: California black rail, tricolored blackbird, giant garter snake, western pond turtle, and California red-legged frog. California black rail occurs in the fresh emergent marsh component of the marsh complex land-cover type throughout Plan Area A, though primarily in the Foothills. Tricolored blackbird historically nests in fresh emergent marshes, though, in the Plan Area, most nest colonies occur in non-native Himalayan blackberry below an elevation of 300 feet.

The aquatic/wetland complex, along with riverine/riparian, is the primary aquatic habitat for giant garter snake in the Valley below an elevation of 100 feet, for western pond turtle throughout Plan

Area A, and for California red legged frog in Plan Area A above an elevation of 200 feet. These species all require aquatic habitat for functions. For example, giant garter snake forages in aquatic habitat; western pond turtle uses aquatic habitats for foraging, thermoregulation, and avoidance of predators; and California red-legged frog uses aquatic habitat for breeding and foraging.

3.4.4.6 Ecosystem Function

Perennial wetlands are important habitat for a wide variety of wildlife species. Wetland land-cover types provide drinking water as well as foraging, breeding, and resting habitat for many fish and wildlife species, including birds, amphibians, reptiles, and mammals. Wetlands provide stopover habitat for migratory waterfowl and songbirds. Many wildlife species, particularly invertebrates, spend their entire lives in wetlands.

Perennial and seasonal wetlands function as essential habitat for amphibians that depend on aquatic environments for reproduction and juvenile development. These wetlands also support high levels of insect production, which, in turn, creates a major food source for amphibians, birds, and other insectivorous species. Perennial wetlands are permanent water sources during the dry season in an otherwise arid landscape and thus function as essential habitat for a wide variety of water-dependent wildlife. Mammals, birds, reptiles, and amphibians from adjacent habitats are likely to use ponds en route to surrounding areas. Many upland species rely on streams and ponds as water sources, especially during the dry summer months.

3.4.4.7 Natural Disturbance

Fresh emergent marshes are transitory, eventually succeeding to upland habitat through gradual siltation. The speed at which this occurs varies with the rate of sedimentation, frequency of flooding, and rate of soil development, but the process usually occurs slowly and fresh emergent marshes often appear relatively stable for many decades (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

Seasonal flooding is a key natural disturbance in seasonal wetlands. Fresh emergent marsh and other wetland plant species must tolerate flooding during the growing season and thus be able to tolerate anoxic conditions. Prolonged flooding can kill off wetland plants if the shoots have been destroyed by grazing or fire prior to the flood event (Keddy 2000). Extended dry periods can function as a disturbance as well, because many wetland plants are adapted to wet conditions. Sediment deposition is a key feature of wetland communities. Seedlings are sensitive to burial under sediment, which can prevent or reduce germination (Keddy 2000). As a fresh emergent marsh ages, vegetation accumulates and may fill the pools of open water, which can eventually lead to meadow creation (Faber 1982).

Mixing of the water column of ponds, lakes, and small reservoirs is also a form of natural disturbance. Wind causes mixing of water in ponds and brings oxygen to the bottom while releasing nutrients into the water column that will feed plants and invertebrates. This sudden release of nutrients to the photic zone can result in rapid algal and plant growth (eutrophication). Ultimately, heavy loads of decaying plant matter result in anoxic conditions and subsequent reduced water quality.

3.4.4.8 Threats

Threats to the aquatic/wetland community include conversion to land uses such as agriculture, urban development, pollution, grazing, changes in hydrologic regime, invasion by non-native species, and natural processes such as fire or flood.

Wetlands in western Placer County, especially seasonal wetlands in the Valley, are vulnerable to destruction and/or fragmentation by urban and suburban development, agriculture, or road maintenance.

Fertilizer and pesticides contribute to pollution and result in a decrease in oxygen, which can kill vegetation within wetlands.

Grazing disturbs the vegetation around wetlands and can result in invasion of non-native plant species into wetlands (Holland and Keil 1995). Urban ornamental landscape species (e.g., weeping willow [*Salix babylonica*] and red sesbania [*Sesbania punicea*]) and common aquarium species that are transported or reseeded within drainages and watersheds can establish and spread, ultimately finding their way into downstream wetlands.

The construction of dams and weirs, extraction of groundwater, and creation of artificial drainages can change hydrologic regimes. In addition, increased stormwater runoff from impermeable surfaces can flow so rapidly into adjacent wetlands that it causes excessive scour and a loss of wetland habitat. Excessive sediment deposition following fire can fill in wetlands, thereby burying vegetation. Modifications to hydrological conditions that provide water year-round to seasonal wetlands can convert seasonal wetlands to perennial fresh emergent marsh.

In the Plan Area, some fresh emergent marsh habitats are created by irrigation runoff. Many of the wetland habitats in the Foothills of the Sierra Nevada used by California black rail are fed by leakage or runoff from irrigation canals or runoff from irrigated pastures (Richmond et al. 2008). The persistence of these habitats relies on a continuous supply of water. They are potentially threatened by canal lining, encasement, and repairs or by long-term changes in the delivery of irrigation water.

Poison hemlock (*Conium maculatum*), Italian thistle, pampas grass (*Cortaderia* spp.), velvet grass, perennial ryegrass, and bulbous canarygrass or Harding grass (*Phalaris aquatica*) are invasive non-native plants that often occur in or adjacent to fresh emergent marshes. Noxious weeds that can colonize fresh emergent marshes and that are known from within or near western Placer County include Himalayan blackberry, Bermuda grass, perennial pepperweed, hydrilla (*Hydrilla* spp.), purple loosestrife (*Lythrum salicaria*), Eurasian milfoil (*Myriophyllum spicatum*), water hyacinth (*Eichhornia crassipes*), giant reed (*Arundo donax*), and parrot's feather (*Myriophyllum aquaticum*). The ability of these species to reproduce asexually by stolons or turions makes them particularly difficult to control or eradicate. Noxious and invasive species that may occur in seasonal wetlands include yellow star-thistle, Himalayan blackberry, lepidium (*Lepidium* spp.), bull thistle, pampas grass, velvet grass, perennial pepperweed, Bermuda grass, Harding grass, Johnson grass, and woolly mullein (*Verbascum thapsus*).

Non-native bullfrogs can be common in shallow ponds and other permanent wetlands of western Placer County. Bullfrogs, along with introduced bass and signal crayfish (*Pacifastacus leniusculus*), can displace or prey upon many native aquatic species (Zeiner et al. 1990; Jennings and Hayes 1994 in Jones & Stokes Associates 2004).

Heavy grazing by livestock can degrade ponds quickly as a result of trampling and grazing, thereby increasing turbidity as well as the nutrient load of water from urine and feces. Increased nutrient load can cause eutrophication, a process where the excess nutrient load causes rapid plant and algae growth. Eutrophication reduces dissolved oxygen in the water as anaerobic microbes break down dead plant material. Reduced levels of dissolved oxygen, as well as reduced penetration of sunlight into the water, often lead to the die-off of other aquatic organisms. Eutrophication eventually leads to the filling in of the lacustrine basin by sedimentation of organic matter. Ponds are susceptible to rapid eutrophication. In urbanized areas, or in areas with septic tanks and leach fields, this process is enhanced by excess nutrient input.

The vast network of ponds, small reservoirs, and associated canals throughout western Placer County supports concentrations of non-native species. These include many aquatic invertebrates (e.g., insects, snails, clams, crayfish), many non-native fish species, and bullfrogs. During times of high rainfall or stream flow, non-native species can be flushed from ponds and reservoirs into stream and river systems where they compete with or prey upon native species. Bullfrogs and several species of bass are known to prey upon the eggs or tadpoles of foothill yellow-legged frog as well as western pond turtle hatchlings and juveniles (Moyle 1973; Holland 1991 in Jones & Stokes Associates 2004). Hatchlings of wood ducks (*Aix sponsa*), mallards, and even Canada geese often fall prey to largemouth bass (*Micropterus salmoides*). Several noxious aquatic weeds, including horticultural escapees such as water hyacinth, parrot's feather, hydrilla, and Eurasian milfoil, could occur in the ponds and reservoirs of western Placer County.

3.4.5 Riverine/Riparian Complex

Riverine and associated riparian ecosystems are present in a diverse mosaic around the streams and rivers in the Plan Area. This mosaic is mapped as a single riverine/riparian complex land-cover type, which also defines the community (see Figure 3-14 and Table 3-12). Other closely associated land-cover types and constituent habitats are interspersed within the riverine/riparian complex including grasslands, valley oak woodland, fresh emergent wetland, off-channel wetlands (not mapped as a land-cover type, but included within riverine), and seasonal wetlands.

The riverine/riparian complex community has strong associations with the riverine and riparian constituent habitat. Therefore, the discussion of this community appears below under these constituent habitats.

The riverine aquatic habitat nominally represents the entire stream ecosystem for aquatic species including the covered salmonids. Mapping establishes the area of patches of land-cover types. Because of the difficulty in mapping the narrow streamcourse itself, riverine/riparian land-cover type appears discontinuously, which inadequately represents the continuity of the stream environment. For this reason, riverine habitat is also represented by the linear measure of streams (see Section 3.3.1.2.5, *Mapping Streams*). These are shown on Figure 3-6 and listed in Table 3-2 and Table 3-3.

3.4.5.1 Land-cover Types

Initial land-cover mapping in 2002 identified creeks (riverine) separately from the valley foothill riparian woodland land-cover type. Subsequent mapping and compilation of land cover and other spatial data into GIS showed that the distinctions between riverine and riparian forest were difficult to discern from air photos. Much of the area mapped as forest was riparian vegetation that did not

meet the definition of the valley foothill riparian woodland CWHR. In the Valley, this was often due to the extensive disturbance in the Stream System where channelization, and braided channels made it difficult to identify the strictly riverine open water component and differentiate it from the disturbed, grazed, or shrubby riparian component. In the Foothills, the boundary between riparian and other woodland was often difficult to draw without reference to topography. Most deciduous trees appear as facultative riparian species in the largely intermittent streams in the Foothills.

The small patch size of these biological resources and linear nature of the streams led to spatial misregistration between the mapped stream line and the mapped land-cover types and the overlay of political boundaries needed to assess Plan effects (see Section 3.3.1.4, *Limitations of Data*). It was concluded that the mapping and resultant spatial analysis for the Plan would be more accurate if these biological resources were mapped as a complex and identified as constituent habitats.

3.4.5.2 Constituent Habitats

The key constituent habitats for the riverine/riparian complex are listed below.

- Riverine
- Riparian

The likely presence of these constituent habitats in an area is estimated by applying the presence factors shown in Table 3-12 to the land-cover types there. The riverine/riparian complex community is the primary association for riverine/riparian constituent habitats. However, other communities and land-cover types may contain riverine/riparian constituent habitats including, but not limited to, those displayed in Table 3-12. For example, urban riparian may contain riparian constituent habitat, even though it is not used in Table 3-12 to calculate presence of this constituent habitat. This is because urban riparian represents a very low proportion of the riparian constituent habitat.

3.4.5.2.1 Riverine

Riverine systems occurring in western Placer County include perennial, intermittent, and ephemeral streams. As the term implies, perennial streams sustain flows year-round. The larger streams in the Plan Area and vicinity such as the Bear River and American River are perennial today and always have been perennial. Intermittent streams receive some input from groundwater discharge in addition to precipitation runoff and seasonal flow. They typically do not flow in the late summer and fall. Some streams in the Plan Area were historically intermittent but have been changed to perennial because of inter-basin water transfers, urban runoff, treated effluent discharges, and inputs of water destined for downstream uses (e.g., Pleasant Grove Creek, Coon Creek) (see Section 3.2.8.1, *Water Deliveries and Diversions*, for discussion of water deliveries and diversions in the Plan Area). Ephemeral streams receive no input from groundwater and flow only during and following storm events in response to precipitation runoff. The flow regime in a stream profoundly affects its ecology, in particular its ability to support fish and other aquatic organisms.

3.4.5.2.2 Riparian

These ecosystems include widely distributed riparian habitats in western Placer County. Riparian constituent habitat includes the more narrow definition of the CWHR class valley foothill riparian woodland as stands of deciduous trees near perennial streams and the broader definition of riparian vegetation, which includes herbs, forbs, and shrubs occurring in the riparian corridor without a

woodland overstory. These ecosystems are dependent on surface and subsurface water sources (e.g., groundwater) in streams and floodplains. Riparian ecosystems are often characterized by highly variable successional stages of vegetation that are influenced by frequent disturbances due to flooding, droughts, and grazing.

Mature riparian habitat is often dominated by willows (*Salix* spp.), Fremont cottonwood (*Populus fremontii*), or white alder (*Alnus rhombifolia*). In drier settings, riparian habitat can be dominated by stands of valley oak. Interior live oak can also be an important associated species in some riparian ecosystems. Other associated species in mature riparian habitat include big-leaf maple (*Acer macrophyllum*) at higher elevations, incense-cedar (*Calocedrus decurrens*), black oak (*Quercus kelloggii*), or blue oak. Two or more age classes may be present in valley oak, Fremont cottonwood, or mixed riparian forests. Age classes and structural diversity are reduced in riparian forests that are heavily grazed by livestock, affected by development adjacent to the stream, or dominated by noxious weeds such as Himalayan blackberry, red sesbania, tree-of-heaven, or giant reed.

Early successional stages of riparian habitat are often dominated by sparse or dense stands of herbs and forbs such as willowherb (*Epilobium ciliatum* ssp. *ciliatum*), tall flatsedge (*Cyperus eragrostis*), torrent sedge (*Carex nudata*), horsetail (*Equisetum* spp.), and common rush. Common shrubs include mulefat (*Baccharis salicifolia*) and low-growing willows.

Species composition in a riparian corridor is determined largely by the depth of the summer water table and the frequency of flooding. On frequently flooded low terraces at or near the active channel, common riparian species in western Placer County include sandbar willow, water smartweed (*Persicaria amphibium*), willowherb, tall flatsedge, torrent sedge, horsetail, common rush, occasional white alder, and, at the lowest elevations, mulefat.

Higher floodplain surfaces and terraces may support more diverse riparian habitat. The tall, dense canopies of mature valley oak and Fremont cottonwood riparian forest in the Central Valley and Sierra Nevada foothills typically have a subcanopy tree layer of white alder, Oregon ash (*Fraxinus latifolia*), several species of willow, and California black walnut (*Juglans californica*). Occasionally, lianas of wild grape (*Vitis vinifera*) up to 50 feet high contribute further to the habitat values (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). White alder is a common sub-canopy component of mixed riparian forests of western Placer County, but at higher elevations, it frequently occurs in pure stands. Where interior live oaks are dominant, common understory species include poison-oak (*Toxicodendron diversilobum*), California buckeye (*Aesculus californica*), hoary coffeeberry (*Frangula californica* ssp. *tomentella*), blue elderberry (*Sambucus nigra* ssp. *caerulea*), and coyote brush (*Baccharis pilaris*). Two non-native cottonwood species, silver poplar (*Populus alba*) and Lombard poplar (*Populus nigra*), can be abundant in riparian habitats in urbanized stream reaches and near old town or mining sites.

Common shrubs associated with multi-layered riparian habitat include Himalayan blackberry as well as native species such as snowberry (*Symphoricarpos* spp.), wild rose (*Rosa* spp.), blue elderberry, poison-oak, spice bush (*Calycanthus occidentalis*), western ninebark (*Physocarpus capitatus*), California blackberry (*Rubus ursinus*), and shrubby willows.

Characteristic forbs and grasses include Douglas's mugwort (*Artemisia douglasiana*), Santa Barbara sedge (*Carex barbarae*), clustered field sedge (*Carex praegracilis*), blue wild rye, deer grass (*Muhlenbergia rigens*), common yarrow (*Achillea millefolium*), bracken fern (*Pteridium aquilinum*), and stinging nettle (*Urtica dioica*) as well as weedy non-native species such as common verbena (*Verbena lasiostachys*), velvet grass, Bermuda grass, and pennyroyal (*Mentha pulegium*). The

herbaceous layer of riparian habitat is often sparse due to a well-developed and sometimes diverse shrub layer, often containing quantities of downed wood and debris from previous flood events. In areas where the shrub layer has been removed or grazed, these ecosystems may have a grassy understory of both native and non-native grasses, sedges (*Carex* spp.), rushes (*Juncus* spp.), and forbs.

Riparian ecosystems are recognized throughout California as important natural communities because of their limited extent compared to historical distributions, their importance to dependent plant and wildlife species, and the threats facing remaining stands. Riparian habitat occur along rivers and creeks in the Central Valley and lower foothills of the Sierra Nevada, Cascades, Coast Ranges, and Transverse Ranges (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

In western Placer County, riparian habitat occurs on the American and Bear River corridors and along Raccoon Creek, lower Auburn Ravine, and lower Dry Creek (Figure 3-14). Significant stands are generally restricted to low-gradient depositional reaches with some floodplain development. Along most other creeks in western Placer County, this ecosystem occurs as narrow and generally discontinuous bands of trees, rarely occurs on intermittent streams, and never occurs on ephemeral streams that only flow during storm events. On high-energy, bedrock-constrained river systems, the riparian corridors are patchy and quite narrow, limited laterally by steep side slopes, and usually not more than one tree canopy wide. Willow scrub is generally persistent but in an early successional stage that is eventually over-topped by valley oak, cottonwood, or alder in mature riparian habitat (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

3.4.5.3 Historical Extent and Composition

Rivers and creeks are among the most altered ecosystems in the Sierra Nevada. There are more than 400 dams, and associated impoundments, that are 25 feet or more in height. Streamflow is diverted for water supply, and large amounts of hydraulic mining debris passed through these systems from 1850 until the early 1900s (Kattelmann 1996 in Jones & Stokes Associates 2004). All riverine systems within the Plan Area have been further altered by the creation of permanent or temporary barriers for road crossings, culverts, authorized and unauthorized water diversions, channelization, flood control projects, the loss of riparian vegetation, and increased rates of sedimentation. These impacts reduce habitat complexity and habitat quality, thereby affecting ecosystem characteristics such as pool/riffle relationships, the level of dissolved oxygen, and substrate composition.

Riparian habitat has been adversely affected by land development, water diversions, and grazing. Flood control activities, cultivated agriculture, aggregate mining, and urban development have all significantly reduced the extent of this land-cover type.

3.4.5.4 Common Wildlife Associations

3.4.5.4.1 Riverine

Invertebrates that might be found in the county's rivers and creeks include mayflies (Order: Ephemeroptera), alderflies, stoneflies (Order: Plecoptera), dragonflies (Order: Odonata), damselflies (Order: Odonata), water striders (Family: Gerridae), and caddisflies (Family: Trichoptera). These provide food for fish and other aquatic wildlife. Emerging aquatic insects are a major food source for many bird and bat species that forage over open waters.

Fish-eating birds, such as ospreys (*Pandion haliaetus*) and bald eagles (*Haliaeetus leucocephalus*), forage for fish near the surface of pools and shallow waters along the Bear River. Belted kingfishers (*Megaceryle alcyon*), double-crested cormorants (*Phalacrocorax auritus*), and common mergansers (*Mergus merganser*) also forage for fish in streams and reservoirs. Many amphibians and reptiles depend on riverine ecosystems; these include Sierra newt, California toad, foothill yellow-legged frog, mountain garter snake (*Thamnophis elegans elegans*), Sierra garter snake, and western pond turtle.

Characteristic mammals in riverine ecosystems include northern river otter (*Lontra canadensis*), American mink (*Neovison vison*), muskrat, and American beaver.

Riverine ecosystems in western Placer County support a diverse fish fauna despite their history of disturbance. Western Placer County fish assemblages are characterized below using the classification system of Moyle (2002) for Central Valley streams in the Sacramento–San Joaquin Province. Each assemblage of fish species is characteristic of Stream Systems that have distinct physical, chemical, and biological characteristics. This method of stream classification assumes some overlap of species will occur between assemblage categories.

Rainbow trout assemblage streams are low-order, cold, high-gradient, high-elevation streams. The current is swift and flow is permanent. Water temperature is usually much less than 70°F. Bottom substrates are dominated by cobble, boulder, and bedrock, and aquatic plants are sparse or absent. The dominant native fish are rainbow trout (*Oncorhynchus mykiss*), riffle sculpin (*Cottus gulosus*), Sacramento sucker (*Catostomus occidentalis*), speckled dace (*Rhinichthys osculus*), and California roach (*Hesperoleucus symmetricus*). In western Placer County, the upstream reaches and tributaries of the Bear River, North Fork American River, Auburn Ravine, Doty Ravine, and Upper Raccoon Creek support the rainbow trout assemblage.

California roach assemblage streams are small, warm tributaries of larger streams that usually support the pikeminnow-hardhead (*Mylopharodon conocephalus*)-sucker assemblage. California roach assemblage streams are usually intermittent in summer, with constant flow during winter and spring. Summer water temperatures in isolated pools may exceed 86°F. California roach is the main permanent-resident native fish in these streams. Other native species may include Sacramento sucker and Sacramento pikeminnow (*Ptychocheilus grandis*). The non-native green sunfish (*Lepomis cyanellus*) may displace roach in some areas. In western Placer County, streams of this type may include tributaries of the Bear River (upstream of Camp Far West Reservoir), Pleasant Grove Creek, Raccoon Creek, Doty Ravine, Auburn Ravine, Antelope Creek, Linda Creek, Secret Ravine, and Miners Ravine as well as intermittent reaches of Doty Ravine, Secret Ravine, and Miners Ravine. Although surveys to accurately characterize fisheries in the major basins and sub-basins in western Placer County have not been conducted, California roach are known to occur in Auburn Ravine and Raccoon Creek (Bailey 2003).

Pikeminnow-hardhead-sucker assemblage streams are low- to mid-elevation streams with deep rock pools and broad, shallow riffles. Water is usually clear, with high dissolved oxygen levels, low conductivity, and moderate summer water temperatures of 66°F to 72°F. Substrates may include bedrock, rock, cobble, sand, and clay. Sacramento pikeminnow and Sacramento sucker are generally the most abundant fishes, along with hardhead in cooler reaches. Other native fishes may include speckled dace, California roach, riffle sculpin, and rainbow trout; downstream of permanent barriers, anadromous species such as Central Valley steelhead, Central Valley fall-run Chinook salmon, and Pacific lamprey (*Entosphenus tridentata*) are also known to occur.

Fall-run Chinook salmon adults spawn in the fall, and juveniles leave the streams in the spring. Steelhead and rainbow trout may occupy the cool upper reaches year-round. Non-native species such as green sunfish, smallmouth (*Micropterus salmoides*) and largemouth bass, carp, and black bullhead (*Ameiurus melas*) may dominate the fish community, especially in the lower reaches near the Valley floor. In western Placer County, pikeminnow-hardhead-sucker assemblage streams include the lower reaches of the North Fork of the American River above Folsom Reservoir, the Bear River upstream and downstream of Camp Far West Reservoir, Raccoon Creek, Doty Ravine, Auburn Ravine, Antelope Creek, Secret Ravine, Miners Ravine, and Dry Creek. Markham Ravine, Pleasant Grove Creek, and Curry Creek may also support species of the pikeminnow-hardhead-sucker assemblage. Navicky (2008) found steelhead trout, Sacramento sucker, and pikeminnow to generally be the dominant species in Auburn Ravine. Sacramento sucker and pikeminnow were dominant species in Raccoon Creek, but very few steelhead trout were found (Navicky 2008). Nearly 10 percent of the total catch on Auburn Ravine was non-native during winter 2004 and spring 2005 sampling events (Navicky 2008). Raccoon Creek had a much larger proportion of non-native species; nearly 20 percent of the total catch was non-native in winter of 2004 and more than 30 percent was non-native during spring and summer sampling efforts in 2005 (Navicky 2008). This is most likely due to the higher temperatures and lower flows found in Raccoon Creek.

Deep-bodied fish assemblage streams are low-gradient warm waterways on the Valley floor. Native resident fishes include Sacramento pikeminnow, Sacramento sucker, and hitch (*Lavinia exilicauda*). Anadromous species, including fall-run Chinook salmon and steelhead, pass through these reaches to spawning areas upstream. Non-native species, including largemouth bass, white and black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), black bullhead, red shiner (*Cyprinella lutrensis*), threadfin shad (*Dorosoma petenense*), and carp, dominate the fish community. Streams of this type include the lower reaches of the Bear River upstream of the confluence with the Feather River, the Cross Canal, and the lower reaches of Dry Creek.

3.4.5.4.2 Riparian

Birds are found in particularly high diversity and numbers in riparian habitat of western Placer County. Characteristic breeding birds include belted kingfisher, downy woodpecker (*Picoides pubescens*), black phoebe (*Sayornis nigricans*), warbling vireo (*Vireo gilvus*), western scrub-jay (*Aphelocoma californica*), bushtit (*Psaltriparus minimus*), Bewick's wren (*Thryomanes bewickii*), house wren (*Troglodytes aedon*), American robin (*Turdus migratorius*), orange-crowned warbler (*Oreothlypis celata*), yellow-breasted chat (*Icteria virens*), black-headed grosbeak (*Pheucticus melanocephalus)*, lazuli bunting (*Passerina amoena*), spotted towhee (*Pipilo maculatus*), song sparrow (*Melospiza melodia*), house finch (*Haemorhous mexicanus*), and lesser goldfinch (*Spinus psaltria*). Riparian areas are also attractive to migratory species, including a variety of flycatchers, vireos, warblers, tanagers, and grosbeaks.

Most amphibians, reptiles, and mammals use riparian corridors for cover, shade, and as a source of water. Amphibians and reptiles in riparian habitat include Ensatina (*Ensatina eschscholtzii*), California slender salamander (*Batrachoseps attenuatus*), Pacific chorus frog, California toad (*Anaxyrus boreas halophilus*), western yellow-bellied racer, mountain garter snake, California whipsnake, Pacific gopher snake (*Pituophis catenifer catenifer*), Northern Pacific rattlesnake (*Crotalus oreganus oreganus*), Skilton's skink (*Plestiodon skiltonianus skiltonianus*), California alligator lizard (*Elgaria multicarinata multicarinata*), and northwestern fence lizard (*Sceloporus occidentalis occidentalis)*. Bats frequently forage for insects over riparian areas in river canyons, and many individuals may roost in riparian trees. Some bat species may also use abandoned mine shafts

and tunnels as roosts. Riparian habitat are especially important for migratory mule deer (Zeiner et al. 1990).

3.4.5.5 Covered Species Associations

Several Covered Species are associated with riverine habitats. Chinook salmon and Central Valley steelhead use 122 miles, or roughly 60 percent, of all major streams in western Placer County. They occur in the Bear River and the Raccoon Creek, Auburn Ravine, and Dry Creek Stream Systems (see Table 3-17 and Table 3-18 for summaries of salmonid habitat in the Plan Area).

Table 3-17. Salmonid Habitat in Western Placer County (stream miles)

Watershed	Stream	Valley	Foothills	NPCs	Western Placer Total
Spawning and Rearing Habitat					
1 Bear River	Bear River	6.48	0.72	-	7.2
2 Raccoon Creek	Raccoon Creek	5.25	9.41	-	14.66
	Doty Ravine	3.28	10.32	-	13.60
	Sailors Ravine	-	0.29	-	0.29
	Raccoon Creek Total	8.53	20.02		28.55
4 Auburn Ravine	Auburn Ravine	0.53	8.82	0.31	9.66
6 Dry Creek	Antelope Creek	-	2.13	7.67	9.80
	Cirby Creek	-	-	3.66	3.66
	Clover Valley Creek	-	1.08	5.94	7.02
	Dry Creek	-	-	2.53	2.53
	Linda Creek	-	3.75	3.04	6.79
	Miners Ravine	-	12.18	3.47	15.65
	Secret Ravine	-	5.06	6.78	11.84
	Dry Creek Total		24.20	33.09	57.29
Spawning Total		15.54	53.76	33.40	102.70
Migration and Rearing Habitat					
2 Raccoon Creek	Raccoon Creek	6.48	-	-	6.48
4 Auburn Ravine	Auburn Ravine	13.33	-	-	13.33
6 Dry Creek	Dry Creek	4.68	-	1.38	6.06
Migration Total		*24.49*	-	*1.38*	*25.87*
All Habitat Total		**40.03**	**53.76**	**34.78**	**128.57**

Source: MIG|TRA (10/12/2015)
NPCs = non-participating cities

Table 3-18. Salmonid Stream Habitat Characteristics in Western Placer County

Stream Name	Habitat Types	Potential to Support Population	Habitat Conditions	Occurrence/Survey Data
Bear River				
Bear River	Spawning and Migration	Low	Anadromous fish have access to the Bear River from its confluence with the Feather River to approximately 15 miles upstream of the confluence at the South Sutter Water District Diversion Dam. Habitat for Chinook salmon and steelhead is limited in Bear River by inadequate streamflow and the high incidence of fine sediment. Inadequate streamflow in the Bear River prevents the establishment of a self-sustaining steelhead population. The lower Bear River continues to support remnant and/or "stray" wild and/or hatchery sustained salmon. During heavy rain events, flow spills from Camp Far West Reservoir and Chinook salmon and steelhead may migrate and spawn in the lower Bear River. Steelhead that spawn during high-flow years likely originated from the Feather River Fish Hatchery. The lower reach of the Bear River is incised and narrow and will likely require physical remediation to restore flow and eradicate invasive plant species. Downstream gravel recruitment is also limited and would have to be actively supplemented to provide suitable habitat for anadromous fish. In addition, the New Camp Far West Reservoir is shallow and warm and may not provide releases of water temperatures suitable for salmonids downstream.	Salmonids continue to be found in the Bear River below Camp Far West Dam.

Stream Name	Habitat Types	Potential to Support Population	Habitat Conditions	Occurrence/Survey Data
Raccoon Creek				
Raccoon Creek	Spawning, Rearing, and Migration	Moderate to High	Raccoon Creek appears to contain good migration corridors for adult salmonids, as well as patchy spawning habitat and good juvenile rearing habitat in the lower reaches. It also contains good spawning habitat and juvenile rearing habitat in the upper reach from McCourtney Road to the downstream end of the canyon section below Garden Bar Road. The upper reach of Raccoon Creek is used to convey supplemental irrigation water imported from other watersheds, resulting in artificially elevated flow patterns and volumes from April through October. Without these supplemental irrigation flows, it is highly unlikely that anadromous fish stocks could be maintained in this watershed on a consistent basis. Data associated with various fish sampling projects indicate that winter and spring water temperatures in Raccoon Creek upstream of Gladding Road are suitable for anadromous fish spawning and rearing on an annual basis. Raccoon Creek downstream of Gladding Road is nearly all sand bottomed with a few heavily sedimented riffles of gravel/cobble. This downstream area is likely not suitable for anadromous fish rearing, except during juvenile emigration in the winter/spring period. In addition, the middle reach is dominated by sandy and silty substrates, which are not suitable for anadromous fish spawning or rearing. Direct effects from cattle are also common throughout the drainage.	2012: Chinook salmon found at Hidden Falls Park on new gravels placed as part of the new bridge over Raccoon Creek. 2010: Several spawning salmon were observed near Gladding Road in Raccoon Creek. 2005: 12 sexually immature steelhead and 25 Chinook were captured in Raccoon Creek. 2004: Three adult Chinook and one sexually immature steelhead were observed spawning in Raccoon Creek. Mid-1990s: Adult fall-run Chinook salmon occasionally observed near Garden Bar Road. 1965 and 1983: Juvenile Chinook salmon captured in Raccoon Creek.

Stream Name	Habitat Types	Potential to Support Population	Habitat Conditions	Occurrence/Survey Data
Doty Ravine	Spawning, Rearing and Migration	High	Doty Ravine contains good migration corridors and juvenile rearing habitat. However, the quality of migration habitat has been reduced by barriers to upstream passage of adult and juveniles salmonids. Lower reaches contain primarily small-sized sediments (sand and gravel) with occasional small patches of larger material. Spawning gravel is larger and more abundant in upstream reaches. Woody debris, undercut banks and complex riparian vegetation are abundant throughout. Direct effects from cattle are common. Data associated with fish sampling projects indicate that winter and spring water temperatures in much of Doty Ravine are suitable for anadromous fish spawning and juvenile rearing. Visual observations show that there is excessive sediment in portions of the channel.	Mid-1980s: Fall-run and spring-run Chinook were salmon were stocked in Doty Ravine three times in the mid-1980s. 1961–1968: Runs of Chinook salmon observed every fall and a couple of steelhead observed in the summertime.

Stream Name	Habitat Types	Potential to Support Population	Habitat Conditions	Occurrence/Survey Data
Auburn Ravine				
Auburn Ravine	Spawning and Rearing (upper); Rearing and Migration (lower)	Moderate to High	Auburn Ravine contains a diversity of aquatic habitats, including shallow, fast-water riffles, glides, runs and pools, and riparian. Portions of the channel contain high sediment loads and sediment transport and inputs are likely limiting hatching and emergence success and overall aquatic habitat quality. The area of Auburn Ravine upstream of the Nevada Irrigation District Auburn #1 Diversion Dam is excellent habitat for anadromous fish other than any effects associated with low fall flows. The general quality of riparian habitat and suitable substrate diminishes downstream of the City of Lincoln. Suitable anadromous fish rearing habitat probably terminates in the area between the Joiner Parkway Bridge and Nelson Lane. The areas downstream of the Placer/Sutter County line are generally considered migration corridors for anadromous fish, but are not suitable for spawning or rearing. Data associated with various fish sampling projects indicate that winter and spring water temperatures are suitable for successful anadromous fish spawning and juvenile rearing; however, discharge from wastewater treatment plants and a lack of riparian buffer in the downstream reaches of Auburn Ravine elevates water temperature.	2016: 190 fall-run Chinook salmon observed in Auburn Ravine; Two steelhead were observed in Auburn Ravine. 2012: Nearly 300 Chinook salmon observed in Auburn Ravine with the modification of the Nevada Irrigation District Gaging Station. 2005: 253 steelhead/rainbow trout and one juvenile spring-run Chinook salmon captured in Auburn Ravine. 2004: 309 steelhead/rainbow trout captured in Auburn Ravine. 1998–1999: Juvenile steelhead collected in the upper reaches of Auburn Ravine. 1985: 12 adult Chinook salmon were observed actively spawning in Auburn Ravine. 1957: Chinook salmon captured in Auburn Ravine. 1917: Several Chinook salmon captured in Auburn Ravine.

Stream Name	Habitat Types	Potential to Support Population	Habitat Conditions	Occurrence/Survey Data
Dry Creek				
Antelope Creek	Spawning and Rearing	Low	Antelope Creek provides minimal habitat for Chinook salmon and steelhead. Habitat in Antelope Creek is degraded, and rock and beaver dams act as barriers to fish movement. High sediment loads and a lack of pools appear to be major problems. In addition, water quality conditions are a concern, particularly the levels of nutrients in the water. Migration habitat quality along Antelope Creek has been reduced by barriers to passage of adult and juvenile Chinook salmon and steelhead. Rock and beaver dams act as barriers to fish movement. In addition, a waterfall and dam/wetlands complex and an asphalt-bottomed culvert under Sunset Boulevard in Rocklin could also be a barrier to migration. Antelope Creek has a mostly sandy bottom. Antelope Creek highly degraded salmonid habitat and is unlikely to support substantial spawning. Limited gravel areas are present in Antelope Creek that may be suitable for spawning. The stream channel has the potential to have good habitat with some restoration. Water temperatures in Antelope Creek are suitable for fall-run Chinook salmon spawning and rearing; however, warm summer water temperatures may limit suitable habitat for salmon rearing.	2011: Four salmon observed in Antelope Creek by the archery range in Roseville. 2003: 44 live salmon, 7 carcasses, and 9 redds observed in Antelope Creek during annual one-day salmon counts coordinated by the Dry Creek Conservancy. 1985: A salmon carcass was observed during CDFW surveys on Antelope Creek. 1964: Spawning fall-run Chinook observed during a CDFW survey in Antelope Creek. The estimated run was 10 Chinook salmon.
Cirby Creek	Spawning	Low	Cirby Creek is heavily urbanized and likely no longer supports salmonids. Sewer line near the confluence with Dry Creek creates a low-flow barrier to migration.	N/A
Clover Valley Creek	Spawning and Rearing (lower)	Low	Habitat is degraded. High sediment loads and a lack of pools appear to be major problems. In addition, water quality conditions are a concern, particularly the levels of nutrients in the water. The stream channel has the potential to have good habitat with some restoration. Rock and beaver dams act as barriers to fish movement.	1964: Spawning and rearing of fall-run Chinook observed in the lower Clover Valley Creek.

Stream Name	Habitat Types	Potential to Support Population	Habitat Conditions	Occurrence/Survey Data
Dry Creek	Migration	Moderate	Dry Creek is heavily influenced by urban development and runoff. The mainstem of Dry Creek is not suitable spawning or rearing habitat for anadromous fish, but is considered a migration corridor to the spawning and rearing habitat in upstream tributaries, despite degradation of habitat and lack of habitat complexity in channel. Riparian cover in upstream portions of the creek are intact. Throughout the creek, reaches have been straightened, floodplain areas reduced, reaches dredged, and riparian vegetation removed. This has resulted in eroding banks, sediment deposition, lack of cover, lack of pools and riffles, lack of sediment deposition, and barrier to anadromous fish movement. High sediment loads appear to be a major problem for hatching and emergence success and juvenile rearing capability in this creek. Sewer and water line crossings create low-flow migration barriers. Beaver dams act as potential barriers to fish movement. Hayder Dam and rubble dam just downstream of Watt Avenue create a partial barrier to anadromous fish migration.	1964: Chinook salmon population was over 1,000 fish; however, most were found in Secret and Miners Ravines. 2003: Known to support a few hundred fish; however, most occur in Secret and Miners Ravines.
Linda Creek	Spawning and Rearing	Low	Most of the habitat is degraded with steep eroding banks and high summer water temperatures. Two sites may be suitable for spawning and rearing.	2010: Salmon observed in Linda Creek above the footbridge. 1999–2004: A total of 251 live salmon and 226 salmon carcasses observed in Linda Creek.

Stream Name	Habitat Types	Potential to Support Population	Habitat Conditions	Occurrence/Survey Data
Miners Ravine	Spawning and Rearing	Low to Moderate	Miners Ravine supports Chinook salmon and steelhead; however, many reaches are heavily degraded. Miners Ravine would likely support more steelhead and Chinook salmon if fish passage were available in the upstream spawning areas on an annual basis. Limited spawning sites have been identified in Miners Ravine. Fall and winter temperatures are sufficient in Miners Ravine to support adult spawning and rearing of juvenile fall-run Chinook salmon. Data show that water temperatures are sufficient for summer rearing of juvenile steelhead. Throughout the creek, reaches have been straightened, floodplain areas reduced, reaches dredged, and riparian vegetation removed. This has resulted in eroding banks, sediment deposition, lack of cover, lack of pools and riffles, lack or sediment deposition, and barrier to anadromous fish movement. High sediment loads appear to be a major problem for hatching and emergence success and juvenile rearing capability in this creek. In addition, water quality may be limiting fish species distribution and composition in the creek. Lastly, placer mining accelerated stream incision down to the bedrock in the upper reaches of Miners Ravine.	2012–2010: Salmon observed during spawning surveys in Miners Ravine. 1980–1990: As many as 100,000 juvenile Chinook salmon from the Feather River hatchery were stocked in Miners Ravine. 1950s: Up to 100 adult Chinook salmon were estimated to occur in Miners Ravine.

Stream Name	Habitat Types	Potential to Support Population	Habitat Conditions	Occurrence/Survey Data
Secret Ravine	Spawning and Rearing	High	Habitat is complex in Secret Ravine with an abundance of pool habitat, large woody debris, and suitable spawning habitat. Secret Ravine supports the highest quality fisheries habitat in the Dry Creek watershed. Water temperature data from Secret Ravine shows that only the upper portion of the watershed may have suitable conditions for summer rearing of steelhead. However, water temperatures appear to be suitable for Chinook salmon spawning and rearing throughout Secret Ravine. Beaver dams act as potential barriers to fish movement. Several utility pipeline crossings also create obstacles to migration.	2010–2012: Salmon were observed during spawning surveys in Secret Ravine. 2005: 95 steelhead/rainbow trout were captured in Secret Ravine. 2004: CDFW noted 41 steelhead/rainbow trout in Secret Ravine. 1999–2000: Juvenile steelhead and Chinook salmon collected in rotary screw traps located immediately downstream of the confluence of Secret and Miners Ravines. 1990s: Estimates of fall-run Chinook salmon within Secret Ravine averaged about 160 fish per year.

Sources: Geographic information system shapefile data from National Marine Fisheries Service 2006, CCC_Steelhead_Distribution_06_2005; National Marine Fisheries Service 2014; Bailey 2003, 2005; Placer County 2013; California Department of Fish and Wildlife 2016; Jones & Stokes Associates 2005; ECORP Consulting 2003

CDFW = California Department of Fish and Wildlife

N/A = not applicable

- Foothill yellow-legged frog occurs in moving but not swiftly flowing rocky streams and associated riparian habitats above an elevation of 500 feet in the Foothills (Hooper pers. comm.). This species is almost always found within a few feet of water.
- Giant garter snakes are found in slow-moving waterways, including riverine habitats, in the Valley below an elevation of 100 feet. Giant garter snake is generally absent from larger rivers and riparian areas lacking suitable basking sites or prey.
- Western pond turtle and California red-legged frog use riverine and riparian areas as aquatic habitat. Western pond turtle uses aquatic riverine habitat for foraging, thermoregulation, and avoidance of predators and may bask on logs or other substrates in riparian habitat. California red-legged frog uses riverine aquatic habitat for breeding and foraging, particularly sites that are associated with riparian vegetation.
- Swainson's hawk regularly nests in riparian habitat in the Valley.
- Elderberry bushes, the host plant for valley elderberry longhorn beetle, are a component of riparian habitat in the Valley and in the Foothills below an elevation of 650 feet.

3.4.5.6 Ecosystem Function

Riverine and riparian ecosystems occupy a relatively small proportion of the total landscape but are disproportionately important for the ecological processes of entire watersheds. Myriad invertebrate and vertebrate species rely on these ecosystems in western Placer County.

Riparian areas perform vital ecological functions, such as dissipating stream energy associated with high water, reducing erosion, filtering sediment, capturing bedload,[7] aiding floodplain development, improving floodwater retention and groundwater recharge, and stabilizing streambanks (Gregory et al. 1991 in Jones & Stokes Associates 2004). Many species depend on riverine/riparian habitats. Research has repeatedly demonstrated a link between the condition of riparian habitat and fish habitat quality, and riparian ecosystems play a crucial role in maintaining fish habitat. Streamside riparian habitat, with cover provided by overhanging vegetation, benefits fish by providing shade that cools the water as well as in-stream woody debris and root masses for escape cover and breeding sites. Leaf drop is also an important nutrient input to streams (Moyle et al. 1996 in Jones & Stokes Associates 2004). Riparian habitat provides food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for a high diversity of wildlife species.

3.4.5.7 Natural Disturbance

Erosion and sedimentation processes are forms of natural and artificial disturbance that affect riverine and riparian areas. Flood and drought cycles of natural streams tend to result in a mosaic of structure and composition in riparian plant communities. This mosaic may be lost in altered flow regimes downstream of reservoirs.

Riparian communities are shaped by their proximity to water and periodic flooding, which maintains the structure and composition of this land-cover type. Wet-season flooding replenishes alluvial soils that are deficient in minerals and organic matter. Flooding also subjects riparian

[7] Bedload is solid matter transported by a stream. Bedload rolls or slides slowly along the floor of a stream. Bedload includes sand, gravel, and boulders among other debris.

habitat to frequent disturbance that benefits regeneration of certain species, including California sycamore, white alder, and black willow. Seeds for many riparian species are dispersed during flood events, and regeneration from seed appears to occur in pulses correlated with large flood events (Shanfield 1984). Additionally, trees that are damaged by flooding can resprout from the roots and trunks (Shanfield 1984). The flowing nature of streams encourages regular mixing as water flows over rocks, tree stumps, and changes gradient. Depending on other environmental influences, including temperature and dissolved oxygen levels, mixing may also trigger the hatching of larvae that will become food for fish, birds, and bats.

3.4.5.8 Threats

3.4.5.8.1 Riverine

The degradation and loss of riverine ecosystems are the primary cause for the decline of many species of aquatic invertebrates, fish, and amphibians in the Sierra Nevada and Central Valley (Moyle 1996 in Jones & Stokes Associates 2004). Factors that contribute to the deterioration of riverine ecosystems include changes in the timing and volume of streamflows (e.g., the effects of reservoir operations, surface water diversions, the construction of levees and other flood control facilities, groundwater pumping, urban and agricultural runoff), dams that impede movement of fish, changes in water quality, reductions in riparian and stream channel structural complexity (e.g., the loss of riparian trees and stream channelization), siltation, and invasions of non-native species (Meehan 1991 in Jones & Stokes Associates 2004). The loss of riparian vegetation results in decreased shading, increased water temperatures, reduced cover, and decreased input of nutrients. Trash and other pollutants that are washed into streams may degrade water quality to the point that aquatic life cannot persist. Aquatic invertebrates, which are often sensitive to water quality, may die off, thereby disrupting the food chain.

High flows cause erosion, unless channels have been armored. Typical flood control entails channel modifications, such as rock riprap and concrete linings, that result in a decrease of riparian vegetation and aquatic habitat for fish and other species. This practice has not been prevalent in western Placer County, but the application of channel modifications tends to increase as population growth encroaches on Stream Systems and increases the property value subject to loss during flood events. Pollution sources along the channels can degrade water quality within riverine systems.

Permanent dams and seasonal irrigation dams (e.g., flashboards) alter flow and sediment transport regimes, adversely affecting the amount of habitat for some species (e.g., spawning gravel) and habitat quality (e.g., water temperature and fine sediment loading). Permanent dams block upstream and downstream movement and migration to spawning and rearing habitat. Seasonal irrigation dams may or may not block upstream and downstream movement and migration, depending on whether the timing of the placement or removal of the impoundment feature is linked to the migratory behavior of a particular species.

The in-stream reservoirs commonly found in western Placer County (including smaller in-stream ponds) can flood stream reaches, changing environmental conditions necessary to support stream-dependent native species. In addition to loss of habitat, fish populations may become isolated, fragmenting populations and adversely affecting their genetic integrity. Reservoirs may also increase human use, affecting populations of native species within reservoirs and in adjacent areas. Dams on major rivers have blocked access by spring-run Chinook salmon to more than 95 percent of

historic spawning and holding habitat and greatly reduced access to spawning habitat of other runs of salmon, steelhead, and Pacific lamprey (Moyle et al. 1996 in Jones & Stokes Associates 2004).

Reservoirs are also sediment sinks, obstructing the natural sediment transport of streams and transport of large woody material. Through natural processes, streams erode sediment from streambanks and move it downstream. In an unimpeded setting, sediment carried from the upper watershed is deposited along the length of the stream. When a dam is built across a stream, all but the finest sediment transported from the upper watershed drops out of suspension in the reservoir where velocities are too low to maintain the sediment load. The result is that downstream reaches are sediment starved, and no new sediment is available to replace eroded sediment downstream of the dam. This triggers down-cutting and deepening of the stream channel and also results in a reduction in gravels suitable for steelhead and salmon spawning downstream of reservoirs. In addition, large reservoirs fill with and store large amounts of turbid storm runoff. Settling of the finer clay and silt particles may take months, resulting in persistent releases of turbid water in winter and early spring. The slowly settling materials may also result in much higher turbidities near the bottom outlet valve than in the surface waters. Although the natural streams upstream of reservoirs rapidly clear between storms, the streams downstream of reservoirs may be persistently turbid and interfere with feeding by steelhead and salmon in winter and spring, reducing their growth and potential survival once they reach the ocean. Slow release of fine sediments may result in silty substrate below the reservoirs, reducing survival of eggs in spawning gravels and affecting the abundance of insects.

Reservoirs also disrupt the natural flow cycle of streams by releasing water during the summer and fall to augment dry-season base flows. Because the reservoirs are deep and store cool winter runoff, the water released out of the bottom of the reservoir can be much cooler than the surface water and also cooler than the stream upstream of the reservoir in late spring and summer.

Rivers and streams altered by human disturbance tend to be more likely to become dominated by non-native fish species (Baltz and Moyle 1993 in Jones & Stokes Associates 2004). Reservoirs provide environmental conditions that generally favor non-native species. Established non-native species can then invade stream reaches both upstream and downstream of the reservoir.

Non-native and invasive species are often introduced to the vast network of ponds, reservoirs, and associated canals throughout western Placer County. These include many aquatic invertebrates (e.g., insects, snails, clams, and crayfish), non-native fish species, and bullfrogs. During times of high rainfall or streamflow, non-native species can be flushed from ponds and reservoirs into stream and river systems where they colonize and compete with or prey upon native species. Bullfrogs and several species of bass are known to prey upon the eggs and tadpoles of foothill yellow-legged frog, California red-legged frog, and western pond turtle as well as western pond turtle hatchlings or juveniles (Moyle 1973; Holland 1991 in Jones & Stokes Associates 2004). Hatchlings of wood ducks (*Aix sponsa*), mallards, and Canada geese often fall prey to largemouth bass.

3.4.5.8.2 Riparian

Seedling establishment and growth in riparian systems are heavily dependent on access to surface water or shallow groundwater during the majority of the year (Sacchi and Price 1992). As such, water operations and land alterations that result in reduced stream baseflows and/or increased depth to the water table will have a significant negative effect on this land-cover type.

Non-native animals that may occur in these woodlands include European starling, wild turkey, Virginia opossum (*Didelphis virginiana*), and wild pig. Livestock operations attract brown-headed cowbirds (*Molothrus ater*), a native North American species that expanded its range in California in the early 1900s. Brown-headed cowbirds parasitize the nests of other native songbirds and reduce their reproductive success (Grinnell and Miller 1944; Beedy and Granholm 1985; Gaines 1992 in Jones & Stokes Associates 2004). In riparian habitat of western Placer County, brown-headed cowbirds are most common in disturbed areas and in early successional stands, especially where livestock are present within about 4 miles of breeding areas (Rothstein et al. 1984 in Jones & Stokes Associates 2004).

Livestock grazing can substantially degrade riparian habitat when cattle and other livestock have unrestricted access to Stream Systems and stocking rates are high. Riparian systems that have been disturbed by historical or current grazing also have a significantly higher proportion of noxious weeds in the understory. Himalayan blackberry, in particular, forms a dense blanket that can dominate many miles of a stream and river corridor, crowding out native vegetation and reducing its diversity and wildlife habitat values.

In addition to Himalayan blackberry, which is a dominant species in many riparian areas, other noxious weeds and non-native plants in riparian habitat in western Placer County include black locust (*Robinia pseudoacacia*), tree-of-heaven, periwinkle (*Vinca major*), English ivy (*Hedera helix)*, poison hemlock, bull thistle, red sesbania, pampas grass, edible fig (*Ficus carica*), giant reed, spotted knapweed, Canada thistle (*Cirsium arvense*), wild fennel, velvet grass, and purple loosestrife.

3.4.6 Oak Woodland

The oak woodland community occurs mainly in the Foothills and comprises a diversity of dominant tree species, which are represented by five woodland land-cover types. Two non-woodland land-cover types that have minor extent and are associated with woodland geographically are mapped with the oak woodland community. Because of its conservation importance, valley oak woodland is treated as a separate community (Figure 3-15 and Table 3-12). These land-cover types are as follows:

- Blue Oak Woodland
- Interior Live Oak Woodland
- Mixed Oak Woodland
- Oak-foothill Pine Woodland
- Oak Savanna
- Foothill Chaparral
- Rock Outcrop

The main sources of information about Placer County's oak woodlands are the *Placer County Natural Resources Report* (Jones & Stokes Associates 2004), *Placer County's Oak Woodland Management Plan* (Placer County 2003), and a series of reports by Richard Harris, Ph.D.

3.4.6.1 Land-cover Types

3.4.6.1.1 Blue Oak Woodland

Oak woodlands dominated by blue oak were mapped as blue oak woodland when they had greater than 30 percent canopy-cover, were not associated with perennial streams, had less than 10 percent canopy cover of foothill pine (*Pinus sabiniana*), and could be distinguished by aerial photograph interpretation or field assessments. Additional oak woodlands dominated by blue oak occur in western Placer County and were mapped as oak woodland savanna when there was less than 30 percent canopy cover, as riparian when they were associated with perennial streams, as oak foothill pine woodland when foothill pine exceeded 10 percent of the total canopy cover, and as mixed oak woodland when the dominant species could not be distinguished on the basis of aerial photograph interpretation or field assessments.

In blue oak woodlands, blue oak generally dominates the tree layer, often in association with widely scattered emergent foothill pines. On some soils, blue oak and interior live oak occurs as co-dominants. The shrub layer in blue oak woodland is generally sparse, except for scattered poison-oak, hoary coffeeberry, buckbrush (*Ceanothus cuneatus*), California buckeye, and whiteleaf manzanita (*Arctostaphylos viscida*) that generally occur only on rock outcrops or poor soils where trees are often very small. Dominant species in the understory include non-native grasses such as wild oat, soft chess, ripgut brome, foxtail barley, hedgehog dogtail, and rattail fescue (*Festuca myuros*), and forbs such as rose clover, hedge parsley (*Torilis arvensis*), and hairy vetch (*Vicia villosa*). Common noxious weeds include yellow star-thistle, Italian thistle, and medusa-head as well as many non-native annual grasses. Characteristic native species include California poppy, brodiaea, fiddlenecks, popcornflower, winecup clarkia, soap plant (*Chlorogalum pomeridianum*), Ithuriel's spear, and goldfields. The understory of blue oak woodlands in western Placer County can support a wide variety of colorful native perennial and annual wildflowers.

Blue oak woodland is the dominant interior foothill woodland, forming an almost continuous belt around the Central Valley (Holland 1986; Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). CDFW considers blue oak woodland a sensitive biotic community (California Department of Fish and Game 2010). Blue oak woodland dominates the lower elevations of western Placer County. In Plan Area A, it occurs at elevations of 90 to 1,600 feet. Above elevations of approximately 1,500 feet in Placer County, blue oak woodland occurs mainly on gently sloping, well-drained, nutrient-poor dry sites where trees grow slowly. On nutrient-poor soils, blue oaks of 8 inches in diameter may be up to 100 years old (McCreary pers. comm. in Jones & Stokes Associates 2004). Blue oak woodland intergrades with annual grassland at lower elevations and with oak-foothill pine woodland, foothill chaparral, or ponderosa pine forest at higher elevations.

3.4.6.1.2 Interior Live Oak Woodland

Oak woodlands dominated by interior live oak were mapped as interior live oak woodland when they had greater than 30 percent canopy cover, were not associated with perennial streams, had less than 10 percent canopy cover of foothill pine, and could be distinguished by aerial photograph interpretation or field assessments.

Dense shade and a thick, persistent layer of leaf litter directly under the oak canopy typically precludes development of an herbaceous layer. Few weedy annual grasses are present, and the shrub layer is often sparse or absent. Where light permits development of an herbaceous layer,

dominant species in the understory of interior live oak woodland include non-native species that are somewhat shade tolerant, such as hedgehog dogtail, hedge parsley, chickweed (*Cerastium* spp.), and the noxious weed Italian thistle. Common native species include blue wild rye, miner's lettuce (*Claytonia perfoliata*), foothill sanicle (*Sanicula crassicaulis*), hairy wood rush (*Luzula comosa*), and western buttercup (*Ranunculus occidentalis*). At woodland edges or in canopy openings, such as rock outcrops, common shrubs include hoary coffeeberry, whiteleaf manzanita, poison-oak, toyon (*Heteromeles arbutifolia*), and pink honeysuckle (*Lonicera hispidula*). In these canopy openings, common non-native herbaceous associates include slender wild oat, yellow star-thistle, and ripgut brome, in addition to those mentioned above. Native forbs and bunchgrasses are best represented on poor, rocky soils and include white globe lily (*Calochortus albus*), twining snakelily (*Dichelostemma volubile*), brodiaeas, many-flowered brodiaea (*Dichelostemma multiflorum*), soap plant, California melic, one-sided bluegrass (*Poa secunda*), purple needlegrass, common madia, and goldback fern (*Pentagramma triangularis*).

Interior live oak woodland is widespread throughout the foothill region surrounding the Central Valley, from Shasta County south to the Kern River (Holland 1986 in Jones & Stokes Associates 2004). However, interior live oak woodland has a restricted distribution in western Placer County, occurring at elevations of about 300 to 600 feet. Interior live oak woodland typically occurs on north-facing slopes and in drainages and stream canyons. Steep terrain and limited forage often reduces the potential for grazing in live oak woodland. In the Granite Bay and Folsom Lake area, interior live oaks are common on flat terrain. At elevations above approximately 1,500 feet in Placer County, they occur in a wider variety of settings, from steep, rocky canyon slopes to gentle slopes or ridges on nutrient-poor soils. The vegetation type is considered to be resilient to wildfire because of its ability to stump-sprout after fire. Live oak will often replace blue oak after catastrophic fire because it is a more successful sprouter (Griffin 1977 in Jones & Stokes Associates 2004), and interior live oak woodland is typically interspersed with blue oak woodland.

3.4.6.1.3 Mixed Oak Woodland

Jones & Stokes Associates mapped a large proportion of Plan Area A as foothill hardwood woodland (in Jones & Stokes Associates 2004, Figures XI-1 to XI-39) and mixed oak woodland (in Jones & Stokes Associates 2004, Table 5 and page 55). In this type, canopy cover exceeded 30 percent, there was less than 10 percent canopy cover of foothill pine, and the woodlands were not associated with perennial streams. There was no single clearly dominant oak species that could be discerned through aerial photograph interpretation. To evaluate the composition of this vegetation type, Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) land-cover data for Placer County were overlain on polygons classified as foothill hardwood woodland/mixed oak woodland. Results indicated that 64 percent of the foothill hardwood woodland was classified by CALVEG as blue oak woodland. Another 26 percent was classified as non-forested (e.g., open water, residential development). On the basis of this analysis and data (as presented in Jones & Stokes Associates 2004), it was concluded that the principal oak species present in mixed oak woodland is blue oak. In mixed oak woodland, blue oak occurs in association with a variety of other trees, including interior live oak, canyon live oak (*Quercus chrysolepis*), Pacific madrone (*Arbutus menziesii*), tanoak (*Notholithocarpus densiflorus*), big-leaf maple and foothill pine.

Mixed oak woodland occurs throughout the foothills of the Sierra Nevada and Coast Ranges and is widespread in western Placer County, occurring at elevations of about 70 to 1,600 feet.

3.4.6.1.4 Oak-Foothill Pine Woodland

Oak-foothill pine woodland is distinguished from other oak woodland types by having a component of foothill pine that exceeds 10 percent of the total canopy cover (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

On gentle, grassy slopes at lower elevations in the county, oak-foothill pine woodlands occur as open park-like stands that are usually dominated by scattered blue oak, with foothill pine occurring sparsely on the more shallow and rocky soils (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). At higher elevations, interior live oak replaces blue oak, especially on steep, rocky soils on north-facing slopes. At these higher elevations, and in river canyons, foothill pine becomes more abundant.

Oak-foothill pine woodland usually has an understory of shrubs and an herbaceous layer dominated by non-native annual grasses. Where the woodland is a dense mix of foothill pine, interior live oak, blue oak, and black oak, the shrub layer is more developed and the herbaceous layer sparser. In western Placer County, common shrubs in such habitats include whiteleaf manzanita, buckbrush, deer brush (*Ceanothus integerrimus*), poison-oak, hoary coffeeberry, bush penstemon (*Keckiella* spp.), silver bush lupine (*Lupinus albifrons*), pink honeysuckle, chaparral honeysuckle (*Lonicera interrupta*), California buckeye, and western redbud (*Cercis occidentalis*). Native perennial bunchgrasses such as California melic, one-sided bluegrass, blue wild rye, and purple needlegrass are usually present in canopy openings. Shade-tolerant forbs and grasses are often sparse in the shade of the oaks; these species include miner's lettuce, western buttercup, foothill sanicle, goldback fern, and non-native hedgehog dogtail and hedge parsley. Native forbs are usually sparse and best represented on rock outcrops. The shrub and herbaceous layers of open oak-foothill pine woodland at low elevations in western Placer County are characterized by foothill chaparral species, including shrubby California buckeye, whiteleaf manzanita, buckbrush, toyon, hoary coffeeberry, and poison-oak. Dominant species in the herbaceous layer include non-native wild oat, slender wild oat, ripgut brome, and rose clover. Widely scattered native forbs include brodiaeas, Ithuriel's spear, fiddlenecks, and California poppy. Noxious weeds are most common along road edges and other disturbed or ruderal areas. The most frequent noxious weed and invasive non-native species include yellow star-thistle, Italian thistle, medusa-head, spring vetch (*Vicia sativa*), black mustard (*Brassica nigra*), and Klamath weed (*Hypericum perforatum*).

In California, oak-foothill pine woodland forms a nearly continuous ring around the Central Valley. It is also found in the Pit River drainage of the Cascade Range, in the foothills of the Klamath Range, widely scattered on the east slopes of the Coast Ranges, and in central San Bernardino County (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). In Plan Area A, oak-foothill pine woodland occurs at elevations of about 190 to 1,600 feet. At the lowest elevations, oak-foothill pine woodland intergrades with annual grassland and oak woodland savanna. At mid- to high elevations, it intergrades with blue oak woodland. At higher elevations, oak-foothill pine woodland merges with foothill chaparral or ponderosa pine forest.

3.4.6.1.5 Oak Savanna

Oak woodlands with between 5 and 30 percent canopy cover were mapped as oak savanna. There are two types of oak savanna in western Placer County. On upland hillsides and broad ridges, the dominant oak species is blue oak. Associated trees and shrubs include California buckeye, toyon, and poison oak. This blue oak–dominated savanna commonly occurs within a diverse mosaic composed

of other oak woodlands, riparian habitat, and annual grassland land-cover types. On valley floodplains and terraces, oak woodland savanna is dominated by valley oak. In both types, community structure is characterized by limited shrub cover and an understory composed of annual grasses and forbs.

Oak savanna ecosystems occur in a ring around the Central Valley in the foothills of the Sierra Nevada (Allen et al. 1989 in Jones & Stokes Associates 2004).

3.4.6.1.6 Foothill Chaparral

Foothill chaparral ecosystems in western Placer County are characterized by high topographic and geologic diversity. For the Plan Area, foothill chaparral is defined as shrub-dominated habitat with less than 10 percent cover of trees. Foothill chaparral occurs sparsely, intermixed with the various Foothills woodland land-cover types, and is included as a component of the overall oak woodland community.

Foothill chaparral ecosystems include successional habitats in mixed oak woodland or lower-elevation ponderosa pine forest as well as persistent chaparrals on poor soils. The largest stands of foothill chaparral in western Placer County are on the slopes of the American River canyon and north and east of Auburn, east of Plan Area A and partly in Plan Area B4, PCWA Zone 1 O&M. Only about 217 acres of foothill chaparral are mapped in Plan Area A, at elevations of about 460 to 1,500 feet; they are most common between mixed oak woodland and ponderosa pine forest.

Foothill chaparral often occurs in settings that are too hot, dry, rocky, and steep to support tree-dominated habitats (Holland 1986 in Jones & Stokes Associates 2004). It generally occurs on south-facing slopes, transitioning to interior live oak woodland or ponderosa pine forest on north-facing slopes.

Chamise (*Adenostoma fasciculatum*), whiteleaf manzanita, buckbrush, and shrubby interior live oaks are the dominant species in foothill chaparral ecosystems of western Placer County. Foothill chaparral ecosystems in western Placer County may exhibit a wide diversity of native shrubs, including hoary coffeeberry, western redbud, birchleaf mountain mahogany (*Cercocarpus betuloides*), Lemmon's ceanothus (*Ceanothus lemmonii*), Sierra plum (*Prunus subcordata*), yerba santa (*Eriodictyon californicum*), Fremont silk-tassel (*Garrya fremontii*), service berry (*Amelanchier* spp.), deerbrush, Oregon white oak (*Quercus garryana*), shrubby interior live oak, chaparral honeysuckle, chaparral clematis (*Clematis lasiantha*), and poison-oak.

Widely scattered emergent pines or oaks are common but generally represent less than 10 percent of the overall cover as mapped by Jones & Stokes Associates. Foothill chaparral ecosystems may persist for many years as successional stages to foothill hardwood woodlands, until the slow-growing oaks begin to shade or compete with the shrub species; this shift may take at least 50 years in blue oak woodlands (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

The California distribution of foothill chaparral includes a fairly continuous band through the Transverse, Peninsular, and South Coast Ranges and large areas of the interior slopes of the North Coast Ranges. In the Sierra Nevada, foothill chaparral occupies a narrower and broken band along the middle and lower elevations of the western slope. Large intermittent patches also occur in the Klamath, Siskiyou, and Cascade Ranges. The species composition of chaparral varies widely throughout California, and many different types of foothill chaparral are recognized (Holland 1986; Sawyer and Keeler-Wolf 1995 in Jones & Stokes Associates 2004).

3.4.6.1.7 Rock Outcrop

Natural barren areas comprise features such as rock outcrops and cliffs. In all cases, barren rock or soil dominates the ground layer, and tree and shrub cover is typically sparse or absent. Pockets of foothill chaparral and annual grassland may be present within natural barren areas. Rock outcrop is included as a component of the overall oak woodland community.

Shrubs range from 1 to 6 feet in height, and dominant species usually include chamise, whiteleaf manzanita, buckbrush, and shrubby interior live oak. Small, scattered stands of conifer forest within barren areas are dominated by foothill pine and incense cedar. Approximately 119 acres of rocks and cliffs are mapped in the Foothills.

3.4.6.2 Constituent Habitats

The mapping methodology for the land-cover types that constitute the oak woodland community excludes potential riverine and wetland so that there are no appreciable constituent habitats associated with this community. Some oak savanna may contain 0.2 percent riverine habitat where small, narrow streams are present but not associated with riparian tree canopy.

3.4.6.3 Historical Extent and Composition

Since European settlement, oak woodlands in California have been managed primarily for livestock production. Historically, losses of oak woodlands occurred because of clearing for range improvements and agriculture (Jones & Stokes Associates 2004). Frequent fires historically occurred in oak woodlands, and fire suppression has affected regeneration negatively in blue oak woodlands (Jones & Stokes Associates 2004).

Blue oak woodland was more affected than any other woodland type in California by livestock grazing and firewood cutting during the 1960s to the early 1980s. A relatively recent trend toward rural-residential development in the Foothills has replaced agriculture as the primary reason for conversion. Additionally, the introduction and dominance of Mediterranean annual grasses and forbs has had a profound effect on the regeneration of oaks. Although blue oak woodlands still cover a large area in California, they are threatened by rangewide fragmentation and an apparent lack of regeneration (The Nature Conservancy 1999 in Jones & Stokes Associates 2004; Zavaleta et al 2007; Pearse et al. 2014).

Other oak woodlands identified by Jones & Stokes Associates (2004) experienced varying degrees of impact due to historical land uses. Mixed oak woodland, which is composed of mixed oak species but dominated mainly by blue oak and the oak-foothill pine woodland, has been affected by grazing and land use conversions but not large-scale clearing for agriculture, at least not during the past 50 to 60 years. From the turn of the 19th century until midway through the 20th century, mixed oak woodlands were affected primarily by orchard production in the Newcastle, Ophir, Penryn, and Loomis Basin regions. Today, some oak woodlands in these areas have regenerated as a consequence of the abandonment of orchards or displacement by rural-residential development or pasture lands. In other areas, predominantly in the Foothills, oaks were cleared to provide firewood or fuel for industrial operations and maximize grassland production for grazing. Many of these oak woodlands have regenerated, but the regeneration has occurred simultaneously with the development of rural-residential subdivisions. Consequently, these regenerated woodlands exist in a highly fragmented condition.

Interior live oak woodland has always been limited in distribution because of its dependence on wildfire as a mechanism to maintain its dominance. Oak woodland savanna has historically been susceptible to clearing for enhancing forage production.

3.4.6.4 Common Wildlife Associations

The mosaic of communities across the landscape creates linkages between oak woodland and vegetation types that are not dominated by oaks, such as annual grassland, riparian habitat associated with perennial and intermittent streams, and, at the eastern portion of Plan Area A, conifer forests (Figures 3-11 and 3-15). As a result, many of the wildlife species associated with these other vegetation types utilize oak woodlands at least in part to meet their habitat requirements.

Amphibians and reptiles in blue oak woodland are mostly those that are associated with open annual grassland ecosystems: California slender salamander, California toad, western yellow-bellied racer, garter snake (*Thamnophis* spp.), California whipsnake, gopher snake, Gilbert's skink (*Plestiodon gilberti*), Skilton's skink, southern alligator lizard, and western fence lizard. Oak woodland savanna and grassland components of this community attracts bird species such as American kestrel, lark sparrow (*Chondestes grammacus*), western meadowlark, and Bullock's oriole (*Icterus bullockii*), while oaks provide food for various songbirds and nesting sites for cavity nesters, such as woodpeckers, oak titmouse (*Baeolophus inornatus*), ash-throated flycatcher (*Myiarchus cinerascens*), house wren, Bewick's wren, and violet-green swallow. Mammals typical of these ecosystems include mule deer, California ground squirrel, and western gray squirrel (*Sciurus griseus*).

Interior live oak woodland often supports many of the wildlife species associated with foothill chaparral because the two land-cover types are often intermixed on the same hillsides. The primary distinction between the two habitats is the presence, in interior live oak woodland, of larger trees, which offer a more complex structural framework and cavities for nesting by larger birds such as red-tailed hawk and great horned owl (*Bubo virginianus*).

In oak-foothill pine woodlands, grass seeds, fruits of various shrubs, oak acorns, and foothill pine seeds all provide nutritious food sources for a wide variety of rodents, squirrels, larger mammals, and granivorous birds. Western scrub-jays, acorn woodpeckers (*Melanerpes formicivorus*), western gray squirrels, and other acorn specialists may be common in these mixed woodlands. Newly emerged oak leaves in the spring support an abundance of insects that attract large numbers of migrating and nesting flycatchers, vireos, warblers, and other insectivorous birds. In areas where shrubs are present, birds such as spotted towhee, California towhee (*Pipilo crissalis*), white-crowned sparrow (*Zonotrichia leucophrys*), golden-crowned sparrow (*Zonotrichia atricapilla*) (winter only), wrentit (*Chamaea fasciata*), and blue-gray gnatcatcher (*Polioptila caerulea*) may occur. Characteristic amphibians and reptiles include California slender salamander, California toad, western yellow-bellied racer, Valley garter snake, California whipsnake, gopher snake, western rattlesnake (*Crotalus viridis*), Skilton's and Gilbert's skinks, southern alligator lizard, and western fence lizard.

Non-native animals that may occur in the oak woodlands of western Placer County are European starling, wild turkey, Virginia opossum, and wild pig.

Many animal species frequent foothill chaparral ecosystems because they provide abundant food supplies, shelter, and nesting sites; some species can be found in their highest abundance in these

communities. Approximately 120 vertebrate species—53 breeding species and 67 visitors—occur in these ecosystems in the Plan Area (Jones & Stokes Associates 2004).

Dusky-footed woodrats (*Neotoma fuscipes*) and deer mice (*Peromyscus maniculatus*), both very common in foothill chaparral, provide abundant food for snakes and carnivorous mammals. A number of other mammals occupy these dense thickets where they can avoid human disturbance. Mountain lion (*Felis concolor)*, black bear (*Ursus americanus)*, coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), and ring-tailed cat (*Bassariscus astutus*) are among the larger mammals that frequent these habitats. Other common mammals include western gray squirrel, California ground squirrel, and brush rabbit (*Sylvilagus bachmani*). Gopher snake, California whipsnake, western rattlesnake, and California kingsnake (*Lampropeltis getulus*) are commonly found in foothill chaparral ecosystems, along with smaller snakes such as western yellow-bellied racer, ringneck snake (*Diadophis* spp.) and sharp-tailed snake (*Contia tenuis*). Skilton's skink, Gilbert's skink, southern alligator lizard, and western fence lizard are also common to abundant in these communities. The most common amphibian is California slender salamander, which can be readily found during the rainy season but retreats far underground in summer.

Numerous bird species either nest in foothill chaparral ecosystems or use them seasonally. Common breeding species include Anna's hummingbird (*Calypte anna*), western scrub-jay, blue-gray gnatcatcher, wrentit, spotted towhee, California towhee, and lazuli bunting. Birds can be particularly abundant in foothill chaparral in winter, perhaps because the ecosystem lies below the snow zone and because many native shrubs (e.g., toyon) produce fruits that attract species such as American robin, cedar waxwing (*Bombycilla cedrorum*), Townsend's solitaire (*Myadestes townsendi*), and hermit thrush (*Catharus guttatus*). Ruby-crowned kinglet (*Regulus calendula*) and Hutton's vireo (*Vireo huttoni*) are typical wintering and resident insectivorous birds, which forage primarily in evergreen foliage.

Despite their steep gradients and lack of vegetation, cliffs and rock outcrops are surprisingly rich in wildlife values. Various birds and mammals find safety and breeding sites within rocky crevices. Typical rock and cliff birds include white-throated swift (*Aeronautes saxatalis*), canyon wren (*Catherpes mexicanus*), rock wren (*Salpinctes obsoletus*), common raven (*Corvus corax*) (nesting), and an assortment of nesting raptors. Various snakes and lizards, including western fence lizard, western sagebrush lizard (*Sceloporus graciosus graciosus*), and western rattlesnake, favor rocky cliffs and outcrops. Most amphibians in the county avoid dry, barren habitats.

3.4.6.5 Covered Species Associations

Few Covered Species are directly associated with woodland land-cover types. Species that use grasslands, such as Swainson's hawk and western burrowing owl, would also use areas in the Valley that have been mapped as oak savanna, which are primarily grassland, with a relatively low tree canopy cover.

Western pond turtle may nest in unshaded slopes in oak woodland where oak woodland is adjacent to aquatic habitat. Western pond turtle may also dig burrows in the leaf litter or soil of oak woodlands for overwintering refuge.

California red-legged frog would use the oak woodland community as upland dispersal and refuge habitat where near year-round water.

3.4.6.6 Ecosystem Function

In oak-foothill pine woodlands, grass seeds, fruits of various shrubs, oak acorns, and foothill pine seeds all provide nutritious food sources for a wide variety of rodents, squirrels, larger mammals, and granivorous birds. In the spring, newly emerged oak leaves support an abundance of insects that attract large numbers of migrating and nesting flycatchers, vireos, warblers, and other insectivorous birds. Oak woodlands perform a variety of ecological functions, including nutrient cycling, water storage and transport, and wildlife habitat (Giusti et al. 2004). Oak woodlands share many of the same functions as the adjacent grassland and chaparral communities. However, the structure and food provided by the dominance of oak trees in this community distinguish it from the other natural community types. Large acorn crops and a diverse insect fauna provide high-quality food for a wide variety of amphibians, reptiles, birds, and mammals. Dense oak woodlands provide cool, shady refugia for wildlife during the hot, dry summer, and more sparse oak woodlands provide raptors with hunting perches. These oak woodlands also provide nesting and foraging habitat for a variety of bird species. The grassland understory provides habitat for fossorial rodents such as ground squirrels and gophers, which are prey for red-tailed hawks, coyotes, and great horned owls. Rodent burrows, in turn, provide habitat for a variety of other species, including western burrowing owls.

3.4.6.7 Natural Disturbance

Oak woodland, ponderosa pine forest, and chaparral are all fire-adapted ecosystems; fire has played a large role in maintaining these communities. Fire creates the vegetation structure and composition typical of oak woodlands. Historically, this natural community experienced frequent low-severity fires that maintained woodland or savanna conditions. In the absence of fire, the low or open understory that characterizes the land-cover type is lost. Fire suppression in the Foothills has reduced the recent extent of fire (Figure 3-4). Ultimately, closed-canopy oak forests are replaced by shade-tolerant species because oaks cannot regenerate and compete in a shaded understory. Drought may also play a role in maintaining an open tree canopy in dry woodland habitat. In addition, grazing, including precolonial grazing by deer and elk, may have helped woodland habitat maintain a more open understory that favors oaks and grasses. Many chaparral species depend on fire to regenerate.

3.4.6.8 Threats

Threats facing oak woodlands vary by community type. Due to the rarity and slow regeneration of some species of oak, several oak-dominated land-cover types are considered sensitive communities by CDFW (California Department of Fish and Game 2010). Additionally, when urban, suburban, and rural-residential land uses are in proximity to these land-cover types, there is a considerable reduction in habitat value. For example, noise, light, irrigation, and frequent disking for fire protection can substantially degrade habitat conditions. Predators of birds and their nest contents (i.e., eggs, nestlings) may be more attracted to, and more abundant in, suburban areas. These predators, such as racRaccoons (*Procyon lotor*) and jays, can move into adjacent woodlands.

The two main processes influencing the prevalence of oak woodlands in California are land conversion (for development and intensive agriculture) and the parcelization of large blocks of contiguous habitat for urban, suburban, and rural-residential development (Giusti et al. 2004).

A lack of oak regeneration, which may be related to development pressures, is a serious threat. Regeneration is typically low, and seedlings are rare. This seems to have been the trend, especially for valley oak and blue oak regeneration, throughout much of California over the past 75 to 125 years (Pavlik et al. 1991). Potential interacting mechanisms include overgrazing, fire suppression, noxious weed invasion, and the dominance of annual grasses over native perennial grasses. Research on the causes of this decline has yet to identify a particular causal mechanism; the relative importance of these factors may be site specific.

Poor regeneration of blue oak is well documented (White 1966; Holland 1976; Griffin 1977; Baker et al. 1981 in Jones & Stokes Associates 2004; Zavaleta et al. 2007) and is evident in western Placer County. Most blue oak stands exist as medium or large tree stages, with few or no young trees present. Age studies in the southern Sierra Nevada indicate that most blue oak stands are currently 80 to 120 years old (Brooks 1969 in Jones & Stokes Associates 2004). The absence of regenerating blue oak may be related to competition for soil moisture from introduced and weedy annual grasses and the consumption of acorns and seedlings by insects, domestic livestock, and wildlife. Blue oak is somewhat intolerant of shade, and disturbances producing openings in the canopy may be necessary for seedling growth and survival in denser stands.

Recent research on the effects of wild or feral pigs in California show that they can disturb up to 35 to 65 percent of the ground annually where they occur in high densities and that they significantly reduce acorn survival (Sweitzer and Van Vuren 2002).

In addition to feral pigs, a high density of invasive weeds and non-native plants in the understory affects oak regeneration. The common noxious weeds in blue oak woodland include yellow star thistle, Italian thistle, and medusa-head as well as many invasive non-native annual grasses. In valley oak woodland, Himalayan blackberry, a noxious weed species, is common in the Plan Area. Typical non-native species in the understory of valley oak woodlands include Italian ryegrass, wild oat, Italian thistle, foxtail barley, yellow star thistle, soft chess, and vetch. Other invasive non-native species that may occur in valley oak woodlands include tree-of-heaven, black locust, ripgut brome, poison hemlock, and French broom (*Genista monspessulana*). For interior live oak woodland, where light permits development of an herbaceous layer, dominant species in the understory include non-native species that are somewhat shade tolerant, such as hedgehog dogtail, hedge parsley, chickweed, and the noxious weed Italian thistle. At woodland edges or in openings of the tree canopy, common non-native herb associates include slender wild oat, yellow star-thistle, and ripgut brome, in addition to those mentioned above. In oak-foothill pine woodland, noxious weeds are most common along road edges and other disturbed or ruderal areas. The most frequent noxious weed and invasive non-native species include yellow star thistle, Italian thistle, medusa-head, woolly vetch, black mustard, and Klamath weed.

The main threats to mixed oak woodland are wildfire and fragmentation caused by rural-residential development. Figure 3-4 shows the limited extent of large fires in the Foothills, mainly as a result of fire suppression.

Inaccessibility and generally poor site conditions have limited the development of agriculture in this type. Occasionally, logging and excessive grazing affect mixed oak woodlands. Commercial logging is non-existent with Plan Area A, although some amount of oak woodland is harvested for firewood.

Much oak woodland savanna has been cleared for range improvement related to livestock grazing. Long-term livestock grazing reduces survival of oak seedlings and saplings, resulting in a lack of recruitment of oaks (Adams et al. 1991 in Jones & Stokes Associates 2004).

Researchers have expressed concern about the future of oak-foothill pine woodland because there has been relatively little oak regeneration in the past 100 years. Most of the acorn crop each year is eaten by livestock, deer, birds, insects, and rodents (Holland 1976; Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

There is physical evidence of this disturbance throughout the more remote and roadless areas of the Plan Area. Some studies have found browsing by deer, livestock, or other large mammals to be an important factor that negatively affects recruitment (Borchert et al. 1989; Bartolome et al. 2002). Grazing by small mammals may also be very detrimental to oak recruitment (Tyler et al. 2002). Recruitment in many tree species, particularly oaks, can be highly cyclical and dependent on long-term rainfall patterns.

Non-native animals that may occur in oak woodlands of western Placer County are European starling, wild turkey, and wild pig. European starlings can displace native cavity-nesting birds (Beedy and Granholm 1985; Gaines 1992 in Jones & Stokes Associates 2004).

Sudden oak death is a tree disease caused by the introduced plant pathogen *Phytophtora ramorum,* which occurs primarily in cool, moist environments (California Oak Mortality Task Force 2015). The disease has resulted in widespread mortality of several tree species in 15 central and northern coastal California counties. Only oaks in the red or intermediate groups, including black oak, have been found infected; oaks from the white group, such as blue oak and valley oak are not susceptible (Rizzo et al. 2002).

P. ramorum's spread into the Sierra Nevada foothills is believed to be limited by the less-than-suitable climatic conditions in the area (Meentemeyer et al. 2011). *P. ramorum* was first reported outside the coast mountain range of California in 2012, from a rhododendron in a landscape setting in the Placer County foothills at an elevation of 1,900 feet (Garbelotto et al. 2014). There have been no other known infestations of *P. ramorum* in the Sierra Nevada foothills.

A regional model for the spread of sudden oak death in California over the time period from 1990 to 2030 predicts that long-distance dispersal of inoculum to susceptible hosts in the Sierra Nevada foothills leads to little secondary disease spread in this region because of lower host availability and less suitable weather conditions for inoculum production and infection (Meentemeyer et al. 2011).

3.4.7 Valley Oak Woodland

Because of its conservation importance, valley oak woodland is treated as a separate community. It comprises one land-cover type (Figure 3-15 and Table 3-12).

3.4.7.1 Land-cover Types

Woodlands dominated by valley oak were mapped as valley oak woodland when they had greater than 30 percent canopy cover, were not associated with perennial streams, and could be distinguished by aerial photograph interpretation or field assessments. Oak woodlands dominated by valley oak were mapped as oak woodland savanna when there was less than 30 percent canopy cover, as riparian when they were associated with perennial streams (see Section 3.4.5, *Riverine/Riparian Complex*), and as mixed oak woodland when the dominant species could not be distinguished on the basis of aerial photograph interpretation or field assessments (see Section 3.4.7, *Valley Oak Woodland*).

In valley oak woodlands, large and broad-crowned valley oak trees occur in stands and blend into riparian habitat of valley oak or mixed tree species along stream courses and on active floodplains. The shrub layer, if present, contains bird-dispersed native species such as poison-oak, hoary coffeeberry, and toyon. Himalayan blackberry, a noxious weed species, may be common. The understory is often grazed and consists of a thick carpet of non-native annual grasses and forbs. Occasional native forbs and grasses found in the understory of valley oak woodlands in western Placer County include blue wild rye, western buttercup, and popcornflower.

3.4.7.2 Constituent Habitats

In many places, valley oak woodland could be mapped as riparian because it is associated with the Stream System. In the Plan, valley oak woodland and riparian habitat are treated essentially the same for mitigation; therefore, the mapping distinction is immaterial. The Stream System association results in a small amount (0.2 percent) of riverine habitat present in areas that have been mapped as valley oak woodland, as shown in Table 3-12.

3.4.7.3 Historical Extent

Valley oak woodland was formerly extensive in the Sacramento and San Joaquin Valleys (Holland 1986 in Jones & Stokes Associates 2004). More than 90 percent of pre-European settlement valley oak stands were cleared for agriculture, flood control projects, and urban expansion. Few large stands still exist. Wildfire suppression has negatively affected regeneration in valley oak woodlands (Jones & Stokes Associates 2004).

In western Placer County, as in other Central Valley and Sierra Nevada foothill counties, valley oak woodland has a very limited distribution, occurring where soils are deep and contain some subsurface soil moisture. Most valley oak woodlands in Plan Area A are on private land. Large stands (more than 40 acres) of valley oaks are nearly absent from the valley-foothill bioregion (Greenwood et al. 1993). Valley oak woodland intergrades with blue oak woodland or oak-foothill pine woodland on shallower or drier sites (Griffin 1977; Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

3.4.7.4 Common Wildlife Associations

Amphibians and reptiles in valley oak woodland are mostly those of open annual grassland ecosystems: California slender salamander, California toad, western yellow-bellied racer, Valley garter snake, California whipsnake, gopher snake, Skilton's and Gilbert's skinks, southern alligator lizard, and western fence lizard.

3.4.7.5 Covered Species Associations

Swainson's hawk is known to nest in valley oak woodland. Western burrowing owl may use valley oak woodland as overwintering habitat. Other Covered Species that are known to occur in valley oak woodland are valley elderberry longhorn beetle, especially where associated with riparian habitat, and western pond turtle and California red legged frog, which use valley oak woodland for upland habitat if suitable aquatic habitats are present nearby.

3.4.7.6 Ecosystem Function

Valley oak woodlands perform many of the same ecosystem functions as oak woodlands generally. The open canopy of valley oak woodlands provide raptors with hunting perches and nesting and foraging habitat for a variety of bird species. The grassland understory provides habitat for ground squirrels and gophers, which are prey for red-tailed hawks, coyotes, and great horned owls. Rodent burrows, in turn, provide habitat for a variety of other species, including western burrowing owls.

3.4.7.7 Natural Disturbance

Valley oak woodland is a fire-adapted ecosystem that generally shares many of the natural disturbance sources of oak woodlands.

3.4.7.8 Threats

The threats that valley oak woodlands face are generally similar to those that face oak woodlands. Valley oak woodland is considered a sensitive community by CDFW because of its rarity and slow regeneration. In valley oak woodland, few young trees grow in open, dry sites, although reproduction of valley oak near streams with floodplain development can be good, especially following flood events. The lack of valley oak regeneration at sites appears to be related to competition for soil nutrients and moisture between oak seedlings and introduced annuals, consumption of acorns and seedlings by wild and domestic animals, and disking or plowing (Holland 1976 in Jones & Stokes Associates 2004). Any activity in the near riparian zone where valley oak occurs is a threat. In the Central Valley, flood control projects may also play an important role in the reduced regeneration of valley oak.

3.4.8 Rice Agriculture

The rice agriculture community is represented solely by the rice land-cover type. Rice is considered at the community level in the Plan because of its large extent in the Valley and its relationship to historic vernal pool complex lands and potential vernal pool restoration (Figure 3-16 and Table 3-12).

3.4.8.1 Land-cover Type

Mapped rice fields include fields that are under current cultivation and fields that are temporarily fallow but have water control structures in place. Rice is planted in April and May and harvested in September and October. Fields are flooded at the time of setting the rice seedlings in the spring and often again after harvest to control pests and to provide waterfowl habitat for hunting clubs. Rice is grown as a monoculture, using flooding, tillage, and/or herbicides to eliminate unwanted vegetation; remaining vegetation is generally confined to the berms, ditches, and canals between and around fields and is dominated by wetland plants, both native and non-native. Typical plants found in uncleared ditches and canals include bulrush, cattail, nutsedge (*Cyperus* spp.), rushes, Harding grass, western vervain, and Bermuda grass.

Rice is grown on suitable soils throughout the Sacramento Valley. Rice is the highest value crop in Placer County, amounting to $22,382,000 in 2012. All rice in Plan Area A is in the Valley, at elevations from 45 to 140 feet. Rice fields are mapped on about 19,580 acres, or about 19 percent of the Valley. Abandoned contoured rice fields established in historic vernal pool landscapes often

retain remnant areas of vernal pool vegetation and seasonal pools that can support listed vernal pool branchiopods, such as vernal pool fairy shrimp and vernal pool tadpole shrimp.

3.4.8.2 Common Wildlife Associations

Flooded rice fields in the Plan Area attract wintering and migrating waterfowl, waders, shorebirds, and gulls (Jones & Stokes Associates 2003). Large concentrations (more than 10,000 individuals) of northern pintails congregate in flooded rice fields prior to spring migration (Miller pers. comm. in Jones & Stokes Associates 2003). In spring, these fields often support foraging resident species such as black-crowned night-heron, Canada goose, cinnamon teal, mallard, gadwall, and killdeer.

In winter, flooded rice fields support large numbers of overwintering killdeer, greater yellowlegs (*Tringa melanoleuca*), long-billed curlew (*Numenius americanus*), dunlin (*Calidris alpina*), least sandpiper, long-billed dowitcher (*Limnodromus scolopaceus*), Wilson's snipe, and American pipit (*Anthus rubescens*). During these winter months, especially after the hunting season, large flocks of waterfowl forage in flooded rice fields. These concentrations of shorebirds and waterbirds attract raptors, especially northern harrier (*Circus cyaneus*), peregrine falcon (*Falco peregrinus*), and bald eagle. When rice fields are not flooded, rodent populations in the fields may also attract raptors, including white-tailed kite (*Elanus leucurus*), red-tailed hawk, Swainson's hawk, American kestrel, and short-eared owl (*Asio flammeus*) (Jones & Stokes Associates 2003).

3.4.8.3 Covered Species Associations

Rice fields, their associated waterways, and adjacent uplands provide the most important agricultural habitat for giant garter snake (a Covered Species), particularly in the Sacramento Valley (U.S. Fish and Wildlife Service 1999). Other special-status animal species that are covered by the Plan and that may visit rice fields in the Plan Area include Swainson's hawk, western burrowing owl, and tricolored blackbird.

3.4.8.4 Ecosystem Function

Rice fields are important to the continuity of wetland habitats along the Pacific Flyway because they attract wintering and migratory waterfowl, waders, shorebirds, and gulls (Hickey et al. 2003; Jones & Stokes Associates 2003). The relative attractiveness of flooded rice fields to migratory and wintering birds depends on rainfall and on site-specific flooding cycles and management practices. However, during fall migration (which begins in late June), flooded rice fields can provide prime habitat for a wide variety of shorebird species; hundreds or thousands of individuals of more than a dozen species forage for invertebrates during brief stopovers on their way south. During the winter months, especially after the waterfowl hunting season, large flocks of waterfowl forage in flooded rice fields. These concentrations of shorebirds and waterbirds attract raptors, especially northern harrier, peregrine falcon, and bald eagle. When rice fields are not flooded, rodent populations in the fields may also attract raptors, including white-tailed kite, red-tailed hawk, American kestrel, and short-eared owl (Jones & Stokes Associates 2003).

Rice agriculture is the dominant land use in the Valley west of Lincoln (i.e., in the Auburn Ravine and Raccoon Creek watersheds). Rice production is water intensive. Water demand from rice farming, other agriculture (e.g., field agriculture [Section 3.4.9, *Field Agriculture*], orchards, and vineyards [Section 3.4.10, *Orchards and Vineyards Agriculture*]), and domestic uses influences current water management practices and the timing of flows to the watersheds in the spring, summer, and early

fall (see Section 3.2.8.1, *Water Deliveries and Diversions,* for a summary of deliveries). Auburn Ravine and Raccoon Creek provide consistent flows for covered salmonids and other aquatic species during the typically low-flow period (e.g., summer-fall) as well as spawning and rearing habitat that otherwise would be limited or absent (National Marine Fisheries Service 2014).

3.4.8.5 Threats

The main threat to rice land is conversion for urban development. Rice land is affected by the loss of irrigation water through diversions to other jurisdictions or municipal uses, which has a significant impact on the viability of agricultural production. The area planted in rice will decline because of the current trend for the conversion of rice or row cropland to orchard land, mainly for walnuts. Walnuts typically thrive in the well-drained sandy soils near rivers. As the value of the crop increases, walnuts trees are planted on converted pasture land and in rice fields, which contain heavier soils (composed partly of clay). These soils do not drain as well, and water that inundates the surface tends to pool, resulting in anaerobic soil conditions that contribute to root rot and tree mortality. The seasonally saturated, poorly drained soils that are characteristic of the area where rice is currently produced can be modified by extensive earthwork; this so-called "deep ripping" may make the ground no longer suitable for rice.

3.4.9 Field Agriculture

Field agriculture is represented by three land-cover types: two crops and the geographically associated eucalyptus woodlands (Figure 3-16 and Table 3-12).

- Alfalfa
- Cropland
- Eucalyptus

3.4.9.1 Land-cover Types

3.4.9.1.1 Alfalfa

Small amounts of alfalfa are grown in western Placer County as a hay crop in irrigated fields. Alfalfa is a perennial plant that lives for 5 years or more and is harvested several times in the growing season. Herbicides are generally used to control weeds and eliminate unwanted vegetation. Any vegetation remaining on field margins may include a variety of introduced grasses and legumes, but noxious weeds and other non-native invasive plants may also be present.

3.4.9.1.2 Cropland

Row crops are generally monotypic agricultural fields of herbaceous species, varying in height from 1 to 6 feet. Most row crops are annual species, although a few of the species that are grown in western Placer County, such as strawberries, are perennial. Major row crops in western Placer County are grain, vegetable crops, and miscellaneous crops (e.g., corn and oats) (Placer County Department of Agriculture 2012). Most crops are planted in spring and harvested in summer or fall. The crops are grown using tillage or herbicides to eliminate unwanted vegetation (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). Small-scale row crop production is increasing in the Foothills because of the continued growth of farmers markets and other direct farm-to-market initiatives.

Areas were mapped as unidentified croplands if they were plowed or fallow agricultural fields or if the crop could not be identified as one of the other subtypes. Most of these areas are likely to be a temporary habitat in the fallow or annual cycle of cultivation of row crops. The dominant plant species in temporary fallow croplands include a variety of introduced grasses and legumes, including noxious weeds and other non-native invasive plants, as listed in the description of row crops.

Row crops generally occur on deep, fertile soils in alluvial valley bottoms or gently rolling terrain in the low to mid-elevations of western Placer County. Alluvial soils are derived from a variety of parent rock types, including soil series derived from granitic and metamorphic parent rocks, as described in Section 3.2.2, *Geology and Soils*.

The dominant species on the margins of row crops include a variety of introduced grasses and legumes; noxious weeds and other non-native invasive plants may also be present. The major noxious weeds subject to biological control measures in western Placer County are yellow star-thistle, Italian thistle, Klamath weed, skeleton weed (*Chondrilla juncea*), and puncture vine; many other noxious and invasive plants have the potential to occur in and around row crops. In moist areas near irrigation ditches and farm ponds, noxious weeds such as Johnson grass and Bermuda grass are often present.

In California, croplands occupy about 9.5 million acres and are found in every county except for San Francisco (U.S. Department of Agriculture 2014). In western Placer County, croplands are mapped on about 2,512 acres, or about 2 percent of Plan Area A; 100 percent of this land-cover type is on private land.

3.4.9.1.3 Eucalyptus

Eucalyptus woodland is lumped with the field agriculture community because of its geographic affiliation. Eucalyptus groves have been planted as windbreaks and for firewood in various rural-residential forested and agricultural areas in western Placer County. Most of these groves are small (less than 5 acres), and their combined acreage is only about 70 acres in Plan Area A.

3.4.9.2 Common Wildlife Associations

Several open-country raptor species that occur in western Placer County (e.g., Swainson's hawk, white-tailed kite, northern harrier, red-tailed hawk, and American kestrel) use alfalfa where they forage on the abundant rodent prey. Because alfalfa is planted in such small amount in the Plan Area, this type of crop most likely provides limited habitat values for Covered Species in the Plan Area. When flooded for irrigation, these fields are used extensively for foraging wading birds and for nesting by several species of ducks.

Row crops support relatively few native wildlife species. In the Plan Area, these ecosystems support about 47 vertebrate species—6 breeding species and 41 visitors (Jones & Stokes Associates 2004). Most of these species do not breed in active row crops, but a few mammals (e.g., black-tailed jackrabbit, desert cottontail [*Sylvilagus audubonii*], pocket gopher, and California ground squirrel) may have natal burrows along the margins of fields. Typical birds that forage in the county's row crops include great blue heron, great egret, northern harrier, red-tailed hawk, American kestrel, California quail, mourning dove (*Zenaida macroura*), western kingbird, American crow, western meadowlark, Brewer's blackbird, and red-winged blackbird. Unlike other areas of the Central Valley, row crops are not a dominant land-cover type in the Valley of the Plan Area. Instead, pasture,

irrigated pasture, rice, and some orchards are the dominant forms of agricultural production in the Valley. Row crop production is typically small in scale and associated with organic farm operations.

Eucalyptus trees (*Eucalyptus* spp.) flower in winter, producing large quantities of nectar. The trees are highly attractive to a variety of nectar- and insect-foraging birds. Anna's hummingbird, rufous hummingbird (*Selasphorus rufus*), ruby-crowned kinglet, bushtit, yellow-rumped warbler (*Setophaga coronata*), American goldfinch (*Spinus tristis*), and house finch are among the species that are especially abundant in eucalyptus groves of the Plan Area.

3.4.9.3 Covered Species Associations

Covered Species that may visit croplands in the Plan Area include giant garter snake (when adjacent to suitable aquatic habitat), Swainson's hawk, western burrowing owl, and tricolored blackbird. Eucalyptus woodland at the edges of croplands offers suitable nesting habitat for Swainson's hawk.

3.4.9.4 Ecosystem Function

In comparison with native large-patch ecosystems in the Plan Area, row crops support relatively few native wildlife species. Nonetheless, these types of agriculture provide some benefit, although species composition depends heavily on the planting cycle. For example, cropland has a higher value for herbivorous birds (e.g., tricolored blackbird) and raptors (e.g., Swainson's hawk) near harvest time when the standing crop is mature and produces a quantity of food (e.g., fruit, seeds, and pest insects) than it does after the harvest when the cropland is fallow. Similar to alfalfa, because row crops are generally planted in such small amounts in the Plan Area, these types of crops most likely provide limited habitat values for Covered Species in the Plan Area.

Agricultural production methods can also have an impact on wildlife use. For example, production practices such as clean farming, where farm edges are maintained as vegetation-free areas, reduce cover and movement opportunities for wildlife; on the other hand, wildlife-friendly farming, where native cover crops and hedge rows are used between crops and on farm edges, can increase foraging opportunities for wildlife use in croplands.

Agricultural lands often play a key role in providing connectivity between larger open space areas. Maintaining connectivity between open space patches that provide habitat helps to support diversified genetic pools by enabling populations to disperse and commingle.

Agriculture often is associated with streams, canals, and ditches used for irrigation that may support riparian vegetation, trees (planted as windbreaks), and shrubs. These areas may provide habitat to songbirds, raptors, amphibians and reptiles, as well as provide a movement corridor for other species.

3.4.9.5 Threats

The main threat to agricultural land is conversion for urban development. Secondarily, a loss of irrigation water through diversions to other jurisdictions or to municipal uses would have a significant impact on the viability of agricultural production.

3.4.10 Orchards and Vineyards Agriculture

Orchards and vineyards are considered together as a separate other agriculture community type in the Plan, mainly so that the effects analysis and conservation strategy can segregate their land area from the other agricultural lands that have some value for Covered Species.

3.4.10.1 Land-cover Types

3.4.10.1.1 Orchards

Orchards in western Placer County are often found near and interspersed within annual grassland, mixed, blue, interior, and valley oak woodlands ecosystems. They are frequently adjacent to streams or irrigation canals. Deep, well-drained soils of volcanic origin and gently to moderately sloping hills in the middle elevations are characteristic of orchards in western Placer County. Loamy soils are the most common or preferred substrate for orchards (Rogers 1980 in Jones & Stokes Associates 2004). Deep ripping has allowed walnuts, almonds and other trees and vineyards to be planted on normally unsuitable rice and pasture land in the Valley.

Orchards are generally monotypic, tree-dominated habitats, although pruning to facilitate harvest results in trees that range in height from 15 to 30 feet (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004). The crowns do not overlap, and trees are uniformly spaced in straight rows. Most orchards are irrigated by sprinkler or drip irrigation and are intensively managed. Trees are replaced when they become old or diseased, generally by 40 years of age for fruit trees and upward of 80 years for walnuts. There are many abandoned orchards in western Placer County, particularly around Ophir, Penryn, and Newcastle in the Sierra Nevada foothills; some of these abandoned orchards are open and grassy, with scattered old fruit trees, while others contain dense shrubs and regenerating oak trees (predominantly blue oak).

Walnuts, plums, peaches, oranges, apples, and pears are the most commonly planted crops in orchards in western Placer County, with walnuts having an annual value of $5,155,000, the fourth-highest crop value in the county (Placer County Department of Agriculture 2015). Below the fruit trees, the understory is either bare soil or a periodically mowed herbaceous layer of non-native species, such as soft chess, annual ryegrass, wild oats, orchard grass, winter vetch, black mustard, red-stemmed filaree, dove-foot geranium, little hop clover, bur clover, or rose clover. In moist areas near irrigation ditches and farm ponds, noxious weeds such as Johnson grass and Bermuda grass are often present.

3.4.10.1.2 Vineyard

Rolling hills of deeper, well-drained soils in the middle elevations are the most likely setting for vineyards in western Placer County. Locally, they occur on soils derived from metamorphic rocks mapped as Sites loam, although other soils are also represented (Rogers 1980 in Jones & Stokes Associates 2004).

Structurally, vineyards are composed of single species planted in rows and supported on wood and wire trellises. Vineyards are managed intensively. The soil under the vines is generally sprayed and barren to prevent the growth of grasses and other herbs, which may transmit pests and diseases to the grapevines. Forbs may be allowed to grow between the rows as a cover crop to control erosion; such cover crops usually consist of introduced clover and other legumes and annual winter grasses. Drip irrigation is often employed. The overall cover is somewhat sparse, composed of young to

mature long-lived woody vines that may persist for more than 40 years but are generally replaced earlier due either to fluctuations in product prices or decreases in productivity (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

Aside from the grape cultivars, the sparse herbaceous layer, if present, typically consists of introduced annual weeds, unless the areas between vineyard rows are specifically seeded with a cover crop. Typical species include soft chess, black mustard, perennial ryegrass, slender wild oat, orchard grass, red-stemmed filaree, dove-foot geranium, little hop clover, and rose clover. Noxious weeds such as Bermuda grass and Johnson grass may also be present, particularly in moist areas.

Vineyards are found in nearly every California county except Alpine, Modoc, Mono, and Plumas (U.S. Department of Agriculture 2014). Vineyards have a more limited distribution in western Placer County than in many California counties that have experienced a dramatic increase in conversions to vineyards. Aerial photos from the late 1960s suggest that many vineyards in California have been developed on lands that previously supported either annual grasslands or foothill hardwoods (Rogers 1980). In Plan Area A, vineyards are mapped on 96 acres in the Foothills.

3.4.10.2 Common Wildlife Associations

In the Plan Area, orchards support about 55 vertebrate species—12 breeding species and 43 visitors (Jones & Stokes Associates 2004). Most of these species do not breed in active orchards, but a few mammals (e.g., black-tailed jackrabbit, desert cottontail, pocket gopher, and California ground squirrel) may have natal burrows along the margins of orchards. Birds that typically visit orchards in western Placer County include white-tailed kite, red-tailed hawk, American kestrel, California quail, mourning dove, red-breasted sapsucker (*Sphyrapicus ruber*), western kingbird, yellow-billed magpie (*Pica nuttalli*), and American crow. Orchards were the dominant land-cover type, particularly in the Newcastle, Ophir, Penryn, Loomis, and Granite Bay areas, for a number of decades. Total acreage of orchard production has declined significantly since the 1950s and has largely been replaced by rural-residential landscapes where oak woodlands have regenerated. The water delivery infrastructure is still present and soil conditions are still conducive to orchard production and as a consequence, it is possible that smaller-scale orchard production will increase (e.g., mandarins), resulting in a displacement of oak woodlands.

In the Plan Area, vineyards support about 52 vertebrate species—7 breeding species and 45 visitors. Native birds that typically forage in vineyards in western Placer County include mourning dove, western scrub-jay, American crow, western bluebird, white-crowned sparrow, golden-crowned sparrow, dark-eyed junco (*Junco hyemalis*), and house finch. Flocks of introduced European starlings may visit vineyards, especially in fall when they may cause damage to ripening grapes (Zeiner et al. 1990 in Jones & Stokes Associates 2004). Although there are relatively few acres of vineyard in production (less than 500 acres in 2010), agricultural trends in western Placer County indicate that vineyard acreage will increase over the term of the Plan permit.

3.4.10.3 Covered Species Associations

No Covered Species are known to find appreciable habitat in orchards or vineyards in western Placer County.

3.4.10.4 Ecosystem Function

Orchards and vineyards provide little to no value for wildlife. However, these agricultural lands can play a role in providing connectivity between larger open space areas. Maintaining connectivity between open space patches that provide habitat helps to support diversified genetic pools by enabling populations to disperse and commingle. Agriculture often is associated with streams, canals, and ditches used for irrigation that may support riparian vegetation, trees (planted as windbreaks), and shrubs. These areas may provide habitat to songbirds, raptors, amphibians, and reptiles, as well as provide a movement corridor for other species.

3.4.10.5 Threats

The main threat to agricultural land is conversion for urban development. Secondarily, a loss of irrigation water through diversions to other jurisdictions or to municipal uses would have a significant impact on the viability of agricultural production. Orchards, vineyards, and row-crops occur mostly on the Valley floor and lower Foothills. In these areas, the major threat to irrigated agriculture is land conversion to urban uses, usually as residential housing.

3.4.11 Managed Open Water

The managed open water community was created to differentiate highly artificial open water from ponds in the aquatic/wetland community that would have lacustrine ecological function as a constituent habitat. The managed open water community comprises three land-cover types, as shown on Figure 3-17 and listed in Table 3-12.

- Canal
- Reservoir
- Urban Open Water

3.4.11.1 Land-cover Types

3.4.11.1.1 Canal

The canal land-cover type was created to differentiate highly managed water conveyance systems from altered streams and artificial channels that have enough natural character to have aquatic and riverine and riparian habitats associated with them. By contrast, areas mapped as the canal land-cover type have concrete lining and bare earthen perimeters that are maintained free of vegetation. The 145 acres of area mapped as canal is in the Valley and is only a portion of the 87 linear miles of canal with defined rights-of-way.

3.4.11.1.2 Reservoir

The reservoir land-cover type was created specifically to account for Camp Far West Reservoir on the Bear River and Folsom Lake on the American River, which border Placer County on the north and south, respectively. The two reservoirs were created by public agencies for a combination of flood control, power generation, and water storage; both are also used for recreational purposes. These two large reservoirs are operated by agencies that are not seeking permit coverage through the Plan. Management of these facilities is not included as a Covered Activity. The reservoir land-cover type is distinct from the pond land-cover type included under aquatic/wetland complex

community, which includes smaller reservoirs with distinctly different biology. The reservoir land-cover type is 4,804 acres of managed open water and is excluded from the Plan's effect and conservation analysis.

Reservoirs are different from natural lakes in their physical and biological characteristics. Most reservoirs fluctuate on an annual basis, being gradually drawn down in summer to supply water for irrigation, power generation, or agriculture. However, even a fluctuation of as little as 3 to 6 feet can prevent plants from establishing at the shoreline or aquatic plant beds from developing. Large reservoirs are usually built in steep-sided canyons with only small areas of shallow-water habitat. Water level fluctuation and limited shallow-water habitat result in a lack of cover for young fishes in shallow water and a lack of habitat diversity for adult fishes.

The fish fauna at the dam end of a reservoir is often different from the fauna at the mouth of the river that supplies the reservoir (Moyle 1993 in Jones & Stokes Associates 2004). The dam end is usually deep and stratifies in summer, with a warmer layer near the surface and a cooler cold layer at the bottom. Stratification also characterizes deep natural lakes.

3.4.11.1.3 Urban Open Water

The urban open water land-cover type was created to account for intensively managed open water, including WWTP ponds, water ski parks, and landscape and golf course ponds in the Valley. Urban open water is distinct from the pond land-cover type, which is part of the aquatic/wetland complex community and has a strong association with functioning lacustrine ecosystems that urban open water does not have.

Many of these ponds were created by excavation and damming of seasonal creeks. These ponds are typically constructed for industrial or intensive recreational use and are maintained with a bare shoreline or with vegetation frequently maintained by mowing and trimming. About 368 acres in the Valley are mapped as urban open water.

3.4.11.2 Constituent Habitats

Although the managed open water community contains the eponymous open water, it is not considered in the Plan as having value as lacustrine habitat in a functioning aquatic/wetland ecosystem and is not assigned a constituent habitat factor.

The two large reservoirs lack a well-developed fringe of wetland and riparian plants due to their steep-sided slopes and fluctuations in water level.

3.4.11.3 Common Wildlife Associations

Reservoirs and urban open water have common wildlife associations similar to lacustrine (Section 3.4.4.4.3, *Lacustrine*). Large reservoirs annually attract large concentrations of wintering gulls that roost along their shorelines. The largest gull roost in the Plan Area is near Granite Bay on the Placer County side of Folsom Lake (Jones & Stokes Associates 2003).

3.4.11.4 Covered Species Associations

Canals in the Valley below an elevation of 100 feet would be suitable aquatic habitat for covered giant garter snake, especially when located adjacent to more productive aquatic habitat such as

marsh complex and rice. Giant garter snakes are able to use canals for feeding and barren canal-side berms or access roads for sunning.

Dams and canals are commonly associated with unscreened water diversions. Dams and unscreened water diversions may entrain fish, including covered salmonids (see Section 3.2.8, *Hydrological Modifications*).

3.4.11.5 Ecosystem Function

Despite their small size, managed vegetation, and human disturbance, urban open water provides a year-round water source for wildlife.

3.4.12 Rural Residential

The rural-residential community is an aggregation of two very low-density (1 to 10 acres per dwelling unit) residential development land-cover types, based on land use categories used by the Placer County Planning Services Division.

- Rural-residential
- Rural-residential Forested

3.4.12.1 Land-cover Types

3.4.12.1.1 Rural Residential

Rural-residential areas were defined as areas developed with 0.1 to 1 dwelling unit per acre and less than 70 percent tree canopy cover. Areas mapped as rural-residential include small pockets of remnant oak woodland land-cover types, often with shrubs and lower branches cleared to reduce fuel loads and small paddocks grazed by a variety of livestock. Large residential lots may have most of the native vegetation removed and replaced with mowed annual grassland, lawns, and widely scattered trees; such management techniques are often intended to reduce the risk of fire.

Large ungrazed lots in rural-residential areas often become infested with weedy, non-native species, especially yellow star-thistle. Many of these invasive non-native plants are horticultural species that were introduced during the Gold Rush era; some are still commercially available. Characteristic horticultural and pasture species that are known to invade wildlands near rural-residential areas locally include French broom, tree-of-heaven, black locust, English ivy, periwinkle, pampas grass, giant reed, scarlet wisteria (*Sesbania grandiflora*) pennyroyal, wild oat, tall fescue (*Festuca arundinacea*), and aquatic species, such as parrot's feather and water hyacinth. Other less serious invaders include hairy vetch, orchard grass, perennial ryegrass, rose clover, and red-stemmed filaree. Many other unintentional introductions are also common in urban and rural-residential areas of the county. These include noxious weeds such as Himalayan blackberry, which can dominate large areas; Italian thistle; knapweeds (*Centaurea* spp.); Klamath weed; field bindweed (*Convolvulus arvensis*); bull thistle; medusa-head; and other invasive species, such as fennel, black mustard, and woolly mullein. Other abundant non-native plants in these ecosystems include hedgehog dogtail, hedge parsley, dove-foot geranium, ripgut brome, red brome (*Bromus madritensis* ssp. *rubens*), velvet grass, dallisgrass, and many more.

3.4.12.1.2 Rural Residential Forested

Rural-residential forested areas were defined as areas developed with 0.1 to 1 unit per acre and more than 70 percent cover of large, mature trees. Undeveloped lots or the natural portion of developed lots in rural-residential forested areas may support remnant patches of mature oak woodland land-cover types, unless they have been previously cleared. Urban vegetation is relatively short lived compared to remnant pines and oaks, which may live for centuries. However, some native species, particularly oaks, may die prematurely as a result of regular surface irrigation, grading near the base of trees, or root damage caused by trenching and excavation (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

3.4.12.2 Constituent Habitats

Areas mapped as rural-residential in the Valley include patches of functional vernal pool complex and are associated with a small amount (0.8 percent) of vernal pool constituent habitat, as shown in Table 3-10.

3.4.12.3 Common Wildlife Associations

Rural-residential areas may support about 122 vertebrate species—65 breeding species and 57 visitors. Native species that may occur in rural-residential areas include yellow-billed magpie, American crow, western scrub-jay, house wren, and brown-headed cowbird. The high densities of exotic fruits and flowers, birdbaths, and hummingbird and seed feeders attract Anna's hummingbird, rufous hummingbird, California towhee, spotted towhee, golden-crowned sparrow, white-crowned sparrow, and American goldfinch. Likewise, produce from vegetable gardens and pet food, when left out overnight, attract resident mammals such as Virginia opossum, Norway rat (*Rattus norvegicus*), black rat, house mouse, racRaccoon, and striped skunk (*Mephitis mephitis)*.

Rural-residential forested areas support about 122 vertebrate species—70 breeding species and 52 visitors. Native species that may occur in unnaturally high densities in rural-residential forested areas include racRaccoon, Botta's pocket gopher, cliff swallow, yellow-billed magpie, American crow, Steller's jay (*Cyanocitta stelleri*), western scrub-jay, brown-headed cowbird, and Brewer's blackbird. Non-native animals that frequent rural-residential forested areas of western Placer County include house sparrow, European starling, wild turkey, bullfrog, black rat, Norway rat, and house mouse.

3.4.12.4 Covered Species Associations

Rural-residential areas and rural-residential forested lands make up a mosaic of developed and natural landscapes. The natural landscape may be visited by Covered Species, such as tricolored blackbird and Swainson's hawk, or may serve as upland habitat for western pond turtle or covered amphibians. Burrowing owl may occur in open rural-residential areas in the Valley that are interspersed with grassland and barren areas and have artificial and/or natural burrows. Although occurrences of Covered Species in rural-residential land-cover types is addressed by the conditions on Covered Activities in Chapter 6, *Program Participation and Conditions on Covered Activities,* rural-residential land-cover types are not considered to be Covered Species habitat in the model described in the Species Accounts.

3.4.13 Urban

3.4.13.1 Land-cover Types

The urban community represents a variety of developed land-cover types, generally based on the Placer County Planning Services Division land use categories where urban and suburban is defined as greater than one dwelling unit per acre (Figure 3-17 and Table 3-12).

- Urban/Suburban
- Urban Golf Course
- Urban Parks
- Urban Riparian
- Urban Wetland
- Urban Woodland
- Barren/Industrial
- Road

3.4.13.1.1 Urban and Suburban

Urban and suburban areas were mapped where development was denser than one dwelling unit per acre or located along with intensive non-residential land uses, including commercial, industrial, office, and related uses. Ornamental plantings in the older neighborhoods of Auburn, Lincoln, and Roseville are often introduced evergreen and deciduous trees that may be as old as 100 years. These ornamental species range from approximately 20 to 50 feet high at maturity and are typically much smaller and younger than the occasional remnant oaks and pines in these neighborhoods. Urban neighborhoods that were built in the last 40 or 50 years tend to have younger or smaller trees and less structural diversity than older neighborhoods. In outlying suburban areas, mature native oaks and pines are also present between the buildings. Intensively developed areas with highly manicured yards typically have very low wildlife habitat values. Small lawns and mature hedges in urban and suburban areas include many introduced fruiting species that may be attractive to birds and other wildlife.

3.4.13.1.2 Urban Parks and Golf Courses

Urban parks were defined as isolated city parks, playgrounds, or grass fields. Parks in the Plan Area range from large areas that may include remnant patches of valley oak woodland, with a diverse and multilayered understory (e.g., Maidu Regional Park or Royer Park/Saugstad Park in Roseville), to small, heavily landscaped and managed playgrounds and ball fields. However, most developed parks in the Plan Area are dominated by lawn grass, along with a few mature trees.

3.4.13.1.3 Urban Riparian

Urban riparian areas are creeks and riparian habitat (often occurring as greenbelts) that are surrounded by urban and suburban development. They are generally disturbed by human activities, including transportation and recreational uses. The creeks are often straightened and channeled, and the riparian habitat is generally traversed by footpaths and bicycle paths. Wooded riparian

areas within or close to urban and suburban areas that appeared to be undisturbed and unused for recreation were mapped as riparian. Urban riparian areas occupy about 104 acres, or less than 1 percent of Plan Area A.

Urban areas often have disproportionate effects on stream environments. Some older development projects in western Placer County have been permitted to encroach into floodplain environments within 10 to 20 feet of active steam channels. Placement of bridges, roads, paved areas, and structures within the lower floodplains of perennial streams in many instances has resulted in the removal of native vegetation and unnaturally narrowed channels that make them more prone to flooding and erosion (note that Stream System Condition 1 [Chapter 6, *Program Participation and Conditions on Covered Activities,* Section 6.3.3.2, *Stream System Condition 1, Stream System Avoidance*] requires avoidance of the Stream System). The native riparian species in urban areas are frequently displaced by noxious weeds and other invasive non-native species, such as Himalayan blackberry, that can form a single-species monoculture over miles of affected stream corridor. In outlying communities, suburban developments often have more mature vegetation and greater wildlife species diversity (Mayer and Laudenslayer 1988 in Jones & Stokes Associates 2004).

3.4.13.1.4 Urban Wetland

Urban wetland includes vernal pools, seasonal wetlands, and fresh emergent marshes that are surrounded by urban and residential development. These areas are mapped on about 21 acres, much less than 1 percent of the Plan Area.

3.4.13.1.5 Urban Woodland

Urban woodland includes city parks with predominantly tree-dominated vegetation, windbreaks with mostly non-native trees, and remnant patches of the former tree cover, usually oak woodland land-cover types, that are disturbed and surrounded by urban development. Urban woodland areas are mapped on about 77 acres, or less than 1 percent of Plan Area A. Species composition of urban woodland often varies with the age of the community, reflecting the changing preferences of homeowners and designers. Common landscape tree species include sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), deodar cedar (*Cedrus deodara*), linden tree (*Tilia* spp.), Modesto ash (*Fraxinus velutina*), Washington hawthorn (*Crataegus phaenopyrum*), and English holly (*Ilex aquifolium*). In newer developments, frequently planted trees include liquidambar (*Liquidambar styraciflua*), European birch (*Betula* spp.), weeping willow, coast redwood, purple-leaf plum (*Prunus* spp.), and eastern dogwood (*Cornus florida*). Locally native oak and conifer species are rarely planted and are not widely available in local nurseries.

3.4.13.1.6 Barren/Industrial Lands

Barren/industrial lands are historically and recently disturbed sites such as landfills and graded nonagricultural lands. Barren rock or soil dominates the ground layer, and tree and shrub cover is typically sparse or absent. Vegetation is usually absent and wildlife values are low.

3.4.13.1.7 Roads

Roads were mapped as a specific land-cover type only in the Valley, outside of areas that were otherwise mapped as urban/suburban. The area mapped includes both the paved roadway itself and the adjoining right-of-way. This land-cover type was created to account for the rather extensive

existing network of roads that cumulatively cover an estimated 1,477 acres, which amounts to 1.6 percent of the Valley outside of the existing urban and suburban area.

3.4.13.2 Historical Extent and Composition

Developed land-cover types were mapped and described for Plan Area A to describe the extent and distribution of modified lands. Areas mapped as developed include commercial, high-density residential development, and the patchy mosaic of ornamental plantings, vacant lots, and remnant native habitats that occur between developed areas. The extent of landscape maintenance and the replacement of native plant species by ornamental plants usually dictate the habitat characteristics of urban vegetation (Mayer and Laudenslayer 1988). Urban habitat is not limited to any particular physical setting; in western Placer County, it often occurs on level agricultural lands, valleys, gently to moderately sloping areas, and level ridges.

3.4.13.3 Common Wildlife Associations

Urban and suburban areas tend to support a low diversity of wildlife. However, some species thrive in urban and suburban areas and tend to be in greater abundance than in natural habitats. Urban and suburban areas in the Plan Area support about 67 vertebrate species—25 breeding species and 42 visitors. Some wildlife typical of urban and suburban habitats include feral and free-ranging cats (*Felis catus*) and dogs (*Canis lupus familiaris*), racRaccoons, striped skunks, opossums, coyotes, western scrub-jays, Steller's jays, and American crows.

Golf courses support about 131 vertebrate species—70 breeding species and 61 visitors. Wildlife species typically found in these areas are Canada goose, American coot, red-shouldered hawk, northern flicker (*Colaptes auratus*), black phoebe, white-breasted nuthatch (*Sitta carolinensis*), northern mockingbird (*Mimus polyglottos*), western tanager (*Piranga ludoviciana*), bobcat (*Lynx rufus*), and mule deer.

Despite their small size, urban riparian areas support about 137 vertebrate species—83 breeding species and 54 visitors. Urban riparian habitats usually support more species than other urban habitat types (Ehrlich et al. 1988 in Jones & Stokes Associates 2004). Strips of habitat (greenbelts) along streams can make urban areas much more attractive to birds and other wildlife as well as to people. Some typical native species that might be found in urban greenbelt areas of western Placer County include Anna's hummingbird, cedar waxwing, American robin, black-headed grosbeak, house finch, Bullock's oriole, Douglas squirrel (*Tamiasciurus douglasii*), western gray squirrel, and mule deer.

Urban woodland areas support many of the same vertebrate species that occur in urban riparian areas. Strips of urban woodland (greenbelts) can make urban areas much more attractive to birds and other wildlife as well as to people. Some of the native species that might be found in urban greenbelt areas of western Placer County include Anna's hummingbird, cedar waxwing, western bluebird, American robin, black-headed grosbeak, house finch, Bullock's oriole, Douglas squirrel, western gray squirrel, and mule deer.

Urban wetlands support about 34 vertebrate species—20 breeding species and 14 visitors. Native species that might be found in urban wetlands are Sierra newt, Sierran treefrog, mallard, American coot, red-winged blackbird, and muskrat.

Artificially disturbed lands support only about 14 vertebrate species. Two breeding species and 12 visitors occur in these areas. Local landfills may attract large numbers of foraging and roosting gulls, especially in winter.

3.4.13.4 Covered Species Associations

Most Covered Species generally do not occur in the urban and non-natural lands of the Plan Area because of the lack of suitable habitat, human disturbance, and the high numbers of native and introduced predators that thrive there (Ehrlich et al. 1988 in Jones & Stokes Associates 2004).

Burrowing owls may occur in vacant lots, industrial areas, golf course margins, common open space, and agricultural buffers along residential areas. Although urban and non-natural lands are not considered to be modeled habitat for western burrowing owl, the potential for take in urban areas will be avoided by the implementation of conditions on Covered Activities (see Chapter 6, *Program Participation and Conditions on Covered Activities*, Section 6.3.5.8, *Species Condition 3, Western Burrowing Owl*).

Other occurrences of Covered Species are incidental to urban land cover. Urban riparian and urban wetland may provide habitat for western pond turtle and California red-legged frog. Most of the major covered salmonid streams pass through urban areas, and steelhead are observed in highly disturbed stream environments.

3.4.13.5 Ecosystem Function

Urban riparian and urban wetland provide ecosystem functions similar to riparian within riverine/riparian complex and marsh complex within the aquatic/wetland complex, respectively (Section 3.4.5.6, *Ecosystem Function* [Riverine/Riparian Complex], and Section 3.4.4.6, *Ecosystem Function* [Aquatic/Wetland Complex]), though surrounding urban landscapes may affect ecosystem function.

Urban, open-water land-cover types, including urban riparian and urban wetland, may provide habitat for western pond turtle and California red-legged frog.

3.5 Trends and Foreseeable Change

In addition to changes that will result from the Covered Activities described in Chapter 2, *Covered Activities*, trends in climate and resulting changes in physical factors, such as precipitation and fire frequency, are foreseeable over the 50-year term of the permit. Major trends are identified here because they determine the setting for the Plan. Chapter 7, *Monitoring and Adaptive Management Program*, describes how trends will be monitored and how reserve management will respond to adverse changes. Chapter 10, *Assurances,* describes the scope of foreseen and unforeseen changed circumstances and how they may affect Plan implementation.

3.5.1 Global Climate Change

Global climate change is occurring as a result of high concentrations of greenhouse gases in the earth's atmosphere (National Research Council 2010; Intergovernmental Panel on Climate Change 2007). *Climate* is defined as the average weather over many years, and *climate change* refers to a statistically significant change in the state of the climate or its variability that persists for an

extended period, typically decades or longer (Intergovernmental Panel on Climate Change 2013). Recent assessments demonstrate the earth is undergoing changes in climate beyond natural variation (National Research Council 2010; Intergovernmental Panel on Climate Change 2013; Melillo et al. 2014). Evidence of long-term changes in climate over the 20th century includes the following:

- An increase of 1.53°F in the Earth's global average surface temperature
- An increase of 6.7 inches in the global average sea level
- A decrease in arctic sea-ice cover at a rate of approximately 4.1 percent per decade since 1979, with faster decreases of 7.4 percent per decade in summer
- Decreases in the extent and volume of mountain glaciers and snow cover
- A shift to higher altitudes and latitudes of cold-dependent habitats
- Longer growing seasons
- More frequent weather extremes, such as droughts, floods, severe storms, and heat waves

To better understand anticipated increases in temperature, climate models are frequently used. Projections of future climate are developed at many scales, from Global Climate Models to Regional Climate Models, including Regional Climate Models based on Global Climate Model data that have been statistically downscaled to a particular region. Future greenhouse gas emissions scenarios are used in climate model projections of possible future climate conditions.

Climate models project that global mean surface temperature will increase, hot days will become more frequent, and heat waves will become longer and more frequent; there will also be fewer cold extremes. Average precipitation in most dry regions is projected to decrease, while average precipitation in wet regions is projected to increase, with extreme precipitation events becoming more intense and frequent.

Placer County spans a dramatic elevational range, from 30 feet asl in western portions of the county to more than 9,000 feet asl in the eastern portion of the county. This difference in elevation contributes to a wide range of historical temperature and precipitation. Future climate conditions will also vary across the county; therefore, caution is needed when interpreting data for specific locations within the county, more generalized data for the Sacramento-San Joaquin Basin, or for the entire state of California. Future climate information, downscaled from Global Climate Models, can be important for improved projections in mountainous areas, such as Placer County. The discussion below draws on published work that references the Sacramento region as representative of conditions in the Plan Area in western Placer County.

3.5.2 Temperature

From 1949–2005, California's average annual mean temperature was approximately 56°F. Over the 20th century, this average increased by approximately 1.5°F. In the Sacramento River basin, average annual temperature increased by approximately 2°F over the 20th century. Average seasonal temperatures in California for spring, summer, and fall have experienced almost the same increase of 1.5°F to 1.6°F over the 20th century (Abatzoglou et al. 2009).

Cayan et al. (2012) provides climate model simulations to investigate changes in regional climate in California under a range of greenhouse gas emissions scenarios. The 2012 paper presents forecasts

for the Sacramento Region, which includes the Plan Area. This 2012 modeling is the best regional prediction available and yields results consistent with other similar forecasts. Average annual mean temperature in California is projected to rise from about 1.8°F to 5.4°F by mid-century and about 3.6°F to 9°F by the end of the century (Cayan et al. 2012). In the Sacramento region, including the Plan Area, warming is projected to range from about 1.8°F to 5.4°F by mid-century and about 3.6°F to 9°F by the end of the 21st century, depending on the modeled scenario (Cayan et al. 2012). Warming in California is expected to occur across all seasons, with greater warming in summer and early fall than in winter and spring (Cayan et al. 2012). Winter temperature increases are expected to range from 1.8°F to 7.2°F, and summer temperature increases are expected to range from 2.7°F to 10.8°F by the end of the century across different models and scenarios.

Heat waves,[8] particularly nighttime heat wave events, have become more frequent, hotter, and more persistent in the California-Nevada region (Gershunov et al. 2009). Nighttime minimum temperatures experienced greater warming than daytime maximum temperatures across the California-Nevada region (Gershunov et al. 2009).

The duration of the individual heat waves and the heat wave season in California is projected to lengthen, with the inland heat wave season peaking in July (Cayan et al. 2012; Gershunov and Guirguis 2012). By mid-century, the average annual number of extremely hot days[9] in Sacramento is projected to increase four to fivefold from the base period (1961–1990) (Cayan et al. 2012).

3.5.3 Precipitation

Over the 20th century, precipitation in California increased by approximately 3.5 inches annually, with great year-to-year variability (Abatzoglou et al. 2009). The basin has experienced a gradual increase in precipitation since the 1930s (Bureau of Reclamation 2012). Global climate change is expected to reverse this trend. Although there is significant variability between models and different results from different greenhouse gas emissions scenarios, a consensus of results suggests a 10 to 20 percent decrease in total average annual precipitation by mid-century in California (Luers et al. 2006). In the Sacramento region, which includes western Placer County, declines in precipitation are anticipated, particularly during the second half of the century (Cayan et al. 2012). Seasonally, precipitation is projected to increase in winter and decrease in the fall and spring (Cayan et al. 2012). In the Sacramento River basin, the frequency of different precipitation events is expected to change under warming conditions, with more frequent rainfall events and less frequent snowfall events (Bureau of Reclamation 2012).

3.5.4 Snowpack, Runoff, and Flooding

The Sierra Nevada region is projected to experience a loss in snowpack of more than 25 percent by 2050 and more than 60 percent by 2100 (Knowles and Cayan 2004; Cayan et al. 2012). The mountain range is also projected to experience earlier snowmelt, about 1 month earlier by 2100, accompanied by increased frequency of winter flooding in the Sierra Nevada and lower summer flows (Dettinger et al. 2004). Changes in temperature and precipitation in the Sierra Nevada will most likely continue to cause a decrease in the fraction of total runoff occurring in the spring. Some of these changes have already started to occur. For example, over the past 100 years, the fraction of

[8] Events that exceed the 99th percentile of temperatures from the base period 1950–1999.

[9] Extremely hot days are defined as events that exceed the 98th percentile level of daily maximum temperatures, 100.4°F. Historically, Sacramento has experienced an average of 4 extremely hot days annually from 1961–1990.

the annual runoff that occurs between April and July has decreased by 23 percent for the Sacramento basin.

In Placer County and the surrounding river basins, runoff is generally greater during the winter to early spring months compared with the warm and dry summer and fall. Winter runoff generally comes from rainfall, and spring to early-summer runoff is driven by snowmelt from the Sierra Nevada (Bureau of Reclamation 2011). Increases in temperatures over the Sierra Nevada region over the past 100 years have resulted in less snowfall, more rainfall, and an earlier snowmelt (Cayan et al. 2012; Moser et al 2009). As a result, the reduced snowpack in the natural reservoir produces less snowmelt runoff during the summer and fall seasons (Moser et al 2009).

Overall, these trends suggest greater peak flows from the Sierra Nevada in the rainy season (winter) and lower flows in the dry season (spring and summer) (Knowles and Cayan 2004). The projected effects of climate change on the Sierra Nevada's precipitation patterns and snowpack indicate Placer County will very likely experience an increase in flooding frequency, intensity, and duration over the permit term (Dettinger et al. 2004). Increased flooding will be caused by heavier precipitation events and earlier snowpack melting. Extreme precipitation events in the wet season (winter) will coincide with earlier snowpack melts to increase the threat of flooding.

According to U.S. Army Corps of Engineers requirements, state water operators maintain a certain amount of space in the major reservoirs to provide winter and early spring flood protection. Capturing earlier runoff to compensate for future reductions in snowpack would take up most of the flood protection space, forcing a choice between winter flood prevention and maintaining water storage for the summer and fall dry period use. These effects are therefore likely to change the way many reservoirs in California are operated to achieve their multiple purposes of flood protection, recreation, power generation, fish and aquatic habitat maintenance, and water supply.

3.5.5 Drought

The precise extent of increased drought in Placer County attributable to climate change is difficult to ascertain due to the region's dramatic range of elevations and discrepancies between climate change prediction models. Nonetheless, predicted alterations in precipitation patterns in the Sierra Nevada and Sacramento Basin indicate increased likelihood of drought events in the Plan Area during the permit term. Model projections for precipitation over California continue to show the Mediterranean pattern of wet winters and dry summers with seasonal, year-to-year, and decade-to-decade variability (Moser et al. 2012). For the first time, however, several of the improved climate models shift toward drier conditions by mid- to late century in central and, most notably, Southern California, with a 10 percent decrease (compared to historical average) in precipitation estimated by late century. This drying trend is caused by an apparent decline in the frequency of rain and snowfall. Even in projections with relatively small or no declines in precipitation, the central and southern parts of the state can be expected to be drier because of the warming effects alone. The spring snowpack will melt sooner, and the moisture contained in the soils will evaporate during the long, dry summer months (Moser et al. 2012).

3.5.6 Fire

Over the last three decades, the wildfire season in the United States has increased dramatically. In California, wildfires have been increasing in size, duration, and frequency as a result of longer dry seasons (Westerling et al. 2006; Moser et al. 2009). Poor land management is partially to blame, but

the effects of climate change will have greater implications for wildfires as the 21st century progresses. Studies analyzing the linkages between climate change and fire frequency in California indicate significant increases in large (more than 500 acres) wildfire occurrence and burned area by mid-century (Westerling et al. 2009). By 2050, Westerling et al. (2009) project average increases in both large wildfire occurrence and burned area at around 30 percent compared to a 1961 to 1990 reference period.

Wildfire risk is expected to increase as a result of several factors, including warmer spring and summer temperatures, with decreased levels of precipitation in the fall and spring and reduced water inflows as a result of reduced snowpack and earlier spring snowmelt in the Sierra Nevada (Westerling et al. 2006). Additionally, drier and warmer temperatures lead to increased evapotranspiration, which accelerates moisture uptake from soil and makes vegetation drier and more flammable (Luers et al. 2006). In locations that experience increased precipitation and temperatures, the vegetative fuel load will increase, while in locations that receive less precipitation and increased temperatures, the dried out vegetation will be more flammable (Luers et al. 2006; Moser et al. 2009). Low- or high-elevation bands of forests are at lesser risk for wildfire than mid-elevation bands.

Fuel loads and fire weather predispose areas to wildfire, but the ultimate cause of most wildfires is people. Humans, not natural ignitions through lightning strikes, have caused virtually all of the recent fires in western Placer County where a cause can be ascertained (California Department of Forestry and Fire Protection 2011). The potential for ignitions will increase in the planning area over time as development occurs. This will be especially true in the Foothills where large-lot zoning will result in relatively large areas of natural vegetation in proximity to roads, residences, and recreational sites.

The preservation of parcels with natural habitat within the Foothills (and in the Valley) to offset the losses due to development will further increase the risks of wildfire unless the parcels are adequately treated to reduce fuels and to separate ignition sources from natural vegetation. Managing fuels in the anticipated 50,000 acres of conservation land secured over the life of the Plan will be a challenge and will be dealt with through the fuel and fire management components of reserve management plans described in Chapter 5, *Conservation Strategy*. It will also be a challenge to ensure that new development is planned in a "fire-safe" manner, that defensible space regulations are strongly enforced, and that new residents are well informed about the risks of living in the mosaic of natural vegetation that they will be calling home.

3.5.7 Atmospheric Nitrogen Deposition

Atmospheric available nitrogen comes from many sources, but vehicular nitrogen oxide (NO_X) pollution is the major constituent. Strict vehicle emissions controls have been successful in reducing overall pollutant emissions despite increased vehicular travel. The California Air Resources Board notes that in the 25 years from 1970 to 1995, average NO_X emissions per vehicle were reduced by 58 percent such that cumulative California auto emissions for NO_X and hydrocarbons were 31 percent less compared to 1970 levels, despite a 137 percent increase in vehicle miles traveled (CARB History). NO_X emissions are undergoing further reduction as other sources come under regulation, but eventually growth will reverse the decline.

Local growth in the Plan Area and in the surrounding Sacramento area will contribute to an increased potential for nitrogen deposition, particularly in the PFG and Foothills, which are closer to

and downwind of new-source growth. It is reasonable to assume that nitrogen deposition in the Plan Area will increase over the permit term and that the effect of nitrogen on grassland will be part of the management burden placed on the Reserve System.

3.5.8 Trend Effect on Biological Resources

Ecological responses to climate change are discussed below.

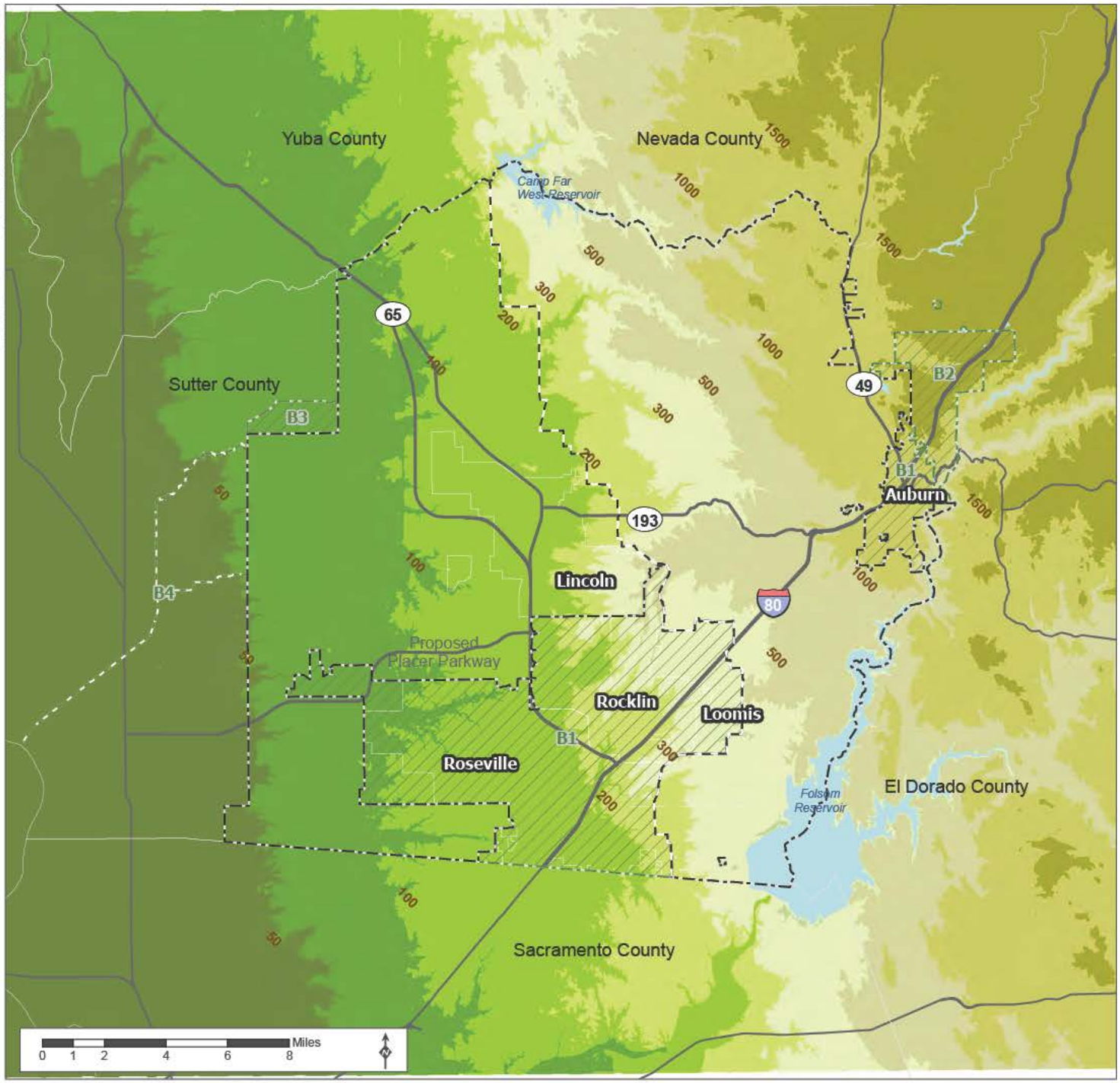
1. Climate change may alter habitat features that are necessary for Covered Species, thereby eliminating suitable habitat or degrading habitat quality. Reduced rainfall will be the main driver of this effect.
2. The number or density of individuals found in a particular location may change. This may be triggered in large part by changes in resource availability associated with an increase or decrease in precipitation.
3. The range and distribution of species may shift geographically, away from existing and future reserve lands.
4. Non-native invasive species could increase in the Plan Area because of changes in the range and distribution of native species and because invasive species tend to be more tolerant of a wider range of environmental conditions than native species.
5. Wildlife disease incidence, spread, and lethality may result from climate change stressors.
6. The seasonal timing of life cycle events in plants and animals, such as flowering, egg laying, hibernation, and migration, may change. The projected increases in temperature in the Plan Area could alter the timing of these life cycle events such that they result earlier or later in the season. These timing shifts can lead to a lack of synchrony between species' interaction events, such as the flowering of plants and the emergence of pollinators.
7. More frequent or more intense disturbance events, such as fire or flooding, could increase the distribution of disturbance-dependent land-cover types.

It is difficult to predict the effect of climatic and other trends on the natural communities of the Plan Area. Many of the trends based on climate change are described as accelerating toward the end of the century, past the permit term. It is reasonable to expect that the intensity and frequency of stress events such as droughts and wildfire will increase over the permit term but not to a level that would result in drastic changes in the character and distribution of the natural communities addressed in the Plan. Reserve management plans will need to use adaptive management to address long-range trends. For example, a foreseeable result of warmer, drier conditions will be that the amount and duration of accumulated water in seasonal wetlands will diminish. This means that the maximum depth and areal extent of vernal pool constituent habitats will be less, changing both the habitat amount and habitat characteristic for Covered Species. A reserve management plan for vernal pool complex would need to take into account the effect of a multiyear drought.

Similarly, regional climatic models indicate an elevation shift in the band of woodlands along the Sierra Nevada foothills. Whereas the present condition in the Plan Area establishes the grassland-woodlands transition contour around 200 feet asl, climate change may shift that transition toward 300 to 400 feet asl. Over the 50-year term of the permit, that climatic effect will be experienced as a reduction in natural regeneration in the lower elevation band. A reserve management plan,

including restoration or enhanced regeneration, will need to take into account the constraints of changed climate.

Just as present and historical land use has had a strong influence on the character and distribution of natural communities, the impact of climate change on land use will also affect natural communities. Nearly all western Placer agriculture depends on irrigation. Essentially all the aquatic/wetland complex community in the Valley is sustained by altered hydrology and dependent on irrigation. If future water supplies become limited by extended drought, or if the growing conditions become unsuitable for present crops, especially rice, the extent of irrigated agriculture and the system of canals and summer water delivery by natural streams will be reduced.



Source: Placer County, 2014; MIG | TRA, 2015; USGS

ELEVATION
Feet above sea level

- 50
- 100
- 200
- 300
- 500
- 1000
- 1500

- Major Road
- Valley/Foothill Divide

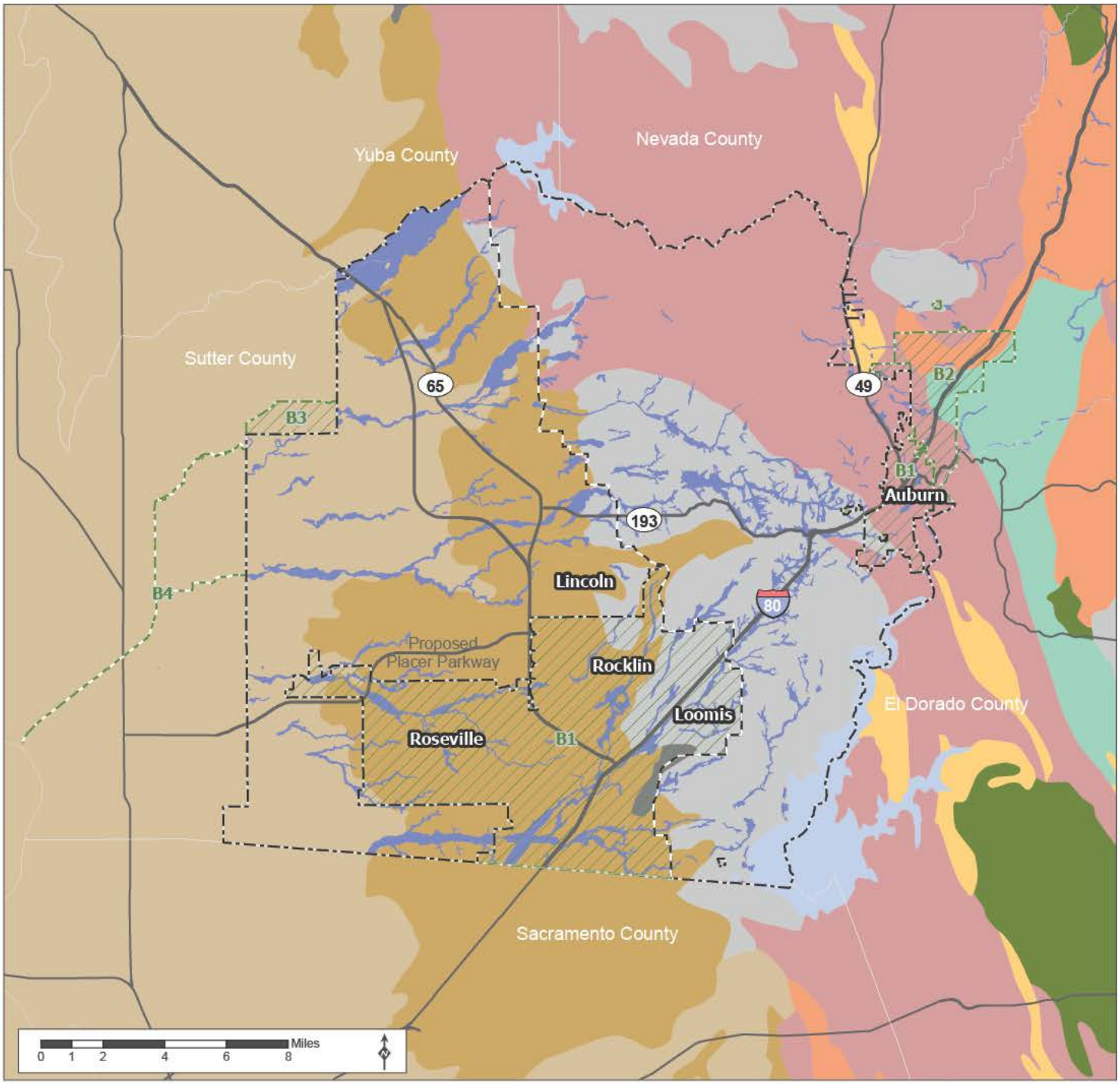
Plan Area A

- Plan Area A

Plan Area B

- B1 Non-Participating Cities
- B2 PCWA O&M
- B3 Raccoon Creek Floodplain
- **B4 Fish Passage Improvement**
- B5 Big Gun Conservation Bank (not shown)

Figure 3-1 Topography



Source: Placer County, 2014; California Geologic Survey, GIS Data for the Geologic Map of California, 2000, reference field ROCKTYPE_1 ; NRCS

Geologic Unit

- alluvium
- andesite
- gabbro
- granodiorite
- mafic volcanic rock
- peridotite
- sandstone
- schist
- slate
- water

Soil Type

mapped in Placer County only

- Xerofluvent

- Major Road
- Valley/Foothill Divide

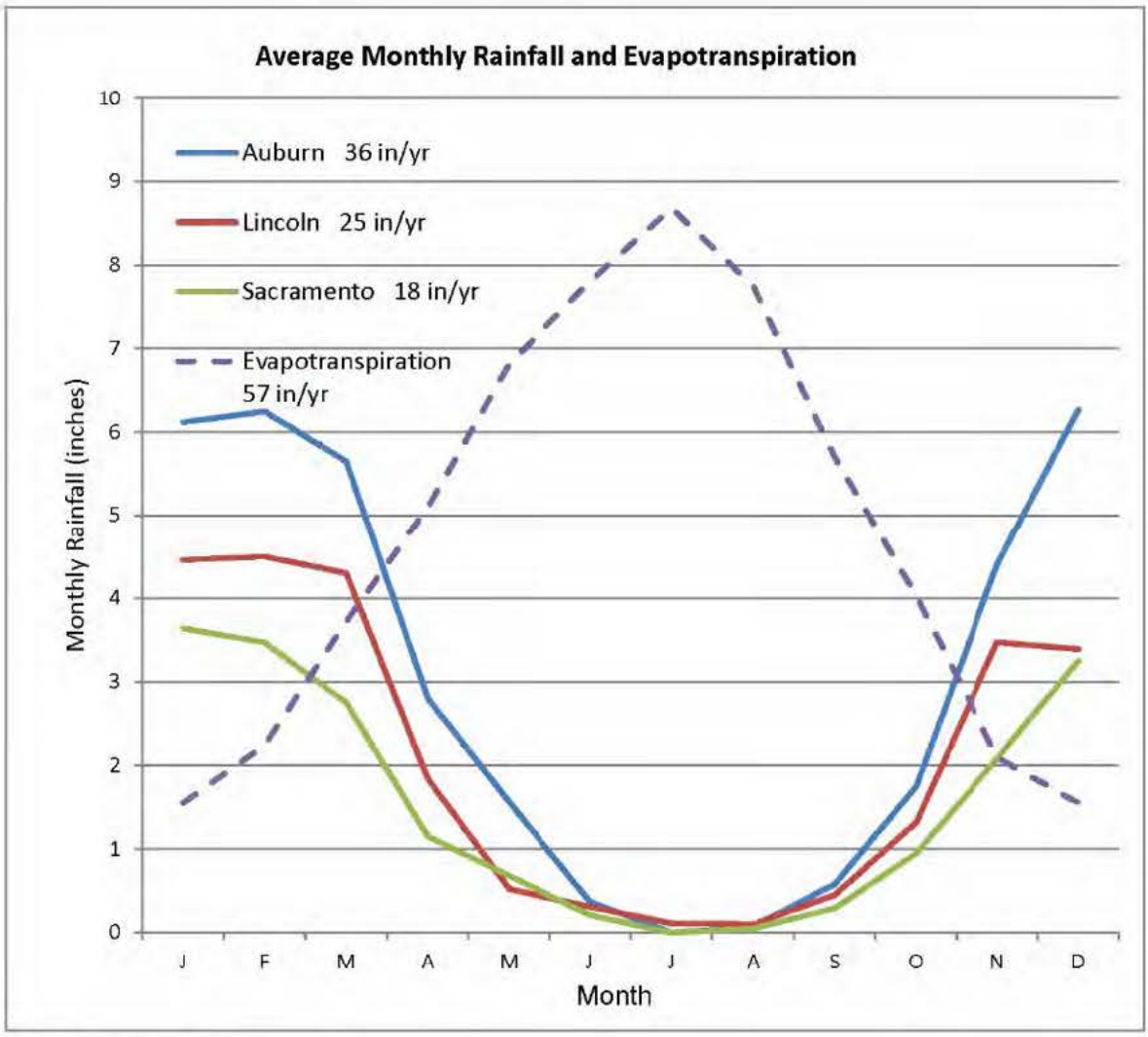
Plan Area A

- Plan Area A

Plan Area B

- B1 Non-Participating Cities
- B2 PCWA O&M
- B3 Raccoon Creek Floodplain
- B4 Fish Passage Improvement
- B5 Big Gun Conservation Bank (not shown)

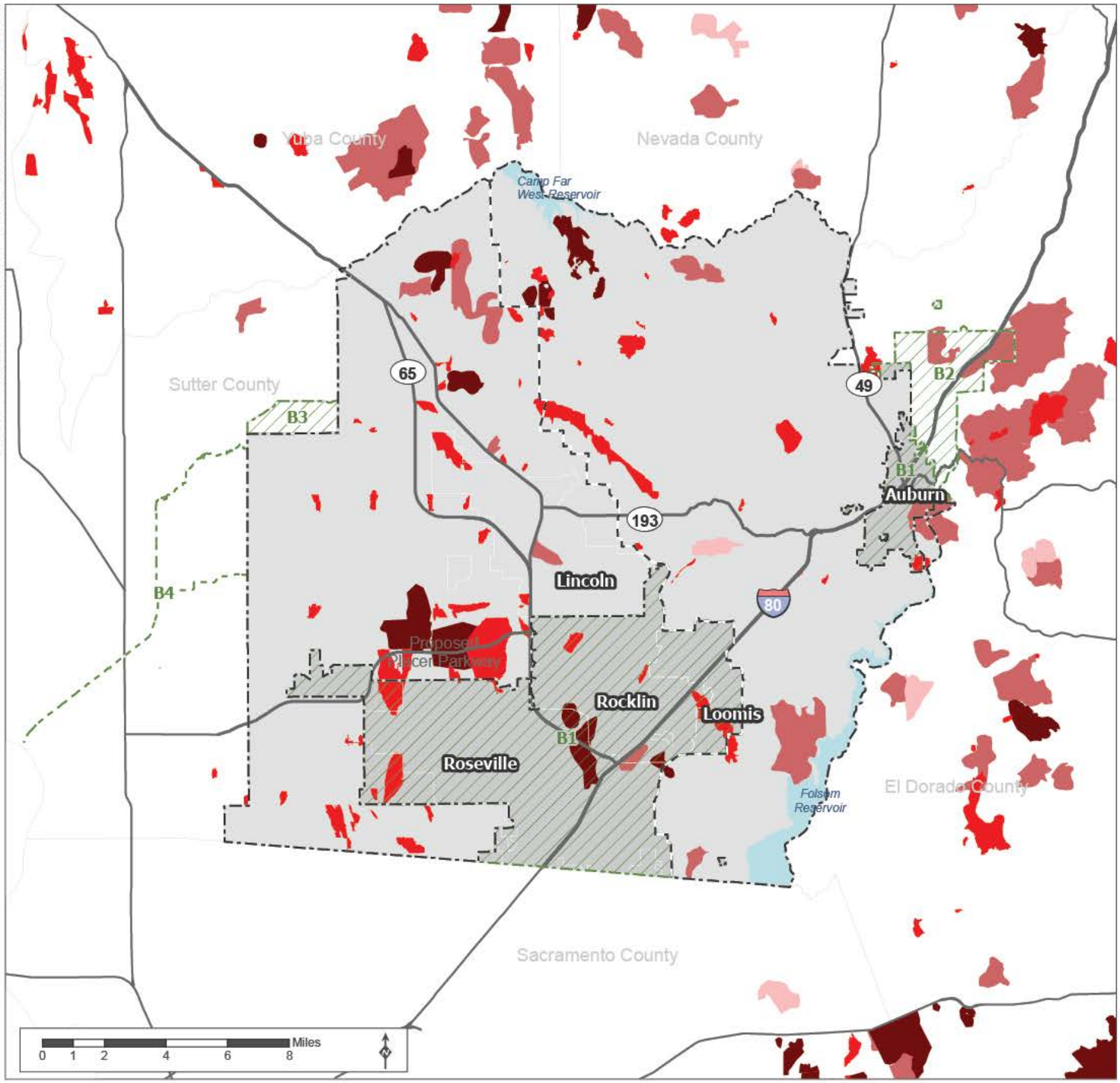
Figure 3-2 Geology and Soils



Source: MIG|TRA 2015

Evapotranspiration: California Irrigation Management Information System, ETo Zones Map 1999
Lincoln: www.weather.com reported at http://en.wikipedia.org/wiki/Lincoln,_California
Auburn, Sacramento: National Climatic Data Center, 1981-2010 Climate Normals

Figure 3-3 Rainfall and Evapotranspiration



Source: Placer County, 2014; Cal Fire, 2013

Burn Areas
- 1991 - 2013
- 1971 - 1990
- 1951 - 1970
- 1878 - 1950

- Major Road
- Valley/Foothill Divide

Plan Area A
- Plan Area A

Plan Area B
- B1 Non-Participating Cities
- B2 PCWA O&M
- B3 Raccoon Creek Floodplain
- B4 Fish Passage Improvement
- B5 Big Gun Conservation Bank (not shown)

Figure 3-4 Historical Wildfire Locations

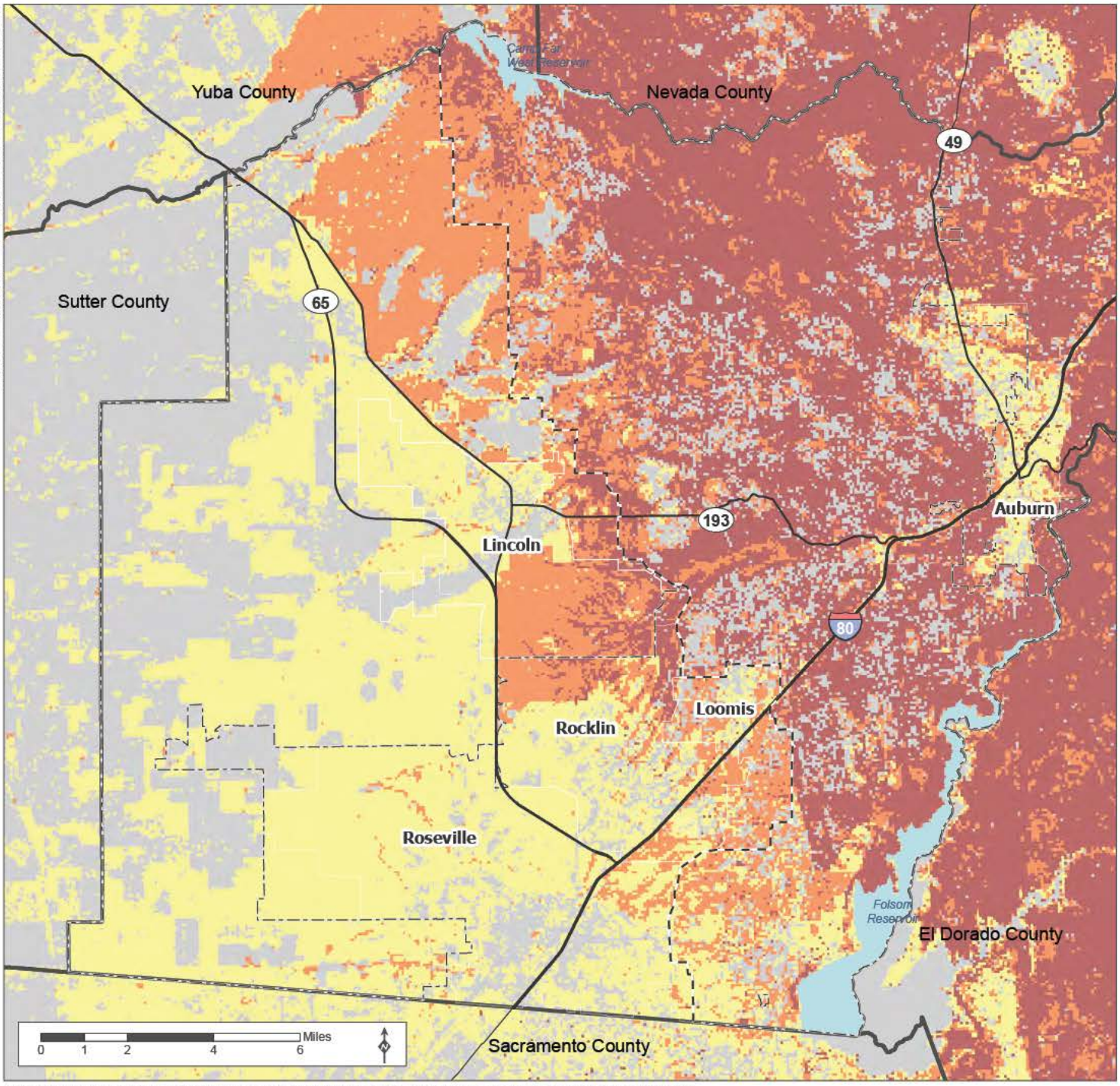
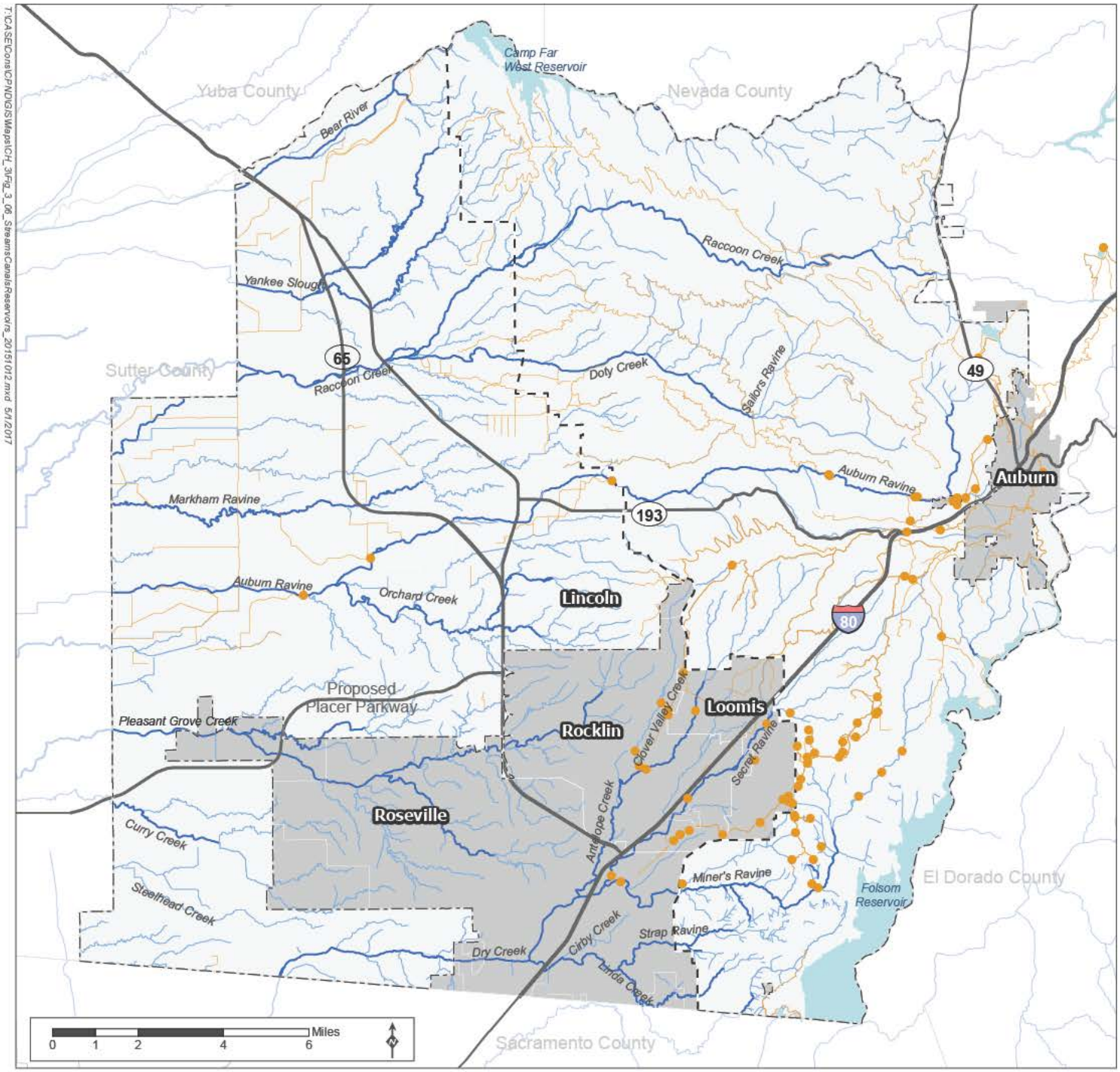


Figure 3-5 Fire Threat

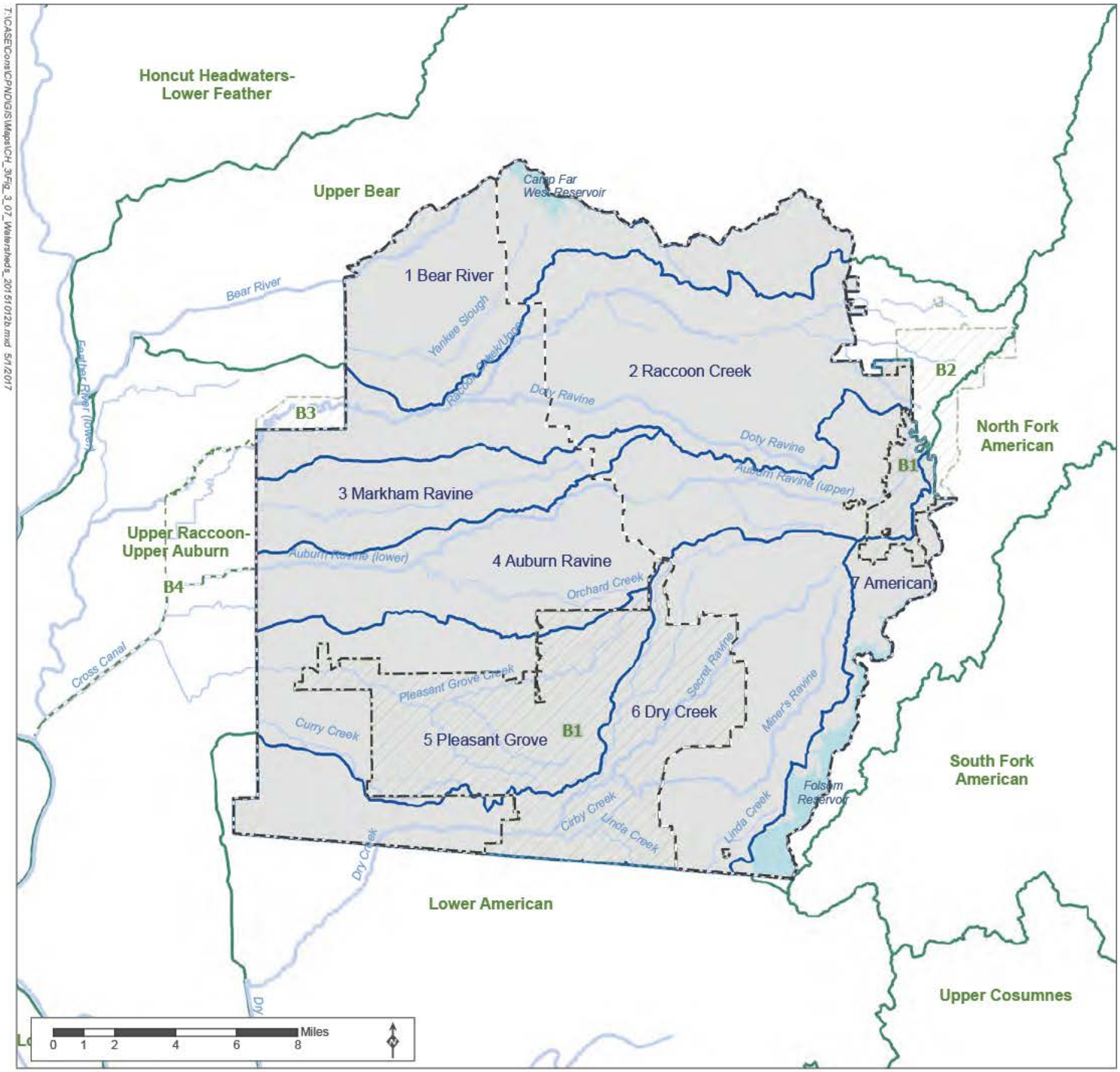


Source: Placer County, 2014; MIG | TRA, 2015; PCWA, 2013; USGS

- Major Stream
- Minor Stream
- Canal
- PCWA Canal/Stream Turnout or Diversion
- Reservoir
- Non-Participating City
- Valley/Foothill Divide
- Plan Area A

Figure 3-6 Streams, Canals, and Reservoirs

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; USGS

HUC 8 Watersheds
Placer County Planning Watersheds
Stream
River
Valley/Foothill Divide

Plan Area A

Plan Area A

Plan Area B

B1 Non-Participating Cities
B2 PCWA O&M
B3 Raccoon Creek Floodplain
B4 Fish Passage Improvement
B5 Big Gun Conservation Bank (not shown)

Figure 3-7 Watersheds

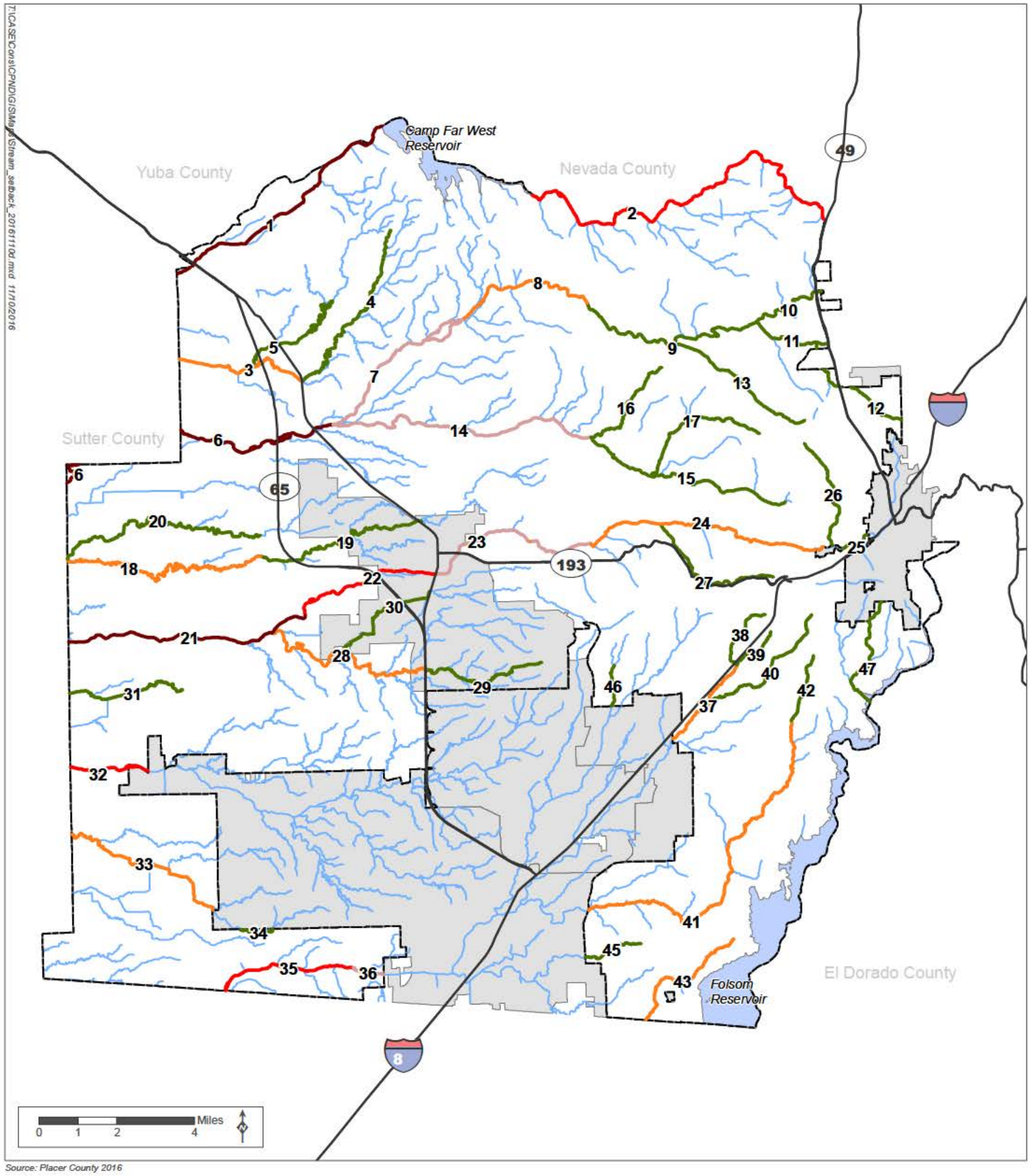
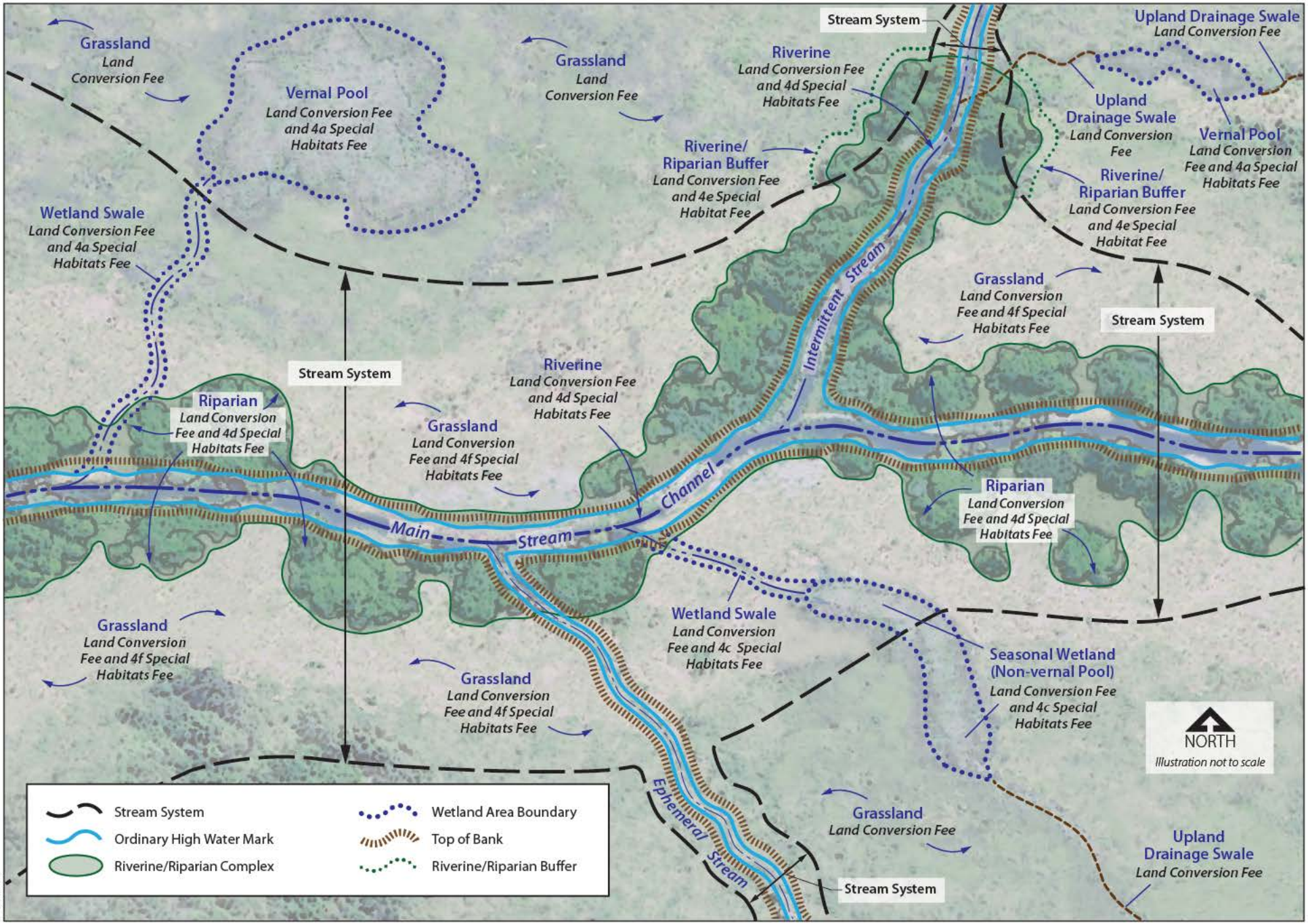
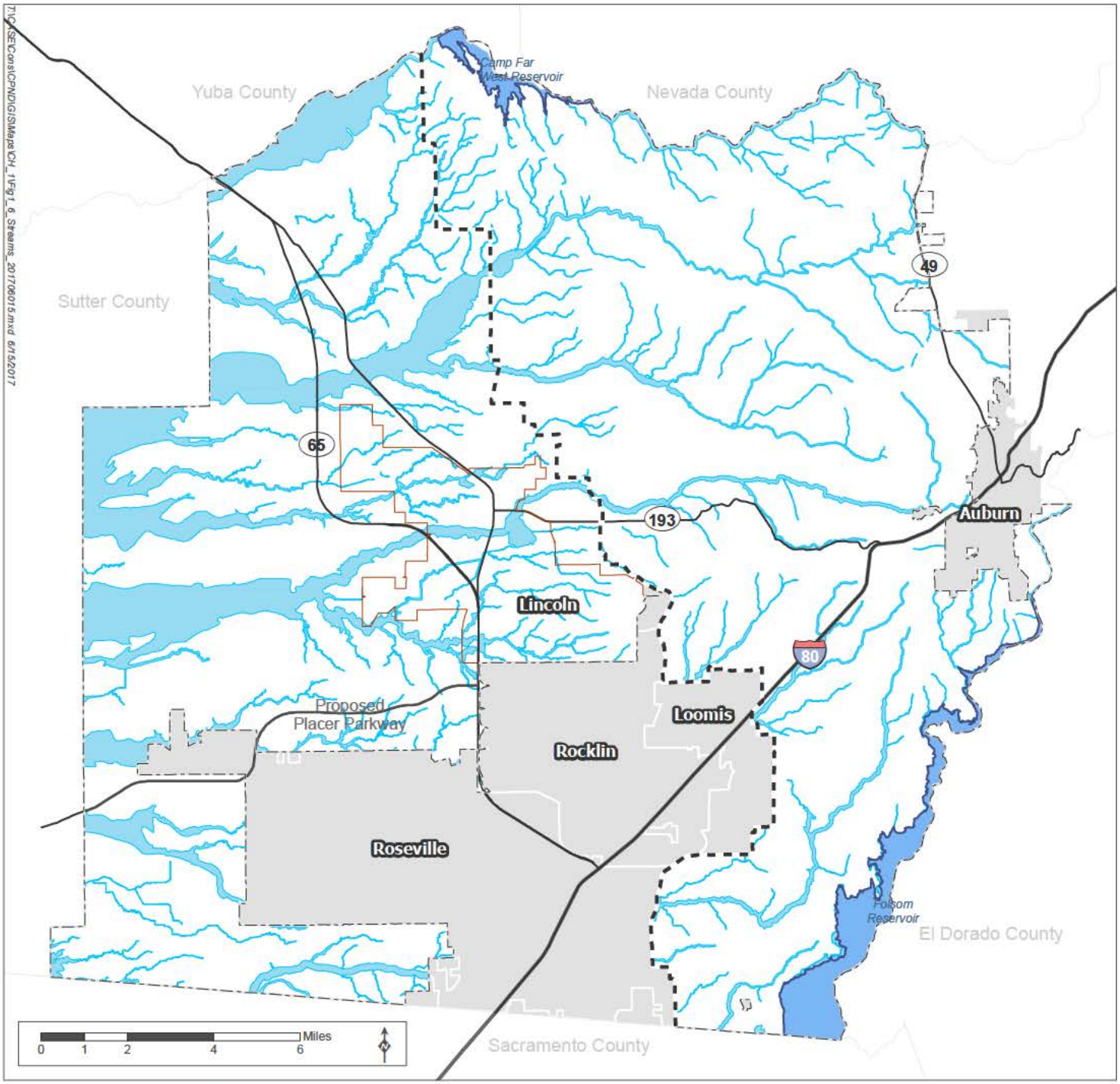


Figure 3-8 Stream System Boundary Widths



NOTES: *1) The development fees are found in Table 9-6 for the Land Conversion Fee and Table 9-7 for Special Habitat Fees.*
2) The figure does not include the 4b Vernal Pool Immediate Watershed Effects special habitat fee that applies to vernal pool constituent habitat indirectly affected by land conversion within the immediate watershed and is paid in addition to the land conversion fee.
3) The figure does not include the 4f Salmonid Stream Channel special habitat fee that applies to linear feet of direct effects in a salmonid stream channel and is paid in addition to the land conversion fee and any other special habitat fee such as fee 4d Riverine/Riparian.

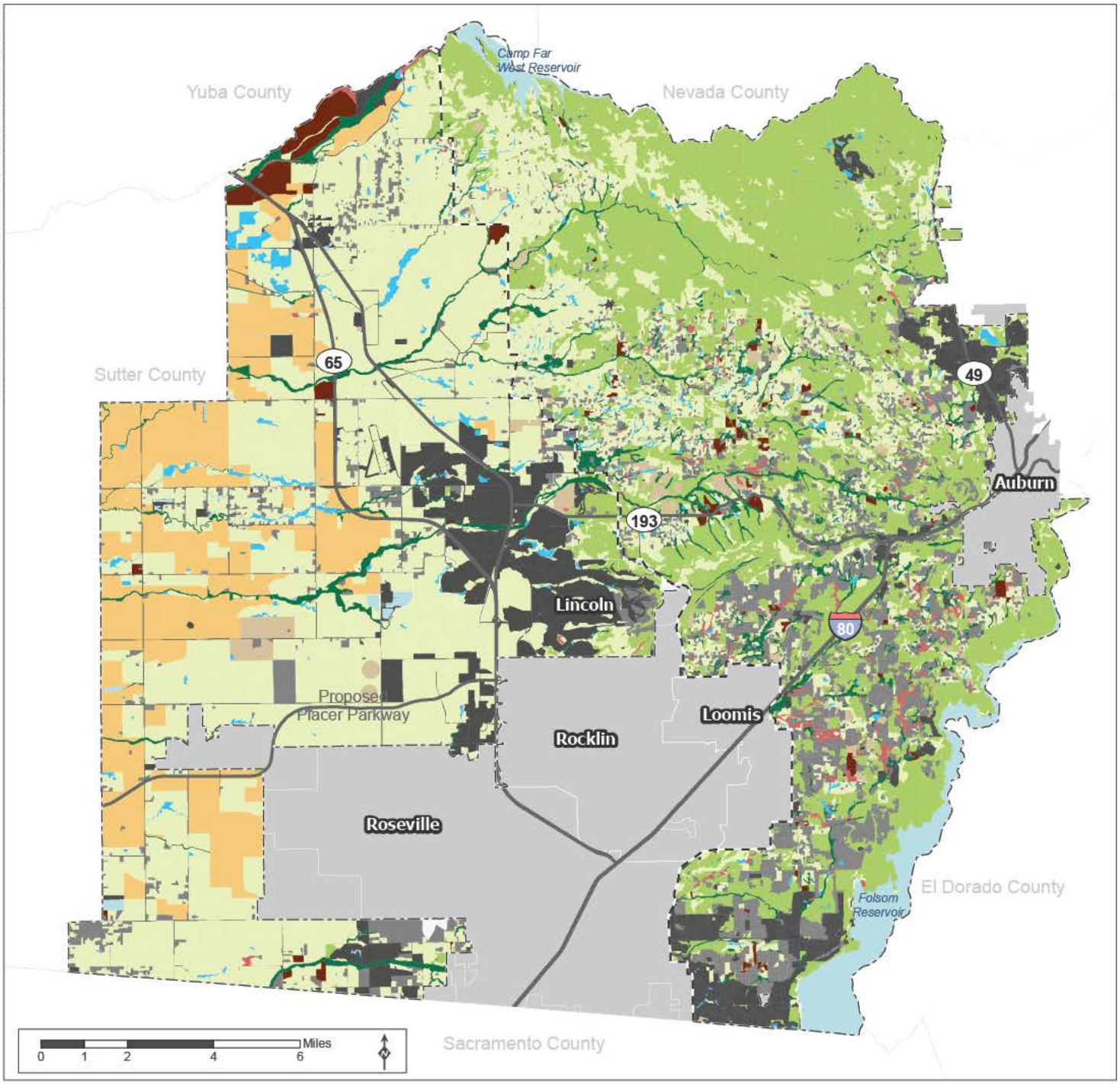
Figure 3-9
Mitigation within the Stream System and Adjoining Areas



Source: Placer County, 2014; MIG | TRA, 2014

- PCCP Stream System
- Reservoir
- Plan Area A
- City of Lincoln
- Valley/Foothill Divide
- Non-participating City

Figure 3-10 PCCP Stream System



Source: Placer County, 2014; MIG | TRA, 2015

Community and Land Cover Type

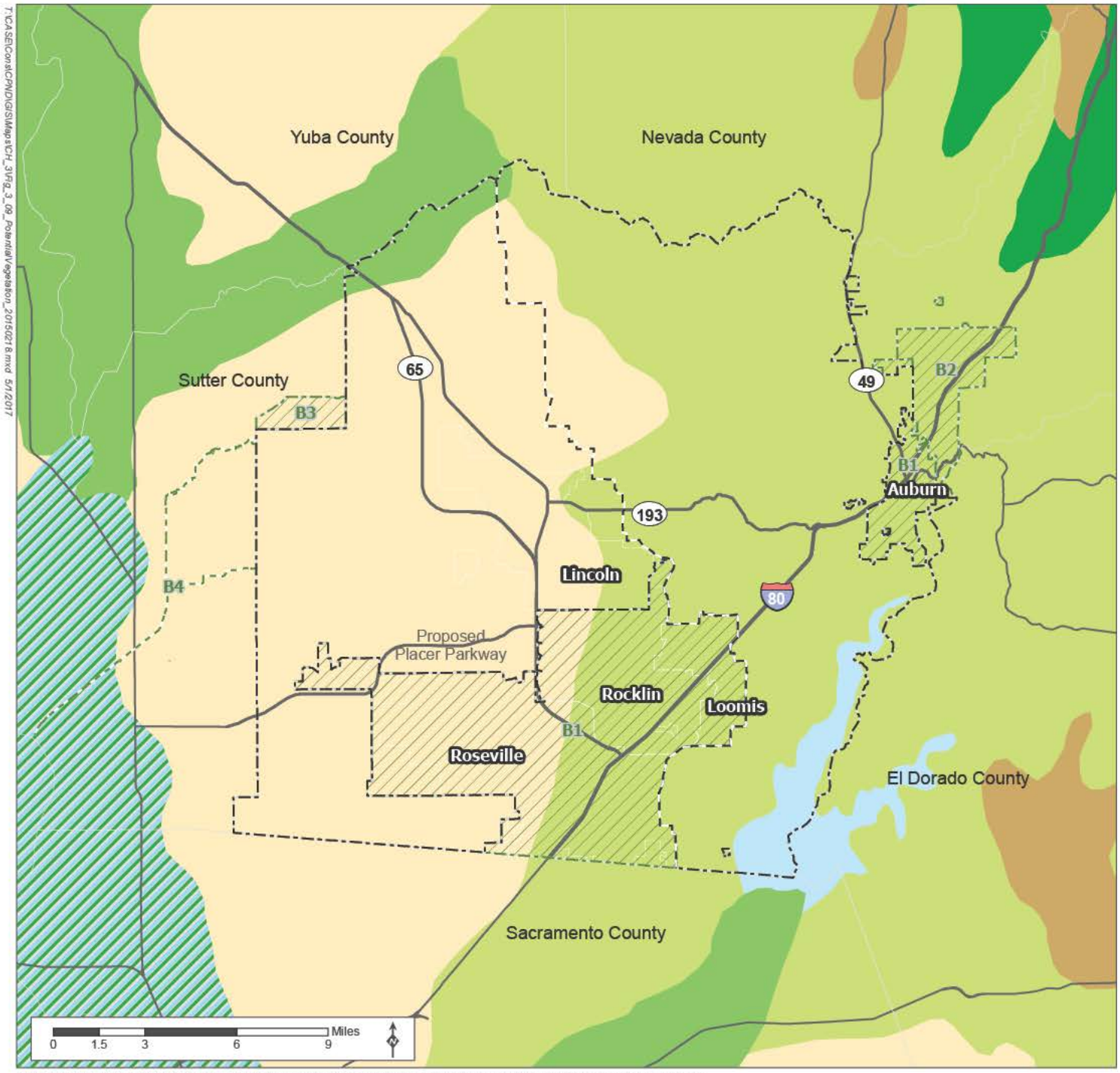
Natural Communities
- Vernal Pool Complex and Grassland
- Aquatic/Wetland Complex
- Riverine/Riparian Complex
- Oak Woodland
- Valley Oak Woodland

Semi-Natural Communities and Other Agriculture
- Rice Agriculture
- Field Agriculture
- Orchard and Vineyard Agriculture

Urban (Non-natural) Communities
- Managed Open Water
- Rural Residential
- Urban

- Non-Participating City
- Valley/Foothill Divide
- Plan Area A

Figure 3-11 Communities



Source: Placer County, 2014; Kuchler Vegetation Potential map for California 1976; database source: U.S. Bureau of Reclamation, MPGIS Service Center.

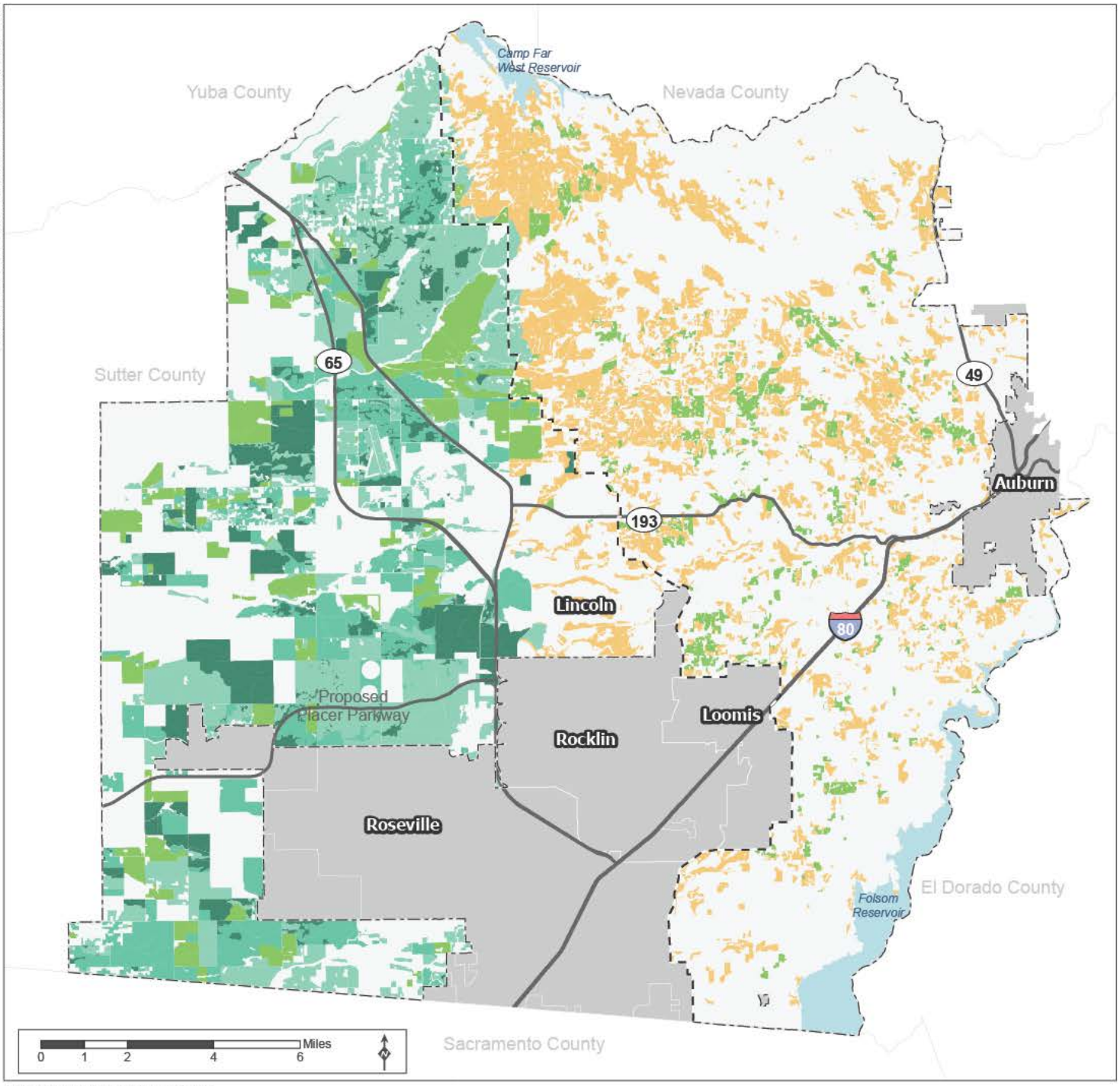
Potential Vegetation
- Blue Oak-foothill Pine Forest
- California Prairie
- Chaparral
- Riparian Forest
- Sierran Yellow Pine Forest
- Tule Marsh
- Water

- Major Road
- Valley/Foothill Divide

Plan Area A
- Plan Area A

Plan Area B
- B1 Non-Participating Cities
- B2 PCWA O&M
- B3 Raccoon Creek Floodplain
- B4 Fish Passage Improvement
- B5 Big Gun Conservation Bank (not shown)

Figure 3-12 Potential Vegetation



Source: Placer County, 2014; MIG | TRA, 2015

Community and Land Cover Type

Grassland

- Annual Grassland
- Pasture

Vernal Pool Complex

- VPC High Density
- VPC Intermediate Density
- VPC Low Density

- Non-Participating City
- Major Road
- Valley/Foothill Divide
- Plan Area A

Figure 3-13 Grassland and Vernal Pool Complex

Placer County Conservation Program - Western Placer County HCP/NCCP

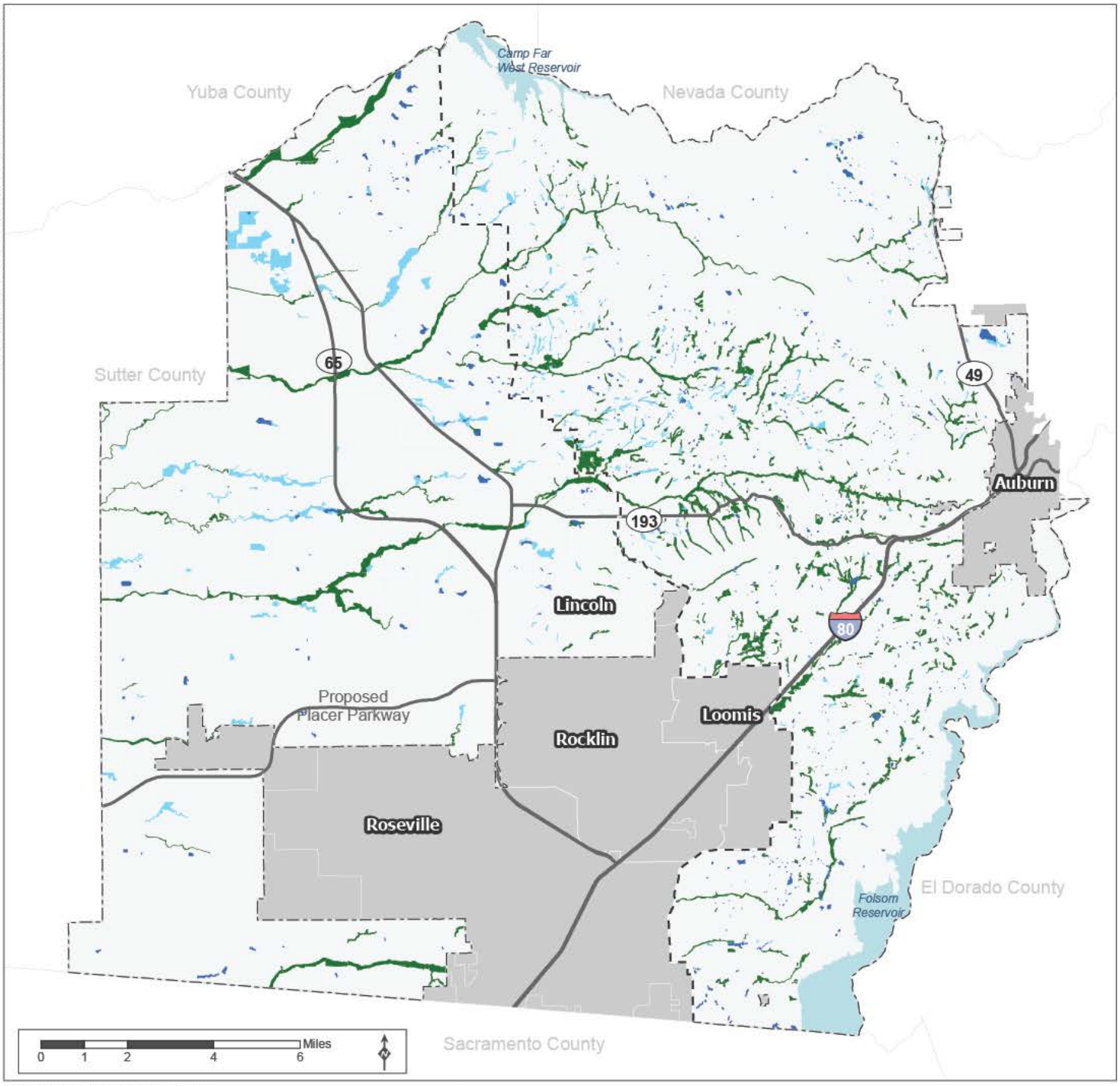
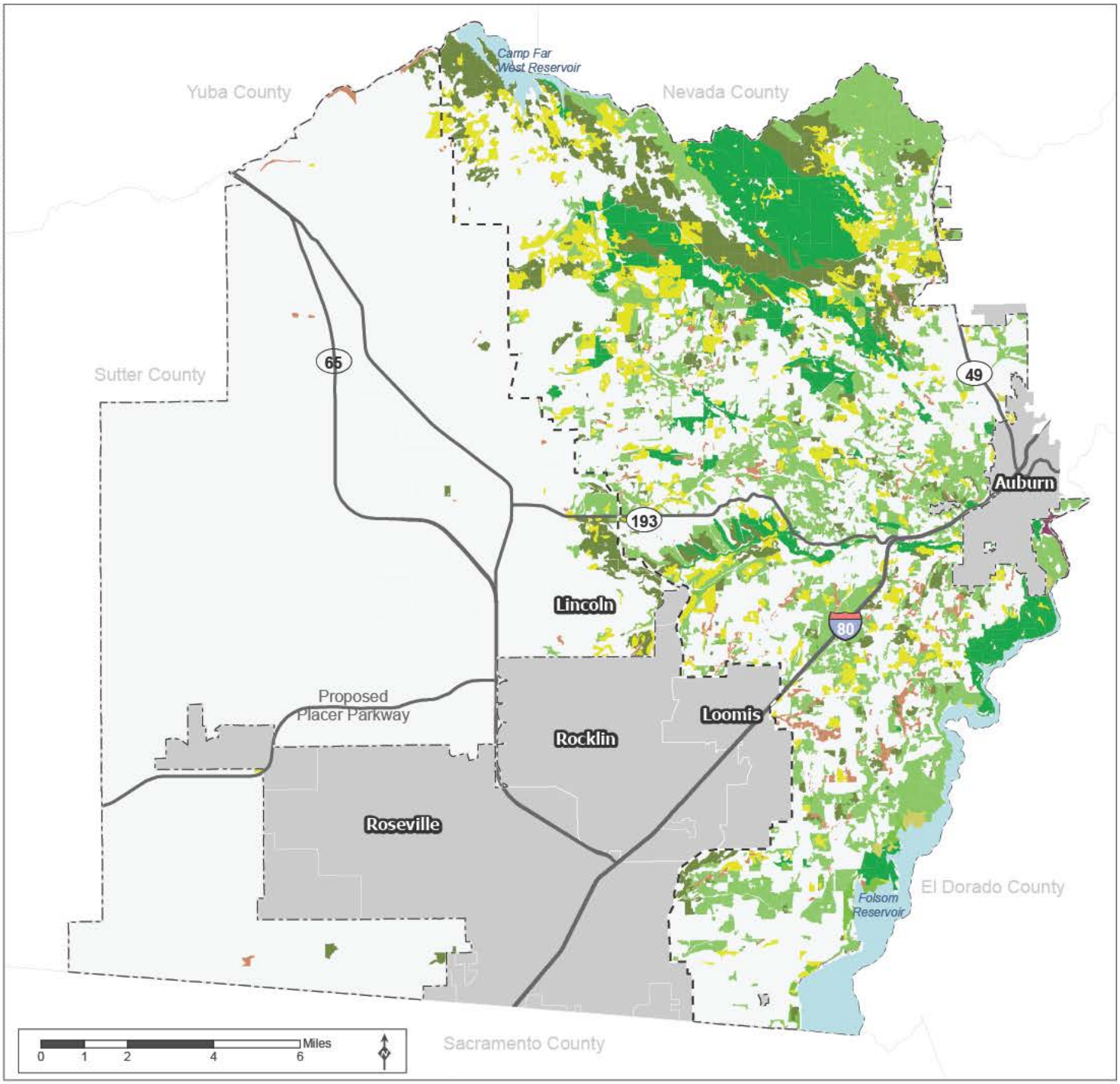


Figure 3-14 Aquatic/Wetland Complex and Riverine/Riparian Complex

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA, 2015

Community and Land Cover Type

Oak Woodland

- Blue Oak Woodland
- Foothill Chaparral
- Interior Live Oak Woodland
- Mixed Oak Woodland
- Oak-Foothill Pine Woodland
- Oak Savanna
- Rock outcrop

Valley Oak Woodland

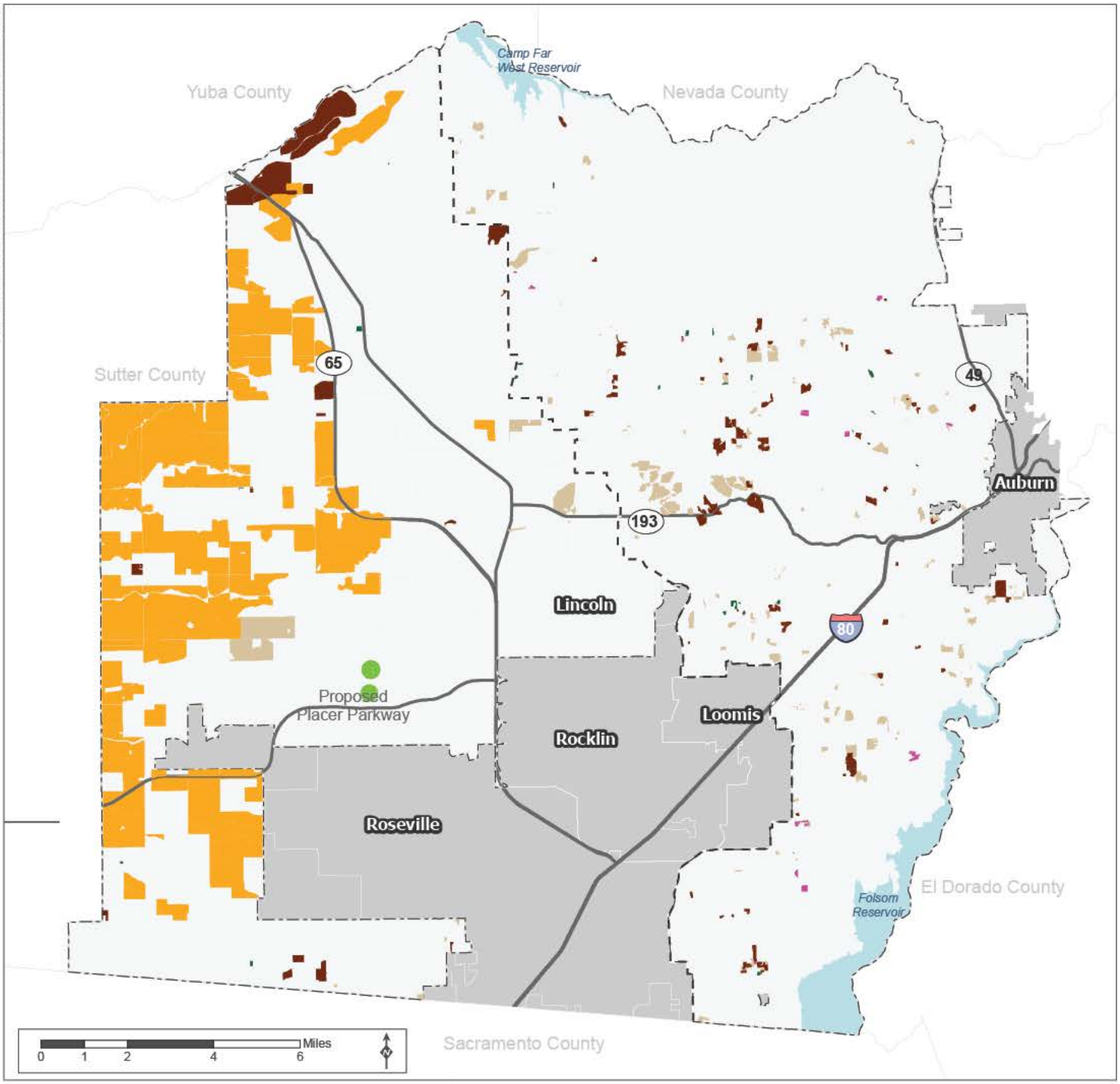
- Valley Oak Woodland

- Non-participating City
- Major Road
- Valley/Foothill Divide
- Area A Boundary

Figure 3-15 Oak Woodland and Valley Oak Woodland

Placer County Conservation Program - Western Placer County HCP/NCCP

MIG | TRA



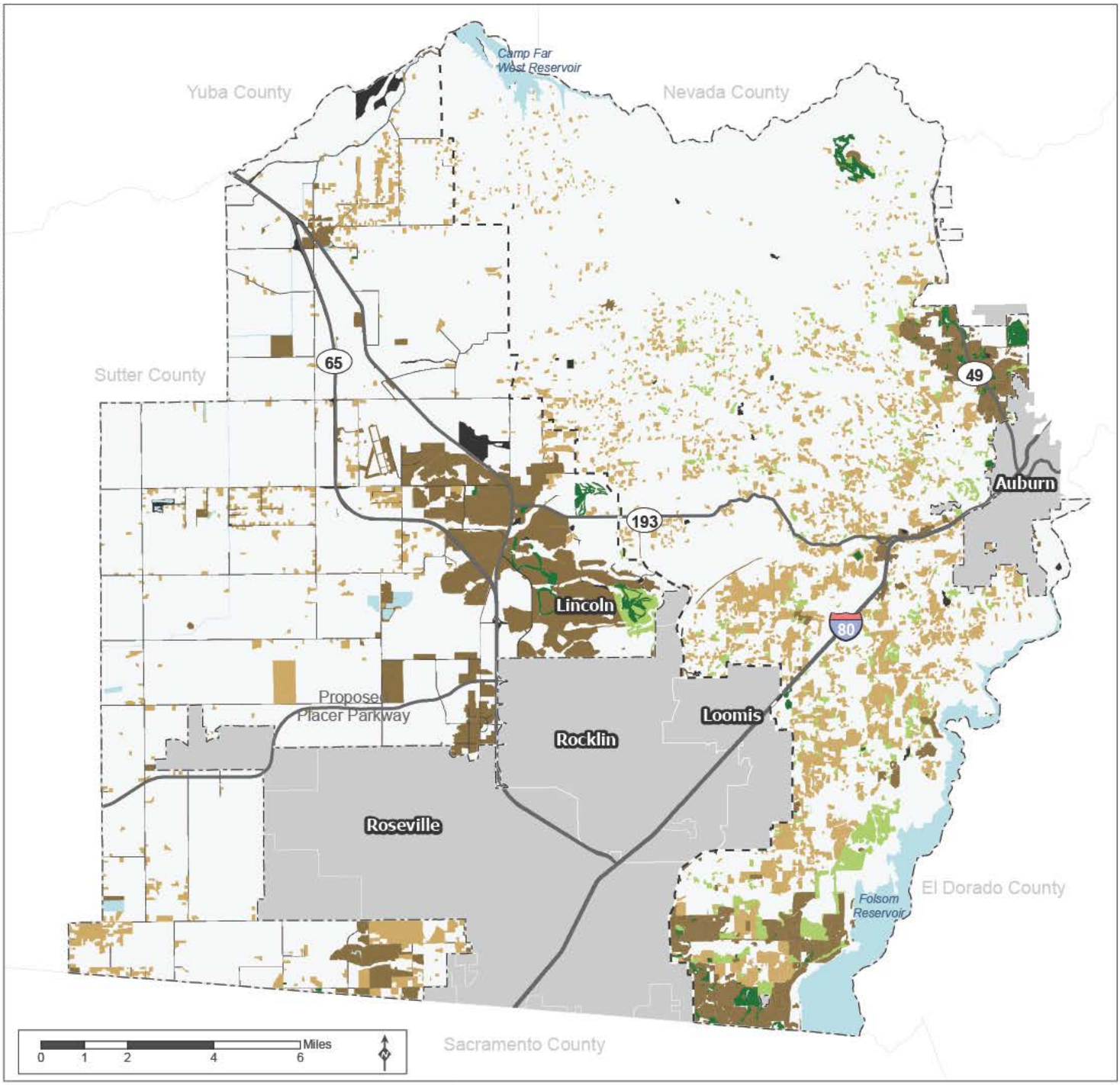
Source: Placer County, 2014; MIG | TRA, 2015

Community and Land Cover Type

Semi-natural and Other Agriculture Communities

- Alfalfa
- Cropland
- Eucalyptus
- Orchard
- Rice
- Vineyard
- Non-participating City
- Valley/Foothill Divide
- Area A Boundary

Figure 3-16 Agriculture and Semi-natural Communities



Source: Placer County, 2014; MIG | TRA, 2015

Community and Land Cover Type

Urban (Non-Natural) Communities

- Canal
- Reservoir
- Urban open water
- Rural residential
- Rural residential forested
- Urban and suburban
- Barren/Industrial Road
- Urban golf course
- Urban park
- Urban riparian
- Urban wetland
- Urban woodland

- Non-participating City
- Major Road
- Valley/Foothill Divide
- Plan Area A

Figure 3-17 Urban and Non-Natural Communities

Chapter 4
Effects of Covered Activities

4.1 Introduction

This chapter addresses the potential permanent and temporary direct, indirect, and cumulative effects of Covered Activities on natural communities and Covered Species and on Critical Habitat, where applicable. Covered Activities include public projects carried out by Permittees and private activities carried out under the authority of Permittees.

This chapter follows the classification of Covered Activities described in Section 2.6, *Categories of Covered Activities*.

1. Valley Potential Future Growth Area (PFG)
2. Valley Conservation and Rural Development Area
3. Foothills PFG
4. Foothills Conservation and Rural Development Area
5. Regional Public Programs
6. In-Stream Activities
7. Conservation Programs

The first four reflect urban and rural development activities within Plan Area A. The latter three are not geographically specific and may occur in either Plan Area A or Plan Area B.

These Covered Activities crosswalk to Plan Area components as shown in Table 2-3. As described in Chapter 2, *Covered Activities*, Plan Area A is where most Covered Activities will occur and Plan Area B is associated with limited coverage.

Because of the broad geographic and temporal scope of the Plan, the estimated effects presented in this chapter are intended to reflect approximate effects rather than a precise quantification of effects on land-cover types. Effects of the Covered Activities are described quantitatively where a methodology allows and qualitatively where there is insufficient basis to derive a numerical estimate of effect.

All of the impact estimates are summed to derive total proposed allowable maximum effects under the Plan and proposed for coverage under the permits. These estimates of maximum effects are expressed as loss of natural communities, wetlands, and modeled habitat for Covered Species (see Tables 4-1, 4-3, and 4-11). These maximum estimated effects represent the proposed limit, or cap, on total effects allowable under the Plan and its permits. Effects that occur beyond the maximum estimated effects would not be covered by the Plan for that parameter (i.e., natural community type, wetland type, or modeled habitat for Covered Species). A Plan amendment would be required to increase the allowable take limits (see Chapter 8, *Plan Implementation*).

As Covered Activities are proposed and implemented, the effects of each Covered Activity will be quantified more precisely based on field surveys and compiled with respect to the maximum extent

of take proposed over the course of the permit term. These data will be used to track effects and ensure that no take limits defined by the permits are exceeded. It is important to note that the estimates of effects of each Covered Activity in this chapter are provided only as a basis for the impact limits proposed in Tables 4-1, 4-3, and 4-11. These estimates are not project-specific estimates, or estimates of the effects of categories of Covered Activities. The Placer Conservation Authority (PCA) expects that some Covered Activities will have less impact than estimated in this chapter, while others will have more impact than estimated. These variations in actual impact are consistent with this Plan as long as the total effects of all Covered Activities remain under the proposed total allowable effects in Tables 4-1, 4-3, and 4-11.

Furthermore, the extent of potential take is limited by conditions on Covered Activities (Chapter 6, *Program Participation and Conditions on Covered Activities*), which are intended to minimize or avoid adverse effects. While this chapter provides context on these conditions, where particularly relevant, details on avoidance and minimization measures are found in Chapter 6, *Program Participation and Conditions on Covered Activities*, and a net effects analysis is provided in Chapter 5, *Conservation Strategy*, where the offsetting mitigation is also described.

Potential effects are presented in several ways below (i.e., by Covered Activity type [Section 4.4, *Effects from Covered Activities*], community [Section 4.5, *Effects on Communities*], watershed [Section 4.6, *Effects on Watersheds*], Covered Species [Section 4.7, *Effects on Covered Species*], and Critical Habitat [Section 4.8, *Effects on Critical Habitat*]). Activities not under the authority of a Permittee are not covered by the Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP or Plan), even if they are located within Plan Area A (see Section 2.4.6, *Participating Special Entities*, and Section 6.2.3, *Application Process for Participating Special Entity Projects*, for exceptions). Notably, agriculture is not included as a Covered Activity, nor is it addressed within the effects analysis unless it is part of conservation strategy implementation through reserve management plans for land acquired by the PCA.

4.2 Definitions

The following terms are defined for the purposes of this Plan:

Cumulative effects result from the proposed action's incremental effect when taken together with past, present, and reasonably foreseeable future actions. For federal purposes, cumulative effects are defined under both the federal Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA). HCPs do not require a discussion of cumulative effects as analyzed under NEPA. The Plan addresses the cumulative effects of public or private activities that could result from individually minor but collectively significant actions that take place over time. The cumulative effects analysis in this chapter is based on the Covered Activities in the context of future growth in the non-participating cities and other activities not covered by the Plan. The Plan does not identify any specific state or tribal projects for coverage in Chapter 2, *Covered Activities*. Any future state or tribal activity will be considered as a Participating Special Entity (see Section 8.9.4, *Take Authorization for Participating Special Entities*). Cumulative effects of all projects will be analyzed under NEPA and the California Environmental Quality Act (CEQA) in the environmental impact statement (EIS)/environmental impact report (EIR) accompanying this Plan.

Direct effects occur when activities immediately result in take or otherwise adversely affect biological resources. Direct effects occur at the time and place of project implementation (e.g.,

ground disturbance, inundation) and thereby remove or alter land-cover types, affecting individuals or populations of Covered Species, Covered Species' habitat, or natural communities. Specifically, direct effects occur within a project "footprint," meaning the outer limit of vegetation clearing, grading, and construction.

Effects are the consequences of an action that alters or otherwise affects biological resources, specifically as applied to natural or semi-natural land-cover types and Covered Species in the Plan Area. Where effects are detrimental to the resource in question, they may be referred to as *adverse effects*. As used in this document, the term *effects* is synonymous with *impacts* and includes "impacts" within the meaning of the California Endangered Species Act, the California Natural Community and Conservation Planning Act (NCCP Act), and Section 10 of the ESA.

Indirect effects are defined by the U.S. Fish and Wildlife Service and National Marine Fisheries Service as "those that are caused by the proposed action and are later in time, but are still reasonably certain to occur" (50 Code of Federal Regulations [CFR] 402.02). For the purposes of this Plan, indirect effects also include those effects that occur at the time of the proposed action but extend beyond the footprint of a project or activity (i.e., beyond the area of land-cover disturbance). Indirect effects can undermine species' viability or habitat quality, especially if multiple indirect or direct effects cumulatively affect the species or degrade its habitat.

Land conversion refers broadly to an activity or process that results in the permanent conversion of a natural or semi-natural land cover to an urban, suburban, rural residential, or other artificial, built-up, or otherwise non-natural condition. It is not meant to apply when one natural or semi-natural land-cover type is converted to another natural or semi-natural land-cover type.

Loss is a more general term to apply to the destruction of habitat or a natural community.

Permanent effects are direct effects that persist for 1 year or more.

Take/taking applied to a Covered Species is defined in the ESA is "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Under the ESA, take of species can occur as a result of inflicting harm. "Harm" is defined by the ESA as "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation that results in death or injury to listed species by impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR 17.3). The term *take* may also apply to destruction of Covered Species' habitat or a natural community containing Covered Species' habitat. Where habitat is occupied or potentially occupied by a Covered Species, take of that species' habitat may constitute take of the species and so the term *take* will apply. *Harass* is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR Section 17.3).

Temporary effects are all effects that persist for less than 1 year. Projects with temporary effects will return habitat to pre-project conditions within 1 year from the time of groundbreaking.

4.3 Methods for Quantifying Effects

Effects are described quantitatively where a methodology allows and qualitatively where there is insufficient basis to derive a numerical estimate of effect. The methods for quantifying effects are described in this section. The results are provided subsequently in Sections 4.4 through 4.8 (*Effects from Covered Activities*, *Effects on Communities*, *Effects on Watersheds*, *Effects on Covered Species*, and *Effects on Critical Habitat*).

The broad geographic and temporal scope of the Plan requires that the effects assessment be conducted at a programmatic level. The quantitative effects analyses presented in this Plan are intended to reflect approximate effects rather than precise measures of land-cover changes. As Covered Activities are implemented over time, specific effects will be documented by the PCA and Permittees. Quantification of project-specific effects will generally occur in conjunction with the CEQA process and/or the development permit application process with a local jurisdiction (see Chapter 6, *Program Participation and Conditions on Covered Activities*).

Methods for quantifying effects are described for each of the following effect categories:

- Land Conversion – Permanent Direct Effects
- Temporary Direct Effects
- Increase in Urban-Wildland Adjacency
- Increase in Rural Densities
- Effects of Covered Activities on Streams
- Effects of Covered Activities on Watersheds
- Habitat Enhancement, Restoration, and Creation

This section ends with a discussion on the limitations of the analysis.

4.3.1 Methods for Land Conversion and Permanent Direct Effect

The majority of take over the permit term is expected to occur as a result of land conversion from continued urban, suburban, and rural residential development within the areas designated for potential future growth. Two methods were used to estimate the effects of land conversion from development, one specific to the Valley described in Section 4.3.1.1, *Land Conversion in the Valley*, and one specific to the Foothills described in Section 4.3.1.2, *Land Conversion in the Foothills*. Note that other effects associated with urban growth, including temporary and indirect effects, are summarized separately (Section 4.3.2, *Methods for Assessing Temporary Direct Effects;* Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley;* Section 4.3.4, *Methods to Assess Indirect Effects from the Increase in Rural Densities in the Foothills;* Section 4.3.5, *Methods for Effects of Covered Activities on Streams*; and Section 4.3.6, *Methods for Effects of Covered Activities on Watersheds*).

The effects analysis for land conversion is described in detail in Appendix G, *Take Assessment Methodology*. This methodology is based on the growth scenario described in Appendix M, *Growth Scenario Memo*. For the HCP/NCCP permits, the land conversion estimates reflect the maximum extent of take proposed over the course of the 50-year permit term.

Communities and constituent habitats will be the metrics by which effects are tracked. The maximum extent of take proposed and effects estimates are shown in Table 4-1. Some guidance regarding Table 4-1 follows:

- Two categories of effect were established, those subject to fixed limits that reflect the maximum extent of take proposed and those with a flexible limit. The flexible amounts presented in the table provide context for the range of effects that may occur.

Flexibility was created because actual loss during Plan implementation may differ from the effects estimates. This is acceptable as long as the losses in the "Maximum Effect" column are not exceeded.

- When reading the table, the italicized numbers are the estimates (labeled "Flexible"), while non-italicized numbers are the maximum effects proposed for coverage under the Plan.
- The values in the "Maximum Effect" column represent the maximum amount of permanent, direct effects (loss) of natural community or constituent habitat proposed for coverage under the Plan.
- The Plan proposes a maximum effect for some but not all communities and constituent habitats, in part, because the relationship between theses habitats is hierarchical, and constituent habitats are nested within natural communities. The maximum estimated effects on the constituent habitats with a flexible limit is set at the level of the complex and semi-natural community (for agriculture).
- Some natural community complexes have associated uplands that are included in the table. These are areas such as grassland or valley oak woodland that may be interspersed with the constituent habitats that compose the complex.
- Individual constituent habitats are summed to a row above titled "Constituent Habitat Total." For example, fresh emergent marsh, lacustrine, and non-vernal pool seasonal wetlands sum to "Aquatic/Wetland Constituent Habitats Total."
- The Plan proposes a maximum effect within Plan Area subcomponents (i.e., Plan Area A – Valley, Valley PFG, Valley Conservation and Rural Development Area, Plan Area A – Foothills, Foothills PFG, Foothills Conservation and Rural Development Area, and Plan Area B).
- The maximum effect proposed for coverage under the Plan in the PFG and the conservation and rural development area do not sum to the Plan's total maximum effect in the subareas overall. For example, a total of 3,500 acres of effects on grassland is proposed for coverage in the Valley. However, the maximum effect within grassland is 3,400 acres for the PFG and 110 acres for the conservation and rural development area, respectively. If all 3,400 acres of effects occur in the PFG then only 100 acres of effects would be covered in the conservation and rural development area (not 110 acres), because the proposed maximum effect for the Valley is 3,500 and cannot be exceeded.
- Conversion of one natural or semi-natural community to another for restoration and/or creation to meet Plan requirements does not count toward the maximum effects in Table 4-1. Similarly, direct and indirect effects related to implementing the conservation program do not count toward the maximum effects in Table 4-1.

A description of the proposed limits as estimated as the maximum effect for each community type follows.

Vernal Pool Complex: The vernal pool complex includes three constituent habitat types: vernal pool wetlands, seasonal wetlands in vernal pool complex, and seasonal swales. The maximum extent of take is proposed for both the vernal pool complex natural community and vernal pool constituent habitats. The estimate of maximum effect for the vernal pool complex natural community is 12,550 acres. This includes all effects on vernal pool constituent habitats as well as associated "uplands," which are grassland areas interspersed within the constituent habitats.

Total maximum effects estimated for vernal pool constituent habitats are 580 acres. Within this proposed 580-acre limit, no more than 185 acres of effects are permissible on vernal pool wetlands. The allowable effects on other constituent habitats (seasonal wetlands in vernal pool complex and seasonal swales) are intended to be flexible, but effects that exceed the collective maximum effect of 580 acres for all vernal pool complex constituent habitats would not be covered by the Plan.

This approach is meant to provide some flexibility in how the proposed take limits are reached. For example, as stated previously, there are an estimated 580 acres of effects on vernal pool constituent habitats and 11,970 acres of associated uplands. Collectively these sum to the 12,550 acres of estimated effects on vernal pool complex to be covered by the Plan. Effects that exceed the maximum estimate of 580 acres will not be covered by the Plan. If fewer than 580 acres of vernal pool constituent habitats are affected, more than the estimated 11,970 acres of upland habitat could be affected within the proposed overall take limit of 12,550 acres for the vernal pool complex community.

Grasslands. The grassland natural community does not include constituent habitats (for a full listing of habitat constituents and their primary associated community types see Table 3-6). Within the grassland natural community, no more the 6,900 acres of total effects are proposed to be covered by the Plan.

Aquatic/Wetland Complex: The aquatic/wetland complex natural community contains three constituent habitats: fresh emergent marsh, lacustrine, and non-vernal pool seasonal wetland. There are no take limits proposed for the aquatic/wetland complex natural community type. Rather, limits are proposed for the associated constituent habitats. The Plan estimates a maximum effect of 260 acres for all aquatic/wetland constituent habitats. No more than 105 acres of these effects can be on fresh emergent marsh. The effects on lacustrine and non-vernal pool seasonal wetlands are proposed to be flexible, but the Plan will not cover collective effects on all aquatic/wetland constituent habitats that exceed 260 acres.

Because the maximum effects are defined for the aquatic/wetland constituent habitats, rather than the aquatic/wetland complex, take limits are not proposed for aquatic/wetland complex uplands. Effects on uplands included within an aquatic/wetland complex will count toward the affected natural community take limits. For example, if patches of grassland are included within an affected aquatic/wetland complex, effects on grassland would count toward the grassland natural community take limit.

Riverine/Riparian: The riverine/riparian complex natural community contains two constituent habitats: riverine and riparian. The Plan does not propose take limits for the riverine/riparian complex natural community. Rather, take limits are proposed for the associated constituent habitats. The Plan estimates a maximum effect of 490 acres for all riverine/riparian constituent habitats. No more than 375 acres of these effects are estimated to be on riparian; exceeding 375 acres of effects on riparian would not be covered by the Plan. The effects on riverine are intended to be flexible, but

the maximum effects on all riverine/riparian constituent habitats are 490 acres. Effects that exceed a total of 490 acres on all riverine/riparian constituent habitat would not be covered by the Plan.

Because the proposed take limits are defined for the riverine/riparian constituent habitats, rather than the riverine/riparian complex, take limits are not proposed for riverine/riparian complex uplands. Effects on uplands included within riverine/riparian complex will count toward the affected natural community take limits. For example, if patches of valley oak woodland are included within an affected riverine/riparian complex, effects on the valley oak woodland would count toward the proposed valley oak woodland natural community take limit.

Valley Oak Woodland. The valley oak woodland natural community does not include constituent habitats (for a full listing of habitat constituents and their primary associated community types see Table 3-6). Within the valley oak woodland natural community, no more than 140 acres of total effects are proposed to be covered by the Plan.

Oak Woodland. The oak woodland natural community does not include constituent habitats. Within the oak woodland natural community, no more than 6,120 acres of total effects are proposed to be covered by the Plan.

Agriculture. The category "agriculture" in Table 4-1 includes three natural community types: rice agriculture, field agriculture, and orchard and vineyard agriculture. Maximum effects on the rice agriculture community are 2,060 acres; effects on rice agriculture that exceed 2,060 acres would not be covered by the Plan. The effects on field agriculture and orchard and vineyard agriculture ("any other agriculture" in Table 4-1) are flexible, but the Plan would not cover collective effects on all communities and constituent habitats that exceed the total limits ("Total All" row in Table 4-1).

The Plan estimates total, maximum effect of 30,100 acres on communities and constituent habitats that are proposed for coverage. This is the sum of all effects that are either "Maximum Effect" or "Flexible."

Table 4-1. Maximum Permanent Direct Effect on Communities and Constituent Habitats (acres) Based on Land Conversion

	Total Plan Area		Plan Area A – Valley			Plan Area A – Foothills			Plan Area B
Communities and Constituent Habitats	**Maximum Effect**	**Flexible**	**PFG**	**CRD**	**All Valley**	**PFG**	**CRD**	**All Foothills**	**All Plan Area B**
Vernal Pool Complex (VPC)	**12,550**		**12,200**	**280**	**12,400**	**10**	**100**	**100**	**50**
Vernal Pool Constituent Habitats Total	580		560	10	570	-	-	-	10
Vernal Pool Wetland	185		180	10	180	-	-	-	5
Seasonal Wetland in VPC		*223*	*220*	*10*	*220*	-	-	-	*3*
Seasonal Swales		*172*	*170*	*10*	*170*	-	-	-	*2*
Vernal Pool Complex Uplands		*11,970*	*11,640*	*270*	*11,830*	*10*	*100*	*100*	*40*
Grassland	**6,900**		**3,400**	**110**	**3,500**	**3,000**	**500**	**3,300**	**100**
Aquatic/Wetland Complex		***260***	***120***	***10***	***120***	***110***	***30***	***130***	***10***
Aquatic/Wetland Constituent Habitats Total	260		120	10	120	110	30	130	10
Fresh Emergent Marsh	105		50	10	50	40	10	50	5
Lacustrine		*103*	*50*	*10*	*50*	*40*	*10*	*50*	*3*
Non-VP Seasonal Wetland		*52*	*20*	*10*	*20*	*30*	*10*	*30*	*2*
Aquatic/Wetland Complex Uplands	-		-	-	-	-	-	-	-
Riverine/Riparian Complex		***490***	***150***	***10***	***150***	***310***	***20***	***330***	***10***
Riverine/Riparian Constituent Habitats Total	490		150	10	150	310	20	330	10
Riverine		*115*	*80*	*10*	*80*	*30*	*10*	*30*	*5*
Riparian	375		70	10	70	280	10	300	5
Riverine/Riparian Complex Uplands	-		-	-	-	-	-	-	-
Valley Oak Woodland	**140**		**30**	**10**	**30**	**100**	**10**	**100**	**10**
Oak Woodland	**6,210**		**1,100**	**10**	**1,100**	**4,700**	**400**	**5,100**	**10**
Subtotal Natural Communities	**26,550**		**17,000**	**430**	**17,300**	**8,230**	**1,060**	**9,060**	**190**
Agriculture		***3,550***	***2,700***	***270***	***2,900***	***540***	***20***	***540***	***110***
Rice Agriculture	2,060		1,800	200	2,000	-	-	-	60
Any Other Agriculture		*1,490*	*900*	*70*	*900*	*540*	*20*	*540*	*50*
Total All	**30,100**		**19,700**	**700**	**20,200**	**8,770**	**1,080**	**9,600**	**300**

Notes: Effects on the in-stream habitat are discussed separately in Table 4-7. Estimates are in italics, are not the maximum effects proposed for coverage under the Plan, and are provided as estimates only.

PFG = Potential Future Growth Area

CRD = Conservation and Rural Development Area

4.3.1.1 Land Conversion in the Valley

For the Valley, estimates of land conversion associated with development are not based on actual project plans but on a growth scenario that uses estimated activity footprints and historical patterns of development. Because the specific location of most Covered Activities is unknown, the land conversion estimate is applied to the current landscape on a pro rata basis. This section addresses only the direct, permanent effects of land conversion from development in the Valley (both the Valley PFG and the Valley Conservation and Rural Development Area) that are shown in Table 4-1.

The extent and location of future growth is described in Chapter 2, *Covered Activities*, and in Appendix M, *Growth Scenario Memo*. This analysis establishes a reasonable scenario for growth in employment and housing in the Plan Area over 50 years. Because different parts of the Plan Area will grow at different rates, the Plan Area is divided into demographic projection zones (Appendix M, *Growth Scenario Memo*). The growth scenario gives an estimate of the land area (acres) required to accommodate anticipated future growth. The estimated area (acres) of future development resulting from the growth scenario were not linked to land cover; further analysis was required to determine how predicted growth would affect natural communities and species.

The growth scenario was combined with geographic information system (GIS) mapping of land cover, the Stream System, Permittees' general plans, and other data to prepare a plan effect model. To link the growth scenario to land cover, the following steps were implemented as described in Figure 4-1. The proportion of total land area available for development in the Valley PFG was calculated. Certain land uses were excluded from development, such as land already in Existing Reserves and Other Protected Areas (EXR), as development is prohibited in these areas. Certain land-cover types were also excluded: canals, reservoirs, barren/industrial, other urban uses, and existing roads. These areas were designated as being zero percent available either because they were already developed or because development was physically precluded. Other land-cover types were assessed as being partially available for development; some direct effects could occur as the result of urban expansion. Land within the Stream System was assigned low availability (10 percent), because physical constraints along with federal and state regulatory processes limit development within the stream, the 100-year floodplain, and the associated riparian buffer. Small ponds, such as stock ponds or recreational ponds, are assessed as being 50 percent available; oak woodlands are 100 percent available if the woodland patch size was greater than 2 acres in area. Woodland areas fewer than 2 acres in size are not considered functional woodlands. Effects on trees in these areas are addressed by local tree ordinances unless the vegetation provides habitat for Covered Species (e.g., a nesting tree for Swainson's hawk as addressed in Chapter 6, *Program Participation and Conditions on Covered Activities*).

Note that the availability of a land cover does not reflect its value for natural species or communities, but simply its suitability for land development as limited by existing regulations and by physical conditions (e.g., reservoirs are not available for development). The effects model does not impose an avoidance requirement on any land-cover type for conservation. The model does restrict allocation of future development in the Stream System, reflecting the regulatory effect of existing stream protection and the presence of floodplains.

Once the overall amount of land available for development was established, the available acres of each land-cover type were determined by multiplying the acres present in the Valley PFG by the proportion available for development. For example, if there are 40 acres of riverine/riparian land

cover in the Valley PFG, and 80 percent are available for development, then 80 percent of 40 or approximately 32 acres of riverine/riparian land cover would be available for development.

Effects were estimated by projecting the quantity of land required to allow for future urban growth within each demographic projection zone. Within each zone, the acres needed for development (as dictated by the growth model) were divided by the total acres available to derive a percentage of anticipated land conversion in each zone. This percentage was distributed across all available acres to derive an impact estimate for each land-cover type. The results for each land cover within each demographic area were summed by land-cover type for the Valley PFG.

In addition to summarizing potential effects by land-cover type, additional analyses were conducted to capture effects on constituent habitats, such as vernal pools that may be present within other land-cover types in very small quantities (i.e., composing less than 1 percent of an area otherwise dominated by another land cover). For this, each constituent habitat type was assigned a proportional presence within each land-cover type. The presence of these unmapped habitat features on the landscape was estimated based on an assessment of existing projects. Once the estimated acres of each constituent habitat type were derived, effects were quantified based on the results above.

For the purposes of quantifying effects, it is assumed that regional public programs within the Valley PFG were captured by this analysis and are included in the maximum effects shown in Table 4-1.

4.3.1.2 Land Conversion In the Foothills

In the Foothills, higher-density growth is projected in the south along the Interstate (I-) 80 corridor and in unincorporated Granite Bay and portions of the Loomis Basin. Much lower-density, rural residential growth is projected to the north. This section addresses estimates of the direct, permanent effects of land conversion from development in the Foothills PFG and the Foothills Conservation and Rural Development Area that are shown in Table 4-1.

The analysis described in Appendix M, *Growth Scenario Memo*, was used to estimate growth in employment and housing. In the higher-density portion of the Foothills PFG, the growth scenario translates directly into the land area affected by covered urban and suburban growth by applying typical land use density factors. Based on Placer County (County) land use designations, some of this growth is considered to be urban and suburban infill and hence does not have a direct effect on natural land. For the purposes of analyzing direct, permanent effects of land conversion, this high-density urbanization in the Foothills will not be quantified as an impact. However, this urban and suburban infill will have indirect effects on rural densities and watersheds as discussed in Section 4.3.4, *Methods to Assess Indirect Effects from the Increase in Rural Densities in the Foothills*, and Section 4.3.6, Methods for *Effects of Covered Activities on Watersheds*, respectively.

Development in low-density areas in the Foothills is largely rural residential. The growth scenario, which was used to estimate the direct, permanent effects of land conversion in the Valley, cannot be used for these areas. Rather, the analysis for land conversion in the Foothills was based on the amount of rural residential development that may be accommodated by available, subdividable lands.

A GIS analysis was used to identify lands not yet subdivided and therefore available for development. Effects on land cover were estimated based on assumptions about the future effects of this development. The process is illustrated in Figure 4-2 and described in the following summary.

The analysis used County land use designations and assessor's parcel data to determine lands available for rural development. City of Lincoln (City) data were not required because all of the Foothills PFG is in the unincorporated area. The maximum subdivision potential for each parcel was calculated based on its land use designation, existing parcel size, and current occupancy. Existing parcels that exceed a multiple of the applicable minimum lot size specified by the designated land use are subject to subdivision in this analysis. The number of new dwellings resulting from subdivision is equal to the total number of parcels after subtracting one dwelling if the original parcel was considered to be already occupied.

For example, if a 17-acre vacant property exists in an area designated for 5-acre minimum, that property can be subdivided to create three parcels, each exceeding the designated minimum lot size. If a house currently exists on the property, that occupied parcel is removed from the calculation, resulting in a net of two 5-acre-plus parcels available for new development.

To account for the likelihood that not all possible growth will occur over the 50-year permit term (e.g., due to market factors, the likelihood that some occupied subdividable parcels may remain undivided, and physical constraints to development on some parcels, such as terrain, access, etc.) it was assumed that the 50-year permit term would experience 80 percent of the estimated growth potential in the area of the Foothills north of State Route (SR) 193 and the city of Auburn and 85 percent of the estimated growth potential in the I-80 corridor to the south.

Once the estimated amount of new parcels is calculated, the direct and indirect effects of new dwellings, or new development, on land cover were calculated. The direct effect is the estimated "footprint" of a new dwelling based on a study that assessed the footprint of development generally associated with parcels of different sizes (Harris 2009). The Harris study assigned typical development footprint by parcel size. This was adapted for GIS analysis, as shown in Table 4-2.

Table 4-2. Rural Residential Direct Effect Footprint as a Function of Parcel Size (Acres)

Parcel Size	Direct Effect Area
Less than 1	All of parcel area
1 to 4.6	1
4.6 to 10	2
10 to 20	3
Greater than 20	4

To use the previous example, if the 17-acre parcel were to be developed for a single dwelling, it would be assigned a direct effect footprint of 3 acres. If the parcel were subdivided into three buildable parcels, each would have a direct effect footprint of 2 acres for a total of 6 acres. The remaining 11 acres are considered to have an indirect effect as discussed under Section 4.3.4, *Methods to Assess Indirect Effects from the Increase in Rural Densities in the Foothills*.

Using GIS, the land-cover type and areal extent of each parcel were determined. The direct effect on land-cover type was estimated by multiplying the percentage of the entire parcel that will be in the development footprint by the area of the various land-cover types present. The totals for each property were then summed to determine the overall effect in the Foothills PFG.

The same methodology described above for the Foothills PFG was used to estimate direct effects in Plan Area A4, the Foothills Conservation and Rural Development Area. Most of the Reserve System

will be established in the northern Foothills Conservation and Rural Development Area and the land acreage proposed for the Reserve System was subtracted from the land available for residential development, thereby reducing the estimated number of new dwelling units and their associated effects.

Estimates of land conversion for the Foothills Conservation and Rural Development Area (Reserve Acquisition Area [RAA] and EXR) include modeled rural development permissible under existing land use designations, but take into account the offsetting effect of reserve acquisition, which will preclude subdivision of large parcels that otherwise are modeled for one or more dwellings. The parcel-based model shows that much of the Foothills RAA is in large parcels lacking structures. Although the overall density will remain very low, existing land use designations allow new residences on large parcels (e.g., 20 to 80 acres) and subdivision of some very large parcels.

The Plan targets substantial reserve acquisition in the RAA and as land is placed into the Reserve System, it will no longer be subject to residential growth. The effect of the PCA diverting open, undeveloped land into the Reserve System is estimated to preclude the construction of an estimated 437 new dwellings and an associated 1,365 acres of land conversion based on the proposed Reserve size requirements in Chapter 5, *Conservation Strategy*.

Future growth in the Foothills Conservation and Rural Development Area is constrained by existing large-parcel land use designation and by diversion of RAA land area into the Reserve System. The demographic model estimates that 288 new dwellings could be constructed in the 24,000-acre RAA over the permit term with a corresponding direct effect of 972 acres, an average of 3.4 acres per dwelling, reflecting the large homesteads and extensive road access needed to serve very low-density growth.

4.3.1.3 Permanent Direct Effects in Plan Area B

Permanent direct effects in Plan Area B will result almost entirely from activities in Plan Area B1, Permittee Activity in Non-participating City Jurisdiction (See Figure 1-2). Covered Activities in Plan Area B1 include public program activities undertaken by the Permittees in the incorporated area and the sphere of influence of the Non-participating cities. Activities in this area include several specific projects such as Placer County Water Agency (PCWA) canals and new pipelines, a portion of Placer Parkway, the I-80/SR 65 interchange, and operations and maintenance (O&M) of miscellaneous County-owned facilities. PCWA activities in Plan Area B2 are not expected to result in appreciable, permanent, direct effects. The conservation actions in Plan Areas B3, B4, and B5 will have a net benefit on Covered Species and habitats and are described in Section 4.4.7, *Conservation Programs*.

Most of Plan Area B1 is already urban; the non-urban area subject to permanent, direct effects is composed of habitats similar to those found in the Valley in Plan Area A. Limited covered public activities will affect less than 1 percent of the 50,636-acre land area of the non-participating cities. At the regional planning scale of analysis, specific project footprints and the presence of natural communities and other site conditions are not known. The estimated maximum effects in Plan Area B shown in Table 4-1 are an allowance based on estimates of direct effects from a general class of public works projects.

4.3.2 Methods for Assessing Temporary Direct Effects

In this Plan, temporary direct effects are those activities that alter land cover for less than 1 year. To qualify as a temporary effect, the disturbed area must recover to pre-project or ecologically improved conditions within 1 year. For the purposes of this Plan, all effects resulting from a Covered Activity that persist for 1 year or more from the start of groundbreaking will be considered permanent.

Most of the temporary effects anticipated to occur under the Plan are related to urban development such as construction corridors for pipelines, utilities, roads, and other infrastructure and for flood control. Therefore, the estimate of the extent of temporary, direct effects is proportional to the estimate of permanent, direct effects. The estimates of temporary effects were established using professional judgment and are based on a percentage of the total land conversion allowed or estimated under the Plan. Temporary effects for natural communities are a percentage of permanent, direct effects (Table 4-1) as follows:

- 3.5 percent in the Valley for vernal pool complex, grassland, and woodlands (valley oak woodland and oak woodland)
- 2.5 percent of in the Foothills for vernal pool complex, grassland, and woodlands
- 20 percent in Plan Area B for vernal pool complex, grassland, and woodlands

For future in-stream flood management and future new and replaced stream crossings, temporary effects are assessed at a higher level.

- 35 percent for aquatic/wetland and riverine/riparian complex in the Valley
- 25 percent for aquatic/wetland and riverine/riparian in the Foothills
- 200 percent for aquatic/wetland and riverine/riparian in Plan Area B

The measure of temporary effects is based on the total extent of land on which temporary effects will occur one or more times during the 50-year permit. This means, for example, that a flood control maintenance project that takes place four times during the permit term and affects the same 5-acre area each of the four times will have a total temporary effect area of 5 acres, not 20 acres, as long as habitat is restored to pre-project conditions within 1 year. Temporary effects will be subject to a *temporary effect fee* (see Section 9.4.1.5, *Temporary Effect Fee*). Communities and constituent habitats will be the metrics by which temporary effects are tracked. Estimated maximum temporary effects are shown in Table 4-3 and in Table 4-7B for temporary effects on in-stream and salmonid habitat. The values in the "Maximum Effect" column represent the maximum amount of temporary, direct effects on natural community or constituent habitats proposed to be permitted under the Plan. Temporary effects that exceed the estimated maximum temporary effects would not be covered by the Plan. The Plan also estimates maximum temporary effects within Plan Area subcomponents (i.e., Plan Area A – Valley, Valley PFG, Valley Conservation and Rural Development Area, Plan Area A – Foothills, PFG Foothills, Conservation and Rural Development Area Foothills, and Plan Area B).

Table 4-3. Maximum Temporary Direct Effects (Acres)

	Total Plan Area		Plan Area A – Valley			Plan Area A – Foothills			Plan Area B - All
Communities and Constituent Habitats	**Maximum Effect**	**Flexible**	**PFG**	**CRD**	**Maximum Effect, All Valley**	**PFG**	**CRD**	**All Foothills**	**All Plan Area B**
Vernal Pool Complex (VPC)	**455**		**425**	**10**	**435**	**5**	**5**	**10**	**10**
Vernal Pool Constituents Habitats	30		20	5	25	-	-	-	5
Vernal Pool Wetland	15		5	5	10	-	-	-	5
Seasonal Wetland in VPC		*8*	*8*	-	*8*	-	-	-	-
Seasonal Swales		*7*	*7*	-	*7*	-	-	-	-
Vernal Pool Complex Uplands		*425*	*405*	*5*	*410*				*5*
Grassland	**235**		**120**	**5**	**125**	**75**	**15**	**90**	**20**
Aquatic/Wetland Complex		***105***	***40***	***5***	***45***	***30***	***10***	***40***	***20***
Aquatic/Wetland Constituent Habitats	105		40	5	45	30	10	40	20
Fresh Emergent Marsh	50		20	5	25	10	5	15	10
Lacustrine		*28*	*10*	-	*10*	*10*	*3*	*13*	*5*
Non-VP Seasonal Wetland		*27*	*10*	-	*10*	*10*	*2*	*12*	*5*
Aquatic/Wetland Complex Uplands			-	-	-	-	-	-	-
Riverine/Riparian Complex		***165***	***55***	***5***	***60***	***80***	***5***	***85***	***20***
Riverine/Riparian Constituent Habitats	165		55	5	60	80	5	85	20
Riverine		*50*	*30*	-	*30*	*10*	-	*10*	*10*
Riparian	115		25	5	30	70	5	75	10
Riverine/Riparian Complex Uplands			-	-	-	-	-	-	-
Valley Oak Woodland	**25**		**5**	**5**	**10**	**5**	**5**	**10**	**5**
Oak Woodland	**180**		**40**	**5**	**45**	**120**	**10**	**130**	**5**
Subtotal Natural Communities	**1,165**		**685**	**35**	**720**	**315**	**50**	**365**	**80**
Agriculture		*170*	*95*	*15*	*110*	*20*	*15*	*35*	*25*
Rice Agriculture	90		65	5	70	5	5	10	10
Any Other Agriculture		*80*	*30*	*10*	*40*	*15*	*10*	*25*	*15*
Total All	**1,335**		**780**	**50**	**830**	**335**	**65**	**400**	**105**

Notes: Effects on the Stream System is discussed separately under Table 4-7. CRD = Conservation and Rural Development Area; PFG = Potential Future Growth Area

The Plan estimates temporary, direct effects for vernal pool complex for the Foothills subarea to account for the presence of marginal vernal pool complex lands on the western edge. The Plan, however, proposes that a take limit not be set for the small amount of vernal pool complex that may be present; if vernal pool complex lands in the Foothills are affected, the area of effect is proposed to be deducted from the maximum take proposed for the Valley overall for vernal pool complex (and for corresponding constituent habitats that are affected).The PCA will quantify temporary effects by tracking Covered Activities through the same or a similar plan participation process used for permanent, direct effects described in Section 6.2, *Program Participation: Receiving Take Authorization under the Plan.*

Examples of permitted temporary effects include routine maintenance in stream channels for flood control, maintenance along roadsides for highways, and short-term disturbance of the landscape for a linear project such as a pipeline. Most construction projects will not qualify as temporary effects due to their size and their level of land disturbance, which usually cannot conform to the required 1-year timeframe for complete restoration. Because of the way a project site is determined (see Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*), most disturbed areas associated with urban development will be included in the permanent site footprint and assessed as permanent direct effects.

4.3.3 Methods to Estimate Indirect Effects in the Valley

This section quantifies the indirect effects from covered urban and rural development adjacent to natural, semi-natural, and other agricultural communities in the Valley, with a focus on vernal pool complexes. Indirect effects are described qualitatively for each species in Section 4.7, *Effects on Covered Species*, below. This section describes the methods for quantifying indirect effects from development in the Valley and estimates indirect effects for vernal pool complexes.

Four categories of effects are considered: (1) off-site indirect effects adjacent to urban development projects in the PFG (Table 4-4A); (2) off-site indirect effects adjacent to rural development in the Conservation and Rural Development Area (Table 4-4B); (3) new urban edge that would be established along the PFG/Conservation and Rural Development Area border (Table 4-4C); and (4) on-site indirect effects on vernal pool wetlands that are subject to development fees (Table 4-4D).

Approximately 51,594 acres (20 percent) of Western Placer County is in urban use (Table 2-1). Most of this urban land use is in the non-participating cities, but 12,107 acres (23 percent of all urban use) is in the Valley Plan Area, mainly in the City of Lincoln. Natural and semi-natural communities adjacent to existing urban development may already be adjacent to indirect effects. This existing effect is considered part of the baseline condition.

4.3.3.1 Overview of Indirect Effects of Development of Adjacent Lands

Urban land use, roads, and other related infrastructure, particularly in flat grassland or agricultural areas in the Valley, can indirectly affect habitat value depending on local hydrological conditions and the nature of adjoining land use. Alteration of hydrologic conditions can impose a barrier to flow, create additional flow into existing vernal pool constituent habitats, and/or divert flow into artificial channels, adversely affecting vernal pool complexes, in particular. This alteration notably occurs at the edge of urbanization, where drainage or other engineered improvements are typically installed.

Rural development and drainage control can also modify local hydrology, particularly in the relatively flat, agricultural land of the Valley where natural drainage is poor and where low relief makes it easy to alter natural drainage. Even minor surface disturbance can alter the local over-land flow, which defines the micro-watershed of vernal pool wetlands remaining on adjacent land. Agricultural lands in the Valley usually have perimeter drainages installed, which divert local overland flow and convey irrigation runoff. Even where grassland landforms are not altered, fence lines are usually paralleled by dirt access roads, which interrupt local surface over-land flow. In the Valley, most parcel lines are marked in the field by fences; the indirect effects analysis uses parcel boundaries as an indicator of potential fence lines and existing access roads.

The potential for indirect effects in the Valley from Covered Activities is proportional to the amount of land adjacent to new development that is not currently subject to indirect effects. This is modeled by estimating the amount of communities likely to fall within 250 feet of the outer edge of new development in areas that are not already subject to urban indirect effects. A vernal pool wetland would be considered subject to indirect effects if ground disturbance from adjacent urban development encroaches on its immediate watershed outward to 250 feet. This buffer distance is based on the 250-foot outward radius for assessing effects on vernal pool habitat commonly used in biological assessments[1]. During implementation, this approach will be refined to reflect the actual hydrology of the affected area, as described in Section 6.1.1, *Definitions, Immediate Watershed*.

4.3.3.2 Existing Indirect Effects

The Valley landscape is already subject to substantial modification from urban, rural, and agricultural use and has an extensive road network throughout the undeveloped landscape. This baseline condition is context for evaluating the changes that will result from Covered Activities. Existing indirect effects were estimated in GIS using the present pattern of development and key indicators of indirect effects; these are tallied in three classes as high, moderate, and low likelihood of present adverse indirect effect. The high likelihood class is land adjacent to mapped features associated with urban or rural development that are consistently associated with disrupted hydrology on adjacent land: (1) present urban land cover, (2) small parcels less than 20 acres in size, (3) paved public roads. The moderate likelihood class is land adjacent to parcel lines, interpreted as fence lines. These features are only indicative of a potentially disrupted hydrology. The low likelihood class is the remainder of the Valley, not adjacent to those mapped features. While there may be unmapped conditions that indirectly affect vernal pool wetlands on adjacent land, these are presumed to be less likely and less significant, so new urban development will more likely have a much greater adverse effect on these lands.

The baseline condition, shown as the Extent of Present Indirect Effects in Tables 4-4A and 4-4B, is based on a simple GIS outward buffer and does not take into account actual interruption of hydrology. While this analysis may overestimate the extent of existing indirect effects, it provides appropriate context to evaluate the increase in urban adjacency that will result from Covered Activities.

[1] U.S. Fish and Wildlife Service 1996. "Habitat indirectly affected includes all habitat supported by destroyed upland areas and swales, and all habitat otherwise damaged by loss of watershed, human intrusion, introduced species, and pollution caused by the project ... Where the reach of these effects cannot be determined definitively, all habitat within 250 feet of proposed development may be considered to be indirectly affected."

The present pattern of urban development places almost 50 percent of mapped vernal pool complex in the Valley in either the high or moderate likelihood of already being subject to indirect effects. Approximately 27 percent of vernal pool complex in the PFG is currently within 250 feet from existing urban land use, and all of these areas may be affected by future urban development, either directly or indirectly. Approximately 17 percent of vernal pool complex mapped in the Valley Conservation and Rural Development Area is currently within 250 feet of existing development and roads.

4.3.3.3 Off-site Indirect Effects Adjacent to Urban Development in the PFG

In the Valley PFG, estimates of off-site indirect effects are estimated using the existing pattern of development in that area. Frequently, a quarter-section (160 acres) is developed where one side of the parcel is adjacent to natural or semi-natural communities, and the other sides are adjacent to developed land, including roads. Indirect effects on the adjacent natural or semi-natural community are estimated by quantifying the acreage within a 250-foot strip adjacent to a half-mile-long side (i.e., the length of a side of a 160-acre square) and extending outward from the corners of a quarter-section, which is roughly 16 acres, or 10 percent of the parcel area. Therefore, the area shown as Subject to Future Indirect Effects in Table 4-4A is estimated to be 10 percent of the direct effects that will be permitted to occur in Valley PFG (Table 4-1). These estimates (Table 4-4A) do not take into account local hydrology and similarly may overestimate potential impact.

Table 4-4A. Estimates of Present and Future Indirect Effects from Urban Development within the Valley PFG (acres)

	Extent of Present Indirect Effects [a]			Subject to Future Indirect Effects[b]
Community	**High**	**Moderate**	**Low**	
Vernal Pool Complex	5,336	5,232	8,891	1,220
Grassland	1,109	1,342	2,018	340
Aquatic/Wetland Complex	119	116	195	12
Riverine/Riparian Complex	287	233	167	15
Valley Oak Woodland	13	10	12	3
Oak Woodland	395	294	372	110
Rice Agriculture	516	1,559	2,825	180
Field Agriculture and Orchard and Vineyard Agriculture	254	365	899	90
All Communities	8,029	9,151	15,379	1,970

Source: MIG|TRA

[a] Extent of Present Indirect Effects is inferred from adjacency to mapped urban use, roads, small parcels and parcel lines.

[b] Indirect effects are estimated to be 10% of the proposed maximum allowable permanent direct effects in the Potential Future Growth Area for each community identified in Table 4-1.

Unlike direct effects, which are permanent once they occur, indirect effects in the Valley will be dynamic, changing in extent and location throughout the permit term as parcels are developed in the PFG. The area initially subject to indirect effects may be permanently affected by development at a later date. That second project may itself have indirect effects on adjacent lands. The extent of off-

site indirect effects will vary depending on the geometry of development: a few outlying projects early in the permit term may have a relatively large amount of adjacent open land, and infill projects later in the permit term may have very little effect because the adjacent land is already developed. Because many of the areas subject to off-site indirect effects within the PFG will ultimately be subject to direct effects or to on-site indirect effects, these impacts will be captured as effects associated with subsequent activities. However, off-site indirect effects within the PFG will be tracked in GIS (based on the 250-foot buffer described above), and the accuracy of the assumptions used to estimate these effects will be reported by the PCA. Tracking will not include surveys or monitoring of off-site properties for indirect effects. Mitigation for off-site indirect effects is captured by the Plan's mitigation for regional development overall.

The analysis of indirect effects from urban growth in the Valley PFG (Table 4-4B) shows approximately 1,970 acres of non-urbanized land will be adjacent to covered, urban development. In the context of present development in the PFG, if all future development covered by this Plan were to fall on lands with a low level of present effects, 1,970 acres of indirect effect would represent an increase of the area already estimated to have a high level of indirect effect by about 25 percent.

4.3.3.4 Off-site Indirect Effects Adjacent to Urban Development in the Valley Conservation and Rural Development Area

In the Valley Conservation and Rural Development Area, Covered Activities are more likely to include linear projects such as the Placer Parkway or small projects with a greater edge-to-area ratio. Indirect effects from these types of projects are estimated by assuming that new indirect effects will occur within a 250-foot strip adjacent to one side of a transportation corridor (one side, on average, along the length of a corridor is assumed to already be directly or indirectly affected by existing development or other features that disrupt hydrology). For example, a 250-foot strip adjacent to one side of a hypothetical 1,000-foot-wide corridor[2] (i.e., a corridor 1,000 feet long and 1,000 feet wide) would be directly affected by a linear project. In this scenario, indirect effects are 25 percent of the area directly affected. Therefore, off-site, indirect effects in the Valley Conservation and Rural Development Area were estimated as 25 percent of direct effects in Valley Conservation and Rural Development Area, as shown in Table 4-1. Estimates of indirect effects in the Valley Conservation and Rural Development Area are shown in Table 4-4B as Subject to Future Indirect Effects. Areas subject to indirect effect in the Valley Conservation and Rural Development Area will be less dynamic than in the Valley PFG, as most of the land in the Conservation and Rural Development Area will not be subject to successive development. These off-site indirect effects will be tracked and reported by the PCA using the 250-ft buffer described above. Tracking would be done on a yearly basis for transportation and other linear projects that occur in this area. The most recent LIDAR data will be used to estimate these effects, unless specific field data can be acquired.

[2] The 1,000-foot corridor is based on the transportation right-of-way used for Alternative #5, found to most likely be the Least Environmentally Damaging Practicable Alternative for the Placer Parkway Corridor Preservation Project (South Placer Regional Transportation Authority, California Department of Transportation, and Federal Highway Administration 2007).

Table 4-4B. Estimates of Present and Future Indirect Effects from Rural Development within the Valley Conservation and Rural Development Area (acres)

Community	Extent of Present Indirect Effects [a]			Subject to Future Indirect Effects[b]
	High	Moderate	Low	
Vernal Pool Complex	4,142	7,524	12,930	70
Grassland	1,230	1,523	3,085	28
Aquatic/Wetland Complex	311	517	888	3
Riverine/Riparian Complex	512	730	638	3
Valley Oak Woodland	61	55	34	3
Oak Woodland	208	283	208	3
Rice Agriculture	1,443	3,615	9,619	50
Field Agriculture and Orchard and Vineyard Agriculture	168	422	1,012	18
All Communities	8,075	14,670	28,412	178

Source: MIG|TRA

[a] Extent of Present Indirect Effects is inferred from adjacency to mapped development, roads, small parcels and parcel lines.

[b] Indirect effects are estimated to be 25% of the proposed maximum allowable permanent direct effects in the Conservation and Rural Development area for each community identified in Table 4-1.

The analysis of the Valley Conservation and Rural Development Area in Table 4-4B shows approximately 178 acres of non-urbanized land will be adjacent to covered development. In the context of present development in the Valley Conservation and Rural Development Area, if all future development covered by this Plan were to fall on lands with a low level of existing indirect effects, 178 acres of new indirect effect would represent an increase of the area already estimated to have a high level of effect by about 2 percent.

4.3.3.5 Effects of New Urban Edge along PFG/Conservation and Rural Development Area Border

The Placer County Conservation Program (PCCP) designation map (Figure 2-4) establishes a border between the Valley PFG and the Valley Conservation and Rural Development Area, which will ultimately become the intersection of urban development in the Valley PFG and natural communities in the Conservation and Rural Development Area, including natural communities in existing protected areas, the future Reserve System, and other areas in the RAA. At the end of the permit term, there will be up to 20,000 acres of covered, new, urban development in the Valley PFG and another several thousand acres of urban development of the adjacent, non-participating city of Roseville, creating a western urban edge against the RAA where the Reserve System will be established.

The Valley PFG is roughly 20 miles long from southwest to northeast, but because of the configuration of the RAA and existing protected areas, the actual length of the future boundary between the Valley Conservation and Rural Development Area (Plan Area A2) and in the Valley PFG (Plan Area A1) is approximately 35 miles. The potential increase in new urban adjacency is estimated by first mapping a 250-foot strip from the Conservation and Rural Development Area along the entire 35-mile PFG boundary and subtracting areas that are already urbanized, areas already experiencing indirect effects, and areas that would be affected by activities not covered

under the Plan (e.g., development in the city of Roseville). Therefore, major road rights-of-way such as County roads and the SR 65 corridor are not counted as a potential increase in urban edge. The extensive edge between the existing reserves and protected areas and the RAA and the existing City of Lincoln was subtracted from the analysis because it is already effectively urbanized. Areas in the Conservation and Rural Development Area already in small parcels (i.e., parcels less than 20 acres in size) or separated by fence lines are also subtracted as they are assumed to be subject to indirect effects and hydrologic barriers. Part of the RAA is adjacent to the non-participating City of Roseville. This 8.4-mile edge was subtracted because land developed by Roseville is not covered or permitted by the Plan. The extent to which a non-participating city provides a buffer or other features to reduce indirect effects is unknown. There are roughly 15 miles of potential new edge along the border between the PFG and Conservation and Rural Development Area after existing urban areas already experiencing indirect effects and areas in non-participating cities were subtracted from the length of the border.

Because RAA and PFG lines are drawn along roads and jurisdiction boundaries (i.e., the City of Lincoln), most of the potential future urban edge is already subject to some level of indirect effect. Table 4-4C shows estimates of the current levels of indirect effects between the PFG and the Conservation and Rural Development Area in the Valley. The column labeled “High” under Extent of Present Indirect Effects is an estimate of the portion of the Conservation and Rural Development Area adjacent to the Valley PFG that is likely already under urban influence and would not be subject to appreciable future indirect effect. The column labeled “Moderate” lists communities bounded or bisected by likely fence lines, and possibly already subject to some hydrological interruption. The column labeled “Low” shows areas that are not currently adjacent to urban influences and fence lines, and these areas along the boundary of the Valley Conservation Rural Development Area and the Valley PFG are where future indirect effects attributable to the Covered Activities could occur.

Not all areas currently estimated to be subject to low levels of indirect effects will be subject to future effects. Of the total 1,651 acres of natural and semi-natural communities mapped along the border, it is reasonable to conclude that less than three-quarters of the land now subject to low levels of indirect effects will be affected at the end of the permit: less than 185 acres of natural, semi-natural and agriculture communities. Similarly, if less than three-quarters of the land now only subject to moderate levels of indirect effects will be affected at the end of the permit, then possibly an additional 560 acres of natural, semi-natural, and agricultural communities will be indirectly affected along the Conservation and Rural Development/PFG interface.

The PCA will assume that vernal pool complex within 250 feet of new urban edge is affected by covered activities. This area of indirect effects will be reported. Should this area approach that estimated by the plan, the PCA will confer with the Wildlife Agencies.. Urban development will indirectly affect biological resources in protected open space, particularly if development is immediately adjacent to these areas. Implementation of General Condition 2, Conservation Lands: Development Interface Design Requirements (Chapter 6, *Program Participation and Conditions on Covered Activities*) will minimize indirect effects of urban development on adjacent reserves and the RAA. The Plan requires buffer zones between aquatic and wetland constituent habitats and new development adjacent to the Reserve System. See Chapter 5, *Conservation Strategy*, Section 5.3.1.3.3, *Buffer Zones*, for details. Chapter 9, *Costs and Funding*, Table 9-5 addresses mitigation for direct and indirect effects.

Table 4-4C. Estimates of Current Indirect Effects from Urban Growth along the Conservation and Rural Development Area/PFG Border in the Valley (acres)

Community	Extent of Present Indirect Effects [a]			Total CRD Area Along PFG Border[b]	Area Potentially Subject to Future Increase in Indirect Effect[c]
	High	Moderate	Low		
Vernal Pool Complex	518	575	100	1,193	506
Grassland	71	52	69	192	91
Aquatic/Wetland Complex	23	38	11	71	37
Riverine/Riparian Complex	2	6	7	15	10
Valley Oak Woodland	-	-	-	-	-
Oak Woodland	-	-	1	1	1
Rice Agriculture	42	70	58	169	96
Field Agriculture and Orchard and Vineyard Agriculture	5	5	-	9	4
All Communities	660	746	246	1,651	744

Source: MIG|TRA

[a] Extent of Present Indirect Effects is inferred from adjacency to mapped development, roads, small parcels, and parcel lines.

[b] Conservation and Rural Development Area within 250 feet of PFG, adjusted for geography.

c Approximately 75 percent of land estimated to presently have moderate and low levels of indirect effects may be further indirectly affected by future, adjacent covered activities.

CRD = Conservation and Rural Development; PFG = Potential Future Growth Area

4.3.3.6 Indirect Effects on Vernal Pool Constituent Habitat Wetland Retained Onsite

Projects may avoid affecting vernal pool constituent habitats on a site if they comply with Community Condition 1.1, Avoidance for Vernal Pool Constituent Habitat Wetlands (Section 6.3.2.1.1, *Community Condition 1.1, Avoidance for Vernal Pool Constituent Habitat Wetlands*). Avoided vernal pool constituent habitats may still be subject to indirect effects where their immediate watershed is affected by adjacent ground disturbance. These projects will be subject to Community Condition 1.1, Avoidance for Vernal Pool Constituent Habitat Wetlands, and the vernal pool immediate watershed effects fee (fee 4b) in Chapter 9, *Costs and Funding*, Table 9-5.

The extent of future avoidance and potential indirect effects on site can only be estimated and will vary greatly depending on the circumstances of the project. Based on typical large projects in the PFG, the extent of vernal pool habitats avoided, but subject to indirect effects, is likely to be less than 10 percent of the area subject to direct effects. Conventional urban development projects will not be covered in the Conservation and Rural Development Area, but the tendency to small, rural residential, rural recreation, and agricultural development and linear projects suggests a higher emphasis on avoidance and a corresponding higher extent of potential on-site indirect effects there, which are assumed to be equal to the extent of direct effects. These estimates are listed in Table 4-4D. These estimates will serve as the proposed maximum for indirect effects on avoided vernal pool constituent habitats on site; the Plan sets a mitigation fee, and these effects will be tracked through that permit term.

Table 4-4D. Maximum for On-site Indirect Effects on All Vernal Pool Constituent Habitat Wetland

	All Vernal Pool Constituent Habitat Wetland Area (acres)	
Plan Area A – Valley	**Permanent Direct Effect**	**Maximum Indirect Effect [a]**
PFG	560	56
CRD	10	10
All Valley	570	66

[a] Maximum indirect effects will apply to all vernal pool constituent habitats where the immediate watershed is affected by adjacent ground disturbance. See Section 6.1.1, *Definitions*, *Immediate Watershed*, and Section 6.3.2.1.1, *Community Condition 1.1*, *Avoidance for Vernal Pool Constituent Habitat Wetlands*.

CRD = Conservation and Rural Development

4.3.4 Methods to Assess Indirect Effects from the Increase in Rural Densities in the Foothills

In addition to the increase in urban adjacency discussed above, the increase in rural densities in the Foothills is an indirect effect quantified by the Plan. Covered growth in the Foothills will increase rural densities. Fragmentation in the Foothills and associated indirect effects occur when large parcels are subdivided into smaller parcels, even though the overall residential density still remains at the rural residential level. Although it is difficult to assign a distinct radius of indirect effects, the intensity of effect is clearly related to residential density. In general, rural densities greater than one dwelling per 10 acres mark a transition between lower and higher indirect effects. For example, in Western Placer County, this 10-acre density is observed in land-cover mapping to correspond to an abrupt decrease in natural land cover, a decrease in land-cover patch (polygon) size, and an increase in road density.

Harris (2009) suggests setting this threshold at the 10-acre parcel size. At a density greater than one dwelling per 10 acres, human activities are more likely to appreciably affect surrounding natural land cover. Above the 10-acre threshold the indirect effects become small compared to the larger extent of remnant natural land cover around human activity sites.

Quantification of the effect of fragmentation and human presence associated with an increase in rural densities was based on the portion of predicted future growth that would result from the subdivision of parcels larger than 10 acres into parcels smaller than 10 acres. Where this subdivision occurs, the balance of the parcel is considered to be subject to indirect effects associated with fragmentation and human presence. For example, when a 17-acre parcel is subdivided into three parcels smaller than 10 acres, the indirect effect is calculated as the original parcel size minus the direct effect footprint (17 acres of parcel minus 6 acres estimated direct effect equals 11 acres of indirect effect). The indirect effect total is apportioned to the land cover associated with the parcel in GIS. The results of this analysis are presented in Table 4-5.

Table 4-5. Indirect Effects in the Foothills – Increased Rural Density (acres)

Community	Existing Land in Foothills	Area of Increased Rural Density
Natural		
Vernal Pool Complex	788	183
Grassland	24,496	4,802
Aquatic/Wetland Complex	1,464	303
Riverine/Riparian Complex	4,262	579
Valley Oak Woodland	1,180	102
Oak Woodland	49,107	5,942
Subtotal Natural	*81,297*	*11,911*
Semi-Natural and Other Agriculture		
Rice Agriculture	-	-
Field Agriculture	1,594	467
Orchard and Vineyard Agriculture	933	237
Subtotal Semi-natural and Other Agriculture	*2,527*	*704*
Urban (Non-natural)		
Managed Open Water	4,804	-
Rural Residential	14,049	634
Urban	6,457	72
Subtotal Urban	*25,310*	*706*
Grand Total	**109,134**	**13,321**

Because the Foothills RAA has the greater extent of very large parcels, the potential for indirect effects from subdivision and resulting fragmentation is high in that area. Establishing the Reserve System there will significantly reduce subdivision potential. The values shown in Table 4-5 reflect a reduction of approximately 3,600 acres of potential fragmentation from rural subdivision in the RAA that is attributable to the establishment of the Reserve System (see Section 4.4.4, *Foothills Conservation and Rural Development*, for more details).

4.3.5 Methods for Effects of Covered Activities on Streams

The Stream System may be affected by urban development, as displayed in Tables 4-1, 4-3, 4-4, and 4-5. However, bridge and flood-protection projects will involve work directly in streams not captured by these analyses.

Specific in-stream activities are described in Section 2.6.6.1, *Bridge Construction and Replacement/ Rehabilitation*, and in Section 2.6.6.2, *Flood Protection Projects.* Existing stream crossings are shown in Figure 2-10. Temporary and permanent disturbance for in-stream projects were derived from specifications of typical projects. The relative frequency of road crossings or other Covered Activities affecting the in-stream environment was extrapolated to total effects of all in-stream programs over the permit term. The following description of in-stream activities provides the parameters used for estimation.

The estimates of new and replacement stream crossings were compiled and compared with the existing distribution of stream crossings in urban and rural areas. Stream crossings were assigned to major and minor streams based on the Strahler stream order, with larger streams requiring bridges and smaller streams being served by culverts. This produced an estimate of the extent of existing stream crossings that may need to be rehabilitated, and it allowed an estimate of the regional scale effect of urban and rural residential growth requiring new roads and new stream crossings. The results are summarized in Table 4-6. These estimates were used to calculate the predicted extent of effects on in-stream habitat, in stream-miles (see Section 4.4.6, *In-Stream Programs*), that may be caused by installing new and replacing existing road crossings.

Over 70 bridges are specifically planned for replacement during the permit term, some of which will affect spawning and migration habitat, and many more will be rehabilitated within the next 50 years (Table 4-6). For purposes of estimating effects, it is projected that 48 new vehicular bridges, 71 replacement vehicular bridges, 213 new culvert crossings, and 485 replacement culvert crossings will be constructed during the Plan's permit term. In addition to vehicular bridges, 100 single-track or pedestrian bridges will be built throughout the Plan Area, including the Reserve System, in association with public access to portions of the Reserve System and to protect sensitive stream or wetland habitat. The Plan assumes that new single-track or pedestrian bridges will avoid effects on in-stream habitats, so effects are not quantified in this analysis.

New and rehabilitated bridges will be designed to federal and state guidelines. The amount of habitat loss will depend on whether the project is new construction or rehabilitation of an existing structure. Public Works provided example drawings of bridge footprints and estimated permanent impact from the construction of new small bridges (40 linear feet of stream) and new large bridges (64 linear feet of stream). Due to federal and state guidelines for bridge repair and replacements, most bridges will need to be wider than the original bridge to accommodate shoulders and pedestrian crossings. Approximately 22 additional linear feet of stream will be affected by bridge widening during repair and rehabilitation of some bridges.

Table 4-6. Calculation of Crossings[1] per Stream Mile

	Number of Road Crossings			Crossings per Stream Mile	
	Bridge	**Culvert**	**Total Stream Miles**	**Bridge**	**Culvert**
All Plan Area – Existing Crossings					
All Streams	95	647	576	0.16	1.12
Spawning	36	95	68	0.53	1.39
Migration	11	-	24	0.45	-
All Plan Area – Projected New Crossings					
All Streams	48	213	576	0.08	0.37
Spawning	5	34	68	0.07	0.50
Migration	2	4	24	0.08	0.16
All Plan Area – Estimated Replacements					
All Streams	71	485	576	0.12	0.84
Spawning	27	71	68	0.40	1.05
Migration	8	-	24	0.34	-

[1] Analysis excludes pedestrian crossings such as foot bridges.

Maintenance activities for flood control infrastructure may also affect streams. Flood control projects include, but are not limited to, maintenance of access roads, debris removal, and vegetation control; maintenance of flood control structures (existing dams, armored creeks, bypass channels, drainage ponds); and drainage improvements such as clearing of drainage structures. The extent of in-channel maintenance is minimal, estimated at 20 miles of the larger natural or altered channels. This estimate of effects is captured by Table 4-3. Where recurring maintenance of undisturbed channel will occur, effects may last longer than is deemed temporary, in which case they will be calculated as permanent effects and subtracted from the proposed maximum extent of take shown in Table 4-1.

Measures to reduce adverse effects on fish and aquatic habitats will be implemented as discussed in Chapter 6, *Program Participation and Conditions on Covered Activities*.

4.3.6 Methods for Effects of Covered Activities on Watersheds

The principal driver of effects on watersheds is the area of natural and semi-natural land cover that is converted to urban and suburban use and the direct effect footprint of rural residential use. The amount of increased urban and rural residential development permitted under the Plan is the basis for the results described in Table 4-8. Watershed effects in the Valley were estimated by apportioning the land conversion from the growth scenario to the watersheds in each demographic projection area. In the Foothills, the GIS-based analysis of vacant parcels and general plan zoning is directly overlaid on seven planning watersheds defined by the U.S. Geological Survey (USGS) hydrologic unit code (HUC) level 10 (HUC-10). The resulting increased urbanization is estimated by applying the rural residential footprint shown in Table 4-2.

4.3.7 Methods for Habitat Enhancement, Restoration, and Creation

Conservation measures for Covered Species involve the creation, enhancement, and restoration of habitat. The purpose of these projects is to benefit species and the net effect on species is positive. This section summarizes the acres of lands restored. The extent of habitat restoration is described in Table 5-5.

In the Valley, the majority of vernal pools and seasonal wetlands will be restored and created on grasslands; approximately 2,700 acres of grasslands will be converted to vernal pool complex, which includes vernal pools, seasonal wetlands, swales, and uplands such as grasslands that form the watershed supporting constituent wetlands.

Within vernal pool complexes, it is estimated that approximately 6,000 acres can accommodate additional wetlands, typically within low- and medium-density vernal pool complexes with less than 5 percent existing vernal pool constituent habitat density, as well as on grasslands without vernal pools, and agricultural lands. The commitments to habitat restoration shown in Chapter 5, *Conservation Strategy*, require restoration of 900 acres of vernal pool constituent habitats. The actual density of vernal pools restored will vary based on site conditions. However, using assumptions of existing density and increases that meet Plan requirements, the average wetland density on vernal pool lands protected and restored for the Reserve System will be increased from 4.6 to 8.4 percent.

In the Foothills, approximately 400 acres of grassland will be restored to oak woodlands, wetlands, and riparian habitat. The effects on Covered Species are expected to be minimal as the grassland affected is less than 2 percent of all Foothill grassland and close to 3,000 acres of grassland will be permanently protected on the Reserve System in the Foothills. Oak woodland restoration will have an overall beneficial effect on the Foothill Reserve System for Covered Species.

Up to 8,000 acres total of rice land or other agriculture land may be used for some other form of agriculture, and a portion (approximately 1,760 acres) may be used to restore natural communities such as fresh emergent marsh and other wetlands, riparian, valley oak woodland, and vernal pool complex. Agricultural fields and orchards may be restored to vernal pool complex, grassland, riparian, and other natural communities.

4.3.8 Limitations of Analysis

Actual conditions will differ from the predictions based on present data and assumptions. Growth patterns over the next 50 years may differ from those used in the analysis. The assumption of pro rata exposure to land conversion may not hold; future growth may deliberately or inadvertently affect or avoid certain land-cover types disproportionately to their presence in the Plan Area. The actual distribution of biological resources may differ from what is mapped.

The estimates of natural community and habitat affected are based on the land-cover mapping described in Chapter 3, *Physical and Biological Setting*. The area-wide analysis presented here is based on the best available information suitable for assessing Plan effects on a uniform, regional basis. The accuracy of the effects estimate is subject to the error inherent in developing the land-cover base map and the inferred estimates of wetland presence. Implementation of the Plan will be based on surveys of reserve lands and areas affected by Covered Activities; these detailed surveys will provide a more accurate accounting of actual take and conservation.

Although these limitations pose a risk that the effects analysis may underestimate the potential for take, the Plan proposes a maximum effect in excess of what is modeled. The Plan is intended to accommodate a certain amount of effects on natural communities and Covered Species. Take exceeding that described in the effects analysis will not be covered by the permit unless amended. The Plan proposes that permit take limits are based on the quantitative estimate of land conversion in the Valley and the Foothills, which is the primary driver of effects and the most reliable metric for assessing take. It is also sufficiently broad as to encompass other forms of take described in this chapter.

It is important to note the following with respect to the effects analysis methods and approach overall:

- The primary driver of effects in the Plan is land conversion resulting from urban development and associated activities. Almost all—roughly 95 percent—of the effects quantified in the plan derive from this mechanism.
- The methodology for quantifying land conversion from development was designed to broadly subsume other non-quantifiable effects.
- Other effects are quantified, as feasible.
- Non-quantifiable effects are described qualitatively. These effects are relatively small with respect to the primary effect of land conversion.

- The maximum effects estimates are built around the quantifiable effects associated with land conversion.
- The effect analysis is programmatic in nature, meaning that the precise location, size, and date of the future activities are unknown. For the purposes of permitting take, projects will be assessed for compliance under the Plan and tracked annually.

4.4 Effects from Covered Activities

Section 4.3, *Methods for Quantifying Effects*, above, describes the methodology used to quantify effects. In this and subsequent sections, effects are described both qualitatively and quantitatively for Covered Activities, communities, watersheds, Covered Species, and Critical Habitat. Cumulative effects are also described. This section describes effects by Covered Activity type.

Seven categories of Covered Activities were defined in Chapter 2, *Covered Activities*, as follows:

1. Valley PFG
2. Valley Rural Development
3. Foothills PFG
4. Foothills Rural Development
5. Regional Public Programs
6. In-Stream Activities
7. Conservation Programs

This section provides a description of the take mechanism and results for each of these categories of Covered Activity. The reader is referred to Table 4-1 and Table 4-3, which have columns corresponding to the Valley PFG, the Valley Conservation and Rural Development Area, the Foothills PFG, and the Foothills Conservation and Rural Development Area (Items 1 through 4 above). As explained in Section 4.3, *Methods for Quantifying Effects*, direct effects within the Covered Activity categories of Regional Public Programs (Item 5) and In-Stream Activities (Item 6) are incorporated into the estimates provided in Tables 4-1 and 4-3. Direct effects associated with the Conservation Programs (Item 7) were not calculated and are not included in the effects analysis because the net effects are assumed to be positive.

For some Covered Activities, additional information that provides useful context for understanding effects is also provided in the subsections titled *Additional Detail on Programs*. Note that the effects assessment for each activity is quantified (programmatically) above and that projects will qualify for coverage by the HCP/NCCP yearly on a case-by-case basis. As such, the details provided in this subsection are for context only. In addition, conditions, procedures, and measures that limit the effects described here are presented in Chapter 6, *Program Participation and Conditions on Covered Activities.*

4.4.1 Valley Potential Future Growth

Valley PFG activities consist of urban development as described in Section 2.6.1, *Valley Potential Future Growth Area (A1)*. In the aggregate, urban development is responsible for most of the take of habitat and natural communities in this Plan.

4.4.1.1 Take Mechanisms

The primary effects of urban development are the result of construction activities that cause ground disturbance and permanent conversion of land cover from natural and semi-natural to developed, and may result in take of individuals of Covered Species or their habitat.

Fragmentation is an indirect effect that occurs when habitat patches are isolated by development. Urban development can lead to water quality degradation and watershed effects. Urban development causes an increase in impervious surfaces in the landscape through the construction of structures and infrastructure such as buildings, roads, sidewalks, and parking lots. Impervious surfaces can affect the flow, sedimentation load, and pollution composition of stormwater runoff. Impervious surfaces prevent the infiltration of water into soil and contribute to increased runoff, especially during storm events. At the watershed level, there will be indirect effects on salmonids.

Locally, impervious surfaces may alter the hydrology of seasonal wetlands and vernal pools, on and off project sites, by altering the duration, volume discharge, and frequency of surface flows through increased runoff and flooding. Altering the timing, frequency, and duration of inundation in vernal pools may affect the survival of vernal pool species that rely on the natural hydrological regimes in vernal pools. Premature dry-down, for example, can prevent completion of a life stage. Longer periods of inundation may affect vernal pool plant species by facilitating seed rot, thus reducing the seed bank. Longer periods of inundation may affect vernal pool branchiopods by facilitating colonization by predators that require longer periods of inundation, such as mosquito fish (U.S. Fish and Wildlife Service 2005).

4.4.1.2 Results

The direct effects of Covered Activities in the Valley PFG are listed in Table 4-1 and Table 4-3 (indirect effects are assessed in Table 4-4a-d). The growth scenario for the Valley PFG leads to an estimate of up to 17,000 acres of land conversion of all natural communities and another 2,700 acres of rice and other agriculture for a total estimate of 19,700 acres of permanent direct effect. As discussed in Section 4.3.2, *Methods for Assessing Temporary Direct Effects*, most of the Covered Activities in the Valley PFG will be considered permanent. The estimate of temporary direct effects in Table 4-3 shows an estimated 780 acres, which is roughly 4 percent of the corresponding estimate for permanent direct effects.

Natural/semi-natural land cover in the Valley PFG is mainly vernal pool complex and non-vernal pool grassland, and it is here that the majority of vernal pool complex take will occur. When the effects model allocates land conversion across the landscape, there will be an estimated loss of 12,200 acres of vernal pool complex scattered throughout the Valley PFG. The vernal pool complex is highly variable in condition and wetland density, with an average wetted area density of 2.5 percent (across low [<1 percent], intermediate [1 to 5 percent], and high [>5 percent] density vernal pool complexes), leading to an estimated loss of 300 acres of actual vernal pool wetland area.

Some patches of relatively intact topography remain and the take estimate includes their conversion on the same pro rata basis as any other lands in the PFG. Although the Plan does not require avoidance of these areas, the conservation strategy specifically provides for incorporation into the Reserve System where the biological resources are of particular value and where the relationship of those lands to developed areas is able to minimize adverse indirect effects (see Chapter 5, *Conservation Strategy*, for provisions for land-in-lieu of payment of mitigation fees). Continuing infill in the present City of Lincoln will result in conversion of non-vernal pool grasslands and some woodland on the City's current east boundary. Where growth will occur in the City of Lincoln General Plan area and in the western side of the unincorporated PFG, land conversion will also affect 1,800 acres of land currently in rice production and some 600 acres of field crops and orchard.

The Stream System makes up 8 percent of the Valley PFG. The Plan will reinforce existing general plan protection of the Stream System, which is largely floodplain in the Valley PFG. Estimated effects within the Stream System are modeled to be less than 400 acres or 2 percent of the land conversion total. Some portion of this is mapped as riparian/riverine land-cover types, mainly riparian, and valley oak woodland. Non-vernal pool wetlands are also found outside of the Stream System, very often associated with irrigation and artificial impoundments for agriculture.

The indirect effects of Covered Activities in the Valley PFG are mainly those associated with the increase to urban area. This is discussed above in Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley*, and Section 4.3.6, *Methods for Effects of Covered Activities on Watersheds*.

4.4.2 Valley Conservation and Rural Development

This category is defined by land-disturbing activities that occur in the Valley Conservation and Rural Development Area (Plan Area A2), which comprises the RAA and EXR, outside of the PFG. Most of the activities in this category are associated with limited rural residential development. This category addresses rural non-residential development including telecommunications facilities, agricultural structures, rural commercial development, and recreational areas. The Valley RAA has some 20-acre lots and a portion zoned for densities consistent with rural residential development (greater than 2.3 acres) and may be subject to land conversion for new homes and associated structures. The area includes a portion of the Placer Parkway transportation project.

4.4.2.1 Take Mechanisms

The primary effects in the Valley Conservation and Rural Development category are from the expansion of agriculture-related commercial and industrial facilities that will result in permanent conversion of land cover from natural and semi-natural to developed.

The Plan foresees relatively limited land conversion in Plan Area A2, where this category of Covered Activity occurs. Where development occurs, indirect effects may include increased fragmentation and watershed effects. The existing condition in Plan Area A2 reflects a high level of fragmentation and hydrologic modification based on roads and drainage imposed to allow agriculture and to control flooding.

Valley rural development is expected to be patchy and insignificant relative to the scope of urban development. The total amount of property with land use designations in a rural residential density (i.e., 1 to 10 acres per dwelling unit) is limited in scope and is situated where fragmentation of land cover has already occurred.

4.4.2.2 Results

The effects of Covered Activities in the Valley Conservation and Rural Development Area are listed in Table 4-1 and Table 4-3. The growth scenario identifies little rural development in the Valley Conservation and Rural Development Area; the permanent direct effects allowance in Table 4-1 is meant to accommodate up to 700 acres of unspecified rural residential and agricultural development along with infrastructure such as transportation and water supply pipeline corridors serving the Valley PFG. The latter are allocated 50 acres of temporary effects.

Most of the RAA will continue in agricultural use (e.g., the planting of crops and disking of lands to prepare a site for cultivation), which is not covered by this Plan and much of which will be targeted for reserve acquisition and management, which is discussed below. Because the RAA lies on the low, western edge of the Plan Area, floodplains widen and merge so that the Stream System makes up 35 percent of the RAA. Covered Activities here, such as transportation or agricultural industry, will inevitably affect floodplains.

Covered Activities are projected to affect only 1 percent of the total Valley RAA land area. Actual effects on natural communities will depend on the specific location of any future activity, but assuming that land conversion occurs proportionately across the landscape, there will be a loss of up to 280 acres of vernal pool complex, 200 acres of land currently in rice production, and 210 acres of other agriculture and grassland.

Vernal pool wetland density in the RAA is estimated to be 2.9 percent; the modeled loss of vernal pool complex land cover predicts a loss of approximately 8 acres of vernal pool constituent habitats within the RAA. Some other wetlands may also be affected by Covered Activities.

4.4.3 Foothills Potential Future Growth

This category includes all ground- or habitat-disturbing projects and activities that occur in the Foothills PFG (Plan Area A3) (Figure 2-4). By far the majority of future growth in the Foothills will be a continuation of past low-density and very low-density rural residential development (more than 1 acre per dwelling unit). Very low-density, rural residential development can leave portions of the landscape in original condition as islands of urban use are embedded within it.

4.4.3.1 Take Mechanisms

The primary effects of rural residential development are the result of a variety of construction activities that cause ground disturbance and permanent conversion of land cover from natural and semi-natural to developed. Agricultural activities, which are prevalent in this area, are not a Covered Activity of this Plan.

In terms of increased fragmentation, the majority of true urban development in the Foothills will be limited to the already built-up areas around I-80, the city of Auburn, and SR 49 to the north. There are numerous small patches of natural land cover interspersed in the area, but the present level of fragmentation and adjacency to development means that the area is already subject to fragmentation and altered hydrology from increased impervious surfaces.

Most growth in Plan Area A3, where this category of Covered Activity is located, will occur as very low-density rural residential. The indirect effect of rural residential development occurs when

density increases to the point where human habitation and human activities are pervasive despite the remnants of natural habitat left around building sites.

These indirect effects derive from habitat fragmentation and presence of humans. While the rural development footprint may not be as extensive as urban development, the indirect effects of habitat fragmentation are higher in rural areas than in urban areas, because the existing landscape is generally less disturbed to begin with. Because rural development will occur in the Valley and Foothills RAA, where the Reserve System will primarily be established, fragmentation caused by rural development will have a greater effect on remaining natural landscapes than in urban areas (i.e., the Valley PFG), where few reserves are expected to be established.

Lengthy private roads and driveways are often required to access rural homes. These roads further fragment the landscape by splitting larger blocks of contiguous habitat into smaller blocks. New roads can potentially degrade movement corridors, introduce vehicle-related mortality, and create barriers to wildlife movement. Roads create corridors for invasive plants to disperse along roadsides and attach to vehicles, thus affecting native vegetation. Rural roads, often privately constructed, can also contribute to erosion and sedimentation in the stream zone.

The effects of fragmentation on wildlife can be variable and species specific. At the landscape level, fragmentation can reduce habitat quality for species that require large, contiguous patches of habitat, or species that are sensitive to human inhabitation (e.g., songbirds that are susceptible to predation by feral cats). For example, in Placer County, Stralberg and Williams (2002) found that abundance of some wildlife species increased whereas some decreased on oak woodland fragments 40 acres or smaller. They recommended retaining oak woodland patches at 40 acres or more to further wildlife conservation objectives. In unfragmented oak woodland, Stralberg and Burnett (2007) found that some birds of high conservation concern had positive associations, with the amount of blue oak woodland and montane hardwood woodland at a 3- to 6-mile radius. They concluded that large, unfragmented blocks of habitat were important to many species but that the diversity of natural habitat types was also important. All of the above activities related to rural development may decrease the health of natural communities and result in harm of Covered Species. Cumulatively, these rural development projects fragment the landscape and make it more likely that wildlife populations will become fragmented.

Effects from light pollution and noise may also be significant when introduced into relatively natural areas (e.g., Barber et al. 2009). Noise from vehicle traffic can disrupt bird populations (e.g., McClure et al. 2013). New sources of light in formerly unpopulated areas can affect the ability of some species—especially birds, bats, and many species of insects—to navigate at night.

Rural development can exacerbate the introduction or spread of non-native species and native predators that thrive in human-dominated environments, such as raccoons and crows. Wildlife, particularly birds, may also be affected by introduced predators such as the domestic cat that prey upon birds and their eggs and nestlings.

4.4.3.2 Results

Table 4-1 shows the estimated effects of Covered Activities in the Foothills PFG resulting in land conversion of 8,770 acres. As explained in the methodology above, this reflects application of a nominal rural residential footprint to estimates of existing vacant parcels and large parcels capable of subdivision and an additional allowance for unspecified urban infill, mainly along the I-80 corridor. As with urbanization in the Valley, the area subject to temporary direct effect is estimated

as an additional roughly 4 percent to accommodate infrastructure, road construction, and other infrastructure from public programs.

The Foothills PFG is a mosaic of woodlands, grassland, and very low-density residential land use. Some of the grassland intergrades with woodland to form an oak savanna; some grassland is pasture or abandoned orchard land, usually interspersed in partially developed rural residential areas. Woodland is found more in patches closer to the I-80 corridor and in more contiguous woodland farther north. The projection of future growth in the Foothills based on parcel map and existing land use designation identifies 8,770 acres of natural and semi-natural land cover likely to be converted to buildings and grounds for rural residential use. Somewhat over half of the conversion for future growth (4,700 acres) is now woodlands, predominantly mixed oak woodlands, along with blue oak woodland and the oak woodland savanna that intergrades with it. Much of the infill of existing but vacant rural residential parcels is mapped as grassland, and future growth could affect some 3,000 acres of grassland.

The Stream System in the Foothills is narrower than in the Valley, less dominated by floodplain, but it is longer and more extensive as low order streams branch into the upper watersheds. Seven percent of the Foothills PFG is in the Stream System; the parcel-based analysis described in Section 4.3.1.2, *Land Conversion in the Foothills*, assumes 80 percent avoidance of the Stream System and predicts a loss of 300 acres of riverine/riparian communities. Valley oak woodland is common in the Foothills in small patches along valley bottoms and intergraded with other oak woodlands. Because of the difficulty in mapping intergraded patches, it is difficult to quantify the amount of valley oak woodland that may be affected below the minimum mapping unit.

Most of the growth in the Foothills will be at lower densities (rural residential and lower). At present, 6 percent of the Foothills is mapped at urban densities, or greater than one dwelling per acre. One-quarter (26,300 acres) is mapped at lower densities between 0.1 and one dwelling per acre. Roughly half of the area mapped as a rural residential land-cover type appears as actual developed land; the balance is patches of natural or semi-natural land-cover types embedded in the overall area mapped as rural residential. Although these embedded patches may amount to 13,300 acres in a natural condition, the patches are already subject to indirect effects from existing rural development and show fragmentation effects associated with a parcel size less than 10 acres.

The indirect effects of Covered Activities in the Foothills PFG are mainly those associated with the increase to urban area discussed above in Section 4.3.4, *Methods to Assess Indirect Effects from the Increase in Rural Densities in the Foothills*, and Section 4.3.6, *Methods for Effects of Covered Activities on Watersheds*.

4.4.4 Foothills Conservation and Rural Development

This category includes Covered Activities that occur in the Foothills Conservation and Rural Development Area (Plan Area A4) (Figure 2-4). These include rural residential development for new homes and associated structures (e.g., roads, garages, barns, stables) as well as rural non-residential development (e.g., telecommunications facilities, agricultural structures, rural commercial development, recreational use areas).

4.4.4.1 Take Mechanisms

The direct effects of all ground- or habitat-disturbing projects will be from land clearing and new impervious surfaces that result in conversion of natural and semi-natural land-cover types to urban, suburban, or rural residential use.

4.4.4.2 Results

The effects of Covered Activities in the Foothills Conservation and Rural Development Area are listed in Table 4-1 and Table 4-3. The conservation strategy defined in Chapter 5, *Conservation Strategy*, will establish 11,200 acres of new reserve lands in the Foothills Conservation and Rural Development Area in addition to the roughly 6,000 acres of EXR (see Table 5-4). This will leave roughly half of the Conservation and Rural Development Area in private ownership where the existing General Plan (Placer County 2013) will allow very low-density residential development and large parcel subdivision. This leads to an estimate of 1,080 acres of permanent direct effect footprint in the Foothills Conservation and Rural Development Area with another 6 percent allowance for temporary direct effects mainly associated with public programs.

Because the northern Foothills are less fragmented by development and roads, there is a larger extent of oak woodland and grassland. Most of the existing parcels subject to possible future development are in the lower elevation and valley portion of the RAA, which is mapped as grassland. Although 55 percent of the RAA is oak woodland, only 400 acres of the estimated 1,060 acres of permanent direct effect are woodland. It is estimated that 9 percent of Stream System in the RAA may be subject to direct effects because of the tendency to locate buildable parcels in the flatter valleys. The very large parcel land use designation (more than 10-acre minimum) and the narrow Stream System here will allow site planning to better avoid effects on the Stream System.

As described above in Section 4.3.4, *Methods to Assess Indirect Effects from the Increase in Rural Densities in the Foothills*, a 10-acre parcel size threshold was used to quantify indirect effects from fragmentation in the Foothills; when existing parcels greater than 10 acres are subdivided to parcels less than 10 acres, the balance of the parcel outside of the permanent direct effect development footprint is considered to be subject to indirect fragmentation effects.

Using this approach an estimated 13,400 acres will be subject to indirect effects beyond the "footprint" direct effects. Because the RAA is where most of the large parcels are located, 21 percent of indirect effects are projected to occur within the RAA. Existing RAA subdivision potential could increase, but land acquisition for the Reserve System will divert approximately 14,000 acres of Foothills RAA and eliminate 3,600 acres of potential effects, leading to a final estimate of 3,900 acres subject to fragmentation effects. The types of indirect effects that could occur are the same as those described above in Section 4.4.4.1, *Take Mechanisms*.

4.4.5 Regional Public Programs

Regional public programs provide the infrastructure that supports public services and development. Effects from regional public program will occur largely in the Valley and Foothills PFGs but may also pass through the Valley and Foothills Conservation and Rural Development Areas (RAA and EXR). All regional public programs in Plan Area A are covered under the Plan. Specific activities/projects in Plan Area B1 and B2 are covered, as noted in Section 2.6.5, *Regional Public Programs*.

4.4.5.1 Take Mechanisms

Several programs are addressed within the Regional Public Programs Covered Activity category, as follows:

- Transportation
- Wastewater
- Water supply
- Solid waste management
- Public recreation facilities
- Utility line construction and maintenance

The primary method of quantifying take associated with this category of Covered Activity will be land conversion from the expansion of regional services over the permit term and from specific projects associated with this expansion. In addition, indirect effects may result from these projects as discussed below.

New and expanded roadways, including the Placer Parkway project and the I-80/SR 65 Interchange, have the potential to fragment natural communities and habitat for Covered Species. Some transportation projects may create barriers or hazards to movement and dispersal, fragment habitat, and increase impervious services. Covered Species and other wildlife could be killed or injured by traffic.

Habitat loss and fragmentation can decrease the abundance of Covered Species through changes in social ecology, productivity, dispersal, and survival. Habitat fragmentation reduces the suitability of habitat and disrupts movement, dispersal, and gene flow. Roads reduce habitat suitability by fragmenting large patches of habitat into patches that may be too small for effective use by some species. Implementation of Regional Public Projects Condition 1, Transportation and Other Infrastructure Projects Design Requirements (Chapter 6, *Program Participation and Conditions on Covered Activities*), will help to minimize the effects of transportation projects on movement of wildlife. Construction of new roads and expansion of existing roads in rural areas could result in an increase in development close to the roads and change in land use practices in adjacent areas.

Roads increase the risk for wildfire and the spread of invasive species. In addition, new and expanded roads and associated traffic can create noise and light that may disturb Covered Species occurring both near to and far from the road. Vegetation management along road shoulders and rights-of-way has the potential to disturb a narrow strip of habitat for Covered Species and possibly to injure or kill individuals that occur in this habitat. Routine or emergency O&M activities are expected to have minimal permanent effects on Covered Species, because the vast majority of these activities occur within the road footprint or shoulder, where Covered Species do not regularly occur. Urban growth and associated effects are the driver for this Plan. Small and/or negligible effects such as vegetation management and routine maintenance are not quantified but are assumed to be addressed by the larger analysis on direct effects.

Streams and wetlands close to new roads may be indirectly affected by increased sedimentation or runoff during or after construction, or by runoff of oil and grease from larger roads with more traffic. Fragmentation caused by a new roadway could also affect vernal pool complexes. Development can affect the hydrology of vernal pools, including pools that are not directly affected. Covering land

surfaces with concrete can affect the amount and quality of water available to the perched water tables characteristic of vernal pool areas. Changes to the perched water table can lead to alterations in the rate, extent, and duration of inundation (water regime) of remaining habitat (U.S. Fish and Wildlife Service 1996). Survival of vernal pool branchiopods is directly linked to the water regime of their habitat. Roads in or near vernal pool constituent habitats can create additional effects through the introduction of runoff (i.e., petroleum products). Traffic on roads can also lead to an increased deposition of nitrogen in vernal pools and surrounding habitats. Increased nitrogen levels could potentially make vernal pool habitat more suitable to non-native species and less suitable to native species (U.S. Fish and Wildlife Service 2005). Development also may produce conditions that are favorable for exotic predators such as bullfrogs and mosquito fish (U.S. Fish and Wildlife Service 1996).

Effects may occur as the result of activities associated with wastewater treatment facilities, water supply programs, and solid waste management. These include noise, increased dust, lighting, erosion, and cleanup of spills. The landfill and composting operations have the potential to attract nuisance species (e.g., seagulls) and introduce invasive exotic plant species.

Other indirect effects from water supply operations could include temporarily altered flows downstream of the site where treated effluent is discharged. Additionally, indirect effects could occur if discharged water is a different temperature than streamflow, causing a temperature fluctuation in the stream. Effects will most likely be confined to relatively small areas.

Indirect effects related to development of trails and recreational facilities are largely related to their use, and potential for inappropriate behavior (e.g., off-trail hiking, illegal dumping). Indirect effects related to public use of regional parks and open space may result from improved trail access to new open spaces. These effects will be minimized through management and supervision of the trail system, education of open space users, and restricted or managed access to open space.

Specific effects will be determined on a project-level basis. Measures to avoid and minimize the effects of wastewater projects and O&M, including design measures, are described in Chapter 6, *Program Participation and Conditions on Covered Activities*.

4.4.5.2 Results

The direct effects of Regional Public Programs are included in the totals shown in Table 4-1 and Table 4-3, which include an allowance for public programs. As a Covered Activity category, Regional Public Programs overlap in geographic extent with urban development in the PFG. Most of the effects of public infrastructure are associated with growth in the Valley and Foothills and are factored into the growth area effect estimates described above. Although public infrastructure, including roads and public use facilities such as parks and schools, may cumulatively amount to one-quarter of the urban landscape, the effects are not listed separately to avoid double counting. The total amount of natural communities likely to be affected is small relative to the large area served and the corresponding extent of urban effects.

4.4.5.3 Additional Detail on Programs

The remainder of this section provides an expanded discussion of the effects mechanisms associated with Regional Public Program components. This detail is provided for context and to describe qualitatively potential sources of take. Note that all quantification of effects is described above in Section 4.3, *Methods for Quantifying Effects*.

4.4.5.3.1 Transportation Programs

Major transportation projects within Plan Area A entail new roadways, highways, or bypasses, or significant improvements and expansions to existing roadways and include the planned Placer Parkway and the I-80/SR 65 Interchange Improvements. Road maintenance on existing and future roadways is also addressed as part of Transportation Programs.

Transportation projects will have permanent effects on land cover within the footprint of new and widened roadways.

Temporary effects may occur in areas where land cover is disturbed for staging and accessing construction sites but revegetated to pre-project or ecologically improved conditions within the time allowed for temporary effects (i.e., 1 year).

Measures to avoid and minimize the adverse effects of covered transportation projects, including design measures for new and expanded rural roads, are described in Section 6.3.4, *Regional Public Programs*.

Two major transportation projects are currently planned within the Plan Area, as described below (see Figure 2-9).

Placer Parkway – South Placer Regional Transportation Authority

As described in Chapter 2, *Covered Activities*, the Placer Parkway will connect SR 99 in Sutter County to SR 65 in Placer County. The Placer Parkway crosses the Valley PFG, Plan Area B1, and the Valley RAA and is a Covered Activity under the jurisdiction of the South Placer Regional Transportation Authority.

Take is projected to occur during construction of transportation projects, including loss of habitat and natural communities as well as direct mortality of individuals. Additional fragmentation is also anticipated to result from transportation projects. The project vicinity includes some of the fast-growing communities in the six-county Sacramento Area Council of Governments region: Roseville, Rocklin, Lincoln, and the unincorporated Sunset Industrial Plan Area. Undeveloped areas support a mix of cultivated rice fields, grasslands, agricultural fields, intermittent streams, riparian, freshwater marsh, vernal pools, and other seasonal wetlands. Developed areas are located intermittently throughout the project area. Large commercial developments generally are found in the southwestern and northeastern corners of the project area.

The overall development footprint for Placer Parkway in the Plan Area is estimated to be approximately 125 to 150 acres.

I-80/SR 65 Interchange Improvements – South Placer Regional Transportation Authority

As discussed in Chapter 2, *Covered Activities*, I-80 is the principal east–west route in northern and central California; SR 65 connects with I-80 in Roseville and runs north past Lincoln into Yuba County. The proposed upgraded interchange is located entirely in non-participating city, Plan Area B1, and is a Covered Activity through the managing authority of the County as Permittee.

The project footprint will occur mostly within urban land cover; consequently, there will be minimal direct effects on natural and semi-natural communities. Both the I-80 and SR 65 freeways run through relatively flat terrain in a heavily urbanized area with frequent interchanges. Most of the anticipated work will occur within existing rights-of-way, although some habitats, including

wetlands, may be affected by land conversion (see discussion of altered hydrology in Section 4.7, *Effects on Covered Species*). The project will also include work within Antelope Creek and Secret Ravine Creek. Implementation of Regional Public Project conditions (see Section 6.3.4, *Regional Public Programs*) will avoid and minimize effects on aquatic and terrestrial habitats.

Road Maintenance

All covered routine road maintenance activities that occur within the Plan Area are described in Section 2.6.5, *Regional Public Programs*.

Vegetation management in roadway medians and shoulders will permanently affect habitat in these areas as vegetation is frequently disturbed for maintenance. Noise and visual disturbances associated with the operation of large machinery and equipment could result in temporary adverse effects on covered and other native species while such activities are implemented. The introduction of contaminants associated with maintenance-related activities (e.g., fuel spills) may cause morbidity or mortality of covered and other native species coming in contact with contaminants. Erosion and sedimentation associated with maintenance-related disturbance of soils (e.g., grading, resurfacing) could result in temporary reduced function of receiving waters and land surfaces as habitat for covered and other native species (e.g., increased turbidity, reduced dissolved oxygen, silting over vegetation). Implementation of Regional Public Projects Condition 3, Operation and Maintenance BMPs (see Chapter 6, *Program Participation and Conditions on Covered Activities*) will avoid and minimize effects on aquatic and terrestrial habitats and Covered Species.

4.4.5.3.2 Wastewater Programs

Improvements to existing and new wastewater treatment facilities, lift stations, and effluent and discharge conveyance pipelines will likely occur over the term of the Plan due to expected urban growth (see Table 2-2 for a list of Covered Activities associated with Wastewater Programs). Covered wastewater activities may occur within Plan Area A or Plan Area B1, Permittee Activity in Non-participating City Jurisdiction.

The construction of new wastewater treatment facilities and pipelines and expansion of existing facilities could result in direct permanent and temporary effects on Covered Species, habitat, and natural communities. These projects may require digging, trenching, excavation, compaction, and/or paving. Implementation of these projects will result in permanent direct effects on land cover within the footprint of each project (i.e., loss of natural or semi-natural land-cover types to new structures).

Some temporary effects outside the project footprint are expected during construction due to access and staging needs.

Pipeline O&M activities prevent deterioration of infrastructure necessary for wastewater conveyance.

Sewage pipe maintenance, rehabilitation, and replacement could have direct permanent and temporary effects caused by staging, off-road access, pipeline drainage, excavation, and repair and/or replacement of sections. Additional maintenance occurs on pump stations, and may include replacement of various components of the station and structure, or the complete replacement of the entire pump station. Depending upon the location of pipes and pump stations, maintenance actions may affect natural and semi-natural land cover.

Sewage pump stations are not manned continuously; they are fully automated and only need to be checked when regular preventative maintenance is performed. Depending on their age and condition, they are checked by maintenance workers as frequently as three times per week and not less than once per week. With the exception of maintenance involving repair or reconstruction, as previously described, it is anticipated that routine sewage pump maintenance will not have any adverse effects on habitat or species.

Staging, excavation, and off-road access may cause temporary effects on upland or riparian vegetation around pipelines. Temporary discharge may disturb soil and vegetation at blow-off[3] locations, increase flows in the receiving channel, and cause channel erosion. Excavation may be required to access buried pipelines. Pipe rehabilitation or installation may require culvert repair or installations that cross or go under streams either above grade along roadway bridges or below grade in trenches beneath the streambed, or horizontal directional drilling (jack and bore). Pipe rehabilitation and installation can affect the streambed during installation, and increase turbidity and sedimentation downstream. These effects are assessed quantitatively as part of the in-stream effects (see Section 4.4.6, *In-stream Programs*).

4.4.5.3.3 Water Supply Programs

Water supply programs are carried out by the following Permittees: PCWA, the City of Lincoln, and Placer County (Sheridan Public Water System). Covered PCWA water supply activities may occur anywhere within Plan Area A, Plan Area B1, Permittee Activity in Non-participating City Jurisdiction, or Plan Area B2, PCWA Zone 1 O&M. Covered water supply activities by the County or the City will occur within Plan Area A in the Valley PFG or Valley Conservation and Rural Development components.

Placer County Water Agency

Water Distribution System Operations and Maintenance

Chapter 2, *Covered Activities*, summarizes the PCWA canal system and raw water operations (see Appendix E, *PCWA Natural Resource Management Plan* for a detailed description of their Covered Activities and their facilities). In essence, PCWA owns, operates, and maintains 165 miles of canals, ditches, and flumes from Lake Alta to western Placer County, along with eight small reservoirs. All but the lines from Lake Alta to Lake Theodore are included in the Plan.

The canals are used to transport raw water via gravity flow to downstream irrigation customers and water treatment plants in Auburn, Colfax, Loomis, Rocklin, Lincoln, Roseville, and unincorporated Placer County. Reservoirs provide flexibility in operations in water delivery by capturing and storing some flow for release to the rest of the system when there is demand. Approximately 51 miles (31 percent of the 165 miles of canals, ditches, and flumes owned, operated, and maintained by PCWA; see Appendix E, *PCWA Natural Resource Management* Plan) of the canals are lined with gunnite or concrete and/or are contained in pipelines. Water in the canal system that is not delivered to PCWA customers is released back into the surface stream waters in the Plan Area at the termini of the canals. Water is released into Miners and Secret Ravines, Antelope Creek, and Auburn Ravine and/or tributaries. This surface flow added directly to streams in the Plan Area contributes to the natural

[3] Blow-off is a release point in a pipeline for the purposes of dewatering.

streamflow in the Plan Area. Because of the various sources of raw water that PCWA uses, the water released into the Plan Area streams may or may not have been there naturally.

The canals may offer some dispersal or refuge habitat for some amphibians. However, the canal system is made up of concrete water transportation open channels with concrete or impervious earthen linings that do not support significant vegetation and are maintained to ensure that vegetation does not impede conveyance of water. As a consequence, these facilities do not provide suitable habitat for Covered Species.

The water that PCWA's supply system releases into the Plan Area surface streams affects aquatic habitat within the Plan Area by increasing the available water, decreasing the temperature during hot months, and modulating flow. PCWA raw water system O&M activities include the following components:

- **Seasonal Decreases in Water Delivery.** Decreases in water delivery during the mid-October to mid-November Pacific Gas & Electric (PG&E) outages could result in temporary minimal decreases in the extent of wetland habitats that may be indirectly supported by canal deliveries. This would have minimal temporary effects on Covered Species that use wetland habitats such as California black rail, amphibians, and western pond turtle by decreasing the amount of water to adjacent canal wetlands during the fall outages. The temporary decreases in water would not result in loss or reduction of the wetland habitat.
- **Annual Canal Outages.** Decreased and intermittent canal system flows during the PG&E yearly fall outages could affect Central Valley fall-/late fall-run Chinook salmon and Central Valley steelhead spawning habitat in Secret and Miners Ravines as a result of reduced flow contributions from the PCWA canal system and flow reductions in these creeks. Although the outages affect PCWA facilities, PG&E is not a Permittee, and the PG&E actions are not a Covered Activity but PG&E may request coverage as a Special Participating Entity.

  Central Valley fall-/late fall-run Chinook salmon may begin spawning activities from early November to December, which may, in some years, coincide with the tail end of PG&E's yearly outages and the resulting streamflow reductions. If the reduction of canal system contributions to streamflow occurs where spawning has occurred and after spawning has begun, redds, which are nests of salmonid eggs in riverbed gravel, may be affected.

  Central Valley steelhead typically do not start their upstream migration until after a large storm event, typically after the PG&E yearly outages are completed. Spawning also occurs after the outages, so spawning and egg incubation will not be affected by the outages. Juvenile outmigration typically occurs before the PG&E outages. Steelhead do, however, rear year-round, especially in Secret Ravine, and may be affected by the PG&E yearly outages through the reduction or loss of rearing habitat, and the potential increase in predation rates. The extent of effects on rearing Central Valley steelhead is dependent upon how low the flows drop during the annual outages, and if the water temperatures increase. If flows decrease too much, or if water temperatures rise too high, Central Valley steelhead will move to locations more suitable, most likely downstream into Dry Creek.
- **Customer Delivery Changes**. Customer delivery schedule changes in April and October could result in potential negative effects on covered bird species if they are nesting near work areas that may be disturbed by noise or human presence. Effects on covered birds are unlikely to occur, however, as seasonal customer delivery changes tend to occur during the non-nesting season for raptors and songbirds. Potential effects on covered bird species will be minimized by

providing buffers around nests (see Community Condition 2.4, Placer County Water Agency Operations and Maintenance Best Management Practices, in Chapter 6, *Program Participation and Conditions on Covered Activities*).

- **Increased Flows.** Routine canal system operations contribute to flows in some year-round Plan Area streams, including Secret and Miners Ravines. The PCWA canal system provides direct contributions to flows within Plan Area streams through regulated releases to streams used for conveyance and unregulated releases from canal outlets, and indirect contributions through customer return flows. These flow contributions have a positive effect on hydrologic and water quality conditions in Plan Area streams. Populations of fall-run Chinook salmon and Central Valley steelhead in Secret and Miners Ravines most likely benefit from consistent contributions to streamflow from the PCWA canal system during routine operations.
- **Canal Cleaning and Flushing Activities.** Short-duration, typically 6-hour reduction of flows in the PCWA canal system during canal cleaning and flushing activities could have minimal effects on species that use these wetland habitats, such as California black rail, giant garter snake, California red-legged frog, foothill yellow-legged frog, and western pond turtle by decreasing the amount of available habitat. Reductions in water levels could expose amphibian eggs in the shallow, vegetated margins of drainages or adjacent wetlands, resulting in loss of egg masses. Potential effects from temporary water reductions on species that use these habitats are expected to be negligible because the canal system contributions to flow within the Plan Area streams through unregulated releases from canal outlets are generally brief (up to 8 hours).

  Flushing after canal cleaning could erode banks and wash away amphibian eggs and juvenile western pond turtles that may be present on stream margins. Increased sedimentation from flushing activities could bury amphibian eggs. The typical timing of the cleaning period in the early part of the year to treat first-flush flows and reduce downstream water quality effects, including minimizing sediment releases, occurs within the breeding period for covered amphibian and fish species.
- **Water Quality.** Changes in water quality could indirectly affect terrestrial habitats and species. Increases in trace elements (such as aluminum and copper) could have some negative effects on plants and wildlife on the margins of canals and tributaries. Amphibians in particular are known to be sensitive to such water quality changes, although effects vary dramatically by type and concentration of contaminant, species, and life stage.

  Habitats and species could potentially be affected directly or indirectly by effects on soils and sediments from equipment, including compaction, erosion, and introduction of petroleum products. Effects on habitats and species could include plant mortality or decreased plant growth. These types of effects are expected to be relatively minimal and small in aerial extent. If equipment is used for removal of debris, damage could be caused to habitats by movement of equipment or by placement of debris and soil near canals. Some potential negative effects could occur if covered bird species are nesting near work areas that may be disturbed by noise. Effects on covered bird species will be minimized by providing buffers around nests (see Community Condition 2.4, Placer County Water Agency Operations and Maintenance Best Management Practices, in Chapter 6, *Program Participation and Conditions on Covered Activities*). Implementation of Species Condition 2, California Black Rail, will avoid and/or minimize effects on California black rail.

Changes in water quality conditions observed in Plan Area streams following canal cleaning activities may affect aquatic habitat for salmonids. Increased levels of aluminum and copper in Plan Area streams during and after canal cleaning activities could potentially affect steelhead and Chinook salmon. Aluminum can affect gill function and growth rates. Aluminum bioavailability is closely tied to pH levels. The level of effect is dependent upon other environmental conditions, such as pH and water temperature. Higher pH levels in the water increase the buffering capacity for the effects of aluminum on fishes.

Potential effects of copper on fish include reduced olfactory sensors and possibly temporary decreased feeding activity. The toxicity of copper on fish is dependent on the chemical form, water hardness, and the life-stage and species exposed. Elevated copper concentrations can result in reduced olfactory sensitivity, affecting the ability to detect predators and prey and also affecting imprinting of smolts on their natal stream (National Marine Fisheries Service 2014). Elevated copper concentrations could also reduce survival of benthic macroinvertebrates, prey for many fish species. Social interactions can also be impaired with copper exposure. Increased stress levels of subordinate fish may also lead to increased copper uptake across the gills.

Turbid waters reduce the fish's efficiency in locating and feeding on prey. Many fish, including juvenile salmonids, find and capture prey by sight. Some fish, particularly juveniles, can get disoriented and leave areas where their main food sources are located, which can result in reduced growth rates. In addition, habitat can become limiting in systems where high turbidity precludes a species from occupying habitat required for specific life stages.

- **Introduction of Petrochemicals.** Weed and brush control activities that involve physical removal of vegetation could potentially have minor effects on soils and sediment quality, although actual effects depend on the equipment used for removal, and type and location of vegetation. Equipment used along canal banks may increase erosion, and motorized equipment may introduce petrochemicals to soils and affect sediment quality. Habitats and Covered Species could potentially be affected directly or indirectly by effects on soils and sediments from equipment used for vegetation removal, including compaction, erosion, and introduction of petroleum products. Covered Species that may potentially use aquatic habitats associated with canals (associated with, but not the canals themselves; e.g., western pond turtle, foothill yellow-legged frog, California red-legged frog) could potentially be crushed by equipment used for vegetation removal. These types of effects are expected to be relatively minimal and small in area extent; the conditions discussed in Section 6.3, *Conditions on Covered Activities*, in Chapter 6, *Program Participation and Conditions on Covered Activities* will avoid and/or minimize these effects on Covered Species and their habitats.
- **Disturbance from Maintenance Activities.** Equipment used for maintenance activities (vegetation removal, canal lining, and repair activities) could have potential negative effects on covered raptors and other covered bird species that are nesting near work areas and are disturbed by noise or affected by human activity or proximity. Implementation of Community Condition 2.4, Placer County Water Agency Operations and Maintenance Best Management Practices (Chapter 6, *Program Participation and Conditions on Covered Activities*), will avoid and/or minimize effects on Covered Species and their habitats (and non-covered bird species)
- **Removal of Habitat.** Physical removal of vegetation could result in direct loss of or damage to elderberry shrubs that may host the valley elderberry longhorn beetle, if present. Implementation of Species Condition 8, Valley Elderberry Longhorn Beetle (Chapter 6, *Program*

Participation and Conditions on Covered Activities) will avoid and/or minimize effects on Valley elderberry longhorn beetle.

- **Repair of Canal Seepage.** Lining sections of unlined canals may indirectly affect adjacent habitat and species historically supported by canal seepage. Through lining sections of previously unlined canals, oak trees and wetlands may be negatively affected by reducing the amount of seepage along the sections, thereby reducing soil moisture and affecting soil geochemical conditions. Covered Species that depend on such wetlands and could potentially be affected include California black rail, tricolored blackbird, and covered amphibians.

  Repairing leaks in canal systems could eliminate the primary source of water to wetlands that support the Sierra Nevada metapopulation of California black rails (Richmond et al. 2008). California black rails use wetlands with water less than 1.2 inches deep that do not fluctuate substantially in depth during the year (Eddleman et al. 1994; Tecklin 1999). Eliminating inadvertent leaks and associated water contributions to wetlands that support California black rail may render those sites unsuitable for California black rail. California black rail could potentially abandon a wetland and its nest if canal repairs eliminate the source of water to the wetland during the nesting season and cause water levels to fall below those needed by California black rail. Effects on California black rail will be minimized by restricting canal lining/gunniting activities that could potentially eliminate the supply of water to occupied wetlands from occurring during the nesting season (see Species Condition 2, California Black Rail, in Chapter 6, *Program Participation and Conditions on Covered Activities*). These effects are expected to be small, given their infrequent occurrence in the Plan Area and because California black rails are known to colonize newly created wetland sites in the Foothills within 1 year, and should be able to colonize (and recolonize) other unoccupied sites as well (Richmond et al. 2010).

  Wetlands supported by seepage from canals that are lost because canal repairs eliminate the supply of water to wetlands will be replaced (through in-kind restoration and creation) to ensure no net loss of wetlands (see Section 6.3.2, *Conditions to Avoid and Minimize Effects on Specific Natural Communities*).

- **Vegetation Removal.** Covered Species and their habitats could potentially be affected directly or indirectly by vegetation removal and effects on soils and sediments from equipment used during maintenance activities including compaction, erosion, and introduction of petroleum products. The effects on natural communities would involve trimming of overhanging woody vegetation (general oak woodland and riparian habitat) that occurs in the work area and removal of herbaceous vegetation. This activity would be limited to the work area and would not have a substantial effect on habitats and Covered Species. Vegetation removal, equipment noise, and human presence could affect covered bird species that are nesting near canal or pipe repair work areas (particularly in undeveloped or remote areas). Vegetation removal would be temporary and vegetation is expected to re-establish quickly. Implementation of Community Condition 2.4, Placer County Water Agency Operations and Maintenance Best Management Practices (Chapter 6, *Program Participation and Conditions on Covered Activities*), will avoid and/or minimize effects on Covered Species and their habitats (and non-covered migratory bird species).

4.4.5.3.4 PCWA Capital Improvement Projects

PCWA will undertake a number of capital improvement projects for new surface and groundwater water supply, treatment, storage, and delivery infrastructure over the term of the Plan. These are outlined in Section 2.6.5, *Regional Public Programs*, and Table 2-9B. PCWA prepared an Integrated Water Resources Plan (2006) that presents a detailed assessment of water supply and demand in western Placer County and an evaluation of available water supply resources to meet future water needs. PCWA's master plan includes capital improvement projects projected in the next 25 years; those projects that cannot be foreseen at this time are described in Table 2-9B as "West Placer Pipeline, Storage Tanks and Distribution Pump Stations (various locations in western Placer County)." PCWA capital improvement projects that occur in-stream are discussed below in Section 4.4.5.3.7, *Utility Line Construction and Facility Maintenance*.

The construction of PCWA capital improvement projects, including the construction of facilities (e.g., water treatment plants, auxiliary power plant), pipelines, pump stations, and other associated infrastructure presented in Table 2-9B, will have permanent and temporary direct effects. The effects of pipeline, associated infrastructure, and facilities are similar to those discussed above for wastewater treatment facilities and pipelines. Although project-specific effects have not been analyzed for the majority of PCWA capital improvement projects, it is anticipated that they will have potential effects on water quality, riparian and oak woodlands, vernal pool grassland complexes, streams, and wetlands, as well as effects on terrestrial and aquatic habitats. The pipeline route locations are centered on disturbed areas, such as existing paved roads, unimproved dirt roads, and informal trails, to the extent feasible.

The facility site locations will be analyzed when the projects undergo design. These projects are Covered Activities and project-specific effects will be tabulated and subtracted from the permit take limits at the time of construction. In addition, individual project environmental review will occur on a project-specific basis. All applicable Plan measures will be implemented accordingly, including compliance with all state and federal permits, performance of wetland delineations, mitigation for wetlands lost, appropriate construction windows with appropriate buffers, preconstruction surveys, and using exclusionary fencing, as necessary.

Sheridan Public Water System

The O&M of Sheridan's water system by the Placer County Environmental Engineering and Utilities Division include the continuous maintenance of the wells, tank, and distribution pipelines in Sheridan. Because these are built facilities, the O&M of them will not have permanent direct effects on Covered Species. O&M activities may temporarily affect Covered Species and habitat by increasing levels of noise, dust, and other forms of human disturbances. Installation of new water tanks and replacement of existing infrastructure such as pipelines and other infrastructure may have direct effects on natural and semi-natural land cover, depending on the location of these activities. In many cases, replacement of existing infrastructure will occur on already developed land and will not have direct effects on natural landscapes.

The city of Sheridan's water supply facilities are located approximately 1.5 miles southeast of the Bear River and 3 miles north of Raccoon Creek. Construction of a pipeline to bring water from Raccoon Creek and the Bear River will require approximately 4.5 miles of pipeline. Effects of pipeline construction will be similar to those discussed above for wastewater projects and in-stream Covered Activities, where pipelines cross streams.

City of Lincoln Water System

As described in Chapter 2, *Covered Activities*, the City of Lincoln negotiated a supply of treated surface water to be provided by the Nevada Irrigation District within its service boundaries that coincide with the City's 2008 General Plan area. The source of water for the proposed project is Lake Combie, with a pipeline proposed to connect at the Combie-Ophir turnout and carry raw water west to a reservoir and treatment plant to be located in the western portion of the Nevada Irrigation District service district. The proposed project will involve approximately 16.3 miles of pipeline, raw water storage, and construction of a water treatment plant.

The effects of pipeline construction, raw water storage, and a treatment plant will be similar to those discussed above for wastewater projects and in-stream Covered Activities, where pipelines cross streams. Based on these studies, the project will potentially directly affect aquatic habitat, valley foothill riparian, wetlands, oak woodlands, annual grasslands, California red-legged frog, western pond turtle, foothill yellow-legged frog, nesting birds, and steelhead Critical Habitat (with the pipeline crossing Raccoon Creek).

4.4.5.3.5 Solid Waste Management Facility Programs

The solid waste management projects listed in Table 2-9C are anticipated to occur within the permit term of the Plan. Solid waste management facility program activities may occur anywhere within Plan Area A. In addition, a transfer station operated by Recology Auburn Placer under the authority of the Western Placer Waste Management Authority will be permitted in Plan Area B1, Permittee Activity in Non-Participating City Jurisdiction.

This category includes ongoing operations at the Western Regional Sanitary Landfill Facility, activities associated with the Materials Recovery Facility, and post-closure activities associated with the Loomis Landfill.

New waste handling and recovery projects are expected to result in permanent and temporary effects on land cover by converting existing land cover within new project footprint(s) and other construction-related effects. The method for programmatically quantifying effects associated with land conversion in the Valley is described in detail in Section 4.3.1.1, *Land Conversion in the Valley*. The overall estimates of land conversion and resulting loss of Covered Species' habitat include an allowance for the aggregate solid waste management facility project activities described here.

The actual extent of effects from these activities cannot be quantified until a specific project is proposed. Specific project proposals are subject to an entitlement process and will receive environmental review under CEQA. The Conditions on Covered Activities described in Chapter 6, *Program Participation and Conditions on Covered Activities*, will be used to avoid, minimize, and mitigate effects from these projects. A brief description of take mechanisms is provided below for context.

Western Regional Sanitary Landfill

The existing O&M of the landfill will be ongoing through at least 2058, and the current effects are not expected to increase, assuming that the amount of refuse accepted on a daily basis is not increased. This is because the landfill is limited in how much waste can be exposed on a daily basis, and it is developed in phases. Portions of the landfill will be closed with a soil cover and revegetated as development of the landfill proceeds. If the amount of waste accepted on a daily basis is proposed to be increased, it will trigger an entitlement process and environmental review.

Continued operations within the existing footprint are not anticipated to result in effects on the Covered Species. Operations may expand two adjacent properties owned by the Western Placer Waste Management Authority. The properties include a 158-acre parcel east of the existing Western Regional Sanitary Landfill boundary, and a 457-acre parcel west of Fiddyment Road (commonly known as the Lastufka property).

This expansion and associated operations are not currently known, and will be subject to the entitlement process if they are proposed in the future. Project-specific effects will be evaluated during the entitlement process. Direct, permanent effects associated with any of these activities include loss of natural and semi-natural land-cover types in the development footprint. Direct effects could also occur during monitoring of closed portions of the landfill if Covered Species are present and using the closed portions of the landfill for nesting/foraging habitat. Temporary effects may occur in areas where the ground is disturbed during development activities and later restored.

Materials Recovery Facility

Operations, relocation, and/or construction of a new Materials Recovery Facility will be Covered Activities. However, the exact footprint of these activities is unknown. Project-specific effects will be evaluated during the entitlement process. Permanent effects associated with any of these activities include loss of natural and semi-natural land-cover types in the development footprint.

The Loomis Landfill (closed)

Closure of the Loomis Landfill will include installation of a cover, revegetation, installation of a landfill gas control system, and associated maintenance activities including emergency response. The post-closure maintenance period will end in 2028.

The environmental risks posed by landfill sites continue after waste acceptance has ceased. These risks with the potential to affect Covered Species and communities could include leachate contamination of groundwater, stormwater, or surface waters, particularly if the landfill lining fails (this Plan does not authorize take associated with a failure of the landfill lining).

Land conversion effects are not expected, because no natural or semi-natural land cover is expected to be converted for landfill activities.

Temporary effects may occur in areas where the ground is disturbed during maintenance activities but these areas will be re-vegetated to pre-project or ecologically improved conditions within the time allowed for temporary effects. Management of the reclaimed landfill as open space may affect any Covered Species, should they colonize the landfill. Any potential effects related to management of open space are expected to be the same as those described below in Section 4.4.7, *Conservation Programs*, and the majority of these management actions are expected to benefit restored vegetation and habitat.

4.4.5.3.6 Public Recreation Serving Activities

Public park activities include the construction of new municipal parks, maintenance of existing parks and trails, and expansion of trails within existing protected areas. A full description of these Covered Activities is found in Section 2.6.5.5, *Public Recreation-serving Activities*.

New Parks

New park facilities, trails, parks, golf courses, and other amenities will be constructed and new and existing facilities will require O&M over the permit term of the Plan. Covered park activities and trail construction may occur anywhere within Plan Area A. The County and the City have developed plans for several trails within the PFG and the RAA.

Use of trails and other public access within the Reserve System is addressed as part of Recreation in Section in Section 2.6.7.1, *PCCP Management Activities*. As such, effects from recreation are discussed separately below in Section 4.4.7.3.1, *Plan Management Activities*. The development of public parks and trails is described here.

New facilities and trail construction in the Valley and Foothills RAA and Foothills PFG will have both permanent and temporary effects similar to those of other capital projects (i.e., permanent conversion of land cover beneath the footprint of the project, with temporary effects occurring in a buffer zone around the project site). In natural, undeveloped parks, new facilities will be sited on already disturbed areas to the extent possible and in areas that minimize effects on Covered Species.

Trails can fragment otherwise intact landscapes and can also facilitate predator movements and invasion by non-native animals (e.g., feral cats, dogs, pigs). Trails are often a source of invasion by non-native plants that are transported into the reserve by trail users. Any new trails will be carefully sited and maintained to minimize the disturbance of habitat and wildlife, as well as sited and maintained to avoid disturbance of cultural and archaeological resources within public parks. New trails will be sited to avoid streams and adjacent riparian vegetation in accordance with the guidelines described in Chapter 5, *Conservation Strategy* (for trails on the Reserve System). However, some new trails will require creek crossings that may result in removal of riparian vegetation and construction of bridges.

Park and Trail Maintenance

Park and trails within the Valley and Foothills RAA and Foothills PFG are managed by either the County or the City. Park facilities, roads, and trails O&M require maintenance ranging from the draining and dredging of ponds to vegetation maintenance to grading, clearing, brushing, erosion control, paving, re-paving, and roadbed or trail restoration (see complete list of Covered Activities associated with park and trail O&M in Chapter 2, *Covered Activities*).

Maintenance work involving minor grading or soil disturbance could cause increased sediment discharge into watercourses. However, implementation of General Condition 1, Watershed Hydrology and Water Quality (Chapter 6, *Program Participation and Conditions on Covered Activities*), will minimize effects on hydrologic conditions.

Direct effects on wetland vegetation around the perimeter of ponds may result from accessing basins for sediment removal or to clear the areas around intake and outlet structures. Effects may also occur by draining ponds, which can eliminate aquatic species and standing biomass. This maintenance will affect Covered Species using the pond.

Some of these activities may directly affect natural or semi-natural land cover (e.g., temporary loss of natural land covers, temporary increases in light and noise pollution). Maintenance of infrastructure such as trails, roads, parking lots, and offices includes treatments such as mowing for fuel breaks. Such maintenance could result in direct, temporary effects, especially if work is conducted on trails through sensitive land-cover types. Any effect on upland land-cover types

resulting from O&M in parks is likely to be minimal. Implementation of Regional Public Projects Condition 3, Operation and Maintenance BMPs (Chapter 6, *Program Participation and Conditions on Covered Activities*), will avoid effects on covered bird species.

Recreational activities allowed on County and City parks and trails are expected to have some minor effects on Covered Species. Heavily used trails will result in some persistent effects on wildlife habitat connectivity. Because wildlife is most active at dawn and dusk or at night when human use is absent, the potentially direct effect of disruptions of wildlife movement is not anticipated to be significant and will be further minimized by restrictions on pets, camping, and off-trail use.

Adverse permanent effects may occur even though such management actions are ultimately beneficial (e.g., removing invasive species and excessive vegetation from ponds). These temporary, direct effects are expected to be minimal.

Hidden Falls Regional Park

The 1,200-acre site is currently developed pursuant to a local land entitlement and a Final EIR that was certified in June 2009. Expansion of park facilities at Hidden Falls includes additional roads, trails, staging and parking area, maintenance and caretaker buildings, and a nature/education center. The greatest potential for expansion is associated with an increase in trail development to the east of the current park boundary up to the Harvego Bear River Reserve by the Bear River. There is also a potential for road development on the west end of the park to connect to Garden Bar Road. Access to the west end of Hidden Falls exists today but is controlled due to a lack of facilities and services. It is further constrained by the limitations of Garden Bar Road. This is a rural county-maintained roadway but does not meet current county road standards in many areas, nor is it likely to in the future due to lack of right-of-way. In addition, the westerly access to Hidden Falls is constrained by a simple private road access easement. The last element of expansion is to increase the size of the current parking lot. Access at the west end will be limited to reservations only.

In addition to the on-site improvements, trail connections to Placer Land Trust and Bear Yuba Land Trust properties are anticipated to the east and north of the current park boundary. The new off-site improvements include trails (paved and natural), equestrian staging areas, utilities, restrooms, emergency access, pedestrian bridges, and picnicking areas.

Conditions on Covered Activities as described in Chapter 6, *Program Participation and Conditions on Covered Activities*, of this Plan include avoiding construction at times when species are most vulnerable, undertaking habitat rehabilitation and restoration, and conducting surveys and monitoring during construction periods.

Construction at the current park site or in the expanded trail network to the east and north will include trails, roads, foot bridges across drainages, viewing boardwalks, septic systems, and other structures that will affect land cover directly by converting land cover beneath the footprint of the project, and with temporary effects occurring in a buffer zone around the project site. Recreation-related facilities built by the PCA on the Reserve System will remove a small amount of habitat. These effects will be subtracted from the maximum extent of effects proposed in Table 4-1.

Other aquatic species also have the potential to be affected. Additionally, removal of vegetation could affect covered birds, though such effects are unlikely as trails, roads, and other infrastructure will be sited away from habitat of Covered Species.

4.4.5.3.7 Utility Line Construction and Facility Maintenance

Utility line construction and facility maintenance is a Covered Activity anywhere within the Plan Area as long as it is directly under the authority of a Permittee. Use of pesticides is not covered by the federal permit.

The routine maintenance of existing facilities on disturbed ground (e.g., concrete pads, gravel) will not typically result in take of Covered Species. Existing utility lines, including pipelines, will likely require maintenance and possibly replacement during the permit term. Most of these lines will be underground and may require excavation to access the lines. Permanent effects include ground disturbance resulting from mowing, excavation, access, and staging. Indirect effects associated with this activity are similar to those of other ground-disturbing work.

4.4.6 In-Stream Programs

In-stream programs encompass any actions that take place in the Stream System or the surrounding riparian corridor. Effects from in-stream programs will occur largely in the Valley and Foothills PFGs as the result of urban development, but may also occur in the Valley and Foothills Conservation and Rural Development Areas. In-stream programs occur in both Plan Area A and B.

As described in Chapter 2, *Covered Activities*, in-stream activities encompass any actions that take place in the stream or the surrounding riparian corridor. The main categories of in-stream programs are as follows:

- Bridge and/or culvert construction and replacement/rehabilitation
- Flood protection projects
- Streamside trails and crossing

In-stream projects have the potential to affect riverine, riparian, reservoir, and pond land-cover types, and, to a lesser extent, adjacent resources.

4.4.6.1 Take Mechanism

Effects from in-stream programs include land conversion, as well as temporary and permanent changes in aquatic and riparian habitat. Indirect effects include the trapping of sediments and vegetation on the upstream side of the piling, potentially causing further disruptions to flow. Also, scour may occur immediately downstream of pilings and contribute to channel erosion and downstream sedimentation. New bridge construction will shade the streambed.

Some bridges may increase access to areas that are currently less accessible to the public. Similarly, new pedestrian bridges in Public Parks and on the Reserve System may increase human access to habitats occupied by Covered Species.

Increased use of open space that is facilitated by new creek crossings may result in effects on land cover and Covered Species related to introduction of non-native species, general use, and illegal activities such as trash dumping. Indirect effects related to new pedestrian access will be minimal because of the few new bridges that will be needed, and new pedestrian bridges will be added in areas that already experience use, such as the Dry Creek watershed. Reconstructed bridges are not anticipated to encourage additional traffic beyond that expected on the basis of existing and planned land use patterns. Bridges and associated trails leading to/from bridges will be sited to avoid

sensitive habitats. Recreation (e.g., pedestrian activity) will be restricted to trails and carefully managed for proper use on newly accessible lands. See Section 5.3.2.1.2, *Content of Reserve Unit Management Plans/Allowable Recreational Uses*, for requirements for the siting and construction of trails and bridges on the Reserve System.

Direct, temporary effects of flood protection projects are most likely to occur during construction when use of heavy equipment may result in loss of vegetation during access to the project site. Any dewatering activities will result in temporary reduction in the amount of available habitat to in-stream species such as covered salmonids, foothill yellow-legged frog, California red-legged frog, western pond turtle, and giant garter snake. California black rail may be temporarily affected by dewatering activities if the dewatered section of stream supports a fresh emergent wetland. Temporary effects are also likely to occur at staging areas used during construction. Existing developed areas such as access roads or adjacent parking lots are generally targeted for use as staging areas. If such areas are not available, highly disturbed, ruderal areas are selected. Staging will not be established in the stream channel and banks and preserved aquatic resources (see Stream System Condition 1, Stream System Avoidance and Minimization, in Chapter 6, *Program Participation and Conditions on Covered Activities*).

Maintenance activities can have temporary effects on riparian habitat and water quality. However, because most maintenance activities will occur on existing constructed facilities such as off-stream detention basins, they will not cause permanent direct effects.

Permanent effects may be caused by the removal of vegetation, which may cause an increase or decrease in the stability of stream channels, cause erosion, and reduce fish habitat. Activities such as minor vegetation, silt, and debris removal (e.g., via shovels or hand pulling) could cause short-term temporary increases in turbidity and levels of total suspended solids that could adversely affect downstream fisheries and amphibians (turbidity levels will return to normal levels within several hours after maintenance activities). Removal of vegetation within channels may also affect salmonids and covered amphibian species by removing cover and decreasing habitat for other aquatic insects that serve as prey for fish and amphibians. Maintenance activities in riparian habitat could also adversely affect nesting birds. Implementation of Stream System Condition 2, Stream System Mitigation: Restoration, and species-specific conditions (Chapter 6, *Program Participation and Conditions on Covered Activities*) will avoid effects on nesting birds.

Additional effects caused by flood-protection projects may also be caused by construction, including an increase in turbidity, in-stream temperature, dust, and noise. In addition, channel realignment and changes in channel substrates may cause changes in sediment transport and deposition, with the potential for increases in sedimentation in receiving streams. However, most construction-related effects will be temporary (i.e., for the duration of construction) and will be avoided or minimized through the appropriate use of best management practices (BMPs) (Chapter 6, *Program Participation and Conditions on Covered Activities*).

4.4.6.2 Results

The in-stream programs effect is mainly measured by the linear extent of riverine habitat affected. Tables 4-7A and B give a summary of stream length affected by classes of Covered Activities and shows the portion that is attributed to salmonid habitat. Table 4-7A gives the estimate of permanent effects; Table 4-7B gives the estimate of temporary effects.

Table 4-7A. Permanent Effects on Salmonid Habitat

Type of Stream	Total Stream Miles	Miles of Effect: All Road Crossings	Miles of Effect: PCWA Pipelines Outside Roadway	Miles of Effect: Flood Control	Miles of Effect: All In-Stream Activities	Proportion of Existing Streams
All Streams	576.15	4.75	0.02	0.74	5.51	1.0%
Spawning/Rearing Habitat	68.17	0.77	0.01	0.24	1.02	1.5%
Migration/Rearing Habitat	24.49	0.09	0.01	0.12	0.22	0.9%
Total Salmonid Habitat Permanent Maximum Effect					1.24 miles	

Source: MIG|TRA 3/14/2014

Table 4-7B. Temporary Effects on Salmonid Habitat

Type of Stream	Total Stream Miles	Miles of Effect: All Road Crossings	Miles of Effect: PCWA Pipelines Outside Roadway	Miles of Effect: Flood Control	Miles of Effect: All In-stream Activities	Proportion of Existing Streams
All Streams	576.15	21.50	0.19	14.82	36.51	6.3%
Spawning/Rearing Habitat	68.17	3.60	0.03	4.72	8.35	12.3%
Migration/Rearing Habitat	24.49	0.38	0.01	2.45	2.84	11.6%
Total Salmonid Habitat Temporary Maximum Effect					11.19 miles	

Source: MIG|TRA 3/14/2014

Permanent effects are dominated by road crossings. As explained in Section 4.3.5, *Methods for Effects of Covered Activities on Streams*, above, both new construction and reconstruction of existing bridges will increase the nominal footprint of the structure in the area of the stream permanently subject to effect, even if the stream bottom itself is restored after construction. Pipelines constructed outside the roadway will generally pass under the stream, and will usually meet the requirements to be considered temporary; there is a small estimate of permanent effect. Flood control activities likewise are expected to being considered temporary; it is anticipated that roughly three-quarters of a mile of stream channel may be subject to permanent effects for flood control.

Temporary effects are shared by road crossings and flood control activities. There is a small extent estimated for pipelines constructed outside of the roadway.

Chapter 3, *Physical and Biological Setting*, and the species accounts in Appendix D, *Species Accounts*, show the distribution of salmonid habitat in the Plan Area. Generally, spawning habitat is in the higher reaches of the watershed, on smaller tributaries located in the eastern part of the Valley and in the Foothills. Migration and rearing habitat is found in the lower reach of the watershed, usually in the Valley. For permanent effects, new public and private roads and new and reconstructed stream crossings in the Foothills may permanently alter roughly three-quarters of a mile of stream channel mapped as salmonid spawning habitat. With flood control, the total estimate of permanent effects is slightly more than 1 mile or 1.5 percent of the present extent of spawning habitat streams in Plan Area A. For migration habitat, the density of new stream crossings in the Valley is lower. The

total estimate of permanent effects is 0.22 stream mile of salmonid migration habitat or 0.9 percent of the present extent in Plan Area A.

4.4.6.3 Additional Detail on Programs

The remainder of this section provides an expanded discussion of effects mechanisms of in-stream program subcategories. This detail is provided for context and to describe qualitatively potential sources of take. Note that all quantification of take is described above in Section 4.3, *Methods for Quantifying Effects*.

4.4.6.3.1 Bridge Construction and Replacement/Rehabilitation

This category includes construction of new vehicular bridges, culverts, and stream channel crossings, as well as maintenance, rehabilitation, and reconstruction of bridges.

New vehicular and rail bridges will be constructed to accommodate growth and development within the Plan Area. Construction of these new bridges will adhere to applicable federal and state regulations for safety and will minimize effects on the environment through location/placement design and stream protection BMPs (e.g., Stream System Condition 2, Stream System Mitigation: Restoration, in Chapter 6, *Program Participation and Conditions on Covered Activities*).

As indicated in Chapter 2, *Covered Activities*, the typical lifespan of a bridge is approximately 50 years. Many of the bridges within the Plan Area will need rehabilitation or repair, or will be replaced within the permit term (see Table 4-6), or will need to be upgraded in the course of roadway expansion or upgrade. Bridge repair, rehabilitation, and upgrading may be similar to bridge replacement in scope, often requiring roadway widening, new deck support structures, and seismic retrofitting. For rehabilitation, the existing structure will be rehabilitated, but the footprint of the structure will not increase. This can include structural work on the deck and roadway approaches, and minor grading below the bridge and around the channel (e.g., placing riprap).

Constructing new bridges and repairing and rehabilitating existing bridges will result in direct effects on in-stream habitats (i.e., riverine land cover), riparian land cover, and Covered Species. Direct effects include the loss of riparian land cover to road and bridge widening and construction of new bridges. Installation of pilings, piers, and/or footings will cause a direct loss of riverine land cover and may contribute to roughness in the stream and slow flows in the vicinity of the pilings. Construction of new bridges may require excavation for foundations. If in stream, this will directly affect the streambed or streambank. Capture associated with cofferdams is considered to be take; mortality and disorientation can occur associated with the acoustic effects of pile driving.

4.4.6.3.2 Flood Protection Projects

Flood protection projects in the Plan include flood control and stormwater management, maintenance of flood protection and stormwater facilities, facility maintenance for County-owned in-stream facilities, and erosion control and storm damage prevention projects. Also covered by the Plan are the Placer County portions of the Flood Control Plan for the Dry Creek Watershed and the Cross Canal watershed (Figure 3-7).

Implementation of Stream System Condition 1, Stream System Avoidance and Minimization (Chapter 6, *Program Participation and Conditions on Covered Activities*), will include the application of BMPs for flood protection and stormwater management projects. This condition will minimize

adverse effects because the use of off-channel basins, levee setbacks, and naturalized structural improvements will be used instead of channelizing streams using concrete.

Flood protection projects and implementation of flood control plans will result in permanent effects, such as those associated with the installation of hardscape on banks for erosion/sediment control and bank stabilization, stabilization when natural or semi-natural land cover is converted to create a flood detention/water retention basin. Canal lining and canal realignment may cause loss of dispersal habitat (for non-fish species that may use the canals for dispersal, such as foothill yellow-legged frog). Use of heavy machinery could compact soils and burrows that may be occupied by giant garter snake; however, implementation of Species Condition 5, Giant Garter Snake (Chapter 6, *Program Participation and Conditions on Covered Activities*), will minimize effects on giant garter snake. The type and severity of permanent effects will vary considerably depending on the scope of specific projects.

Retention/detention facilities, particularly when located in an agricultural or natural setting, provide habitat for wildlife species. Facilities that function as wetlands benefit waterfowl, shorebirds as well as aquatic species typically associated with seasonal marshes. Seasonally, when not filled with water, stormwater basins are typically maintained as managed grassland, and will consequently provide some habitat function for grassland wildlife species.

4.4.6.3.3 Streamside Trails and Crossings

Trails in general are addressed in Section 2.6.5, *Regional Public Programs*. Most new trails are sited outside of the stream zone to avoid effects on riparian vegetation and streams. However, some trails will need to cross streams and will require installation of bridges or other types of crossings. Because the trails are narrow, the extent of effects on streams is smaller than associated with a road crossing. The estimate of effects from road crossings includes a 3 percent allowance for new trails. Trails may also be implemented as a component of other types of projects such as flood protection projects or levee reconstruction. In such cases, trails will generally be sited along maintenance roads or in other disturbed areas and will not result in additional effects beyond those attributed to the main project.

4.4.7 Conservation Programs

The implementation of the conservation program is described in detail in Chapter 5, *Conservation Strategy*. The aim of the conservation program is to benefit species and natural communities. However, some temporary, negative effects may occur during the course of implementation, and some land-cover types may be permanently converted (in the case of restored or created habitat). These effects are described below, but, for the purposes of the Plan, are not quantified and are assumed to have a net benefit to the Covered Species and natural communities. Implementation of the conservation strategy may occur anywhere in the Plan Area, but most of these activities will take place within the Reserve System assembled in Plan Area A. Some conservation activities may also occur outside of the Reserve System, specifically as associated with in-stream conservation and in Plan Area B5, Big Gun Conservation Bank.

The County also administers ongoing conservation programs that are separate from the Plan, such as Placer Legacy Open Space and Agricultural Conservation Program (Placer Legacy Program), and implementation of Coordinated Resource Management Plans for a number of western Placer County watersheds. These actions will occur primarily outside the Reserve System. However, in some

instances the conservation objectives (e.g., scenic and recreation) of programs like the Placer Legacy Program will overlap with the Plan biological goals and objectives. All activities within streams and other aquatic resources within the County and the City will be implemented according to the County Aquatic Resources Program (CARP) and conditions on Covered Activities in Chapter 6, *Program Participation and Conditions on Covered Activities*. In-stream and riparian conservation activities may occur within and outside reserves.

The conservation strategy outlined in Chapter 5, *Conservation Strategy*, sets targets for reserve acquisition in the Valley and Foothills. Most of the acquisition will be in the RAA, supplemented by acquisition of land along the Stream System and in high-value parcels in the PFG. The acquisition commitments by natural community are listed in Table 5-3.

4.4.7.1 Take Mechanism

Conservation programs, including the Reserve System established for the Plan, generally have beneficial effects on adjacent biological resources. The management plans for reserve units will address potential effects such as wildfire (fuel management) and describe avoidance and minimization measures associated with these effects.

The main concern for conservation programs is the effect of adjacent land uses on the reserves. The final locations of Plan reserves are unknown at this time, but some reserves are expected to be near or adjacent to urban areas. The conservation strategy includes measures to minimize some of the foregoing indirect effects through actions such as the creation of buffer zones and development of design guidelines that reduce effects from development on natural lands (e.g., General Condition 2, Conservation Lands: Development Interface Design Requirements). Conservation actions on the Reserve System (e.g., grazing) will be tailored to manage and minimize the potential effects of nitrogen deposition within an adaptive management framework (see Chapter 5, *Conservation Strategy*, for conservation and management actions in vernal pool grassland complexes, annual grasslands, and oak woodlands). Reserve management plans will be developed for each Plan reserve, with specific restrictions on recreation to avoid and minimize effects on Covered Species and their habitats (see Section 5.3.2.1.2, *Content of Reserve Management Plans*). Despite these measures, however, indirect effects may still occur.

Controlled burns, if used to manage fuels in grasslands, could temporarily reduce the extent of available foraging and nesting habitat for grassland birds such as Swainson's hawk and western burrowing owl. Actual effects will depend on the seasonal timing of controlled burns; however, controlled burns will be conducted outside of the nesting season to minimize take of birds (see Appendix E, *PCWA Natural Resource Management Plan*). Other Covered Species, if present in vernal pool grassland habitats, could be affected by prescribed fire. Prescribed burning is intended to provide a net benefit for natural communities and Covered Species by enhancing and maintaining beneficial conditions for Covered Species.

4.4.7.2 Results

The effects of conservation programs will be mainly in two areas: implementation of active management of reserve lands and natural community restoration. The measure of effect is proportional to the land area.

The scope of reserve management plans is described in Chapter 6, *Program Participation and Conditions on Covered Activities*. Because of the disturbed condition of most of the lands available for

incorporation into the Plan Reserve System, nearly all of the natural communities intended for preservation will require habitat management, including grazing and fuel reduction for exotic species control and fire risk management. The management plans are intended to maximize benefits for covered communities and species and minimize the adverse effects.

Plan restoration of natural communities is described in Chapter 5, *Conservation Strategy*. In general, restoration will take disturbed land and improve biological values through revegetation, reestablishment of natural hydrology, and alteration of use such as grazing regime. Some restoration will be fairly intensive and may represent a change in species presence, and there will be at least a short-term reduction in value to species. In some cases, restoration/creation may convert one community type into another. The Plan estimates that approximately 1,760 acres of agriculture (including rice land and other agriculture types) may be restored to natural communities. All of the restoration sites will be selected for maximum net benefit.

4.4.7.3 Additional Detail on Programs

The remainder of this section provides an expanded discussion of effects mechanisms of conservation program subcategories. This detail is provided for context and to describe qualitatively potential sources of take. Note that all quantification of take is described above in Section 4.3, *Methods for Quantifying Effects*.

4.4.7.3.1 Plan Management Activities

Actions related to the implementation of the Plan conservation strategy will occur on and off Reserve System lands and include management activities, such as conservation and habitat/species management activities on the Reserve System and in-stream habitats. Plan activities that occur off the Reserve System are focused mostly on actions within the Stream System, but may also include monitoring activities on other public lands (e.g., County and City parks and private lands).

Habitat Enhancement, Restoration, Creation, and Species Translocation

Conservation measures implemented within the Reserve System are expected to have an overall benefit for all Covered Species (see Chapter 5, *Conservation Strategy*); nevertheless, some conservation measures may have effects on Covered Species and their habitats, resulting in take. In some cases, activities that are designed to benefit one or more Covered Species may harm other Covered Species. However, the Reserve System will be large and diverse enough in natural communities and habitats to ensure that the net effect of all conservation measures is beneficial to all species across the Reserve System.

In other cases, habitat enhancement, restoration, and creation activities may temporarily affect habitat for Covered Species. For example, planting emergent vegetation in stock ponds could temporarily disturb amphibians occupying the pond. Placement of large woody debris and/or rock structures for fish cover can temporarily disturb aquatic species within the stream channel. Cleaning and replacement of spawning gravels may temporarily alter hydraulic conditions for spawning by salmonids and may cause localized sediment transport and deposition downstream. Areas cleared of invasive non-native plants may be re-colonized before native vegetation establishes. Management activities, however, will be designed and implemented in ways to avoid or minimize effects on Covered Species (see Section 5.3.2.1.2, *Content of Reserve Unit Management Plans*).

Enhancement of fish habitat may result in incidental take. In-stream impediments to fish passage will be modified or removed to improve habitat connectivity. Effects may occur as the result of construction activities required to improve passage (e.g., removal of a culvert). For example, removal of barriers to fish passage can result in temporary re-transport of trapped heavy sediment and smothering of downstream gravels following construction. Activities to remove invasive species from streams and riparian habitats and to enhance stream habitat (e.g., installation of spawning gravel, coarse woody debris, and rocks) can temporarily add sediment into the water column. Implementation of Stream System Condition 2, Stream System Mitigation: Restoration (Chapter 6, *Program Participation and Conditions on Covered Activities*), will protect water quality downstream of the site.

Other in-stream conservation measures may affect stream-inhabiting Covered Species (i.e., covered salmonids, California black rail, foothill yellow-legged frog, California red-legged frog, western pond turtle, giant garter snake). Riparian and in-stream restoration projects may involve vegetation removal, sedimentation, and the temporary dewatering of stream reaches. Stream channel realignment, stream bank setback, invasive weed eradication, gravel augmentation, and in-stream barrier modification projects all have the potential to require use of heavy equipment, which leads to sedimentation, vegetation removal, and stream reach dewatering.

Sediment input into streams, in particular those fine sediments mobilized during construction, affect aquatic species by increasing turbidity, filling important deep pool habitat, and clogging the interstitial spaces between cobbles and gravels. Increases in turbidity decrease the foraging success of fish and can create negative physiological and behavioral responses, which lead to increased susceptibility to predation and disease. The loss of complex habitat, such as deep pools, due to sediment infilling decreases the overall diversity of in-stream habitat for Central Valley steelhead and Chinook salmon, and the aquatic plants and insects that make up the foundation of the riverine food chain.

Removal of vegetation not only increases the risk of erosion by destabilizing soils, but also decreases shade, cover, and habitat complexity for Central Valley steelhead and Chinook salmon. The removal of plants and their associated root structures loosens soils and increases the potential for sedimentation. The decrease in tree and shrub canopy, and the shade it provides, can result in increased stream temperatures, which can have negative physiological and behavioral implications for salmonids and other aquatic species. Vegetation removal can also remove cover for small mammals, birds, and reptiles. Intact riparian forests provide the bank stability necessary to create complex habitat such as undercut banks, back channels, runs, riffles, and pools, as well as the large woody debris necessary to create scour pools, in-stream shade, and escape cover, all of which are very important habitat characteristics for healthy salmonid streams.

Dewatering of stream reaches causes the temporary loss of habitat and requires the collection, handling, and relocation of any rare aquatic species, most notably salmonids. The handling of listed species is considered harassment under the ESA and can lead to an increased risk of predation, disease, and mortality. More information on the effects of sedimentation, vegetation removal, and dewatering can be found in Section 4.4.6, *In-stream Programs*. Implementation of BMPs, Low Impact Development, and other mitigation measures will limit, minimize, or avoid the above-mentioned effects (Stream System Condition 2, Stream System Mitigation: Restoration, in Chapter 6, *Program Participation and Conditions on Covered Activities*).

Vegetation management to reduce fire hazard, eradicate exotic plants, or remove trees hazardous to recreationists all have the potential to disturb or inadvertently harm Covered Species. Of these, fire hazard reduction is of the most importance and is addressed in more detail below. Guidelines for fire hazard reduction in reserves, including BMPs to avoid or minimize effects on natural resources, have been prepared and are included in Appendix E, *PCWA Natural Resource Management Plan*, and will be incorporated into Reserve Management Plans (which need approval by the Wildlife Agencies).

Livestock grazing will be a primary method to manage vegetation, invasive plant species, and fuels (see below). Grazing could affect Covered Species; for example, burrowing owls may have their burrows trampled by livestock. Vernal pool branchiopods may be consumed and trampled by livestock. Reserves will be fenced, primarily around the perimeter, but also within the interior of reserves, to control movement of livestock. Fences that permit movement of wildlife will be used to minimize barriers to movement by wildlife. Erecting new and maintaining existing fences may have a limited amount of temporary effects on land cover within and immediately adjacent to the footprint of the fence. Overall, however, grazing will be managed within an adaptive management framework and will provide a net benefit for Covered Species and their habitats.

Restoring and creating new wetlands and other natural communities will permanently affect existing, pre-restoration/creation habitat by converting that habitat to wetlands or the other natural communities such as riparian and valley oak woodland. In addition, restoration and creation activities will temporarily affect land cover surrounding the restored/created wetlands for staging and maneuvering equipment necessary for contouring wetland basins.

Covered branchiopods may be translocated to restored and created vernal pools on the Reserve System in the form of inoculum (i.e., cysts and seed bank) (see Section 5.3.3.4.3, *Vernal Pool Branchiopods*). Collecting inoculum from pools about to be affected by Covered Activities will save cysts of covered branchiopods from being destroyed when their wetlands are filled. Nevertheless, the translocation process will cause take (of the branchiopods) through disturbance and possibly through injury or loss of individuals.

Effects on vernal pools will be avoided when feasible (see Chapter 6, *Program Participation and Conditions on Covered Activities*, for a full description of avoidance practices). However, in some cases occupied pools will be affected and covered branchiopods may be translocated. While translocation may have some negative effects, it is a net benefit relative to loss from habitat conversion and associated indirect effects, especially at sites that are too small and surrounded by inhospitable land uses (e.g., urban development) for long-term persistence.

Creation of vernal pools within a vernal pool complex of existing pools can alter the hydrology of the existing pools and can affect ground-nesting bees and other upland plants and animals (U.S. Fish and Wildlife Service 2005). Therefore, to minimize effects on existing vernal pool complexes, vernal pools will only be created in areas where they will be isolated hydrologically from existing pools and when adequate amounts of surrounding upland habitat are protected (see Section 5.3.1.5.2, *Vernal Pool Complexes and Grassland Natural Communities*). Additionally, vernal pools will only be restored and created in the types of soils that the covered branchiopods are known to inhabit (Rogers 2014).

Species Surveys, Monitoring, and Research

Biologists will need to conduct surveys for Covered Species, natural communities, and other resources within the Reserve System on a regular basis. These surveys may capture and inspect Covered Species to determine, identify, and mark individuals, or measure physical features.

Monitoring and research activities required by the Plan (see Chapter 7, *Monitoring and Adaptive Management Program*) may affect all Covered Species, primarily by disturbing animals. For most species, surveys will primarily be conducted using visual and auditory detection. For example, methods commonly employed emphasize minimizing the disturbance to birds in order to maximize detection. Listed individuals must be handled by a qualified biologist[4] to conduct monitoring activities. Handling of birds, for example, may be necessary for more focused monitoring (e.g., to band birds or to affix radio transmitters), should the need arise; however, such intensive monitoring measures are not planned as part of routine monitoring for the Plan. Trapping and handling will be necessary to monitor other species, such as giant garter snake, vernal pool branchiopods, and salmonids (e.g., smolts). People conducting surveys may trample covered branchiopods. Monitoring of the covered branchiopods requires capture with a dip net and handling. Such handling constitutes harassment—a form of take—under the ESA and requires authorization of a permitted biologist. In all of these cases, the benefits from surveys, monitoring, and research are expected to greatly outweigh any negative effects of such activities on the Covered Species by informing conservation measures through an adaptive management framework.

All biologists (see Section 6.1.5, *Qualified Biologist/Qualified Professional*) conducting monitoring under the Plan will be covered for their monitoring and translocation activities. If the task of the qualified biologist has the potential to result in take of listed species (e.g., dip-netting for Conservancy fairy shrimp), such take will be covered under the Plan.

Fuel Management

Fuel management has several components including prescribed burning, creation of fuel breaks, and fuel reduction through livestock grazing and other techniques. An overview of fuel management is provided by forester Richard Harris in Appendix F, *Fuel Management*. Each reserve unit will have a fire and fuel management component included within the Plan reserve management plans. The fire and fuel management component will describe site-specific conditions and actions required to (1) reduce existing fuel loads, (2) re-introduce fire as a natural process of the ecosystem (if relevant), (3) minimize environmental effects and protect sensitive resources, and (4) enhance and/or restore natural community characteristics.

The type of fuels treatment to be applied to a specific area depends on the type of vegetation, the amount of existing fuel, and the potential for development of ladder fuels. Of the natural communities to be protected within the Reserve System, oak woodlands and some riparian woodland have the greatest potential for having high fuel loads.

Treatments intended to reduce fuel loads in forest and woodland settings (including riparian) are more complex. Surface, ladder, and canopy fuels are often all present. Highest priority is usually placed on reducing ladder and surface fuels because they connect the tree canopy with the ground.

[4] A qualified biologist is one who has the experience, education, and training necessary to perform a given task described in this Plan accurately and in an unbiased fashion. Training must be in the specific field to which the task is related. See Chapter 6, *Conditions on Covered Activities*, Section 6.1.5, *Qualified Biologist/Qualified Professional*, for details.

Recommendations for oak woodlands and riparian woodlands include installation of "shaded fuel breaks" (zones in which ladder fuels and overall density is reduced) and strategically placed areas of fuel reduction within reserves. Methods used to conduct these operations fall into four general categories: (1) mechanical (mechanized) harvesting, (2) hand harvesting, (3) prescribed fire, and (4) grazing and browsing mainly to reduce surface fuels.

Fine surface fuels are abundant in grasslands and vernal pool complexes. Grazing of livestock will be the primary means for managing vegetation, invasive species, and fuels in these communities. Additional measures may include prescribed fire, or mowing to keep fuel loads under control. The methods to manage fuels in grasslands are consistent with the conservation measures that will be implemented to manage vegetation and invasive species, and enhance habitat.

Creating and maintaining fuel breaks will have minor direct effects on natural communities by clearing habitat and disturbing grounds on and around staging areas. Creating and maintaining fuel breaks may result in take of some Covered Species, if they are present in the area to be cleared for fuel breaks. In the context of managing the Reserve System, considering effects and mitigating them is of equal or greater priority to reducing fire risk. A principal constraint on fuels management is maintaining the habitat and ensuring that there are no significant effects on Covered Species or biodiversity, generally. For this reason, extensive BMPs will be applied to fuels treatments in the Reserve System (see Appendix E, *PCWA Natural Resource Management Plan*).

The overarching desired outcome of the Plan fuels management program is to reduce the risk of habitat destruction caused by moderate- to high-severity wildfires. Risk-reducing treatments must be undertaken without sacrificing the ecological values of the Reserve System or having significant effects on Covered Species. Although temporary effects on natural communities and Covered Species will occur during treatments, ignoring fuel hazards and gambling on avoiding future fires may ultimately have more severe, permanent effects. In all cases where fuels treatments are proposed, site-specific assessments and prescriptions will be required with Wildlife Agency review and approval.

Recreation Activities

The Plan will develop limited recreational facilities on reserves. As such, permit coverage is extended to the construction and maintenance of limited recreational facilities such as trails(see Chapter 2, *Covered Activities*, for additional details). EXR or other Jump Start lands that will be enrolled in the Plan may be open the public (see Section 6.3.6.3, *Reserve Management Condition 3, Jump Start Lands*). However, recreation on future reserves will be limited (see Section 6.3.6.1, *Reserve Management Condition 1, Public Access and Recreation on Future Reserve Lands*). No more than 70 miles (assuming a 6-foot width equals 50 acres) of trails will be created on future reserves (not including Jump Start lands) and available for limited public access. In addition, trails, facilities, roads, and other infrastructure will be created in association with some reserves. Existing trails and roads on acquired parcels will be used for recreation trails where available. All recreational activities proposed within a reserve will need to be compatible with the primary purpose of a reserve and the requirements in Section 5.3.2.1.2, *Content of Reserve Unit Management Plans*.

New trails will be sited to avoid streams and adjacent riparian vegetation in accordance with the requirements described in Chapter 5, *Conservation Strategy*, and Section 6.3.6.1.2, *New Trail Design and Use Standards for Future Reserves*. However, some new trails will require creek crossings that may result in removal of riparian vegetation and construction of bridges. The majority of bridges will be for pedestrian and equestrian uses. Some bridges will be sized to accommodate small

maintenance vehicles. A few larger bridges will be required to accommodate large emergency vehicles (e.g., 40,000-pound load limits).

Heavily used trails will result in some permanent indirect effects on wildlife habitat connectivity. Because wildlife is most active at dawn and dusk or at night, the potentially direct effect of disruptions of wildlife movement are not anticipated to be significant. Trails can fragment otherwise intact landscapes and can also facilitate predator movements and invasion by non-native animals (e.g., feral cats, dogs, pigs). Trails are often a source of invasion by non-native plant species that are transported into the reserve by trail users. Trails can also be a source of erosion. As described in Chapter 5, *Conservation Strategy*, recreational uses will be limited to low-intensity activities such as hiking and wildlife observation. Any new trails will be carefully sited and maintained to minimize the disturbance of habitat and wildlife. Despite these restrictions, some take in the form of harassment associated with recreational activities is expected to affect Covered Species that are sensitive to human disturbance.

While some temporary effects on streams are likely to occur during project construction, compliance with the trail construction guidelines in Section 5.3.2.1.2, *Content of Reserve Unit Management Plans*, will minimize effects on riparian and stream habitat.

Recreation-related facilities built by the PCA on the Reserve System will remove a small amount of habitat. These effects will be subtracted from the maximum extent of effects proposed in Table 4-1. Facilities will be sited and built to avoid or minimize their effects on Covered Species, but a small amount of take may nevertheless occur.

Reserve System Infrastructure

In addition to building trails and fences, as described above, the PCA will construct, replace, and refurbish infrastructure on the Reserve System necessary for reserve management. Infrastructure that will be installed or replaced includes signage, gates, parking areas, field facilities (e.g., garages and workshops for reserve maintenance equipment and management), roads, bridges, and culverts necessary for reserve management and monitoring activities. Facilities will be constructed on already disturbed areas and existing access roads and trails will used, where available. Implementation of the applicable conditions in Chapter 6, *Program Participation and Conditions on Covered Activities*, will avoid and/or minimize effects on Covered Species and habitats.

Emergency Activities

Emergency situations may arise within the Reserve System that could affect Covered Species and natural communities. As described in Chapter 2, *Covered Activities*, emergency activities could include firefighting, evacuation, site remediation from illegal dumping, motor vehicle use, facility repair, and a number of other activities done in response to an emergency within the Reserve System.

These activities are anticipated to be rare and, therefore, effects on Covered Species are anticipated to be negligible. Most emergency activities, such as evacuation of injured persons or repair of structures, will likely have very few effects, either because the activity is not ground disturbing, the activity is contained in a small geographic area, or the activity occurs in already developed areas. Fighting of small wildfires or structure fires may have effects associated with fire containment such as access to the burn site, construction of fire breaks, and use of fire retardant. In general the effects of fire and other natural events will be addressed as described in Chapter 10, *Assurances*. If

necessary, effects from other emergency activities will be assessed against the maximum extent of take proposed herein and calculated annually.

4.4.7.3.2 Plan In-Stream Conservation Activities

The Plan provides coverage for projects and activities associated with implementation of the Plan's conservation strategy. Conservation measures and other in-stream activities necessary for the implementation of the conservation strategy are discussed in Section 2.6.7.2, *PCCP In-stream Conservation Activities*. In-stream conservation activities are covered wherever they occur in the Plan Area. Most of the direct in-stream conservation activities will comprise barrier removal. An estimated 0.12 stream mile would be affected during barrier removal: 0.05 mile of salmonid spawning and rearing habitat and 0.07 mile of salmonid migration and rearing habitat. Although the condition of the stream would be altered by barrier removal, this activity is considered to be beneficial and is not counted in the estimates of maximum permanent direct effect or maximum temporary direct effect.

Plan Areas B3 and B4 are located in Sutter County just to the west of Placer County; see Figure 2-6 and Figure 2-7. Raccoon Creek in Placer County and those Sutter County Plan Areas are currently under study to identify the effect of hydrology, water quality, channel geomorphology, and riparian vegetation on salmonid habitat. Specific plans for channel restoration will include estimates of channel disturbance and restoration. All of this disturbance is intended to be both short term and beneficial to the species. It is not considered to be subject to the maximum temporary effect, nor will it be required to pay the fees outlined in Chapter 9, *Costs and Funding*.

4.4.7.3.3 Non-Plan Placer County Conservation Programs

Placer County administers conservation and resource management programs that are separate from, but complement, the Plan, including the following: Placer Legacy Program, Auburn Ravine/Raccoon Creek Ecosystem Restoration Plan, Dry Creek Coordinated Resource Management Plan, Pleasant Grove/Curry Creek Ecosystem Restoration Plan, and Dry Creek Greenway Plan. These actions will occur primarily outside the Reserve System.

Placer Legacy Program and Resource Management Plans

Placer County, through the Placer Legacy Program, is committed to protecting and managing open space for the preservation of agricultural and rangeland heritage, scenic vistas, recreation opportunities, and native habitat. Implementation of the Placer Legacy Program includes property and conservation easement acquisitions, stewardship promotion, passive outdoor recreation, and habitat restoration and enhancement actions. This section includes Placer Legacy Program activities and implementation of Resource Management Plan activities that are not implemented as part of the Plan's conservation strategy.

The Auburn Ravine/Raccoon Creek Ecosystem Restoration Plan and the Dry Creek Coordinated Resource Management Plan were written by a consortium of watershed stakeholders, including Placer County, to inform the watershed restoration and enhancement component of the Placer Legacy Program. The Auburn Ravine/Raccoon Creek and Dry Creek plans provide the rationale for, and prioritization of, specific upland, riparian, and in-stream actions to benefit ecosystem function and riverine and riparian special-status species. Because effects associated with each of the three above-mentioned plans overlap considerably, they will be discussed together in this section.

The actions of acquiring property, obtaining easements, or promoting stewardship, as described in the Placer Legacy Program (Placer County 2000), do not have direct, on-the-ground effects. The indirect effects of stewardship promotion are similar to those that will occur directly from the restoration and enhancement components of the Placer Legacy Program and, by extension, the Auburn Ravine/Raccoon Creek and Dry Creek plans.

Overall, these projects will provide a net benefit to natural and semi-natural communities and Covered Species by improving ecosystem integrity, resiliency, and connectivity. Anticipated effects are listed below (as well as those effects discussed above for Plan activities within the Reserve System) followed by a short discussion describing their nature and persistence.

- In-stream or near-stream activities such as grading, heavy equipment use, soil moving, or vegetation removal will temporarily increase the amount of suspended sediment in streams (discussed above in Plan activities within the Reserve System).
- Removal of streamside vegetation for stream bank restoration or invasive species management will result in the temporary loss of shade, cover, and soil stability (discussed above in Plan activities within the Reserve System).
- Temporary dewatering of aquatic habitat for such activities as gravel augmentation, fine sediment removal, barrier or diversion modification, stream bank stabilization, and channel realignment will temporarily reduce or eliminate habitat for some Covered Species such as covered salmonids, foothill yellow-legged frog, California red-legged frog, western pond turtle, and giant garter snake. California black rail may be temporarily affected by dewatering activities if the dewatered section of stream supports a fresh emergent wetland (discussed above in Plan activities within the Reserve System).
- Construction equipment working within or near streams could spill petrochemicals that could pollute soils and waters (discussed above in Plan activities within the Reserve System).
- Handling and relocation of rare and protected species to avoid mortality during temporary construction activities will result in stress and/or mortality.
- The construction of impermeable surfaces such as trails, trail connectors, nature and heritage centers, and scenic byways will cause an increase in runoff during periods of rain.
- Increased disturbance could occur to Covered Species and wildlife caused by recreation activities in previously inaccessible habitats.
- Introduction of human-generated noise and litter into previously inaccessible areas could occur with the creation of recreational trails in acquired open space areas.

Petrochemical pollution associated with the use of heavy, motorized equipment during in-stream and riparian construction activities can cause direct mortality of aquatic species or cause less severe, less obvious problems, such as increased susceptibility to predation and/or disease.

The Placer Legacy Program calls for the creation of cultural heritage and nature interpretive centers. These facilities and their associated parking lots will be addressed in the same way as recreational facilities described above in Section 4.4.5.3, *Additional Detail on Programs*.

The Placer Legacy Program calls for appropriate public access and provides for small visitor interpretive centers. Increased public access to open space will bring increased litter and noise into areas where they had previously not been. Litter can not only end up in waterways, but can increase the incidence of scavenger species such as raccoons, corvids, rats, and pigeons. These species can

have negative effects on birds species by depredating bird nestlings. An increase in noise can cause certain species to vacate historical nesting or foraging habitats, leading to a regional decline. Security lighting associated with parking lots, restrooms, and interpretive centers can also have an indirect effect on wildlife. The minimization measures in Chapter 6, *Program Participation and Conditions on Covered Activities*, will reduce these adverse effects. However, the size of each facility is expected to be small and sited with sensitivity to the surrounding habitat, thus limiting the indirect effects.

Implementation of the Placer Legacy Program, the Coordinated Resource Management Plan, and other similar conservation efforts, including conservation efforts developed over the permit term, will generally have temporary effects caused by construction or restoration activities.

Community Wildfire Protection Plan and Placer County Strategic Plan for Biomass Utilization Program

The extent of permanent direct effects on natural and semi-natural communities and Covered Species caused by implementation of the Community Wildfire Protection Plan and the Biomass Utilization Program is expected to be minimal. Some natural and semi-natural land cover may be permanently affected where new fire breaks and buffers are established. Indirect effects caused by fuels treatment and restoration of habitat are expected to be similar to those discussed in Section 4.4.7, *Conservation Programs*.

Wildlife may be temporarily disturbed by wildfire protection plan activities; however, implementation of Species Conditions in Chapter 6, *Program Participation and Conditions on Covered Activities*, will minimize or avoid these effects.

4.5 Effects on Communities

As explained in Chapter 3, *Physical and Biological Setting*, the Plan uses the term *community* broadly to classify a wide range of natural, semi-natural, and non-natural land-cover types that characterize the Plan Area. The quantitative measure of effect on communities is estimated based on the areal extent of land cover affected by urban and rural development and other Covered Activities. Table 4-1 presents the estimated permanent direct effects on acres of communities and constituent habitats. Table 4-3 shows the estimated temporary direct effects. The Plan proposes separate maximum allowable effects for the Valley and Foothills of Plan Area A and for Plan Area B.

Certain communities or constituent habitats are key habitats for Covered Species and for implementing the conservation strategy. The maximum effects are established using the growth model described in Appendix M, *Growth Scenario Memo*, and are intended to reflect the maximum extent of take proposed by the Plan for the effects of Covered Activities.

Maximum effects are set for the following communities and constituent habitats (see Table 4-1 and 4-4):

- Vernal pool complex natural community
- Vernal pool constituent habitats
- Grassland natural community
- Aquatic/Wetlands constituent habitats

- Riverine/Riparian constituent habitats
- Valley oak woodland natural community
- Oak woodland natural community
- Rice agriculture

Aggregate maximum effects are proposed for all natural communities, as well as all permanent direct effect on non-urban lands

As described above, some communities and constituent habitat have proposed maximum effects, while others are "flexible" (see Section 4.3.1, *Methods for Land Conversion and Permanent Direct Effect*). This was done to create flexibility in implementation while establishing firm amounts of maximum effect that cannot be exceeded through coverage under the Plan. Note that natural communities or constituent habitats without maximum effects have maximum effects established at other hierarchical levels. For example, some constituent habitats do not have maximum effects (e.g., seasonal swales), but maximum effects exist for the associated group of constituent habitats collectively (e.g., vernal pool constituent habitats). Conversely, some natural communities (e.g., aquatic/wetland complex) do not have maximum effects, but their component parts (the constituent habitats) have maximum effects (i.e., fresh emergent marsh, lacustrine, and non-vernal pool seasonal wetland). Ultimately, the Plan proposes a maximum effect for both natural communities as a whole, and effects on all communities as a whole (i.e., natural and semi-natural communities).

As an example, although the maximum effect includes a loss of up to 560 acres of vernal pool constituent habitat in the Valley PFG, it is desirable that actual growth consume less than that total. For example, if 100 acres of vernal pool constituent habitat can be avoided in the Valley PFG, only 460 acres of vernal pool constituent habitat will be lost in that subarea at permit term. In order to accommodate that growth, the 100 acres avoided on vernal pool complex has to be built on some other community or constituent habitat, such as vernal pool complex uplands. In this example, the total loss of vernal pool complex uplands is proposed to be able to rise beyond the 11,640 acres of effect predicted in Table 4-1 within the Valley PFG. More uplands are lost, but less vernal pool constituent habitat is lost. The Plan proposes that the permit accommodates that shift away from more biologically important communities within set limits.

Tables 4-1 and 4-3 show the proposed maximum permanent and temporary effects, respectively, for relevant community and constituent habitat types. This is the maximum extent of take proposed over the course of the 50-year permit term. The maximum effects are intended to apply to each subarea and geographic components within those subareas. Therefore, there is a maximum effect stated for the Valley PFG, a maximum effect for all Valley (PFG and Conservation and Rural Development Area), and a maximum effect for all of the Plan Area that includes the Valley and Foothill subareas in Plan Area A as well as Plan Area B.

The maximum effects proposed for one community or constituent habitat are not necessarily additive across geographies within Table 4-1. Generally, the maximum effects within the Valley subarea will be roughly the sum of Valley PFG and the Valley Conservation and Rural Development Area or slightly smaller. Therefore, the maximum effect on vernal pool complex in the Valley is 12,200 acres in the PFG and 280 acres in the Conservation and Rural Development Area; if actual land conversion from Covered Activities in the Conservation and Rural Development Area reached the 280-acre maximum effect, the maximum effect in the PFG would be reduced to 12,120 acres so as to avoid exceeding the overall Valley vernal pool complex maximum effect of 12,400 acres.

More flexibility is applied to the relatively low estimates of take in the Conservation and Rural Development Area, which is the sum of RAA and existing protected areas because actual conditions at one or two project sites could cause a large variance.

4.5.1 Natural Communities

4.5.1.1 Vernal Pool Complex and Grassland Communities

Although diminished by urban growth and conversion to intensive agriculture, grasslands still cover much of the Valley landscape. Of the roughly 60,000 acres of the Valley still considered to be in natural land cover, roughly 55,000 acres are in grassland. Of this some 44,000 acres are mapped as vernal pool complex lands, because they still bear the topographic signature that reflects vernal pool hydrology. The remainder shows the effects of more intensive cultivation and occasionally irrigation and for pasture use.

Over the permit term, covered future growth is expected to continue the past trend of conversion of grassland to urban use. The effects analysis (Table 4-1) show an estimated loss of some 19,450 acres of grassland and vernal pool complex lands. Vernal pool complex lands make up 12,550 acres of the total effects, with about half of that amount being mapped as intermediate or high density.

Vernal pool complex lands contain vernal pool constituent habitats as described in Chapter 3, *Physical and Biological Setting*. The estimated loss of vernal pool complex amounts to 580 acres of all vernal pool constituent habitats, of which less than a third, 185 acres, is estimated to be delineated as vernal pool wetlands. The grassland natural community will contain small amounts of other constituent habitats such as fresh emergent marsh or riverine and riparian habitats that occur in patches along small tributary creeks or artificial drainage ways.

Grassland in the Foothills represents a transition between the Valley grassland and the more heavily wooded uplands. Although some of the soil types can produce vernal pool constituent habitat, for the most part Foothills grasslands are better-drained, rolling lands that inter-grade with oak savanna. Covered Activities are estimated to result in direct effects on 3,300 acres of Foothills grasslands.

Indirect effects on grasslands ecosystems are difficult to quantify. For the specific vernal pool component, however, the Plan adopts a 250-foot radius of indirect effects outward from development as a way of representing effects on mainly hydrologic processes upon which vernal pools depend. Although the pattern of actual growth in the Valley is not determined, it is estimated that vernal pool complex indirect effects, both on and off site, will amount to roughly 20 percent of direct effects (see Tables 4-4A through 4-4C for indirect effects on vernal pool complex in the Valley).

In the Foothills, indirect effects on grasslands are associated with the progressive subdivision of larger parcels and the increased density of residential development. The analysis of increase in rural densities predicts as many as 4,802 acres of grasslands in the Foothills will be subject to subdivision for rural residential development (Table 4-5).

4.5.1.2 Aquatic/Wetland and Riverine/Riparian Communities

These biologically important communities are found scattered throughout the broader upland expanses in both the Valley and the Foothills and are often associated with the Stream System.

Because of the Stream System location, the effects of Covered Activities are estimated to be less intense for these communities due to the regulatory protections of the Plan and the CARP, and the inherent physical constraints of construction in the Stream System.

For this reason estimated loss of aquatic/wetland constituent habitats is low—about 260 acres in all divided roughly evenly between Valley and Foothills, with 10 additional acres of effect in Plan Area B. Loss of riverine/riparian constituent habitats is estimated to be 490 acres over the permit term, with about two-thirds of that occurring in the Foothills (Table 4-1).

The mapped aquatic/wetland complex community contains constituent habitats as described in Chapter 3, *Physical and Biological Setting*, including fresh emergent marsh, lacustrine, and non-vernal pool seasonal wetlands. The riverine/riparian complex contains riverine and riparian constituent habitats. Direct, permanent effects on these constituent habitats are shown in Table 4-1.

The description of Covered Activities in Chapter 2, *Covered Activities*, and in Section 4.4.6, *In-Stream Programs*, shows that direct effects on the stream itself will occur over small segments, typically on the order of 100 feet in extent, but at multiple locations throughout the Plan Area. The streams physically occupy a relatively small areal extent and are best measured as a linear feature (stream miles). Tables 4-7A and 4-7B give a summary of stream length affected by classes of Covered Activities and show the portion that is attributed to salmonid habitat.

Tables 4-7A and 4-7B itemize estimated permanent effects for the four main classes of Covered Activities that have quantified effects on streams: road crossings, pipelines not associated with road crossings, flood control, and fish passage enhancement projects. Of these, road crossings will account for the majority of permanent effects on streams and the breakdown of road crossings by bridge and culvert are shown in Table 4-6. The estimated sum of road crossings over the 50-year permit term will amount to permanent effects on over a total of 4.75 miles of streams, 0.8 percent of the total in the Plan Area. The total permanent direct effect on streams is estimated to be 5.50 miles (1.0 percent). Table 4-1 estimates effects and proposes limits for effects on riparian and riverine habitat types as measured in acres. In all cases the BMPs and other conditions outlined in Chapter 6, *Program Participation and Conditions on Covered Activities*, will significantly minimize the adverse alteration of the streambeds in areas considered to be subject to effect. Unlike land conversion where the natural community is converted by the Covered Activity, in-stream activities will leave the stream channel intact and in many cases in a natural and possibly improved condition. The project footprint persists nonetheless and exerts the direct effects discussed in Section 4.4.6, *In-Stream Programs*.

Table 4-7B gives the estimated temporary effects of in-stream activities over the 50-year permit term and also on an annualized basis. Road crossings are expected to temporarily affect a total of 21.5 miles of streams, 3.7 percent of the total in the Plan Area. Flood control activities are less well-defined, but may affect an estimated 14.8 miles of streams (2.6 percent). On an annual basis, temporary effects will occur over an estimated 0.73 mile of stream. BMPs and other conditions outlined in Chapter 6, *Program Participation and Conditions on Covered Activities*, will require minimization of temporary effects and rehabilitation of areas subject to construction disturbance.

Indirect effects on these communities will result mainly from increased encroachment on the Stream System and fragmentation and subsequent isolation of smaller patches due to increased urban/suburban and very low-density development. Because these aquatic habitats are also dependent on water quantity and water quality, indirect effects will result at some level from any activities in the upper watersheds. For this reason, essentially all of the aquatic and riverine complex

communities will be subject to some level of increased indirect effect over the course of the 50-year permit (Tables 4-4 and 4-5).

4.5.1.3 Woodland Communities

Woodland communities comprise a mosaic of diverse land-cover types. The overall oak woodland community contains blue oak, interior live oak, mixed oak woodland, and oak-foothill pine woodland. Where canopy density is roughly 5 percent or less, woodland is classified as oak savanna. Because foothill chaparral occurs only in isolated patches in the Plan Area, it is included within the overall definition of oak woodland.

Two natural communities (valley oak woodland and oak woodland) compose woodland communities. The greatest effect on woodland communities is estimated to occur within the Foothills where the cumulative footprint of very low-density rural residential development may result in a direct loss of just over 5,100 acres of oak woodland and 100 acres of valley oak woodland.

Valley oak woodland is naturally interspersed with oak woodlands in the Foothills, particularly near the Stream System. Valley oak woodland is also represented as a separate community in order to take account of this biologically important component. Because valley oak woodland is associated with the Stream System, there is a corresponding anticipated effect from Covered Activities.

Indirect effects on woodland communities in the Valley are hard to quantify. Most of the Valley future growth will occur in large blocks of urban/suburban development, which will have limited indirect effects on the scattered patches of woodland distant from development sites. Table 4-4 estimates effects on woodland natural communities in the Valley. Although individual trees may not be removed, the functional value of the woodland is often lost.

In the Foothills, the conversion of large parcels (in excess of 10 acres) into smaller parcels will result in indirect effects on oak woodland due to the increased presence of human activity. The effects model estimates that over 6,000 acres of oak woodland and valley oak woodland may be subject to indirect effects through the progressive subdivision of the Foothills (Table 4-5).

4.5.2 Semi-natural Communities

For the purposes of the Plan, a semi-natural community is a community that has been intensively managed for agricultural uses with soil disturbance and planting that retains habitat values for native wildlife. The Plan recognizes two semi-natural agricultural communities: rice agriculture and field agriculture. Field agriculture includes alfalfa, cropland, and eucalyptus.

4.5.2.1 Rice Agriculture

In the Valley, rice cultivation accounts for 90 percent of the extent of semi-natural communities, but most of this falls to the west of the PFG so that only about 10 percent of rice lands will be subject to conversion due to covered future growth. Approximately 1,760 acres of rice land may be restored to natural communities such as fresh emergent marsh and other wetlands, riparian, valley oak woodland, and vernal pool complex. Indirect effects on rice agriculture are estimated in Tables 4-4 and 4-5.

4.5.2.2 Field Agriculture

The effects model shows that field crops may be affected by Covered Activities, including a small amount of alfalfa on a pro-rata basis. Direct effects on field agriculture are included in the 1,490 acres of other agriculture (all agriculture other than rice) that are estimated to be affected by Covered Activities (see below). Approximately 50 acres of field agriculture may be restored to natural communities (e.g., vernal pool complex, grassland). Indirect effects on field agriculture are estimated in Tables 4-4 and 4-5.

4.5.3 Other Agriculture

Other Agriculture is defined in the Plan as a community with agricultural value that does not provide habitat value for Covered Species (as distinguished from semi-natural communities, which do provide habitat value). Orchard and vineyard agriculture is the community type within Other Agriculture(see Table 3-11). Orchards and vineyards are increasing in the Valley, but some conversion to urban use is likely to occur. Indirect effects on orchards and vineyards are estimated in Tables 4-4 and 4-5.

4.5.4 Urban (Non-Natural)

The urban category includes managed open water, rural residential, and urban community types. Urban communities are estimated to increase as a result of Covered Activities. Although some species are able to tolerate human presence in suburban and low-density residential, the increase in those land-cover types is not considered to benefit species and, therefore, it is not quantified.

4.6 Effects on Watersheds

Covered Activities in the Plan Area can alter watershed hydrology and introduce new sources of pollution that may affect water quality in local streams. Changes in watershed hydrology can occur by increasing impervious surfaces in urban, suburban, and rural areas, thus reducing the capacity of remaining pervious surfaces to capture and infiltrate rainfall, resulting in increased surface flow and peak discharge rates to local streams during storm events. Resultant increases in peak streamflow have the potential to erode stream banks, damage streamside vegetation, and widen or incise stream channels.

In addition, water quality in receiving water bodies may be degraded by pollution from urban or urbanizing areas. Surface runoff can transport sediment from construction, including oil, grease, heavy metals, and toxic chemicals from roads; nutrients and pesticides from turf management and gardening; and viruses and bacteria from failing septic systems into local streams. Increased flows may also cause increased sediment load from sloughing or undercut banks.

Streams and wetlands, especially vernal pools, may be particularly susceptible to increased runoff. Such increases can result in greater levels of scour and/or incision of local creeks, alterations of downstream hydrology, and increased sediment loads in creeks and wetlands. Also, additional development may increase the amount of pollutants such as grease, oil, and lawn pesticides that can be transported from residences during wet weather.

Increases in the human population in the Plan Area (primarily associated with urban development) will increase the demand on water resources in the Plan Area, particularly for potable water and other development-related uses. An increase in the demand for water may remove water from natural systems in the Plan Area, from surface water (e.g., in streams) and groundwater systems. The removal of water from surface waters, and the storage and release of surface waters, can alter the temperature regime, the flow regime, or the depth or width of waterways, potentially reducing the availability of side channel and off-channel habitat for Covered Species inhabiting Plan Area streams (e.g., Central Valley Steelhead, Central Valley fall-/late fall-run Chinook salmon, foothill yellow-legged frog). Changes in the volume of flows in Plan Area streams may cause changes in water temperature (e.g., decreased amounts of water may increase water temperature and decrease flows) and may affect the amount or the quality of available habitat to in-stream species.

Implementation of BMPs and other avoidance measures will reduce effects across watersheds as discussed in Chapter 6, *Program Participation and Conditions on Covered Activities*.

The location, number, and capacity of groundwater wells installed at a given site may have indirect effects on streamflow and riparian vegetation. If a well is placed in such a manner that it draws down groundwater levels along a reach of stream, that reach may experience reduced flows. Reduced flows can occur either from a reduction in groundwater supporting the streamflow or from the more rapid percolation of flows from the upper watershed into the channel substrate, filling the space once occupied by groundwater. Reduced flows may degrade aquatic habitat for covered fish, amphibians, western pond turtle, and other wildlife, inhibit migration of covered fish, or prevent riparian vegetation from obtaining adequate water.

Effects on groundwater levels from multiple wells drilled into the same aquifer are expected to be minor in Placer County. Deep and overdraft pumping are more commonly associated with agriculture, which is not a Covered Activity, as opposed to rural residential use. Rural residential development in Placer County has mainly been in the Foothills and has been limited by adequate septic capacity and not by water supply. Agriculture in the Foothills that may accompany rural residential development is well supplied by the existing canal system, bringing water down from the Sierra Nevada, and has not historically relied on wells.

As explained in Section 3.2.6, *Streams and Watersheds*, the Plan defines seven planning watersheds based on watersheds defined by the USGS HUC-10. Table 4-8 summarizes the effects estimated within the seven planning watersheds.

Table 4-8A. Effects on Watersheds within All of Plan Area A

Watershed	Acres of Watershed in Plan Area A	Current Proportion of Urban	Acres of Urban Growth	Growth as Proportion of Watershed	Proportion in Plan Area after Growth	Miles of Salmonid Spawning Stream	Miles of Salmonid Migration Stream
1. Bear River	33,540	10%	1,890	6%	16%	7.2	—
2. Raccoon Creek	52,094	9%	4,347	8%	17%	28.6	6.5
3. Markham Ravine	17,174	22%	3,724	22%	44%	—	—
4. Auburn Ravine	42,309	24%	7,570	18%	42%	9.3	13.3
5. Pleasant Grove	15,220	10%	3,864	25%	35%	—	—
6. Dry Creek	39,633	36%	6,864	17%	53%	23.1	4.7
7. American	9,862	48%	939	10%	58%	—	—
Plan Area A Total	**209,832**	**20%**	**29,198**	**14%**	**34%**	**68.2**	**24.5**

Table 4-8B. Effects on Watersheds within Valley

Watershed	Acres of Watershed in Plan Area A	Current Proportion of Urban	Acres of Urban Growth	Growth as Proportion of Watershed	Proportion in Valley after Growth	Miles of Salmonid Spawning Stream	Miles of Salmonid Migration Stream
1. Bear River	18,594	11%	949	5%	16%	6.5	—
2. Raccoon Creek	14,138	5%	1,558	11%	16%	8.5	6.5
3. Markham Ravine	16,123	23%	3,624	22%	45%	—	—
4. Auburn Ravine	25,085	27%	5,931	24%	51%	0.5	13.3
5. Pleasant Grove	15,220	10%	3,864	25%	355	—	—
6. Dry Creek	11,536	24%	4,189	36%	60%	—	4.7
7. American	—		—			—	—
Valley Total	100,698	17%	20,114	20%	37%	15.5	24.5

Table 4-8C. Effects on Watersheds within Foothills

Watershed	Acres of Watershed in Plan Area A	Current Proportion of Urban	Acres of Urban Growth	Growth as Proportion of Watershed	Proportion in Foothills after Growth	Miles of Salmonid Spawning Stream	Miles of Salmonid Migration Stream
1. Bear River	14,946	9%	941	6%	15%	0.7	—
2. Raccoon Creek	37,956	10%	2,790	7%	17%	20.0	—
3. Markham Ravine	1,050	12%	100	10%	22%	—	—
4. Auburn Ravine	17,223	21%	1,639	10%	31%	8.8	—
5. Pleasant Grove	—		—			—	—
6. Dry Creek	28,096	42%	2,675	10%	52%	23.1	—
7. American	9,862	48%	939	10%	58%	—	—
Foothills Total	109,134	23%	9,084	8%	31%	52.7	—

Source MIG|TRA 2/24/16

Tables 4-8A through 4-8C consider three major areas: all Plan Area A, Valley, and Foothills. The table shows the percentage of each watershed mapped as urban, suburban, or rural residential, all of which are considered here as "urban." The table also shows the modeled extent of new urban growth in the watershed in acres and as a percentage of the watershed area. As a reference, the mapped stream miles of salmonid spawning and migration habitat are shown to indicate potential for watershed effects on these habitat metrics.

Table 2-1 shows that the present extent of urbanization in the Plan Area is substantial. Overall, 20 percent of the Plan Area is mapped as urban/suburban. The degree of current urbanization ranges from a low of 9 percent in the Raccoon Creek watershed to a high of 48 percent in the American River watershed (Table 4-8A). Urban land-cover types in the Foothills are mainly suburban along the I-80 corridor with extensive rural residential areas already present in all watersheds from Auburn Ravine north to the Bear River.

The northern watersheds, Bear River and Raccoon Creek, will experience the lower direct effects from urbanization and indirect effects from rural residential fragmentation. Much of these watersheds are within the RAA, and, after establishing the Reserve System, there will be an appreciable reduction of the potential for land conversion. As a consequence, overall direct effects on the Bear River and Raccoon Creek watersheds are on the order of 6 to 8 percent of total area, respectively (Table 4-8A).

The central watersheds, Markham Ravine, Auburn Ravine, and Pleasant Grove Creek, are where the majority of land conversion will take place. These watersheds include the City of Lincoln, the non-participating cities, and the large amount of unincorporated land in the Valley PFG. Farther into the Foothills, these watersheds include lands within the Foothill PFG developing around the city of Auburn and rural residential reaching northward to the RAA. Direct effects in these watersheds range from 15 to 22 percent in Plan Area A as a whole.

The southern watersheds, Dry Creek, Curry Creek, and American River, are already substantially urbanized. Direct effects on Dry Creek watershed are estimated at 36 percent of its area. The American River within the Plan Area is mainly steep terrain above Folsom Reservoir and is unlikely to be subject to appreciable future growth.

Covered urban, suburban, and rural residential development will more than double the extent of urbanization in the Valley watersheds, increasing urban/suburban and rural residential land uses from 17 to nearly 37 percent over the 50-year permit term (Table 2-1). In the Foothills, covered rural residential growth is modeled to increase the presence of urban land uses by 6 to 10 percent in all watersheds including watersheds supporting salmonid habitat.

Table 4-9 puts the Plan Area watersheds in a regional context. As explained in Chapter 3, *Physical and Biological Setting*, the planning watersheds are made up of USGS HUC-10 watersheds. Table 4-9 lists the HUC-8 subbasins and their HUC-10 watersheds and shows the proportion of each watershed that falls in the Plan Area (Plan Area A and B and the non-participating cities). Some watersheds, such as Auburn Ravine, fall almost entirely within the Plan Area. For others such as the lower North Fork American River watershed in the upper American River subbasin, the Plan Area makes up only 18 percent.

Table 4-9. Proportion of Regional Watersheds in the Western Placer Planning Area (acres)

HUC-8 Subbasins	HUC-10 Watersheds	Western Placer	Not in Plan Area	HUC-10 Total	Proportion in Western Placer
Upper Bear River					
	Lower Bear River	54,169	26,114	80,283	67%
	Middle Bear River	8,029	48,973	57,003	14%
Raccoon Creek/Auburn Ravine					
	Auburn Ravine	39,994	841	40,834	98%
	Raccoon Creek	52,187	38,029	90,216	58%
	Curry Creek-Sacramento River	8,861	57,534	66,395	13%
	Pleasant Grove Creek-Cross Canal	52,942	84,973	137,915	38%
Lower American River					
	Dry Creek	21,267	28,736	50,004	43%
	Steelhead Creek	11,360	80,183	91,543	12%
Upper American River					
	Lower North Fork American River	11,846	52,517	64,363	18%
All Regional Watersheds		**260,655**	**417,901**	**678,556**	**38%**

Source MIG|TRA 2/24/16

Covered urban growth will occur largely in Plan Area A. Plan Area A contains 31 percent of the total area of all regional watersheds. Covered urban growth modeled for the plan is 29,198 acres, which represents a 4.3 percent increase in the extent of urban area in the regional watersheds. As mapped, the Plan Area includes the non-participating cities of Roseville, Rocklin, and Auburn, which are included within Plan Area B1. Urbanization in this area is not a Covered Activity.

4.7 Effects on Covered Species

This section describes the potential effects on Covered Species under the Plan. The amount of incidental take of Covered Species proposed by the Plan has been described in accordance with Section 4.3, *Methods for Quantifying Effects*, for direct, indirect, and temporary effects. Quantification of incidental take is focused on the direct, permanent effect of land conversion (Table 4-1) with respect to habitat models developed for 13 of the 14 Covered Species. A GIS-based habitat model for Conservancy fairy shrimp was not created because its known distribution and habitat associations are restricted in the Plan Area to a single vernal pool.

Table 3-7 and the species accounts (Appendix D, *Species Accounts*) provide information on specific biological needs for each Covered Species, including the links between a species' life-history requirements and land cover, community types, and constituent habitats used in the analysis. The proposed maximum allowable permanent and temporary effects on communities and constituent habitats composing Covered Species' habitat are provided in Table 4-1 and Table 4-3, respectively. Those proposed community and constituent habitat limits are the basis for the estimated maximum allowable effects for the Covered Species shown in Tables 4-11 and 4-12. The proposed maximum extent of effects on covered fish species' habitat are given in Table 4-6. Compliance monitoring for

community and constituent habitat limits will also document take of modeled habitat. Covered Species are grouped and discussed in the following order.

Birds

1. Swainson's hawk
2. California black rail
3. Western burrowing owl
4. Tricolored blackbird

Reptiles

5. Giant garter snake
6. Western pond turtle

Amphibians

7. Foothill yellow-legged frog
8. California red-legged frog

Fish

9. Steelhead
10. Chinook salmon

Invertebrates

11. Valley elderberry longhorn beetle
12. Vernal pool fairy shrimp
13. Vernal pool tadpole shrimp
14. Conservancy fairy shrimp

Table 4-10. Covered Species' Habitat Model Summary

Habitat Type	General Habitat	Location
Birds		
Swainson's Hawk		
Nesting Habitat	Riparian and Valley Oak Woodland	Valley
Foraging Habitat	Grassland and Cropland	Valley
California Black Rail		
Year-round Habitat	Marsh Complex	All Plan Area
Western Burrowing Owl		
Year-round Habitat	Grassland, Cropland, Oak Savanna and Valley Oak Woodland	Valley
Tricolored Blackbird		
Nesting Habitat	Aquatic	Valley; Foothills below 300 feet elevation
Foraging Habitat	Grassland and Cropland	Valley; Foothills below 300 feet elevation
Reptiles		
Giant Garter Snake		
Aquatic Habitat	Aquatic, Riverine, Rice	Valley below 100 feet elevation
Upland Habitat	Grassland and Cropland	Within 200 feet of aquatic habitat
Western Pond Turtle		
Aquatic Habitat	Aquatic, Riverine	All Plan Area
Upland Habitat	Grasslands, Woodlands	Within 150 feet of aquatic habitat
Amphibians		
Foothill Yellow-legged Frog		
Year-round Habitat	Riverine	Foothills above 500 feet elevation
California Red-legged Frog		
Aquatic Habitat	Aquatic, Riverine	Plan Area above 200 feet elevation. Includes upland type habitat within 100 feet of aquatic habitat
Upland Habitat	Grasslands, Woodlands	Within 1 mile of aquatic habitat
Invertebrates		
Valley Elderberry Longhorn Beetle		
Year-round Habitat	Riparian and Valley Oak Woodland	Valley; Foothills below 650 feet elevation
Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp		
Wetland Habitat	Vernal Pool Constituent Habitats	Valley
Vernal Pool Complex	Vernal Pool Complex	Valley

Source MIG|TRA 12/3/15

Because land conversion from urban growth is the main driver of potential take of Covered Species, the assessment of effects on Covered Species is focused on permanent, direct effects as quantified in Table 4-1, but also includes other direct and indirect effects. During habitat destruction, take may occur through the direct killing, injury, or harassment of individual animals. For example, construction activities in vernal pool constituent habitats will crush vernal pool branchiopods and draining or earth-filling wetted areas will cause desiccation during the wet season. During construction activities, animals could be struck or crushed on the ground surface by construction

vehicles or heavy equipment, or entombed inside their burrows during surface-disturbing activities such as grading or trenching. Aquatic animals, such as salmonids, vernal pool branchiopods, and California red-legged frog, could die or be displaced as a result of draining of their wetland habitats, alteration of hydrological regimes, or habitat degradation through sedimentation or pollution.

Although some individuals may survive initial site disturbance and habitat loss by escaping into adjacent areas, they may ultimately die as a result of starvation, exposure, or predation if such areas do not provide suitable habitat. Even if these animals reach other habitats, they may still face competition and reproductive exclusion if such habitats are already at carrying capacity.

Although some species occurrence data are available, as presented in Appendix D, *Species Accounts*, the vast majority of the Plan Area is in private ownership and has not been surveyed. Occurrence data alone are not a reliable indicator of Plan effect on Covered Species; for this reason, the effects analysis must rely on modeled habitat.

Furthermore, some Covered Species such as giant garter snake are rare or have not yet been observed in the Plan Area, but potentially suitable habitat is present and loss of that habitat represents potential take. For this reason, the main assessment of Covered Species take in the form of habitat loss (i.e., harm) for each Covered Species is expressed in terms of the amount of modeled habitat that may be removed.

Direct effect on species' modeled habitat is estimated using the same methodology used for natural communities. Where a Covered Activity would affect an area of a land-cover type included in modeled habitat, that area is added to the total estimated effect for that species. The results are presented in Table 4-11 and Table 4-12. The results in those tables show the estimated maximum permanent and temporary direct effects on Covered Species' modeled habitat based on the maximum effects on natural communities and habitats shown in Table 4-1.

Table 4-11. Permanent Direct Effect of Covered Species' Modeled Habitat (acres)

Species/Habitat Type	Plan Area A Existing Habitat	Direct Effect Valley	Direct Effect Foothills	Plan Area A Effect as Percent of Existing	Permanent Plan Area B	All Plan Area Direct Effect
Birds						
Swainson's Hawk						
Nesting Habitat	1,968	139	-	7%	10	149
Foraging Habitat	54,574	16,067	-	29%	200	16,267
Total	56,542	16,206	-	29%	210	16,416
California Black Rail						
Year-round Habitat	1,112	50	50	9%	5	105
Western Burrowing Owl						
Year-round Habitat	55,101	16,244	-	29%	200	16,444
Tricolored Blackbird						
Nesting Habitat	633	50	-	8%	5	55
Foraging Habitat	60,974	16,395	420	28%	200	17,015
Total	61,608	16,445	420	27%	205	17,070

Species/Habitat Type	Plan Area A Existing Habitat	Direct Effect Valley	Direct Effect Foothills	Plan Area A Effect as Percent of Existing	Permanent Plan Area B	All Plan Area Direct Effect
Reptiles						
Giant Garter Snake						
Aquatic Habitat	19,511	1,393	-	7%	45	1,438
Upland Habitat	3,537	479	-	14%	5	483
Total	23,049	1,872	-	8%	49	1,921
Western Pond Turtle						
Aquatic Habitat	10,244	270	460	7%	20	750
Upland Habitat	14,263	504	902	10%	-	1,407
Total	24,507	774	1,362	9%	20	2,157
Amphibians						
Foothill Yellow-legged Frog						
Year-round Habitat	1,837	-	155	8%	-	155
California Red-legged Frog						
Aquatic Habitat	8,532	-	672	8%	-	672
Upland Habitat	75,306	-	8,551	11%	-	8,551
Total	83,838	-	9,222	11%	-	9,222
Invertebrates						
Valley Elderberry Longhorn Beetle						
Year-round Habitat	6,367	180	286	7%	10	476
Vernal Pool Invertebrates						
Wetland Habitat	2,230	570	-	26%	10	580
Vernal Pool Complex	44,278	12,400	100	28%	50	12,550
All Land Area	209,832	20,200	9,600	14%	300	30,100

Source: MIG|TRA 2016.

Table 4-12. Temporary Direct Effects on Covered Species' Modeled Habitat (acres)

Species/Habitat Type	Plan Area A Existing Habitat	Temp-Effects Valley	Temp-Effects Foothills	Plan Area A Effect as Percent of Existing	Temporary Plan Area B	All Plan Area Temporary Effect
Birds						
Swainson's Hawk						
Nesting Habitat	1,968	5	-	0%	5	10
Foraging Habitat	54,574	562	-	1%	40	602
Total	56,542	567	-	1%	45	612
California Black Rail						
Year-round Habitat	1,112	18	13	3%	10	40
Western Burrowing Owl						
Year-round Habitat	55,101	569	-	1%	40	609

Species/Habitat Type	Plan Area A Existing Habitat	Temp-Effects Valley	Temp-Effects Foothills	Plan Area A Effect as Percent of Existing	Temporary Plan Area B	All Plan Area Temporary Effect
Tricolored Blackbird						
Nesting Habitat	633	18	-	3%	10	28
Foraging Habitat	60,974	574	10	1%	40	624
Total	61,608	591	10	1%	50	652
Reptiles						
Giant Garter Snake						
Aquatic Habitat	19,511	167	-	1%	36	203
Upland Habitat	3,537	17	-	0%	5	22
Total	23,049	184	-	1%	41	225
Western Pond Turtle						
Aquatic Habitat	10,244	95	115	2%	40	250
Upland Habitat	14,263	18	23	0%	-	40
Total	24,507	112	138	1%	40	290
Amphibians						
Foothill Yellow-legged Frog						
Year-round Habitat	1,837	-	39	2%	-	39
California Red-legged Frog						
Aquatic Habitat	8,532	-	168	2%	-	168
Upland Habitat	75,306	-	214	0%	-	214
Total	83,838	-	382	0%	-	382
Invertebrates						
Valley Elderberry Longhorn Beetle						
Year-round Habitat	6,367	6	7	0%	5	18
Vernal Pool Invertebrates						
Wetland Habitat	2,230	25	-	1%	5	30
Vernal Pool Complex	44,278	435	10	1%	10	455
All Land Area	209,832	830	400	1%	105	1,335

The estimated maximum effects on Covered Species' modeled habitat shown in Table 4-11 are not proposed as take limits *per se*, because they are derived from the maximum effect established for the communities and constituent habitats shown in Tables 4-1 and 4-3 and they overlap across species. Rather, the Plan proposes that the maximum extent of take be set at the level of communities and constituent habitats, except for salmonids. The Plan proposes that the maximum extent of take of covered salmonids be based on effects on salmonid habitat, as described in Section 4.4.6, *In-Stream Programs*, and shown in Tables 4-7A and 4-7B. The PCA, however, will track effects relative to modeled habitat on Covered Species.

As described in Section 3.3.2.2, *Habitat Distribution Models*, the quantitative extent of modeled habitat is likely to be overstated because (1) habitat models do not predict habitat quality, which influences species occupancy and (2) not all modeled habitat is occupied by the subject species.

This analysis likely inflates the amount of habitat affected due to Covered Activities because habitat models may overestimate the actual extent of suitable habitat (see species accounts in Appendix D, *Species Accounts*, for details on each model), and suitable habitat may not be occupied by the subject species. In addition, avoidance and minimization measures for Covered Activities, natural communities, constituent habitat, and species are presented in Chapter 6, *Program Participation and Conditions on Covered Activities*. These measures will substantively reduce the amount of take estimated in these analyses.

Indirect effects are quantified in Tables 4-4 and 4-5. These effects on species are described qualitatively in the species-specific text below.

4.7.1 Swainson's Hawk

Swainson's hawk nests in the Plan Area in the spring and early summer and spends the non-breeding season from Central Mexico to South America. In California, Swainson's hawks require large areas of open, flat landscapes that include suitable grassland and agricultural habitat for foraging and sparsely distributed trees, particularly in riparian habitats, for nesting. Suitable habitat for Swainson's hawk in the Plan Area is present in the western Valley portion of the Plan Area below an elevation of 200 feet. The Plan evaluates two types of habitat for Swainson's hawk: nesting habitat and foraging habitat.

Swainson's hawks will be directly affected primarily by the conversion of their foraging and nesting habitat to rural and urban development, and, to a lesser extent, other Covered Activities that permanently affect habitat. Changes in land use that reduce the prey base for Swainson's hawks could also affect the population of Swainson's hawk within the Plan Area.

Permanent, direct effects on Swainson's hawk nesting, foraging, and movement habitat are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12.

Covered Activities that remove suitable nest trees will affect Swainson's hawks. Swainson's hawk usually nests in large, native trees such as valley oaks and cottonwoods and in non-native trees such as eucalyptus (Bechard et al. 2010). Nests occur in riparian woodlands, roadside trees, trees along field borders, isolated trees, small groves, trees in windbreaks, and on the edges of remnant oak woodlands. Isolated trees that may be used as nest sites will be lost primarily to activities that affect isolated trees within modeled foraging habitat. Loss of isolated trees was not estimated by the effects analysis, as these potential nest sites were not included in the land-cover mapping. Loss of nesting habitat, isolated nest trees, and foraging habitat (see below) will reduce the available habitat for Swainson's hawk in the Plan Area.

Table 4-10 assigns riparian and valley oak woodland as nesting habitat. As seen in the first column *Plan Area A Existing Habitat* of Table 4-11, there are 1,968 acres of modeled nesting, less than 1 percent of the total area The distribution of known occurrences of Swainson's hawk in the Plan Area fits the model reasonably well. Because riparian habitats and remnant valley oak woodlands occur in narrow patches, there are isolated nest trees, which are not included in land-cover mapping.

Most of mapped Swainson's hawk nesting habitat falls in the Stream System. Because the Plan provides for the majority of Covered Activities to take place outside of the Stream System, this minimizes potential direct effect on Swainson's hawk nesting habitat and Table 4-11 shows the

estimate of take as 149 acres of nesting habitat, roughly 7 percent of the extent of existing modeled nesting habitat.

Temporary effects are estimated in Table 4-12. Temporary effects on nesting habitat are likely to be low because conditions in Chapter 6, *Program Participation and Conditions on Covered Activities*, minimize effects in areas where nest trees are present (see Section 6.3.5.6, *Species Condition 1, Swainson's Hawk*). Any direct take of a potential nest tree would not meet the short-term restoration requirement necessary to be classified as a temporary effect. Although potential nest trees removed will be replanted as a part of riparian restoration described in Chapter 5, *Conservation Strategy*, this would not meet the timeframe defined for temporary effects.

Foraging habitat is modeled extensively throughout the Valley portion of the Plan Area. Open grassland including vernal pool complex lands and, to a much lesser extent, agricultural landscapes with a variety of seasonal crops and perennial cover types provide a relatively constant source of suitable foraging habitat for Swainson's hawks throughout the season. Table 4-10 assigns grassland including vernal pool complex and cropland as foraging habitat. As seen in the first column *Plan Area A Existing Habitat* of Table 4-11, foraging habitat is widespread in the Plan Area, modeled at 54,574 acres, three-quarters of the Valley non-urban land cover.

Urban growth makes up the majority of the Covered Activities in the Valley. As shown in Table 4-1, grassland, vernal pool complex land, and agricultural land will be subject to land conversion through Valley Covered Activities. Because these land-cover types are modeled as Swainson's hawk foraging habitat, it is estimated that direct effects on foraging habitat would amount to a loss of an estimated 16,267 acres if the maximum effects on natural communities and agriculture occur. This degree of foraging habitat loss amounts to 30 percent of existing foraging habitat in the Valley.

Swainson's hawk is susceptible to indirect effects from disturbance from activities that occur near Swainson's hawk nests, which could harm or harass individuals by disturbing nesting and foraging behavior. Implementation of Species Condition 1, Swainson's Hawk, will minimize such potential effects.

Increases in the human population related to increased urban development will result in associated indirect effects such as increased harassment from people, increased vehicle-related disturbance (e.g., of breeding habitat near roads), increased risk of wildfire, and increased noise and light pollution. The assessment of new urban edge in the Valley shows that as many as 3,416 acres of grassland and field agricultural land may have new urban development within the 250-foot disturbance radius used in that analysis (see Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley*, and Appendix G, *Take Assessment Methodology*).

4.7.2 California Black Rail

California black rails are residents in the Plan Area occupying perennial wetlands that are dominated by rushes and cattails. The Plan evaluates year-round habitat. California black rail modeled habitat is defined as fresh emergent wetlands greater than 0.2 acre in the Plan Area. The scale of the land-cover data and mapping is too coarse to specifically identify suitable year-round black rail habitat, but the estimated fresh emergent marsh component of mapped marsh complex land-cover type is a reasonable measure of modeled habitat.

Appendix D, *Species Accounts*, maps California black rail occurrence in the Plan Area. Populations were only recently discovered in Placer County and observed occurrences are sparse. Additional

information on suitability of potential black rail habitat mapped in the species account is based on roadside reconnaissance surveys of potentially suitable wetlands focused in an area in the central and north central region of the Plan Area where California black rail have been previously detected (Dudek Consulting 2014). Despite this geographic focus, black rail is considered to be potentially present in suitable habitat throughout the Plan Area. California black rail will be directly affected by Covered Activities that result in the removal or permanent alteration of perennial fresh emergent marsh habitat. Covered Activities that eliminate California black rail habitat include rural and urban development that eliminate or degrade water quality and/or quantity.

Permanent, direct effects on California black rail year-round habitat are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12. Although temporary effects are usually small compared to permanent effects, the potential for future flood control channel maintenance raises a risk of effect on black rail. Another 40 acres of potential habitat may be subject to temporary effects at least once during the 50-year permit term. Although rushes and cattails reestablish fairly quickly after disturbance as long as the water availability is unchanged, it will be particularly important to avoid actual occupied habitat. Both permanent and temporary effects will be limited by the requirements in Section 5.3.1.6.2, *California Black Rail*, and Section 6.3.5.7, *Species Condition 2, California Black Rail*.

Covered Activities that eliminate suitable habitat unoccupied by California black rails will indirectly affect California black rail, because the California black rail metapopulation in the Plan Area and surrounding Sierra Nevada Foothills is most likely maintained, in part, through colonization of unoccupied sites (Richmond et al. 2008).

As described in Section 4.4.5, *Regional Public Programs*, canal-lining activities performed by PCWA—to reduce erosion and sloughing of canal banks, improve the efficiency of water delivery in canal segments, and/or repair and prevent leaks in canal sections—that may cause damage to infrastructure and/or property may indirectly affect California black rail habitat historically supported by canal seepage. Wetlands supported by seepage from canals that are lost because canal repairs eliminate the supply of water to wetlands will be replaced (through in-kind restoration and creation) to ensure no net loss of wetlands (see Section 6.3.2, *Conditions to Avoid and Minimize Effects on Specific Natural Communities*).

Growth of the human population associated with rural and urban development will increase demands on water. As demand for water grows, there may be a decrease in the availability of surface and groundwater, which can reduce the amount of water in the fresh emergent marsh that provides habitat for California black rail.

Rural and urban development could also disturb adjacent populations, such as through an increase in predators associated with development (e.g., house cats, raccoons). California black rail habitat is so patchy in occurrence that it is difficult to quantify the extent that growth will encroach on potential populations. The assessments of incremental urban edge in the Valley (Table 4-4) and fragmentation in the Foothills (Table 4-5) suggest that covered growth may have an indirect effect on aquatic/wetland complex (a primary component of black rail habitat) equivalent to 457 acres.

4.7.3 Western Burrowing Owl

Western burrowing owls are rare in the Plan Area. They occur primarily as overwintering birds in the Plan Area; however, breeding western burrowing owls have been documented at Swainson's hawk preserve in 2012, 2013, and 2015 (Wages pers. comm.). A pair with at least two nestlings was

observed in 2012, a pair with at least four nestlings was observed in 2013, and two pairs with three nestlings each were observed in 2015 (Wages pers. comm.). Additionally, a pair has nested in artificial burrows in 2012 and 2013 at the Swainson's hawk preserve (Appendix D, *Species Accounts*). The Plan evaluates year-round habitat.

Suitable overwintering habitat for western burrowing owl includes grassland, vernal pool complex, pasture, oak woodland savanna, and habitat adjacent to row crops, rice, and alfalfa. These natural and agricultural communities in the Valley are modeled as year-round burrowing owl habitat (see Table 4-10). These common habitats are present on an estimated 55,101 acres in Plan Area A as shown in existing habitat in Table 4-11 The species account map in Appendix D, *Species Accounts*, confirms the broad distribution of habitat for the burrowing owl with occurrences scattered widely across the Valley. This model, however, overestimates the extent of western burrowing owl habitat because the specific characteristics of western burrowing owl habitat are likely patchily distributed within the Plan Area.

Urban and rural development and other Covered Activities that remove overwintering and potential breeding habitat will directly affect western burrowing owls. Ground-disturbing activities along stream courses, including maintenance of stream banks, levees, and channel rights-of-way, could also remove habitat for western burrowing owl. Because burrowing owl habitat requirements are so broad, future growth in the Valley affects a large amount of potential habitat.

Permanent, direct effects on western burrowing owl year-round habitat are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12.

Individual burrowing owls may be "harmed" if they are passively relocated from actively used burrows that are filled and burrowing owls cannot successfully relocate to suitable habitat. Passive relocation (by passively excluding an owl from its burrow[s]) in Species Condition 3, Western Burrowing Owl, is allowed only during the non-breeding season and will be authorized only if all alternative avoidance and minimization measures are exhausted (and with approval from the Wildlife Agencies). Passive relocation can "harass" individuals by preventing them from accessing shelter.

Western burrowing owls and their habitat will be indirectly affected by human population growth and increased urbanization within the Plan Area. Burrowing owl is commonly observed roosting close to urban areas where disturbance creates the low vegetation and earthen berms that favor the establishment of burrows. Indirect effects related to human population growth include increased harassment from people, increased mortality from vehicle collisions, increased risk of wildfire, increased noise and light, habitat fragmentation, rodent abatement programs, and increased populations of predators that thrive in urbanized habitats. The assessment of new urban edge shows that as many as 3,416 acres of grassland and agricultural land in the Valley may have new urban development within the 250-foot disturbance radius used in that analysis (see Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley*). Implementation of General Condition 2, Conservation Lands: Development Interface Design Requirements, will minimize effects of urban development adjacent to the Reserve System and RAA.

4.7.4 Tricolored Blackbird

The Plan evaluates two types of habitat for tricolored blackbirds, nesting habitat and foraging habitat, both of which are found in the Valley and in the western portion of the Foothills below an elevation of 300 feet.

Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: open accessible water within 1,500 feet of a colony site; a protected nesting substrate, including either flooded or thorny or spiny vegetation (e.g., cattails, bulrushes, and blackberries); and suitable foraging habitat providing adequate insect prey within a few miles of the nesting colony. These habitat requirements are difficult to model at a regional scale with the relatively coarse land-cover mapping available. Appendix D, *Species Accounts*, maps tricolored blackbird occurrence scattered throughout the Valley and lower Foothills usually associated with aquatic/wetland complex lands in the Stream System. These small, narrow patches of habitat are estimated to amount to only about 633 acres at present (Table 4-11).

Permanent, direct effects on tricolored blackbird nesting and foraging habitat are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12.

Foraging habitat in all seasons includes annual grasslands, vernal pool complexes, seasonal wetlands, valley foothill riparian, and agricultural fields (e.g., large tracts of alfalfa with continuous mowing schedules and recently tilled fields). These far more common land-cover types contribute to an overall estimate of 60,974 acres of tricolored blackbird foraging habitat in the Plan Area.

Tricolored blackbirds will be directly affected by any Covered Activities that result in the removal or permanent alteration of breeding colony sites or potential breeding colony sites with suitable habitat. They will also be directly affected by any Covered Activity that removes or permanently removes standing water within 1,500 feet of colony sites, and suitable foraging habitat within 3 miles of nesting habitat. Covered Activities that could eliminate tricolored blackbird habitat include rural and urban development and alterations to hydrological regimes that eliminate or degrade standing water quality and/or quantity. It is difficult to model the potential effect on this patchy habitat. Because most of it is in the Stream System, it is expected that only about 55 acres of nesting habitat may be affected, amounting to 9 percent of the existing extent (Table 4-11). Because tricolored blackbird habitat may be involved in vegetation management for flood control, there will be additional acreage subject to temporary direct effects, although application of Species Condition 4, Tricolored Blackbird, requires avoidance of active tricolored blackbird nest colonies during the nesting season.

Because foraging habitat is so broadly defined, the covered future growth in the Valley is estimated to affect 17,015 acres (28 percent). Actual potential effect will be smaller in extent because it is limited to the presence of actual breeding colony sites.

Tricolored blackbirds will be indirectly affected by adjacent covered land use activities that alter the quantity and quality of standing water within 1,500 feet of nest colony sites. Breeding success could be indirectly affected by Covered Activities, if such activities enhance populations of predators of eggs and chicks such as black-crowned night herons, common ravens, and coyotes. Tricolored blackbirds may be sensitive to pesticides (Hosea 1986; Beedy and Hayworth 1992) and could be potentially indirectly affected by expansion of rural and urban development, if such expansion leads to mosquito or other pest control in occupied habitat. Other indirect effects of Covered Activities on tricolored blackbird include increased harassment from people, increased risk of wildfire, increased noise and light pollution, increased potential for vehicle collisions, and habitat fragmentation.

As with the other bird species with broad foraging habitat definitions, the extensive covered growth has the potential to have indirect effects on a large area. The assessment of new urban edge in the Valley shows that as many as 2,827 acres of grassland and agricultural land may have new urban development within the 250-foot disturbance radius used in that analysis (Table 4-4).

4.7.5 Giant Garter Snake

Giant garter snakes use suitable wetland habitat and canals in the drainage network associated with agricultural fields in the western portion of the Valley (U.S. Fish and Wildlife Service 1999). The Plan evaluates two types of habitat: aquatic habitat and associated upland habitat.

Although giant garter snake has been recorded frequently in neighboring Sutter and Sacramento counties, there are no records of the species' occurrence in western Placer County and it is believed that its original habitat in the vast tule marshes around the Sacramento River did not extend appreciably east into what is now Placer County; see Appendix D, *Species Accounts*. Changes in the Sacramento River basin hydrology and changing land use, in particular the introduction of irrigated rice agriculture, suggest that suitable habitat is present within the Plan Area; Dudek Consulting (2014) identified suitable habitat for giant garter snake within the Plan Area from approximately Sheridan south to the area of Baseline Road and South Brewer Road (U.S. Fish and Wildlife Service 1999, 2006; Dudek Consulting 2014). Several locations within this area are used for growing rice, and the associated agricultural ditches, wetlands, and sloughs containing emergent vegetation in conjunction with suitable adjacent upland habitat could be used by giant garter snake during both the active and inactive seasons (Dudek Consulting 2014).

These observations along with knowledge of established habitat patterns west of the Plan Area lead to a model for aquatic habitat as ponds, fresh emergent marsh, flooded rice land, and riverine (smaller, low-gradient streams, tributaries, and smaller drainage or agricultural irrigation water supply canals) below an elevation of 100 feet (see Table 4-10). The narrow aquatic features are poorly mapped at the regional scale of the land-cover map. The areal extent of mapped features is usually overestimated and many smaller features, such as drainage ditches integral to the irrigated agricultural landscape, are unmapped. The model estimate of 19,511 acres of existing aquatic habitat, shown in the first column (*Plan Area A Existing Habitat*) of Table 4-11, is dominated by the large extent of rice agriculture currently in the western portion of the Valley (refer to Table 3-11).

Upland habitat is modeled as any annual grassland, pasture, alfalfa, irrigated pasture, unidentified croplands, vernal pool complex, and row crop below an elevation of 100 feet and within 200 feet of the edge of aquatic habitats (see Table 4-10). Although these land-cover types are common in the Valley, the elevation and adjacency constraint leads to an estimate of some 3,537 acres of existing potential upland habitat for giant garter snake.

Conversion of wetlands, particularly fields flooded for rice cultivation, for rural and urban development, regional public programs, in-stream activities, and other Covered Activities will directly affect this species by removing or altering its potential habitat. Direct effects on giant garter snake could occur as a result of degradation of habitat from activities such as maintenance of flood control waterways.

Covered Activities such as vegetation management may remove vegetative cover and basking sites necessary for thermoregulation, fill or crush upland burrows or crevices, dewater habitat, and remove prey. Because giant garter snakes utilize small mammal burrows and soil crevices as retreat sites, giant garter snakes may be crushed, buried, or otherwise injured by Covered Activities that also affect adjacent uplands. Giant garter snakes may be run over by construction equipment or other vehicles accessing construction sites. Species Condition 5, Giant Garter Snake, will minimize effects of Covered Activities on giant garter snake.

Modeled giant garter snake habitat is restricted to the western side of the Valley, which is largely contained in the RAA as shown in the species account map 5, Giant Garter Snake Modeled Habitat Distribution and Occurrence. Much of this lower elevation land is constrained by floodplain and lack of infrastructure. The growth scenario assigns relatively little future growth and this limits the effects of Covered Activities.

Permanent, direct effects on giant garter snake aquatic and foraging habitat are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12 and amount to roughly 1 percent of modeled habitat as shown in Table 4-3.

Linear giant garter snake movement habitat in waterways will be affected as alterations in drainages occur. The Stream System mapping does not identify most of the small agricultural drainages that constitute important movement habitat for giant garter snake and there is no quantitative estimate of this effect.

Construction and maintenance of infrastructure associated with urban and rural development and in-stream activities, such as utility lines, road improvements, drainage facility improvements, and flood control projects, may indirectly affect giant garter snakes. Disturbance from Covered Activities may cause giant garter snakes to move into areas of unsuitable habitat where they will experience greater risk of predation or other sources of mortality. Other indirect effects include predation from domestic and feral animals (e.g., raccoons, skunks, opossum) attracted to suburban developments; reduced water quality from urban runoff that may reduce the population size of prey species; and introduction of invasive species such as predatory game fish that may prey on juveniles or compete with giant garter snakes for prey. On the whole, the growth scenario shows little urban development and the far western reach of the Valley where giant garter snake habitat is found.

Increases in severity and frequency of flooding may be associated with the increase in impervious surfaces related to urban and rural development and may inundate overwintering snakes or force snakes to seek new flood refugia during their inactive period. Other potential habitat alterations include changes in fluvial morphology and floodplain configurations for flood control, which may eliminate or reduce the availability of refugia and the loss of aquatic corridors, thereby restricting dispersal. Additionally, land conversions may change stream and wetland hydrology, which, for example, may make habitat less suitable by altering habitat structure and by reducing prey availability.

At present giant garter snake has not been found in the Plan Area and the location or extent of these indirect effects cannot be made more specific. Provisions in the conservation strategy in Chapter 5, *Conservation Strategy*, and the conditions in Chapter 6, *Program Participation and Conditions on Covered Activities*, are intended to monitor for occurrences of giant garter snake in the Plan Area and take appropriate actions to protect those sites, including incorporation in the Reserve System that will be established over the majority of modeled giant garter snake habitat.

4.7.6 Western Pond Turtle

Western pond turtles use aquatic habitats, including wetlands, stock ponds, lacustrine, riverine, riparian, and canals, for cover, foraging, and other functions. Western pond turtle uses adjacent upland habitats for nesting, dispersal, and aestivation. The Plan evaluates two types of habitat: aquatic habitat and associated upland habitat.

Western pond turtle is believed to have been abundant in western Placer County when it supported extensive wetlands (Hayes et al. 1999), but conversion of former wetlands to agricultural lands has likely resulted in local declines of these populations (Jennings and Hayes 1994). Therefore, the known occurrence of western pond turtle mapped in Appendix D, *Species Accounts*, shows only a few sparse known occurrences in the Foothills. Based on its presence elsewhere and historical habitat, the species' model is applied to the entire Plan Area, both the Valley and Foothills (see Table 4-10).

Western pond turtle requires a distinct association of dry upland nesting sites close to aquatic habitats, which are used primarily for foraging, thermoregulation, and avoidance of predators during the non-nesting season. While nesting has been reported to occur up to 1,391 feet from water (Jennings and Hayes 1994), it is usually closer, averaging 92 feet from aquatic habitat (Rathbun et al. 2002). The habitat model for western pond turtle reported in Table 4-10 assigns upland habitat within 150 feet of aquatic habitat. The broad model of aquatic habitat suggests that as many as 10,244 acres may be present across the Plan Area. The adjacent strip of upland habitat along the extenuated aquatic habitat may contain 14,263 acres of habitat. Urban and rural development and other Covered Activities that eliminate aquatic and terrestrial habitats will directly affect western pond turtle.

Permanent, direct effects on western pond turtle aquatic and upland habitat are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12.

Covered Activities that remove or degrade wetlands, marshes, stock ponds, riverine, and riparian habitat could directly affect this species. Covered Activities that remove vegetation and basking sites from the edges of wetlands and riparian corridors or from within aquatic habitats will reduce habitat heterogeneity and adversely affect western pond turtles. In addition, the removal or degradation of upland habitat could prevent individuals from reproducing or dispersing to other breeding habitat. Covered Activities that move or disturb upland habitat could destroy eggs or overwintering hatchlings or kill overwintering adults.

In-stream projects can also have adverse effects on western pond turtle by reducing or eliminating flows in occupied stream habitat during summer months, temporarily eliminating western pond turtle habitat. Direct and indirect effects on western pond turtle habitat is also described in Section 4.4.6, *In-Stream Programs*.

Some of these Covered Activities may allow disturbed habitat to recover within the 1-year timeframe needed to meet the Plan definition of temporary effect. It is expected that disturbance of aquatic habitat would more likely be considered temporary such that the limits proposed in Table 4-3 suggest temporary direct effects on up to 250 acres of western pond turtle aquatic habitat. Temporary effects on adjacent upland are expected to be minimal because they are more likely to be considered permanent due to the nature of the Covered Activity or the difficulty of restoration within the required time period. Increased vehicular traffic from population growth and the development of new roadways to support new urban or rural development could increase the number of individuals that are killed or injured on roadways. Indirect effects resulting from urban and rural development and other in-stream activities could degrade the aquatic habitats that support western pond turtle. Runoff into wetlands, ponds, and riverine habitats from urban and rural development and new or expanded roads may carry petroleum products or sediment derived from vehicles, paving, or road maintenance activities. Pesticide, fertilizer, and sediment from developed areas may also be conveyed to aquatic habitat used by western pond turtle, potentially

reducing habitat quality. Implementation of General Condition 1, Watershed Hydrology and Water Quality, will minimize the effects of Covered Activities on water quality in the Plan Area.

Urban and rural development and the construction of new roads and other infrastructure will fragment western pond turtle habitat. The removal or degradation of upland habitat could affect survivorship and reproduction by limiting movement between aquatic and upland nesting habitat. Populations in isolated aquatic habitat (e.g., ponds) are more likely to suffer from local extinction events (U.S. Fish and Wildlife Service 2005) due to environmental or demographic factors.

Urban and rural development may facilitate the introduction, establishment, and spread of invasive plant and animal species. Urban development adjacent to nesting habitat could result in increases in predation rates, particularly of eggs and young by predators that thrive in human-dominated environments (e.g., domestic pets, raccoons, coyotes, skunks, bullfrogs). This predation can have a detrimental effect on local populations. Implementation of General Condition 2, Conservation Lands: Development Interface Design Requirements, will minimize the effects of development adjacent to reserves and the RAA, including the potential spread of non-native species onto reserves.

4.7.7 Foothill Yellow-legged Frog

Foothill yellow-legged frog is dependent on riverine habitat, which the Plan models as year-round habitat. There are no current records of foothill yellow-legged frog in western Placer County; the species has been recently recorded to the east of the Plan Area in Placer County and is assumed to be present or potentially present within the Foothill region of the Plan Area (see Appendix D, *Species Accounts*). Foothill yellow-legged frogs occupy, and are nearly always found within a few feet of, rocky streams that run through oak woodlands, relying on moving but not swiftly flowing water (Stebbins 1954). Although foothill yellow-legged frog is found at lower elevations down to sea level, the only suitable stream habitat is found in the Foothills. Modeled year-round habitat for foothill yellow-legged frog is defined by riverine land cover above 500 feet in elevation. This relatively narrow habitat definition amounts to an estimated total of 1,837 acres of year-round habitat in the upper Foothills. Foothill yellow-legged frog will be affected by any projects implemented in its habitat range within the stream channel or that result in the removal of cobblestone substrate or riparian vegetation. Ground-disturbing activities, such as maintenance of stream banks, levees, and channel rights-of-way (e.g., bank repair, vegetation management), could increase erosion and sediment discharge that could disrupt breeding. Projects that place structures in channels (e.g., culvert installation), or that require stream access, may crush individuals and expose adults, metamorphs, and tadpoles to unsuitable conditions (e.g., predators, high temperatures). It is difficult to estimate the actual extent of this level of disturbance because of the patchy distribution of foothill yellow-legged frog habitat. Permanent, direct effects on foothill yellow-legged frog year-round habitat are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12.

Foothill yellow-legged frog is very closely associated with riverine habitat, and the linear miles of the Stream System is another way of modeling habitat potential. Covered Activities will directly affect up to up to 3 stream miles of potential foothill yellow-legged frog riverine habitat (1 percent of a total of 290 stream miles of estimated habitat in the Plan Area) and 5 acres of riparian foraging and movement habitat (1 percent of a total of 593 acres of modeled foraging and movement habitat in the Plan Area). Effects will occur in the Foothills, because this species does not occur in the Valley.

Because foothill yellow-legged frog is tied to an aquatic environment, water quality can affect growth, development, and survival. Amphibians have permeable, exposed skin and eggs that may

readily absorb substances, including toxins, from the environment. Indirect effects resulting from urban development and other Covered Activities could degrade the aquatic habitats that support this species. Runoff into wetlands, ponds, and riverine habitats from urban and rural development and new or expanded roads may carry petroleum products or sediment derived from vehicles, paving, or road maintenance activities. Pesticide, fertilizer, and sediment from developed areas may also be conveyed to aquatic habitat used by this species of frogs. Implementation of General Condition 1, Watershed Hydrology and Water Quality, will minimize the effects of Covered Activities on water quality in the Plan Area.

The Plan does not cover activities that would create barriers to movement for foothill yellow-legged frog through riverine habitat. Because the year-round habitat is constrained to the riverine environment, foothill yellow-legged frog is not dependent on movement to upland habitats, so removal of upland habitat would have minimal direct effect. Urban development adjacent to breeding habitat could result in increases in spread of invasive plant and animal species and predation from animals that thrive in human-dominated environments (e.g., domestic pets, raccoons, coyotes, skunks, bullfrogs). Implementation of General Condition 2, Conservation Lands: Development Interface Design Requirements, will minimize the effects of development adjacent to reserves and the RAA, including the potential spread of non-native species onto reserves.

Implementation of conservation measures in in-stream habitat will have direct, temporary, and indirect effects on foothill yellow-legged frog. These conservation measures are discussed in Section 4.4.7, *Conservation Programs*. Overall, habitat management activities (including enhancement and restoration measures; see Chapter 5, *Conservation Strategy*) will enhance and restore habitat, providing a net benefit for the species.

4.7.8 California Red-legged Frog

The Plan evaluates two types of habitat for California red-legged frogs: aquatic habitat and associated upland habitat. Historically, the California red-legged frog occupied wide sections of the Valley and western slope of the Sierra Nevada, but modeled habitat is restricted to elevations above 200 feet in the Plan Area because California red-legged frogs are believed to be extirpated from the floor of the Central Valley and have not been identified within the Plan Area outside of the Big Gun Conservation Bank. California red-legged frogs use a diversity of aquatic habitats, including fresh emergent and seasonal wetlands, stock ponds, and riverine and riparian habitats, for breeding and foraging. This comprehensive suite of aquatic habitats is estimated to compose 8,532 acres in the Plan Area. California red-legged frogs use upland habitats such as grassland, pasture, and oak woodland for refugia and to disperse to other aquatic habitats. Because the actual movement patterns of California red-legged frog in western Placer County landscapes are generally not known, movement habitat was conservatively modeled to include suitable land-cover types within a radius of 1 mile from all potential breeding sites. This puts nearly all of the Foothills within nominal movement distance for California red-legged frog and leads to a fairly high estimate of as many as 75,306 acres of potential upland habitat. Covered Activities that remove or affect fresh emergent marshes, seasonal wetlands, marshes, ponds, or rivers and streams will directly affect breeding, foraging, and dispersal habitat for California red-legged frog. Permanent, direct effects on California red-legged frog aquatic and upland habitats are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12.

Removal or degradation of upland habitat could prevent individual California red-legged frogs from dispersing to other habitats. Covered Activities that remove vegetation from the edges of wetlands

and riverine and riparian corridors or from aquatic habitats will reduce habitat heterogeneity and adversely affect this species. Covered Activities in the Foothills will affect 8,551 acres of uplands that fall within the 1-mile radius of aquatic habitat. Even with a well-established population, only a small portion of upland habitat would actually be used for dispersal and refugia; the large modeled extent of upland habitat is an overestimate of the potential for adverse effect.

Increased vehicular traffic following road widening or creation of new driveways/access roads within dispersal habitat for California red-legged frog will increase the number of individuals that are killed or injured on roadways.

Indirect effects resulting from urban development and other Covered Activities could degrade the aquatic habitats that support this species. Runoff into wetlands, ponds, and riverine habitats from urban and rural development and new or expanded roads may carry petroleum products or sediment derived from vehicles, paving, or road maintenance activities. Pesticide, fertilizer, and sediment from developed areas may also be conveyed to aquatic habitat used by this species of frogs. Amphibians have permeable, exposed skin and eggs that may readily absorb toxins, which can affect their growth, development, and survival. Implementation of General Condition 1, Watershed Hydrology and Water Quality, will minimize the effects of Covered Activities on water quality in the Plan Area.

Urban and rural development and the construction of new roads and other infrastructure will fragment California red-legged frog habitat. The removal or degradation of upland habitat could affect survivorship and reproduction by limiting movement between breeding habitats. Populations in isolated aquatic habitat (e.g., ponds) are more likely to suffer from local extinction events (U.S. Fish and Wildlife Service 2005) due to environmental or demographic factors.

Urban development adjacent to breeding habitat and movement to upland habitat could result in increased spread of invasive plant and animal species and increase predation from animals that thrive in human-dominated environments (e.g., domestic pets, raccoons, coyotes, skunks, bullfrogs). This predation can have a detrimental effect on local populations. Implementation of General Condition 2, Conservation Lands: Development Interface Design Requirements, will minimize the effects of development adjacent to reserves and the RAA, including the potential spread of non-native species onto reserves.

In-stream habitat conservation measures will have direct, temporary, and indirect effects on and California red-legged frog. These conservation measures are discussed in Section 4.4.7, *Conservation Programs*. Overall, habitat management activities (including enhancement and restoration measures; see Chapter 5, *Conservation Strategy*) will enhance and restore habitat, providing a net benefit for the species.

4.7.9 Salmonids: Central Valley Fall-/Late Fall-Run Chinook Salmon, Central Valley Steelhead

Central Valley fall-/late fall-run Chinook salmon and Central Valley steelhead (hereafter Chinook salmon and steelhead) use riverine and riparian habitat for spawning, rearing, and migration. These streams are referred to here as salmonid streams. As presented in Appendix D, *Species Accounts*, the main salmonid streams are the Bear River below Camp Far West, Raccoon Creek, Doty Ravine, Auburn Ravine, and Dry Creek and its tributaries, Secret Ravine, Miners Ravine, Linda Creek, Antelope Creek, and Cirby Creek.

Direct effects of Covered Activities are assessed based on effects on salmonid streams, with quantitative estimates of effects in stream miles and acres of riparian habitat. For the regional scale assessment of Covered Activities, estimates of effects on salmonids are based on effects on habitat, rather than numbers of fish that will be taken. Any contact with or handling of individual fish in association with monitoring or habitat enhancement will be conducted as specified in Table 6-2. Indirect effects are assessed based on effects on salmonid streams, similar to direct effects. The PCWA Covered Activities' effect on salmonids is discussed earlier in Chapter 4, *Effects of Covered Activities*, along with the description of the effects of the PCWA Covered Activities (see also Section 4.8.1, *Central Valley Steelhead*).

Chinook salmon and steelhead will be affected by any project implemented in the stream channel or project that affects riparian habitat. Projects that involve permanent infrastructure (e.g., bridges and roads, stormwater detention ponds) could decrease habitat value or availability, both in the immediate project vicinity and downstream.

Flood protection may directly affect covered fish species if stream corridor habitat is converted from natural or earthen to hardscape (e.g., riprap) or the water flow is altered (e.g., retention and detention). However, where Stream System avoidance is not feasible, Covered Activities will minimize effects by following design, construction, and operations guidelines in Chapter 6, *Program Participation and Conditions on Covered Activities*. It is possible that a flood protection project, once completed, will provide better habitat for covered fish than previously existed. In addition, no new fish passage barriers will be constructed.

The total length of salmonid habitat, measured in stream miles, was selected as the uniform measure of potential effects of Covered Activities. Pool availability, water quality, gravel substrate, water temperatures, and other attributes were evaluated, in consultation with National Marine Fisheries Service, but lack of data, stemming largely from access limitations on private lands, prevented consideration of these metrics across a statistically meaningful portion of the Stream System. Monitoring provisions in Chapter 7, *Monitoring and Adaptive Management Program*, include developing a systematic set of habitat metrics that will be used to track effects on salmonid streams and benefits of stream improvements outlined in Chapter 5, *Conservation Strategy*.

While the quality of habitat will vary, particularly in spawning and rearing habitat in the upper reaches of the watersheds, the lack of specific information of proposed in-stream activities and the lack of specific information on these reaches of the streams prevent a more detailed effects analysis. To compensate for this, in-stream activities will be subject to extensive requirements for survey and evaluation as specified in Chapter 6, *Program Participation and Conditions on Covered Activities*.

Some effects on covered fish species caused by in-stream activities are discussed above in Section 4.4.6, *In-Stream Programs*, and Section 4.4.7, *Conservation Programs*, as well as effects caused by PCWA Operations and Maintenance Activities (see Section 4.4.5.3.3, *Water Supply Programs*).

Effects on hydrology and water quality caused by greater levels of urbanization in watersheds drained by streams supporting anadromous fishes are considered indirect effects because they are separate from direct disturbance of in-stream habitat. Non-point source pollution has the potential to degrade water quality to the extent that fish, especially juveniles, are adversely affected. Changes in peak flows or sediment discharge to streams could have incremental effects on in-stream habitat quality. Minimization of these potential effects is addressed in Section 6.3.1.1, *General Condition 1, Watershed Hydrology and Water Quality.*

4.7.9.1 Water Temperature and Quality

The loss of riparian cover resulting from Covered Activities could contribute to a localized increase in stream water temperature. The localized loss of vegetation and the concomitant loss of shade could result in elevated water temperatures and warmer flows downstream. Increases in temperature may affect salmonids in a variety of ways. Elevated temperature may decrease dissolved oxygen and make the stream unsuitable to salmonids; increased temperature may make salmonids more susceptible to disease, parasites, and predation; and altered temperature may change prey abundance, or may trigger altered migration timing. The Plan conservation strategy provides for extensive restoration of riparian habitat (see Chapter 5, *Conservation Strategy*, Objective RAR-1.3, Restore Riverine/Riparian Complex), which will result in a net increase in riparian cover in the Plan Area. Additionally, changes in water quality conditions observed in Plan Area streams following some PCWA raw water distribution system O&M activities described in Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley*, may affect Chinook salmon and steelhead. Implementation of Community Condition 2.4, Placer County Water Agency Operations and Maintenance Best Management Practices (Chapter 6, *Program Participation and Conditions on Covered Activities*), will minimize and avoid adverse water quality effects on aquatic habitat and species associated with PCWA raw water distribution system O&M activities.

4.7.9.2 Sediment Dynamics and Channel Substrate (Geomorphology)

Most studies of salmonids indicate that behavioral and/or physiological responses to suspended sediment loads occur at concentrations of about 250 milligrams per liter or more and that mortality occurs only at much higher concentrations (Griffin 1938; Newcombe and Flagg 1983). Stress from suspended sediment is associated only with larger, heavier sediment and not with the fine particulates associated with turbidity plumes. However, the accumulation of fine sediment in gravels used for spawning can reduce the permeability of gravel to dissolved oxygen, thereby suffocating eggs. The filling of interstices of stream gravels (embeddedness) and the filling of pools can reduce the availability and/or quality of rearing habitat. Such pools provide suitably cool temperature and refuge for young-of-year and yearling steelhead. Fine sediment can also reduce insect abundance and increase stream turbidity, both of which reduce feeding success by juvenile Chinook salmon and steelhead.

Ground-disturbing activities, such as maintenance of stream banks, and channel rights-of-way (e.g., bank repair, vegetation management) may increase erosion and sediment discharge, degrading water quality. Most of these activities will result in temporary effects from suspended sediment.

Increases in peak flows can alter sediment transport processes in a stream. The potential effects are complex and vary from stream to stream. They can include increased bed and bank erosion, scouring and deposition, and channel avulsions (changes in channel location). Naturally occurring extreme peak flows will have similar effects. Effects on covered fish species can include sedimentation in spawning gravels, scouring of redds (spawning nests for salmonids), and consequent effects on eggs and loss of rearing habitat.

Covered Activities that require in-stream work, as described in Chapter 2, *Covered Activities* (e.g., channel maintenance, bridge construction, barrier removal, gravel augmentation, stream restoration), will generate increased turbidity in areas downstream of the work performed. BMPs are addressed in Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*. BMPs will reduce the potential for most suspended sediments to be transported

downstream, but very fine particulates may remain suspended in the water column. Because BMPs will be implemented during construction, repair, and maintenance of facilities, and because work will be restricted to the dry season or to areas where the work is isolated from the active stream with temporary barriers, the short-term and narrowly distributed increase in concentration of suspended sediment will be below levels that would cause stress.

Increased sedimentation and turbidity resulting from erosion and/or flushing of sediment associated with some PCWA raw water distribution system O&M activities described in Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley*, may result in short-term, temporary effects on Chinook salmon and/or steelhead until water quality conditions improve. Implementation of Community Condition 2.4, Placer County Water Agency Operations and Maintenance Best Management Practices (Chapter 6, *Program Participation and Conditions on Covered Activities*), will minimize and avoid sediment and geomorphology effects on aquatic habitat and species associated with PCWA raw water distribution system O&M activities.

4.7.9.3 Urbanization and Rural Residential Development

Urban and rural development and other Covered Activities will result in increased impervious surface area in each watershed in the Plan Area, leading to increased peak storm runoff. While General Condition 1, Watershed Hydrology and Water Quality (Chapter 6, *Program Participation and Conditions on Covered Activities*), will help minimize runoff discharge from new impermeable surfaces, there may be some adverse effects on covered fish species. An increase of impervious surfaces within a watershed due to urbanization may result in changes to in-stream flow, turbidity, temperature, and stream geomorphology. Increases in impervious surfaces can also result in increased sedimentation and water pollutants in local streams, particularly during "first flush" rain events. Herbicides, pesticides, and other toxic materials can reduce reproductive rates or increase mortality rates of fish or their food sources. Fertilizers and other organic materials can cause algal blooms that decrease dissolved oxygen levels, while fine sediments may degrade spawning beds. Studies reveal that fish diversity declines with increasing development in a watershed; sensitive species tend to be lost and are replaced by more pollution-tolerant and/or non-native species (Center for Watershed Protection 2003).

Changes in land use that reduce natural land cover and increase impervious surfaces in areas adjacent to riverine habitats can also lead to increased disturbance of covered fish (e.g., reduced foraging and reproductive success) due to increased sources of noise, light, neighborhood runoff (e.g., fertilizers, oil), and introduced species.

Urban development and agriculture are widely regarded as causes of degraded watershed health and fish habitat (Moyle 2002). A recent study also implicated rural residential land use as a cause of watershed degradation (Lohse et al. 2008). This study found that increases in rural residential development in a watershed resulted in losses of high-quality in-stream habitat. In addition, the study indicates that rural residential development may have a greater relative effect than urban development on stream conditions because rural residential development generally occurs in areas that are less developed and have existing high-quality habitat (Lohse et al. 2008). This effect is examined in Appendix G, *Take Assessment Methodology*, which estimates the extent of new rural residential growth in the Foothills and the degree of fragmentation of largely undeveloped lands.

Urban development and the associated increase in the human population in the Plan Area will result in an increase in the demand for water. Such a demand could affect the quantity (e.g., reduced flows)

and quality (e.g., increases in water temperature) in the Plan Area streams occupied by steelhead and Chinook salmon as well as in streams outside of the Plan Area such as the Yuba River and American River. These affects are discussed in Section 4.3.1, *Methods for Land Conversion and Permanent Direct Effects*. Implementation of General Condition 1, Watershed Hydrology and Water Quality, including the establishment of Placer County and City of Lincoln Low Impact Development standards, will minimize the effects of increased water demands on Chinook salmon and steelhead.

4.7.9.4 Conservation Strategy Implementation and Non-Plan Conservation Measures

Implementation of conservation measures in in-stream habitat will have indirect effects on the covered salmonid species. These are discussed in Section 4.4.7, *Conservation Programs*. Overall, habitat management activities (including enhancement and restoration measures; see Chapter 5, *Conservation Strategy*) will enhance and restore habitat, providing a net benefit for these species.

4.7.10 Valley Elderberry Longhorn Beetle

Valley elderberry longhorn beetle depends on its host elderberry shrubs in valley foothill riparian and valley oak woodlands. The Plan models year-round habitat as riparian and valley oak woodland that supports the valley elderberry longhorn beetle, which occurred historically along low-elevation creeks, streams, and rivers throughout western Placer County up to an elevation of 650 feet mean sea level. The presence of host elderberry plants could not be determined from the land-cover data; therefore, modeled habitat for valley elderberry longhorn beetle is likely an overestimate of occupied habitat. Appendix D, *Species Accounts*, shows only a few sparse known occurrences, although elderberry shrubs are more common. Covered Activities that remove valley foothill riparian and valley oak woodlands, or destroy host elderberry plants that occur within or outside of these natural communities, will affect valley elderberry longhorn beetle directly by killing adults, larvae, and eggs, if present. Permanent, direct effects on valley elderberry longhorn beetle year-round habitat are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12.

Covered Activities with potential to affect valley elderberry longhorn beetle individuals and/or suitable habitat include urban and rural development, in-stream projects that affect adjacent riparian and valley oak woodlands, maintenance of culverts and road crossings, utility and water conveyance maintenance or repair, and recreation that could result in habitat degradation. Effects from Covered Activities will be minimized by Species Condition 8, Valley Elderberry Longhorn Beetle, to avoid and minimize direct and indirect effects on valley elderberry longhorn beetle.

Conservation actions will have effects on valley elderberry longhorn beetle. Vegetation management will involve use of various methods in valley foothill riparian and valley oak woodlands including grazing and prescribed burns. Spot burning will be conducted in riparian habitat, and will avoid elderberry plants. However, grazing in riparian and oak woodland habitat and prescribed burns in oak woodland habitat may be used as a management tool on reserves. The valley elderberry longhorn beetle is primarily dependent on the interconnected nature of riparian habitat to have a functioning metapopulation. Effects from grazing and burning in oak woodlands will be minimal even if isolated elderberry shrubs are present. Overall, the net effect of management activities will be beneficial for valley elderberry longhorn beetle by expanding habitat within the Reserve System. Indirect effects on valley elderberry longhorn beetle habitat include the accumulation of dust on shrubs resulting from upwind disturbances. Flood control practices could affect valley elderberry longhorn beetle by reducing habitat quality of host elderberry plants and by fragmenting habitat

used by valley elderberry longhorn beetle. Valley elderberry longhorn beetle may be sensitive to habitat fragmentation, as evidence indicates that it may have limited dispersal capabilities (Collinge et al. 2001). Small, fragmented populations may be more susceptible to extinction if they become isolated from neighboring populations.

Urban and rural development increases the risk of wildfire and the spread of invasive plants and animals that could affect valley elderberry longhorn beetle. Invasive plants could affect valley elderberry longhorn beetle by out-competing host elderberry shrubs, reducing the availability of suitable habitat for valley elderberry longhorn beetle. Invasive animals, such as the Argentine ant, could affect valley elderberry longhorn beetle through predation (Huxel 2000).

4.7.11 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Vernal pool fairy shrimp and vernal pool tadpole shrimp are modeled together, as they occur in the same habitats and are generally affected by the same types of Covered Activities. These two species are restricted primarily to the vernal pools and seasonal wetlands that compose vernal pool complexes; as such, the effects on these species are directly related to the effects on the vernal pool complex land-cover type. The discussion here addresses potential effects on vernal pool branchiopod habitat throughout the Plan Area. See also the analysis of effects on Critical Habitat in Section 4.8.2, *Vernal Pool Fairy Shrimp*.

Modeled year-round habitat for vernal pool tadpole shrimp is defined by all densities of vernal pool grassland complex in the Valley. Appendix D, *Species Accounts*, maps of known occurrences show that the more common vernal pool fairy shrimp is broadly distributed across modeled habitat while vernal pool tadpole shrimp was recorded in only four locations, with a fifth recorded in a non-participating city.

Both vernal pool branchiopods are found in vernal pools formed in depressions, usually in grassland habitats. Pools must fill frequently and persist long enough for this species to complete its lifecycle, which takes place entirely within vernal pools. Not all mapped vernal pools and vernal pool grassland complexes have pools that provide suitable habitat features for vernal pool branchiopods; the level of detail necessary to identify microhabitat features (e.g., size and depth of pools, water chemistry) suitable for vernal pool tadpole shrimp are not captured in the GIS land-cover data. Therefore, modeled habitat may overestimate suitable habitat available for vernal pool fairy shrimp and vernal pool tadpole shrimp.

The Plan evaluates effects on vernal pool branchiopods by estimating direct effects on vernal pool complex lands as a whole and on the constituent wetland habitats found there. At the community level, these are described in Section 4.5.1.1.1, *Vernal Pool Complex and Grassland Communities*. Taken together, the overall complex and the constituent wetlands define vernal pool habitat well. The mapping methodology used in the Plan identifies three classes of vernal pool density and assigns a wetland presence for the three components of vernal pool constituent habitats (see Section 3.4.3, *Vernal Pool Complex*).

Permanent, direct effects on vernal pool fairy shrimp and tadpole shrimp wetland habitat and vernal pool complex are estimated in Table 4-11. Temporary, direct effect estimates are in Table 4-12.

Table 4-11, uses the direct effects on vernal pool complex as an estimate of permanent direct effects on vernal pool branchiopods. Land-cover mapping shows 44,278 acres of vernal pool complex lands

in Plan Area A. The maximum direct effect on this community proposed in Table 4-1 is 12,550 acres, or 28 percent of the existing extent of vernal pool complex. Table 4-11 includes a proposed maximum effect to be covered under the Plan of 100 acres of vernal pool complex lands in the Foothills. Although modeled habitat is limited to the Valley, nominally to the area below an elevation of 200 feet, there are grasslands on the western edge of the Foothills that may be classified as vernal pool complex lands under some climatic conditions. For completeness, an allowance for take of these lands is included in Table 4-1, and the estimate of potential take of vernal pool fairy shrimp and vernal pool tadpole shrimp in Table 4-11 includes that Foothills allowance for completeness.

Actual wetland habitat within the larger extent of vernal pool complex is estimated at 580 acres of vernal pool constituent habitats corresponding to an average wetland density of 4.7 percent spread across all density classes. Table 4-1 includes a breakdown of the wetland constituent habitats showing that roughly one-third are likely to be delineated as vernal pools, with the remainder divided roughly equally between seasonal wetlands located in vernal pool complexes and seasonal swales. Table 4-11 does not show an allowance for take of wetland habitat in the Foothills, even though there is a corresponding allowance for vernal pool complex as a whole. This is because it is expected that wetlands found there would be shown to not constitute habitat for the covered vernal pool branchiopods. If vernal pool wetlands are present, the Foothills allowance would be deducted from the Plan Area total.

The Plan proposes limits that reflect the maximum extent of take of vernal pool branchiopods by proposing limits based on the maximum effect on vernal pool complex lands, the total extent of vernal pool constituent habitats contained within them, and the maximum amount of those wetlands that can be delineated as vernal pools. Limits set this way will encompass the specific wetland physical and hydrologic characteristics that constitute habitat for the vernal pool branchiopods.

Expansion of urban development into vernal pool habitat in the Valley is expected to account for most of the permanent direct effect on the vernal pool branchiopods through the elimination, loss, or modification of vernal pool complexes. The covered vernal pool branchiopods are also susceptible to loss of habitat due to construction, change in hydrology, and O&M of infrastructure. O&M activities that require accessing areas off established roadways could cause individuals to be crushed or habitat to be altered. If such activities require ground disturbance, they could remove suitable habitat.

The covered vernal pool branchiopods may also be affected by habitat management and conservation actions. Take may occur when soils containing cysts and seeds of these species are collected, stored, and used as inoculum from pools that will be affected by Covered Activities (see Community Condition 1.3, Wetland Impact Minimization Measures, in Chapter 6, *Program Participation and Conditions on Covered Activities*) and from pools protected on the Reserve System. Additionally, habitat management activities on the Reserve System, such as grazing and prescribed burns, will take covered vernal pool branchiopods when they are crushed by livestock or burned. However, habitat management activities (including enhancement and restoration measures; see Chapter 5, *Conservation Strategy*) are essential to maintaining these populations and will enhance and restore their habitat, thus providing a net benefit for these species.

Indirect effects on covered vernal pool branchiopods may result from factors that affect the hydrological conditions of vernal pools and seasonal wetlands, from runoff and erosion associated with impervious surfaces and construction; habitat fragmentation; the introduction of non-native,

invasive plant species; and increases in recreational uses of vernal pool complexes not protected on the Reserve System.

The timing, duration, and frequency of inundation are critical to the ecology of vernal pool branchiopods. Alteration of hydrological conditions can cause a pool to dry-down before resident species complete their life cycles (e.g., reproduction). Alternatively, increasing the duration of inundation could make pools suitable for species such as bullfrog and mosquito fish, predators of vernal pool branchiopods. Vernal pool hydrology can be altered in many ways—for example, when swales connected to vernal pools are destroyed or blocked by roads and other barriers.

Increases in impervious surfaces associated with new development can alter hydrological conditions that affect the duration, volume discharge, and frequency of flooding in vernal pools (U.S. Fish and Wildlife Service 2005). Changes in hydrological patterns could also curtail the movement of nutrients into pools from overland flow (Rogers 1998). Siltation and reduction in the size of a pool's watershed can often lead to smaller, warmer pools, reducing habitat quality for many vernal pool species. Changes to the hydrological regime of pools could also make vernal pool habitat more amenable to invasive plants, which out-compete native species for resources and can crowd out native vernal pool plants.

Runoff into vernal pools and seasonal wetlands from urban and rural development and new or expanded roads may carry petroleum products or sediment derived from vehicles, paving, or road maintenance activities. Pesticide, fertilizer, and sediment from developed areas may also be conveyed to occupied habitat. Ground disturbance from development activities may loosen soil that may be conveyed to occupied habitat as sediment. Non-point source pollution of this nature may be injurious to vernal pool branchiopods. Implementation of General Condition 1, Watershed Hydrology and Water Quality, will minimize the effects of Covered Activities on water quality in the Plan Area.

Urban and rural development and the construction of new roads (e.g., Placer Parkway) and other infrastructure will fragment vernal pool habitat. Populations in isolated patches are more likely to suffer from local extinction events (U.S. Fish and Wildlife Service 2005), due to environmental or demographic factors. Habitat fragmentation can also indirectly affect vernal pool branchiopods by reducing movement between pools and complexes, and reducing genetic interchange between populations. Fragmentation creates smaller patches of vernal pools, which may be less attractive to foraging waterfowl and shorebirds. These birds transport cysts of vernal pool branchiopods and may make fewer visits to isolated or small complexes and transport fewer cysts to and from such pools.

Fragmentation and isolation of vernal pools can reduce the dispersal of seeds, effectively reducing gene flow and potential colonization of unoccupied pools. Fragmentation can also reduce the transfer of pollen between wind- and animal-pollinated species by increasing the distances between populations, thereby reducing gene flow and reproductive success. Non-native invasive species may be introduced as a result of human encroachment and neighboring development and are a threat to vernal pool branchiopod communities. Bullfrogs may feed upon vernal pool branchiopods (Balfour and Morey 1999). Additionally, exotic manna grass (*Glyceria declinata*) and Italian rye grass (*Lolium multiflorum*) may invade vernal pools and create heavy thatch that decomposes and oxidizes the water within the pools (Rogers 1998), subsequently reducing habitat quality for vernal pool branchiopods. People may introduce the predatory mosquito fish into vernal pools to control perceived local mosquito problems. Implementation of General Condition 2, Conservation Lands:

Development Interface Design Requirements, will minimize the effects of development adjacent to reserves and the RAA, including the potential spread of non-native species onto reserves.

Expansion of urban development into areas that support vernal pool habitats may cause an increase in recreational use of vernal pool habitats not protected in the Reserve System (recreation on the Reserve System, where permitted, will be managed to avoid effects on Covered Species and sensitive habitats [see Section 5.3.2.1.2, *Content of Reserve Unit Management Plans*]). Off-trail use of vernal pools (hiking, bicycling, horse-back riding, and vehicle-use) damage vernal pools by causing erosion and crushing or displacing organisms in the pools. Some vernal pool wetlands are used for "mud bogging" or dirt-bike riding, where off-road vehicles are driven around and through a pool; this activity is especially damaging to vernal pools, as it causes significant damage to pool topography and crushes organisms and cysts in the pools. It is particularly prevalent in rural residential settings. Off-road vehicles cut deep ruts, compact soil, destroy native vegetation, and alter vernal pool hydrology (U.S. Fish and Wildlife Service 2005). Because vernal pool fairy shrimp cysts appear to be easily crushed (Hathaway et al. 1996), the abundance of this species in affected pools could be reduced by off-trail disturbance (U.S. Fish and Wildlife Service 2005).

The diversity of potential indirect effects cannot be represented by a simple quantitative model. Actual effects will depend a great deal on the terrain, including hydrology, the character of adjacent intensive use, and the physical relationship between intensive use and vernal pool habitat. The analysis of incremental urban edge, however, provides a useful overall indication of covered urban growth's indirect effect on vernal pool habitat. The analysis described in Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley* uses four categories of indirect effects to vernal pool complexes, and by extension, vernal pool fairy shrimp and vernal pool tadpole shrimp. The four categories include (1) off-site indirect effects adjacent to urban development projects in the PFG (i.e., indirect effects to vernal pool complexes on parcels adjacent to the project site) (Table 4-4A); (2) off-site indirect effects adjacent to rural development in the Conservation and Rural Development Area (Table 4-4B); (3) new urban edge that would be established along the PFG/Conservation and Rural Development Area border (Table 4-4C); and (4) on-site indirect effects on vernal pool constituent habitat (Table 4-4D).

The analysis suggests that there could be (1) 1,200 acres of vernal pool complex constituent habitat in the Valley PFG subject to future indirect effects (Table 4-4A), (2) 70 acres of vernal pool complex constituent habitat within the Valley Conservation and Rural Development area subject to future indirect effects (Table 4-4B), (3) less than three-quarters of the vernal pool complex constituent habitat assumed to currently be subject to low and moderate levels of indirect effects could be subject to future indirect effects (Table 4-4C), and (4) 56 acres of on-site indirect effects to vernal pool complex constituent habitat in the PFG, and 10 acres of on-site indirect effects to vernal pool complex constituent habitats in the CRD (Table 4-4D).

The area of indirect effect at the end of the permit term will be concentrated along the edge of urban development and correspond roughly to the boundary between the PFG and the RAA. During the permit term, as parcels within the PFG are developed, they will not only have the direct effect due to land conversion of vernal pool complex lands and their constituent wetlands but they will also exert indirect effects on yet undeveloped adjacent vernal pool complex lands. As covered urban growth proceeds, however, these adjacent areas of indirect effect are likely to become subject to direct effect as growth continues. Although quantitative estimates of indirect effect are subject to numerous caveats, the geometrical relationship between urban growth and outlying habitat

suggests that the rough proportion of an acre of indirect effect for each 4 acres of direct effect reasonably represents the scale of the diverse indirect effect factors.

4.7.12 Conservancy Fairy Shrimp

The vernal pool branchiopod species covered by this Plan are restricted primarily to the vernal pools and seasonal wetlands that compose vernal pool complexes; as such, the effects on these species are directly related to the effects on the vernal pool complex land-cover type.

Conservancy fairy shrimp is not modeled because its known distribution in the Plan Area is restricted to a single vernal pool (in the Mariner Vernal Pool Conservation Bank). In addition, the type of vernal pool where this species typically occurs (large and turbid pools) (Helm 1998; U.S. Fish and Wildlife Service 2007), is not found in the Plan Area.

Because the known occurrence of Conservancy fairy shrimp is in an established protected area, it would not be subject to direct take by Covered Activities. Without being able to model habitat, the usual methodology for estimating effect does not apply to Conservancy fairy shrimp. Given the limited distribution and known present location, there would be no take of Conservancy fairy shrimp. It is possible, however, that Conservancy fairy shrimp may be discovered in other locations, including in areas potentially subject to effects from Covered Activities. The Plan addresses this possibility by applying conditions requiring species-specific surveys and population protections in Section 6.3.5.14, *Species Condition 9, Conservancy Fairy Shrimp*, and by establishing a specific conservation objective in Chapter 5, *Conservation Strategy*, Objective VPB-2.1, Protect Conservancy Fairy Shrimp Occurrences, which states, "Protect two previously unknown (at the time of Plan development) and unprotected Conservancy fairy shrimp occurrences for the first occurrence taken, prior to such take. Protect three additional occurrences for each additional occurrence taken, prior to such take." Achieving the proportional conservation required in Objective VPB-2.1 will limit potential take. As with the other vernal pool branchiopods discussed in Section 4.7.11, *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp*, indirect effects on Conservancy fairy shrimp would result from changes in hydrological conditions of vernal pools and seasonal wetlands; runoff and erosion associated with impervious surfaces and construction; introduction of non-native, invasive plant species; and increases in recreational uses of vernal pool complexes not protected on the Reserve System.

The conditions in Section 6.3.2, *Conditions to Avoid and Minimize Effects on Specific Natural Communities*, will minimize indirect effects from urban adjacency including hydrologic modification, runoff water quality, and potential disturbance. Conservancy fairy shrimp populations are already relatively isolated in the Plan Area and would not be subject to appreciable additional fragmentation from urban effects.

4.8 Effects on Critical Habitat

The ESA requires the federal government to designate Critical Habitat for any species it lists under the ESA. Section 3 of the ESA defines Critical Habitat as:

> "An area designated as critical habitat by the U.S. Fish and Wildlife Service or by the National Marine Fisheries Service pursuant to the federal Endangered Species Act. Critical habitat areas are specific geographic areas that may or may not be occupied by listed species, that are determined to be

essential for the conservation and management of listed species, and that have been formally described and designated in the Federal Register (16 USC 1532 [5]).”

In addition, the designation of Critical Habitat necessitates establishing Primary Constituent Elements (PCEs) for a species. PCEs are those physical or biological features essential to the conservation of a species’ life-history processes that form the basis of proposed or designated Critical Habitat.

Six species covered by the Plan have designated Critical Habitat. Of these six, only vernal pool fairy shrimp and Central Valley steelhead have Critical Habitat designated within the Plan Area. The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and Wildlife Service 2005) identifies core areas necessary to recover endangered or threatened species addressed in the Recovery Plan. A discussion of effects of Covered Activities on Critical Habitat and core area in the Plan Area is provided below.

4.8.1 Central Valley Steelhead

Critical Habitat for the Central Valley steelhead distinct population segment was designated in 2005 for 2,308 miles of streams in the California Central Valley. In Placer County, Critical Habitat includes the Bear River to Camp Far West Reservoir, and the main stems of Raccoon Creek, Doty Ravine, Auburn Ravine, Dry Creek, Secret Ravine, and Miners Ravine (Figure 4-3). With the exception of 6 miles of Antelope Creek, all of the salmonid habitat discussed above is also Central Valley steelhead Critical Habitat, so the foregoing discussion applies directly to evaluation of Central Valley steelhead Critical Habitat.

The lateral extent of designated Critical Habitat is defined as the width of the stream channel defined by the ordinary high-water line as defined by the U.S. Army Corps of Engineers in 33 CFR 329.11. In areas where ordinary high-water has not been defined pursuant to 33 CFR 329.11, the width of the stream channel is defined by its bankfull elevation (70 *Federal Register* 52488). Thus, the lateral extent of Critical Habitat does not include riparian habitat that occurs beyond ordinary high-water line.

Three of the primary constituent elements of Critical Habitat for Central Valley steelhead occur in the Plan Area and provide:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged, and overhanging large wood, log jams, and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival

The primary constituent elements that do not occur in the Plan Area include:

1. Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh and saltwater
2. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage that support growth and maturation
3. Offshore marine areas with water quality conditions and forage that support growth and maturation

4.8.1.1 Loss of Critical Habitat Potentially Resulting from Covered Activities

Because Critical Habitat for this species is confined to rivers and streams, only Covered Activities that occur in stream channels as defined above (and in 70 *Federal Register* 52488) will directly affect Critical Habitat designated for Central Valley steelhead. Table 4-7A shows that Covered Activities are expected to directly affect up to 1.24 stream miles of Critical Habitat (1.4 percent of the total in the Plan Area); up to 1.02 miles (1.5 percent) of spawning Critical Habitat will be affected and up to 0.22 mile (less than 1 percent) of migration and rearing habitat will be affected.

In-stream activities include bridge replacements and retrofits, road widening, and culvert replacements. Covered Activities will adversely affect riparian areas within the ordinary high-water or bankfull line; these include the digging, grading, and building associated with the development of roads, buildings, parking lots, trails, parks, and other structures. These activities result in an increase in sedimentation rates and the modification of stream morphology. Application of Stream System Condition 1, Stream System Avoidance and Minimization, and Species Condition 7, Central Valley Steelhead and Central Valley Fall-/Late Fall-run Chinook Salmon (Salmonids), will avoid and minimize direct effects on Critical Habitat (see Chapter 6, *Program Participation and Conditions on Covered Activities*, for Conditions). Critical Habitat will be indirectly affected by urban and rural development. Urban and rural development will cause the hydromodification of streams and increased rates of sedimentation and pollution. Hydromodification is the alteration of the process under which runoff, primarily rainwater, moves over land. The addition of impervious surface and runoff control mechanisms such as culverts and storm drain systems will cause water to move more quickly over land to streams, resulting in less percolation and filtration to the groundwater table and more pollutants and refuse being transported to waterways.

Additionally, changes in water quality conditions and sediment dynamics observed in Plan Area streams following some PCWA raw water distribution system O&M activities described in Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley*, may affect Critical Habitat for Central Valley steelhead. Implementation of Community Condition 2.4, Placer County Water Agency Operations and Maintenance Best Management Practices (Chapter 6, *Program Participation and Conditions on Covered Activities*), will minimize and avoid water quality effects on aquatic habitat and species associated with PCWA raw water distribution system O&M activities.

Increased sedimentation rates into rivers and streams decreases the quality of spawning beds, minimizes the surface area of high-quality over-summering and over-wintering deepwater pools, and decreases the abundance and diversity of invertebrate prey species. Increased pollution increases water temperatures, nutrient loads, and the potential toxicity of the aquatic habitat, all of which decrease the quality of habitat for adult and rearing juvenile steelhead. The modification of the hydrograph increases peak flood flows while minimizing the natural water storage capacity of

the landscape, resulting in a greater amount and frequency of peak winter flows and reduced amounts and frequencies of spring and summer flows for migration and rearing of juveniles. See Section 4.7, *Effects on Covered Species*, for detailed discussion of adverse effects on Central Valley steelhead, which also apply to designated Critical Habitat. Application of General Condition 1, Watershed Hydrology and Water Quality, and Species Condition 7, Central Valley Steelhead and Central Valley Fall-/Late Fall-run Chinook Salmon (Salmonids) (see Chapter 6, *Program Participation and Conditions on Covered Activities*, for Conditions), will minimize indirect effects on Central Valley steelhead Critical Habitat.

4.8.1.2 Conclusion

The estimated amount of Critical Habitat affected is 1.22 miles, which is 1.4 percent of all Critical Habitat in the Plan Area and 0.054 percent of the designated Critical Habitat throughout the species' range. This is not expected to constitute an appreciable reduction in the conservation value for Central Valley steelhead Critical Habitat.

4.8.2 Vernal Pool Fairy Shrimp

There are two designated Critical Habitat units (Units 12A and 12B) for vernal pool fairy shrimp in the Plan Area, totaling 2,580 acres (Figure 4-4). No other Critical Habitat exists in the Plan Area. The only portions of the vernal pool fairy shrimp Critical Habitat units that are relevant to this analysis are those containing PCEs.

PCEs for vernal pool branchiopods, including vernal pool fairy shrimp, are defined in 71 *Federal Register* 7118 through 7316 as follows: "These features include, but are not restricted to, the restrictive underlying soil layers (hardpans, claypans, volcanic flows, and non-volcanic rock) that perch water for extended periods of time, the surface soils associated with each species, and the topography that captures and delivers water to the vernal pools themselves, all of which vary by species." These PCE components are organized as follows for the purpose of evaluating effects on Critical Habitat.

- **PCE 1:** Topographic features characterized by mounds and swales, and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described in PCE 2, providing for dispersal and promoting hydroperiods of adequate length in the pools.
- **PCE 2:** Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum time period (41 days for vernal pool tadpole shrimp, 19 days for Conservancy fairy shrimp, and 18 days for vernal pool fairy shrimp) in all but the driest years, thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.
- **PCE 3:** Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding.
- **PCE 4:** Structure within the vernal pools, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks,

and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

One or more of these PCEs are absent from a number of parcels within units 12A and 12B, which include properties that have been adversely affected by intensive agricultural (e.g., rice and row crop production) and industrial uses (e.g., clay mining operation), as well as urban development (e.g., SR 65). Of the 2,580 acres in units 12A and 12B, the PCEs for vernal pool fairy shrimp may occur in approximately 1,801 acres (70 percent) that are mapped by the Plan as vernal pool complex (vernal pools in a matrix of surrounding uplands).

4.8.2.1 Loss of Critical Habitat Potentially Resulting from Covered Activities

Plan Covered Activities may directly and/or indirectly affect 851 acres (47 percent) of the vernal pool complex land mapped in Critical Habitat units 12A and 12B. Of these, 440 acres are mapped as low vernal pool density, 316 acres are mapped as intermediate vernal pool density, and 95 acres are mapped as high vernal pool density. The vernal pool complex mapping density classes are explained in Chapter 3, *Physical and Biological Setting*.

Critical Habitat in units 12A and 12B occurs in small, relatively isolated patches compared with the planned vernal pool Reserve System. Furthermore, the Plan will enhance and manage the vernal pool landscape within the Reserve System in perpetuity. Consequently, preserving, enhancing, and managing larger areas of intact habitat (which could include areas of Critical Habitat) in a permanent Reserve System under the Plan will play a larger role in species recovery than avoiding effects on formally designated Critical Habitat would have in the absence of the Plan.

4.8.2.2 Conclusion

All designated Critical Habitat for vernal pool fairy shrimp totals 597,821 acres throughout California. The 851 acres of vernal pool fairy shrimp Critical Habitat to be lost under the Plan constitutes 0.14 percent of all designated Critical Habitat (851/597,821 acres). Vernal pool complexes to be lost in Critical Habitat units 12A and 12B (851 acres) provide all the life history needs for vernal pool fairy shrimp.

4.9 Cumulative Effects

4.9.1 Ongoing and Routine Agriculture

Ongoing and routine agricultural activities in the Plan Area are not covered by this Plan. Although it is anticipated that the effects of ongoing agricultural activities on Covered Species will be relatively low, there is the potential for cumulative effects on Covered Species to accrue. Ongoing ranching operations such as road construction, road maintenance, or intensive livestock grazing may limit or degrade habitat for species such as western pond turtle, California red-legged frog, and foothill yellow-legged frog. (However, ranching activities, such as pond maintenance and moderate livestock grazing, are essential to the long-term survival of some Covered Species, such as California red-legged frog and vernal pool species.) Rodent control on grazing lands may adversely affect western burrowing owl. Some ongoing cultivated agricultural activities may limit or degrade foraging habitat for tricolored blackbird and western burrowing owl. Conversion of agricultural land that supports

uses that are compatible with the sustainability of vernal pools and the species they support (e.g., rangeland) to intensive forms of agriculture (e.g., row crops, laser-leveled rice) has caused widespread loss and fragmentation of vernal pool habitat in the Central Valley, and continues to threaten vernal pool habitat in the Plan Area (U.S. Fish and Wildlife Service 2005; Holland 2009).

4.9.2 Use of Existing Roads

Construction of rural roads within the Plan Area is anticipated to increase the mortality of Covered Species. The use of existing rural roads in the Plan Area is not a Covered Activity. Continued and expanded use of existing rural roads will contribute to a cumulative effect on some Covered Species (i.e., burrowing owl, reptiles, and amphibians) through continued mortality and injury. The magnitude of this cumulative effect is unknown.

4.9.3 Water Supply

The Plan proposes that the permits cover the actions of two water suppliers: the PCWA and the City of Lincoln. Two other water suppliers, Nevada Irrigation District and South Sutter Irrigation District, also have a network of irrigation canals and also use some of the same creeks for water transport as does PCWA. Nevada Irrigation District and South Sutter Irrigation District are not Permittees to the Plan. Their operations, in conjunction with PCWA and the City of Lincoln, are considered to be a cumulative effect.

This Page Intentionally Left Blank

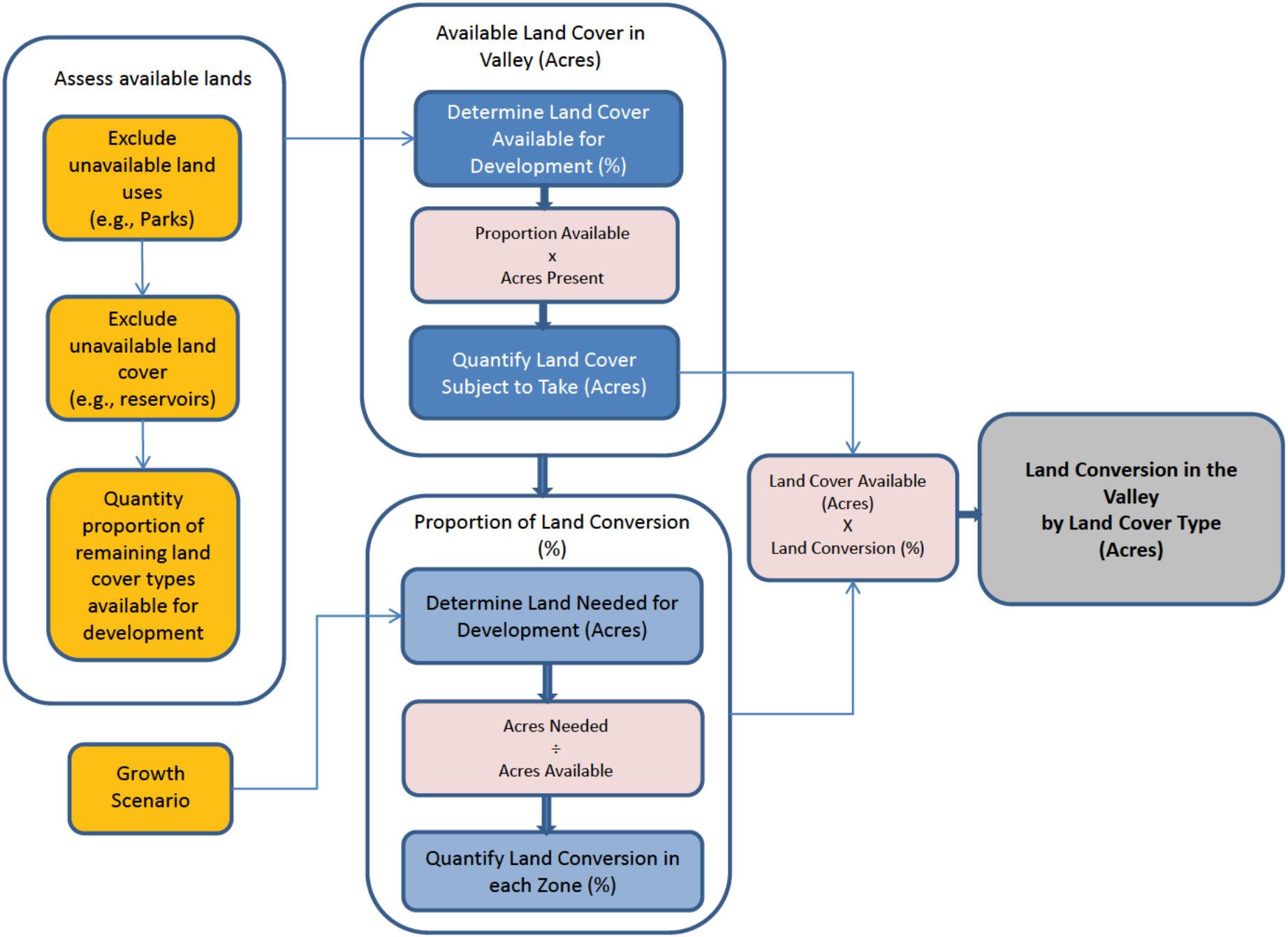


Figure 4-1 Estimating Land Conversion in the Valley - Schematic

Placer County Conservation Program - Western Placer County HCP/NCCP

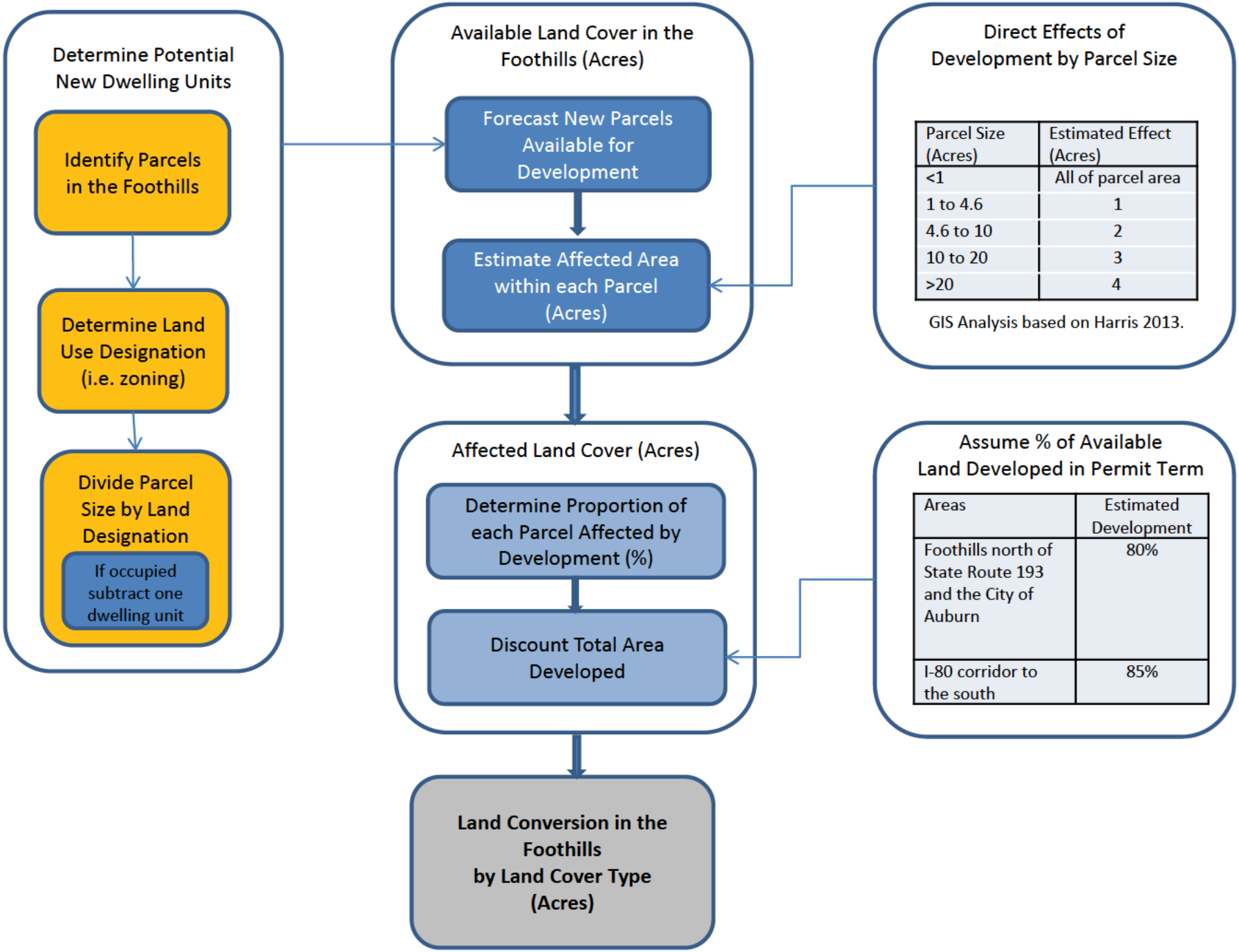
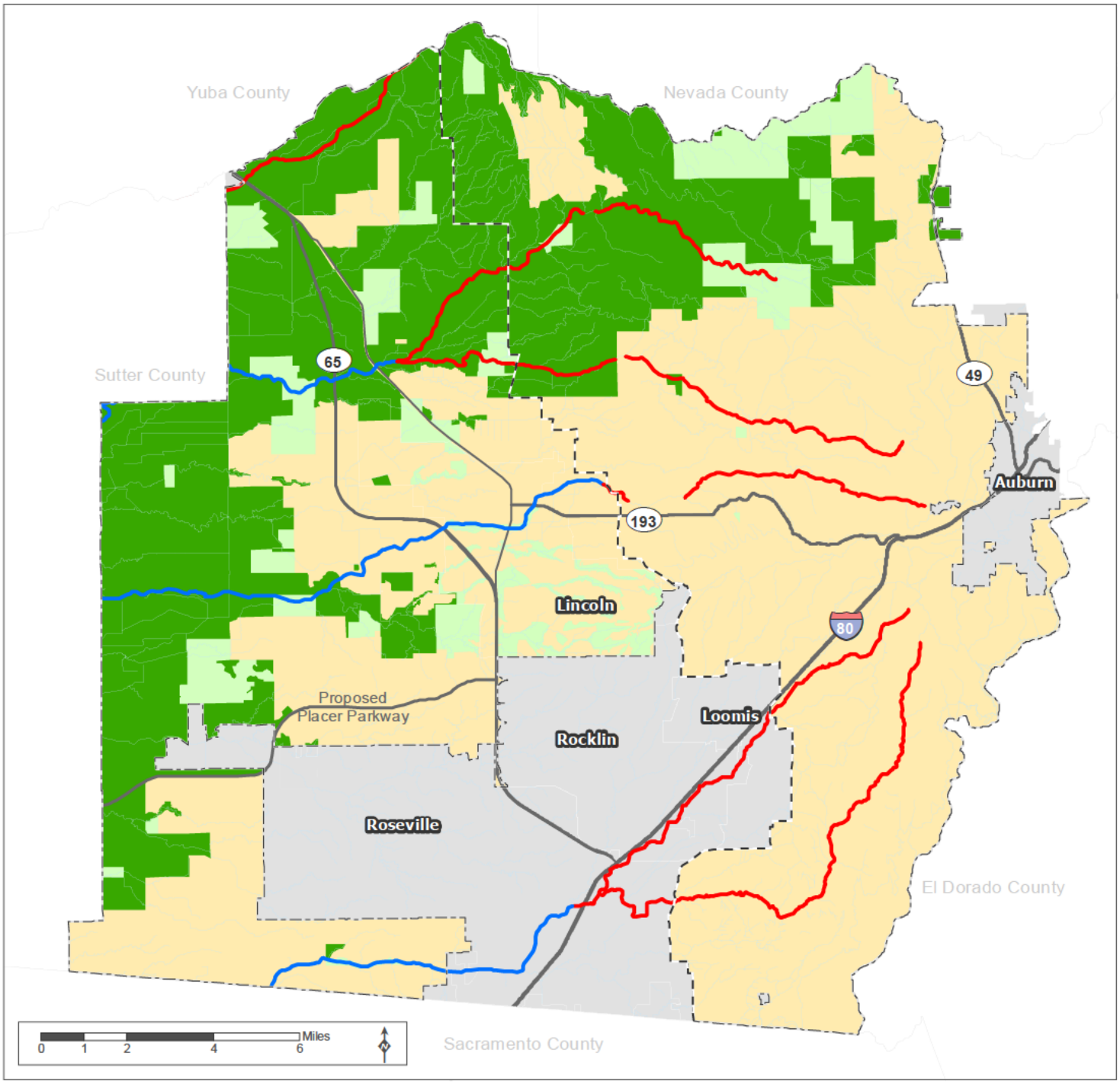


Figure 4-2 Estimating Land Conversion in the Foothills - Schematic



Source: Placer County, 2014; MIG | TRA 2015; CDFG

Central Valley Steelhead Critical Habitat

- Spawning
- Rearing and/or Migration

- Existing Reserve
- Reserve Acquisition Area
- Potential Future Growth Area
- Non-Participating City

- Valley/Foothill Divide
- Road
- Stream
- Major Road

MIG | TRA

Figure 4-3 Central Valley Steelhead Critical Habitat

Placer County Conservation Program - Western Placer County HCP/NCCP

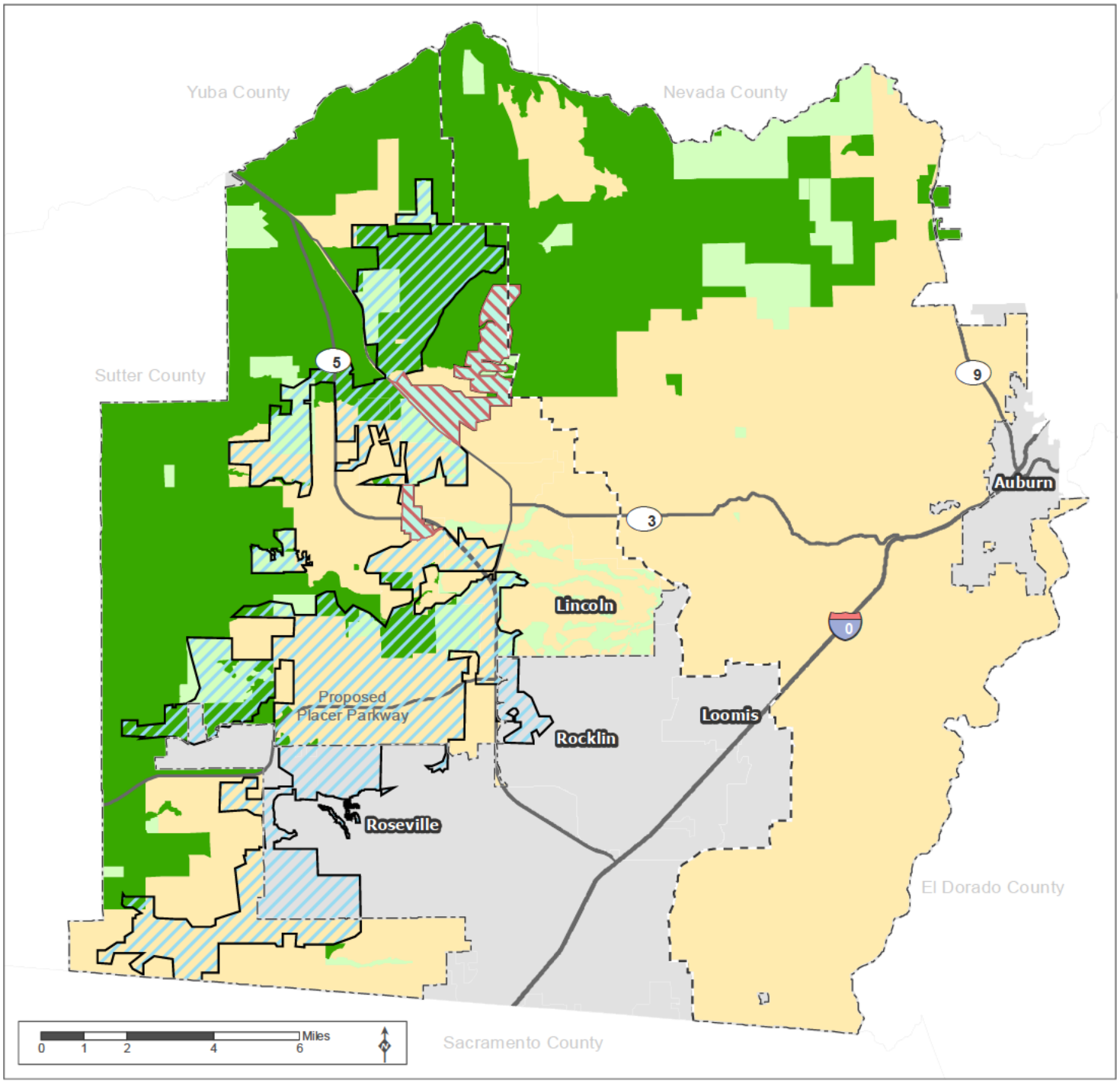


Figure 4-4 Vernal Pool Fairy Shrimp Critical Habitat

Placer County Conservation Program - Western Placer County HCP/NCCP

MIG | TRA

Chapter 5
Conservation Strategy

5.1 Introduction

The Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP or Plan) will provide for conservation of landscapes, natural and semi-natural communities, and Covered Species. This chapter describes how the Plan's conservation strategy defines overarching biological goals; sets measurable objectives, including quantified geographic acquisition targets; and defines implementation actions that will achieve these goals.

5.1.1 Planning Levels

Biological goals are addressed at three levels:

1. **Landscape**. Landscape-level conservation aims to acquire and manage large interconnected blocks of land in which optimal conditions for ecological sustainability can be maintained, including hydrologic function and land-cover diversity, while minimizing land use incompatibility.
2. **Community**. This level of conservation addresses natural and semi-natural communities primarily through the protection, management, enhancement, restoration, and creation of community types, particularly as habitat for Covered Species. The Reserve System will encompass viable units of the various natural and semi-natural communities.
3. **Species**. Covered Species may need protection for individuals and enhancement of populations and groups of populations. These needs may not be fully addressed at the landscape or community level and thus species-level goals, objectives, and conservation measures are also developed for some Covered Species. They will be incorporated into the management plans for conservation reserves and will be included as conditions on Covered Activities.

5.1.2 Definitions

Definitions for key elements of the conservation strategy are defined below.

Acquisition. The acquisition of land, through purchase of fee title or conservation easement, to either protect or restore natural communities or Covered Species' habitat. Protection and restoration are defined below.

Biological goals. Guiding principles for conservation within the Plan Area based on the conservation needs of the Covered Species and natural communities. The goals describe the vision for the Covered Species and natural communities to be achieved through implementation of a successful conservation program. Biological goals are typically qualitative rather than quantitative (65 *Federal Register* 106 35242–35257, June 1, 2000).

Biological objectives. Measurable targets that will be sought to achieve the biological goals. Biological objectives are typically quantitative or at least measurable (65 *Federal Register* 106 35242–35257, June 1, 2000).

Creation, or habitat creation. The establishment of a vegetation community or aquatic habitat in an area that did not previously support it. For example, fresh emergent wetlands can be created as breeding habitat for California black rail within grasslands that did not previously have fresh emergent wetlands. (In fact, many of the fresh emergent wetlands inhabited by California black rail in the Sierra Nevada Foothills were created by leaks from irrigation canals [Richmond et al. 2008]). Habitat creation should occur in damaged or disturbed areas whenever possible, except in situations where historic physical conditions can be restored to a rarer community that was historically present. For example, a rice field may be initially identified for creation of a fresh emergent marsh; however, if historic vernal pool signatures are identified in the rice field, the site should be restored to vernal pool complex. Created habitat must be placed in a perpetual conservation easement to be incorporated into the Reserve System and to count toward creation commitments.

Habitat enhancement. Natural community and Covered Species' *habitat enhancement* is the improvement of an existing degraded natural community or Covered Species' habitat. Enhancement, for the purpose of the Plan, improves the *condition* of existing natural communities or Covered Species' habitat and does not involve increasing the area of natural communities or Covered Species' habitat. This is consistent with the U.S. Army Corps of Engineers (USACE) definition of enhancement for aquatic resources: *the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s)* (U.S. Army Corps of Engineers 2008). Aquatic resource enhancement results in the gain of an aquatic resource function, but does not result in a gain in aquatic resource area (U.S. Army Corps of Engineers 2008). *Enhancement,* as defined for the purpose of the Plan, may in some cases equate with the USACE definition of rehabilitation: "the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded natural resource" (U.S. Army Corps of Engineers 2008). Both *enhancement* and *rehabilitation*, as defined by USACE, result in the gain of the aquatic resource function, but do not result in a gain in aquatic resource area. Hence, both these terms are included as *enhancement* for the purpose of the Plan.

Enhancement includes a wide range of ecologically appropriate actions that will improve the condition of natural communities or Covered Species' habitat. The Placer Conservation Authority (PCA) will enhance all lands protected on the Reserve System to conserve populations of species and maintain or improve ecological processes. Enhancement actions include, but are not limited to, livestock grazing and fencing areas to facilitate grazing, controlling access to reserves, improving habitat connectivity, planting oak seedlings in an existing stand to increase oak recruitment, and removing or controlling invasive species. Enhancement measures will be implemented to increase wildlife habitat value, which may increase the abundance and diversity of Covered Species as well as other native species. Terrestrial habitat enhancement activities typically occur on soils that are largely intact (e.g., soils that have not been tilled or otherwise disturbed). Enhancement measures will differ according to each natural community and site, because natural communities differ in species composition and vegetative structure, and threats to communities vary by site. The appropriateness of habitat enhancement will be considered on a site-by-site basis and in the context of the entire Reserve System and Plan goals and objectives.

Management. Natural community and Covered Species' *management* is ongoing manipulation of the land supporting the natural communities or Covered Species' habitat as needed to maintain the functions of these lands. All land and aquatic habitat that is preserved in the Reserve System will be managed to maintain and enhance ecological function for Covered Species. An example of management would be grazing in vernal pool complexes to control cover and thatch buildup of

invasive species in vernal pools (e.g., Marty 2005). Habitat management may include measures such as grazing, mowing, or burning in grassland in order to prevent invasive species from becoming established where they are largely absent.

Protection. Protection of landscape, natural and semi-natural communities and Covered Species' habitat means to prevent land disturbances and land uses that would harm or reduce its conservation values, including aquatic resource values, natural and semi-natural community values, and habitat values. This protection is accomplished by acquiring fee title with a conservation easement on habitat and managing it to protect wetlands, natural and semi-natural communities and Covered Species' habitat or purchasing a conservation easement that prevents land disturbances and land uses that would harm conservation values. The conservation strategy uses the term *protection* in setting biological goals and objectives for adding land and wetlands into the Reserve System.

Reserve System. The Reserve System will be assembled through the HCP/NCCP and the CARP to provide for the conservation of Covered Species and Aquatic Resources of Placer County. The Reserve System will be a large system of interconnected land blocks located in the western and northern Valley and northern Foothills, estimated to be between around 47,300 acres and will include existing and newly acquired lands that are part of the PCCP reserves, and adaptively managed consistent with the Plan. The Reserve System would be capable of protecting, managing, restoring and creating the natural and semi-natural communities and habitats that support the covered species.

Reserve Units. Multiple parcels in the same area with similar management needs. Each reserve unit will have a management plan and will be a part of the larger Reserve System.

Restoration or Habitat Restoration. Natural community and Covered Species' habitat *restoration* is the establishment of a vegetation community or aquatic habitat in an area that historically supported it, but no longer does because of environmental changes in site conditions or past disturbance. *Restoration*, as defined by the Plan, is equivalent to the USACE definition of re-establishment: *the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Restoration* results in a gain of both area and function of the natural community or Covered Species' habitat, while *enhancement*, as defined by the Plan, results in a gain in natural community or Covered Species' habitat function, but not a gain in area.

Restoration may involve altering the conditions on a site, to improve its ability to support the historic land-cover types. In this Plan, habitat restoration is only allowed on those land-cover types for which current techniques are generally successful in restoring habitat function and where restoration would increase habitat for Covered Species and native biological diversity. Habitat restoration will be focused on lands in the Reserve System, including lands within Existing Reserves Areas and Other Protected Areas (EXR)[1] that will be enrolled in the Reserve System (see Section 5.3.1.3.5, *The Role of Existing Protected Areas in the Conservation Strategy*). Restored habitat must be placed in a perpetual conservation easement to be incorporated into the Reserve System to count toward restoration commitments.

[1] Public and private lands in Plan Area A already protected for conservation or open space use. See Appendix H, *Existing Open Space Lands*, for a description of the Existing Reserves and Other Protected Areas in Plan Area A.

There may be some uncertainty associated with completely re-establishing all functions of a natural community. For example, recent studies of wetland restoration projects indicate that many of them fail to meet success criteria or lack important functions of natural reference sites (National Research Council 2001). The conservation strategy takes this uncertainty into account by relying primarily on protecting existing habitat and on adaptively managing restored habitat (Chapter 7, *Monitoring and Adaptive Management Program*).

5.1.3 Conservation Strategy Components

The Plan's conservation strategy will be implemented by the PCA in partnership with the Permittees and the Wildlife Agencies. The strategy has four main components:

1. **Reserve System**. The Plan proposes to progressively establish a large system of interconnected blocks of land. Over the proposed 50-year permit term for the Plan, the PCA will acquire approximately 47,300 acres for natural and semi-natural community protection and restoration irrespective of loss (Table 5-2 and Table 5-3). Within that land, the PCA will restore at least 4,405 acres of natural communities independent of effects, and 6,220 acres of natural communities if all allowable loss proposed under the Plan occurs (Table 5-4). These protected and restored lands will augment the approximately 16,000 acres of EXR. Cumulatively, 38 percent of the present natural and semi-natural landscape in Plan Area A (Figure 1-2) would ultimately be subject to conservation management[2] (Table 5-2).

   The Reserve System will provide a means for protecting, managing, enhancing, and restoring or creating the natural and semi-natural communities and habitats that support the Covered Species. The Reserve System will mainly be located in the western and northern Valley and in the northern Foothills, regionally separated from future urban and suburban growth. The geographic aspect of the conservation strategy is expressed on Figure 5-1.

2. **Stream Protection, Enhancement, and Avoidance**. The conservation strategy provides protection of the Stream System everywhere in Plan Area A. Conservation measures in, and avoidance of (see Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*), the Stream System contribute both to Covered Species' habitats and connectivity in the Reserve System. In-stream enhancement actions will occur inside and outside of the Reserve System, in Plan Area A and B (see Section 5.3.1.3.4, *Conservation in Plan Area B*). Such actions include, but are not limited to, removal and/or modification of barriers to fish passage, screening unscreened water diversions, improvement of in-channel features, and non-native animal species control (see Section 5.3.2.3.3, *Riverine/Riparian Complex Natural Communities*).

3. **Wetland Conservation and No Overall Net Loss of Wetland Functions and Services.** The Plan provides for protection, enhancement, restoration, and creation of wetlands through the conservation measures for the vernal pool complex, riverine/riparian complex, and aquatic/wetland complex natural communities. The conservation strategy provides for the protection of surrounding upland necessary to sustain the hydrological function of protected, restored, and created wetlands.

[2] The Plan will protect 47,300 acres of natural and semi-natural communities in addition to the approximately 15,600 acres of natural and semi-natural communities already protected on Existing Protected Areas in Plan Area A. In total, the 62,900 acres of natural and semi-natural communities that would ultimately be protected in Plan Area A is approximately 38 percent of the total natural and semi-natural communities present in the Plan Area (167,133 acres) (see Tables 5-3 and 5-4 for details).

The Plan anticipates loss of wetlands, including vernal pool wetlands. Restoration and creation of wetlands will specifically provide in-kind compensatory habitat in the Reserve Acquisition Area (RAA) or Stream System in order to achieve conservation of the Covered Species and no overall net loss of wetland habitat through the term of the permit.

4. **Avoidance and Minimization**. Covered Activities will avoid and minimize take by complying with specific conditions that apply to certain communities and species. The conditions are listed in Chapter 6, *Program Participation and Conditions on Covered Activities*. The Plan proposes (1) conservation measures will take place on lands set aside for conservation purposes, (2) implementation of the conservation strategy will accomplish avoidance and minimization on a cumulative regional scale, and (3) avoidance and minimization in the Potential Future Growth Area (PFG) will be focused only on specific resources.

5.1.4 Chapter Organization

The remainder of Chapter 5, *Conservation Strategy,* consists of the following sections:

- Section 5.2, *Conservation Strategy Framework*, describes the approach that was used for developing conservation commitments, and the approach to integrating wetland requirements for Clean Water Act needs. It also describes data sources used to develop the conservation strategy. This section also describes the framework for biological goals, objectives, and conservation measures, including a description of how these components are organized and integrated in Sections 5.3, *Conservation Measures,* and 5.4, *Mitigation and Conservation Outcomes*.
- Section 5.3, *Conservation Measures,* describes the conservation measures the PCA will implement to achieve the biological goals and objectives. Section 5.3.1, *Conservation Measure 1: Establish Reserve System*, describes the Plan's requirements for Reserve System assembly, including reserve design criteria and acre commitments for natural and semi-natural communities and Covered Species' habitats. Section 5.3.2, *Conservation Measure 2: Manage and Enhance the Reserve System,* describes the actions necessary to maintain and improve the ecological conditions of natural and semi-natural communities and Covered Species' habitat on the Reserve System and along streams outside the Reserve System. Section 5.3.3, *Conservation Measure 3: Restore and Create Natural Communities and Covered Species' Habitat*, describes restoration and creation actions the PCA will implement to increase the acres of natural communities and Covered Species' habitat. Section 5.3.4, *Conservation Measure 4: Plan Area-wide Actions,* describes conservation measures that the PCA will implement throughout Plan Area A, including outside the Reserve System.
- Section 5.4, *Mitigation and Conservation Outcomes,* summarizes the mitigation and conservation outcomes of the Plan's conservation strategy for Covered Species, in the context of effects of the Covered Activities, and describes how outcomes are consistent with Endangered Species Act (ESA) and NCCP standards.

5.2 Conservation Strategy Framework

The conservation strategy was designed in accordance with principles of conservation biology and reflects the recommendations of a group of Science Advisors convened at the beginning of the planning process (Brussard et al. 2004). The strategy addresses regional conservation needs at a

descending level of scale, identifies biological goals and objectives to encompass ecological processes, environmental gradients, biological diversity, connectivity between habitat patches, and proposed conservation measures to implement these goals and objectives.

5.2.1 Approach to Developing Conservation Commitments

The Plan sets quantitative commitments for land acquisition, protection, and natural and semi-natural community restoration. The natural and semi-natural community commitments were developed to provide for the conservation needs for Covered Species, natural and semi-natural communities, and constituent habitats and to provide mitigation for Covered Activities. The strategy identifies two types of quantitative objectives: (1) commitments independent of effects, and (2) commitments dependent on effects. Commitments independent of effects include actions needed (i.e., protection, enhancement, restoration, and creation) to provide for the conservation of Covered Species and actions required for mitigation. Commitments dependent on effects provide for additional restoration and creation to mitigate effects of Covered Activities.

The natural and semi-natural community protection and restoration commitments are also presented as commitments to protecting Covered Species' habitat, as represented by the species' habitat models. See Chapter 3, *Physical and Biological Resources*, Section 3.3.2.3, *Habitat Distribution Models*, for an overview of how the species' habitat models were developed. See Appendix D, *Species Accounts*, for species-specific details on the habitat models.

- **Commitments independent of effects** include natural and semi-natural community and Covered Species' habitat acquisition, protection, and restoration/creation necessary to meet overall Plan biological objectives. Commitments independent of effect will be achieved regardless of the amount of natural and semi-natural community, constituent habitat, and Covered Species' habitat lost to Covered Activities. All natural and semi-natural community and constituent habitat acquisition (see Table 5-3) and protection commitments (see Table 5-4) are independent of effect. Commitments are set for the Plan Area as a whole and include actions (i.e., protection, enhancement, restoration, and creation) to conserve natural and semi-natural communities, actions to provide for the conservation of Covered Species, and actions required to mitigate effects on Covered Species and natural and semi-natural communities. Commitments for the timing of this conservation are provided in Section 8.4, *Establishing the Reserve System.*
- **Commitments dependent on effects** include restoration/creation of specific natural communities and their constituent habitats (e.g., wetlands, valley oak woodland) to mitigate, in part, effects of Covered Activities supplemental to the commitments independent of effects (see Table 5-4). Commitments dependent on effect are based on project-specific mitigation requirements (i.e., 1.5:1 wetland mitigation ratio), and provide for mitigation only. Because it is difficult to predict the level of onsite avoidance of natural communities and constituent habitats, particularly avoidance of wetlands, the Plan utilizes mitigation ratios that are tied to actual loss of communities and constituent habitats during Plan implementation to determine the necessary level of restoration/creation for mitigation purposes.

The estimated amount of restoration/creation that will occur dependent on effect is based on estimates of project-specific mitigation for Covered Activities. Effects on the natural communities and constituent habitats subject to specific mitigation requirements will be minimized on a project-by-project basis; hence, the extent of future natural community loss may fall below maximum thresholds, in which case, the amount of mitigation may fall below the levels described in the conservation strategy.

The acquisition commitments in Table 5-2 identify the amount of communities and constituent habitats that will be acquired by the end of the permit term, independent of effect. The protection commitments in Table 5-3 identify the amount of natural and semi-natural communities and constituent habitats that will be protected on the Reserve System. The acquisition and protection commitments differ because approximately 4,410 acres of acquired grassland will be restored to other natural communities including vernal pool complex (i.e., by restoring and creating wetlands within grasslands), riparian, valley oak woodland, and other natural communities.

The conservation commitments and proportional restoration estimates were developed using land-cover mapping for the Plan Area (Chapter 3, *Physical and Biological Setting*). The land-cover mapping is based on air photo interpretation. The land-cover classification and the associated estimates of constituent habitats (e.g., wetlands) present are necessarily at a coarser scale and are less precise than will be obtained through on the ground mapping and wetland delineation. It is intended that plan implementation be based on future detailed site evaluation both for the conservation benefits of reserve land (see Chapter 8, *Plan Implementation*) and the effects of Covered Activities (see Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*).

The conservation strategy identifies key natural communities that define the major biological values of the Plan Area and are most strongly representative of Covered Species' habitats:

- Vernal pool complex and grassland natural communities
- Riverine and riparian natural communities
- Aquatic/Wetlands complex natural communities
- Oak woodland natural communities

The conservation strategy also includes biological goals and objectives and conservation measures for agriculture and other open space.

5.2.2 Approach to Coordinating with Wetland Requirements for Clean Water Act Needs

As described in Section 1.3.1, *County Aquatic Resources Program* (CARP), the CARP will provide a programmatic approach to obtain permits for fill of aquatic resources within the Plan Area, consistent with requirements under Section 404 of the federal Clean Water Act (CWA). The CARP provides a framework to be implemented to comply with USACE CWA Section 404 regulations. The Plan's conservation strategy and the CARP have been developed to be compatible with each other, but they are separate plans meeting different regulatory needs. Although the Plan meets requirements under the federal ESA and the Natural Community Conservation Planning Act (NCCP Act), the CARP meets requirements under Sections 404 and 401 of the CWA.

5.2.3 Data Sources

The conservation strategy is based on the best scientific data available at the time of its preparation and takes into account the limitations of the baseline data available for the Plan Area. The primary sources of data used to develop the conservation strategy were the ecological accounts of Covered Species (Appendix D, *Species Accounts*), the species distribution models (Appendix D, *Species Accounts*), and the inventory of existing conditions summarized in Chapter 3, *Physical and Biological*

Setting. Other sources consulted to develop the conservation strategy are cited throughout the chapters. Additional general sources are listed below.

- Species recovery plans, Critical Habitat designations, 5-year reviews, and management plans, if available: Recovery Plan for the California Red-Legged Frog (U.S. Fish and Wildlife Service 2002); Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and Wildlife Service 2005); National Bald Eagle Management Guidelines (U.S. Fish and Wildlife Service 2007a); Draft Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*) (U.S. Fish and Wildlife Service 1999a); Recovery Plan for the Valley Elderberry Longhorn Beetle (U.S. Fish and Wildlife Service 1984); Recovery Plan for the Evolutionary Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead (National Marine Fisheries Service 2014)
- Species and natural community experts, including the independent Science Advisors for the Plan, and other non-governmental sources of species occurrence data, such as eBird (Sullivan et al. 2009)
- Data from government organizations, including species' occurrence data from the California Natural Diversity Database (CNDDB) (California Department of Fish and Wildlife 2016) and the Essential Connectivity areas of California (Spencer et al. 2010)
- Approved or in-process HCPs for adjacent or nearby areas with similar natural communities and Covered Species (e.g., Santa Clara Valley HCP/NCCP, Natomas Basin HCP, East Contra Costa County HCP/NCCP [approved]; San Joaquin County Multi-Species Habitat Conservation and Open Space Plan [approved]; South Sacramento County HCP [in-process]; Yuba-Sutter Regional Conservation Plan [in-process]; Butte Regional Conservation Plan [in-process])
- Local land acquisition priorities of open space agencies and organizations where they overlap with the biological goals and objectives of the Plan, Placer Legacy Open Space and Agricultural Conservation Program (Placer Legacy Program), Placer Land Trust
- Watershed assessments and watershed resource management plans, such as the Raccoon Creek Watershed Assessment (cbec, inc., eco engineering and H.T. Harvey & Associates 2017), the Dry Creek Watershed Coordinated Resource Management Plan (ECORP Consulting, Inc. 2003), and the Auburn Ravine/Raccoon Creek Ecosystem Restoration Plan, Review Draft (Placer County 2002)

The species-level biological goals and objectives were developed using the following primary sources:

- Ecological data from species accounts, descriptions of natural communities, the scientific literature, and envirograms[3] prepared by experts at the University of Nevada, Reno under the direction of Dr. Peter Brussard (recommendations in the Science Advisor's Report) (Brussard et al. 2004)
- Data from other HCP/NCCPs (e.g., East Contra Costa HCP/NCCP; Santa Clara Valley Habitat Plan, Yuba-Sutter Regional Conservation Plan) prepared or under preparation that addressed the same species and/or habitats

[3] Envirograms are conceptual models developed based on guidance provided in the *Report of the Science Advisors* (Placer County 2004) to facilitate the understanding of important ecological factors affecting each Covered Species.

- Information from scientific studies prepared in support of the Plan (see next list of bullet points, below), as listed in the *Bibliography*
- Federal and state recovery plans for Covered Species, 5-year reviews, and conservation commitments or management recommendations for Covered Species
- Critical Habitat designation rules for vernal pool fairy shrimp (U.S. Fish and Wildlife Service 2005, 2006) and California Central Valley steelhead (National Marine Fisheries Service 2005);
- Other sources with conservation commitments or conservation recommendations that address the Covered Species, natural communities, or the Plan Area (California Partners in Flight 2000, 2002; Riparian Habitat Joint Venture 2004; Tricolored Blackbird Working Group 2009)
- Input from resource specialists, outside workshops, including the Wildlife Agencies and local "species experts" with intimate knowledge of the Covered Species and natural communities within the Plan Area.

During the early stages of the formulation of the Plan, Placer County (County) and its interagency and scientific advisors determined that additional studies were needed to fill gaps in the scientific knowledge of biological resources in western Placer County. The following studies were conducted to inform the development of the biological goals, objectives, and conservation measures necessary to achieve these goals:

- *Important Migrant and Wintering Bird Concentration Areas of Western Placer County*, Jones and Stokes Associates (JSA), February 2003
- *Aquatic and Wetland Resources in Western Placer County*, North Fork Associates, December 2003
- *Streams of Western Placer County, Aquatic Habitat and Biological Resources, Resource Assessment*, prepared by Randy Bailey, December 2003
- *Salmonid Spawning Habitat Surveys for Western Placer County*, JSA, March 24, 2004
- *Relationships Between Animals and Site Attributes in Riparian Ecosystems in Western Placer County*, JSA, May 10, 2004
- *Preliminary Assessment of the Effects of Habitat and Landscape Variables on Vernal Pool Ecosystems*, ECORP Consulting, Inc., August 12, 2004
- *Setback Recommendations to Conserve Riparian Areas and Streams in Western Placer County*, JSA, February 2005
- *Assessment of Habitat Conditions for Chinook Salmon and Steelhead in Western Placer County*, CA, JSA, 2005
- *Placer County Natural Resources Report: A Scientific Assessment of Watersheds, Ecosystems, and Species of the Phase I Planning Area*, JSA, April 2004
- *Placer County Vernal Pool Functionality Assessment Method*, prepared by Christopher Rogers, 2009
- *Placer County Vernal Pool Restoration Feasibility Assessment*, prepared by Christopher Rogers, 2009

A series of studies was conducted by Richard R. Harris, Ph.D., Registered Professional Forester, to support the impact assessment methodology and conservation strategy for oak woodlands:

- *Estimating Habitat Losses in Placer County Oak Woodlands*, November 2009
- *Oak Woodland Restoration Potential: Placer County Conservation Plan*, February 2013
- *Site Assessment Procedure Proposed Acquisitions and Conservation Easements Placer County Conservation Plan*, October 2009
- *Guidelines for Reducing Fire Hazard and Minimizing Environmental Impacts of Fuel Reduction Projects and Fire Suppression*, October 2009

5.2.4 Framework for Biological Goals, Objectives, and Conservation Measures

The conservation strategy is designed to achieve landscape-, natural community–, and species-level biological goals and objectives established for the Plan, through the implementation of conservation measures. The hierarchal framework for the Plan included goals, objectives, and conservation measures as described below.

- **Goals** are future desired states based on the conservation needs of the Covered Species and natural communities. A statement of biological goals for Covered Species is required by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service's (NMFS') Five-Point Policy to be included in HCPs (65 Code of Federal Regulations 35242, June 1, 2000).
- **Objectives** are measurable achievements or results that support the completion of a goal. They may include quantitative commitments, such as an amount of land to be protected and restored. They clearly state a desired result and will collectively achieve the biological goals.
- **Conservation Measures** are implementable measures designed to achieve the biological goals and objectives. For the Plan, they consist of four broad conservation measures (Establish the Reserve System, Manage and Enhance the Reserve System, Restore and Create Natural Communities and Covered Species' Habitat, and Plan Area-wide Actions), each of which includes detailed descriptions of multiple conservation measures to be implemented under that measure to achieve the landscape-level, natural community–level, and Covered Species–level biological goals and objectives.

Goals are organized by planning level and are provided in Section 5.2.5, *Landscape-level Biological Goals and Objectives*, Section 5.2.6, *Natural Community–level Biological Goals and Objectives*, and Section 5.2.7, *Species-level Biological Goals and Objectives*. The biological goals apply to the entire Plan Area, recognizing though that it will be the managed Reserve System that ultimately is capable of protecting and maintaining communities and species for the Plan. Conservation measures (Section 5.3, *Conservation Measures*) will be implemented to achieve the goals and objectives. They will occur primarily within the Reserve System, though some conservation measures may be encouraged and, in certain instances, are already required or will be required on private lands outside of the Reserve System. Biological goals apply to the Plan Area as a whole, as species conservation may occur outside the Reserve System (e.g., covered fish and/or nesting birds in avoided riparian habitat or avoided habitat providing appropriate transit corridors for wildlife).

The goals, objectives, and conservation measures will guide Plan implementation. The Permittees' implementation of the Plan will need to be consistent with the Plan's goals and objectives. The goals and objectives will guide the acquisition of reserves, the preparation of site-specific reserve management plans, the development of monitoring programs, and the evaluation of adaptive

management strategies. The monitoring program described in Chapter 7, *Monitoring and Adaptive Management Program,* is closely tied to the biological goals and objectives.

The biological goals and objectives describe *what* the Plan will achieve. The rationale for each objective provided in Section 5.2, *Conservation Strategy Framework,* describes *why* each objective is needed to meet conservation requirements for the Plan. The conservation measures provided in Section 5.3, *Conservation Measures*, describe *how* the biological goals and objectives will be met through the implementation of conservation measures.

5.2.4.1 Biological Goals and Objectives

This section describes the Plan's biological goals and objectives using a nested approach for the three planning levels (landscape, community, and Covered Species).

- Section 5.2.5, *Landscape-level Biological Goals and Objectives*, lists the landscape-level goals and objectives and describes the rationale for each.
- Section 5.2.6, *Natural Community–level Biological Goals and Objectives*, addresses the conservation strategy for communities using a nested approach. For each community, the landscape-level goals and objectives that would benefit that community's conservation strategy are described. Next, the goals and objectives developed specifically for that community are listed with their associated rationale.
- Section 5.2.7, *Species-level Biological Goals and Objectives*, uses the same nested approach for Covered Species. For each species, the landscape-level and community–level goals and objectives that would benefit that species are described, followed by goals and objectives developed for that species and their associated rationale. For the most part, the Plan addresses conservation of Covered Species through goals and objectives at the landscape and community levels. Species-specific goals and objectives were only developed when additional factors, such as specific habitat requirements or population factors, needed to be addressed to provide for the conservation of the species in the Plan Area.

The goals and objectives, and their conservation measures, are listed in Table 5-8. Each goal and objective is coded using the abbreviations listed in Table 5-1. Each objective is also titled to facilitate cross referencing with the conservation measures.

Table 5-1. Acronyms for Landscape-, Community-, and Species-level Goals, Objectives, and Conservation Measures

AO	agricultural lands and other open space
AW	aquatic/wetland complex natural communities
BLRA	California black rail
BUOW	western burrowing owl
CRLF	California red-legged frog
FISH	Central Valley Steelhead – Distinct Population Segment and Central Valley Fall-/Late Fall-run Chinook Salmon
FYLF	foothill yellow-legged frog
GGS	giant garter snake
L	landscape level
RAR	riverine and riparian complex natural communities
SWHA	Swainson's hawk
TRBL	tricolored blackbird
VELB	valley elderberry longhorn beetle
VPB	vernal pool branchiopod
VPCG	vernal pool complex and grasslands natural communities
VPFS	vernal pool fairy shrimp
VPTS	vernal pool tadpole shrimp
WPT	western pond turtle

5.2.5 Landscape-level Biological Goals and Objectives

Landscape-level goals and objectives are designed to protect, enhance, and restore ecological processes that occur on the scale of the Plan Area as a whole. Such processes include, for example, east-west movement of organisms to and from the Valley floor and the Sierra Nevada Foothills. The most fundamental landscape-level goal is the creation of the Reserve System, which will provide the means and assurances to protect, maintain, enhance, and restore the representative landscapes of the Plan Area and the diversity of communities that make up the landscapes and provide habitat for Covered Species and the occurrences of Covered Species necessary to ensure their recovery in the Plan Area.

Goal L-1. A Reserve System with representative natural communities along a range of environmental gradients large enough to support ecosystem function, sustain populations of Covered Species, maintain or increase biological diversity of native species, and accommodate changing environmental conditions.

Objective L-1.1. *Establish a Large, Interconnected Reserve System.* Establish a large, interconnected Reserve System of at least 47,300 acres of natural communities, agricultural habitat, and Covered Species' habitat, with all natural communities in the Plan Area represented, primarily within the RAA, irrespective of amount of natural communities and Covered Species lost as a result of Covered Activities, including at least 33,000 acres in the Valley and at least 14,300 acres in the Foothills.

Objective L-1.1 Rationale. This objective is intended to protect the highest quality natural communities and Covered Species' habitat in the Plan Area to optimize the ecological value of the Reserve System for conserving Covered Species and native biodiversity. The commitment for the total Reserve System is based on the sum of all community acreage commitments. Achieving this objective is intended to protect and restore natural communities, species-specific habitat elements, and species diversity on a landscape-level consistent with Section 2820(a)(3) of the NCCP Act and to offset direct and indirect effects on Covered Species and their habitats, such as edge effects. Achieving this objective is also intended to conserve representative natural and semi-natural landscapes to maintain the ecological integrity of large habitat blocks, including desired ecosystem function, and biological diversity, consistent with Section 2820(a)(4)(A) of the NCCP Act.

Goal L-2. Reserve System connectivity to sustain the effective movement and genetic interchange of organisms between natural communities in a manner that maintains the ecological integrity of the natural communities within the Plan Area.

Objective L-2.1. *Protect Habitat Linkages.* Protect habitat linkages that allow native and Covered Species to move between protected natural communities within and adjacent to the Plan Area.

Objective L-2.1 Rationale. This objective is intended to protect the large, interconnected blocks of habitat required for movement of native organisms and genetic exchange among wildlife and plant populations. Achieving this objective will contribute to the establishment of linkages between reserves within and adjacent to the Plan Area, consistent with Section 2820(a)(4)(B) of the NCCP Act. It is also intended to sustain effective movement and interchange of organisms between habitat areas to maintain ecological integrity of habitat within the Plan Area, consistent with Section 2820(a)(4)(E) of the NCCP Act and Section 10 of the federal ESA. This objective will also benefit Covered Species, as described in Section 5.2.7, *Species-level Biological Goals and Objectives*, and Section 5.3.1.3.6, *Conservation Zones*.

Objective L-2.2. *Maintain and Enhance Reserve System Permeability.* Maintain and enhance permeability within the Reserve System to provide for wildlife movement, by not adding barriers and by removing or modifying existing barriers in the Reserve System.

Objective L-2.2 Rationale. This objective is intended to maintain permeability within the Reserve System. Species movement may be impaired by barriers such as some fences or roads. The dispersal and local movements of some wildlife, such as amphibians, can be impeded by dense grasses and lack of burrows, soil cracks, or other refugia. Achieving this objective will contribute to sustaining effective movement and interchange of organisms between habitat areas to maintain ecological integrity of habitat within the Plan Area, consistent with Section 2820(a)(4)(B) of the NCCP Act and Section 10 of the federal ESA.

Barriers to be modified or removed will be identified in site-specific management plans (CM2 L-3), and barriers to fish passage will be removed or modified (CM2 RAR-1).

Objective L-2.3. *Establish East–West Corridors.* Establish corridors for east-west movement by Covered Species and other native species along the Stream System by protecting and restoring interconnected riverine and riparian natural communities.

Objective L-2.3 Rationale. This objective is intended to protect and restore movement corridors for Covered Species and other native species between the Valley and the Foothills, and between reserves within and adjacent to the Plan Area, consistent with Section 2820(a)(4)(B) of the NCCP Act and Section 10 of the federal ESA. Riverine and riparian complex habitats are naturally existing corridors for aquatic and terrestrial species, including Covered Species such as western pond turtle, foothill yellow-legged frog, California red-legged frog, valley elderberry longhorn beetle, and covered salmonids (see Section 5.3.1.3.6, *Conservation Zones*, for description of east-west linkages). Protecting existing riparian habitat and restoring riparian habitat between existing patches will improve connectivity within the Plan Area by expanding contiguous patches of habitat.

Objective L-2.4. *Conserve North–South Connectivity.* Protect and restore north-south connectivity in the Valley RAA through an interconnected network of vernal pool complex, grassland, rice land, and, to a lesser extent, agricultural reserves extending from the border of the Plan Area A with Sutter County, east and north to the border of Yuba and Nevada Counties.[4]

Objective L-2.4 Rationale. This objective is intended to protect and restore north-south connectivity by maintaining a "working landscape" in the Valley. The reserve acquisition strategy will focus protection and restoration to protect and increase connectivity between natural and semi-natural communities within the Plan Area (see Section 5.3.1.4, *Landscape-level Reserve Design*, Section 5.3.1.5.1, *Restoration Site Reserve Design for All Natural Communities*, and Figure 5-1). Agricultural lands are interspersed with other natural communities in the Valley. Rice production can provide valuable benefits to giant garter snake (U.S. Fish and Wildlife Service 1999a), waterfowl and other wildlife. While the interconnected networks of reserves is anticipated to meet ESA and NCCP standards, additional agricultural land can provide additional open-space corridors for movement of wildlife between habitats on reserves, particularly through vegetated buffer strips, hedgerows, and riparian habitats.

Objective L-2.5. *Conserve Upland Natural Communities Surrounding Aquatic/Wetlands Complex Natural Communities.* Protect upland natural communities surrounding wetlands and ponds to provide the life history requirements for native amphibians and Covered Species with both aquatic and upland habitat requirements.

Objective L-2.5 Rationale. Protecting wetlands or ponds without surrounding uplands does not benefit many native species using wetlands and ponds. Covered Species such as giant garter snake, western pond turtle, foothill yellow-legged frog, and California red-legged frog require both wetlands and adjacent uplands. Many other native species, including waterfowl, also require both wetlands or aquatic habitat and adjacent uplands.

Protecting and enhancing upland natural communities surrounding wetlands will protect and enhance hydrologic conditions in associated wetlands, consistent with Section 2820(a)(4)(A) of the NCCP Act, to conserve, restore, and manage representative natural and semi-natural landscapes to maintain the ecological integrity of ecosystem function and biological diversity.

[4] Lands will be protected and restored consistent with the "Essential Connectivity Area" identified by the California Essential Habitat Connectivity Project (Spencer et al. 2010) and shown on Figure 5-1.

Goal L-3. Ecological processes and conditions that sustain and reestablish natural communities and native species.

Objective L-3.1. *Implement Low Impact Development Standards.* Implement Low-Impact Development Standards (LIDS) for Covered Activities in the Plan Area.

Objective L-3.1 Rationale. Rapidly moving stormwater erodes stream banks and scours stream channels, degrading or removing habitat for fish and other aquatic life. Using LIDS reduces the amount of stormwater reaching a surface water system and helps to maintain natural stream channel functions and habitat. This objective will be met through implementation of measures outside the Reserve System, in areas where Covered Activities take place.

Objective L-3.2. *Reduce Invasive Non-native Species and Increase Native Species.* Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of non-native plants and animals.

Objective L-3.2 Rationale. Achieving this objective is intended to increase native species diversity, which improves natural community resilience and resistance to disturbances such as drought and flooding by increasing the likelihood that species or strains with attributes to withstand these disturbances are present on the landscape. Additionally, vegetation biodiversity in riparian and other natural communities provides the structural diversity necessary to provide suitable habitat for many wildlife species. Increasing the relative cover of native plant species also potentially increases resistance to invasion by non-native plants and reduces potential negative effects of non-native plants. This objective is also intended to minimize the introduction and spread of invasive non-native species as described. The Plan does not intend to control non-native species that are naturalized and are not adversely affecting native species in the Plan Area.

Objective L-3.3. *Manage Fire.* Manage fire as a natural process of the ecosystem to enhance and/or restore natural communities, while protecting natural communities from adverse effects of fire.

Objective L-3.3 Rationale. Placer County developed fire management guidelines that are provided in *Fuel Management* (Appendix F). The document recommends that each of the Plan's reserves have a fire management component included within the HCP/NCCP-mandated management plan. It stipulates that the fire management component should include actions to re-introduce fire as a natural process of the ecosystem, if relevant, and use fire to enhance and/or restore natural communities.

Fire management will also be necessary to prevent adverse effects of fire on the Reserve System. Some sensitive areas, such as patches of habitat occupied by tricolored blackbird, Swainson's hawk, and California black rail, could be adversely affected by fire. Additionally, fires that are too intense or frequent could result in undesirable conversion from one natural community type to another.

5.2.6 Natural Community–level Biological Goals and Objectives

Natural community–level goals and objectives are designed to protect, maintain, enhance, and restore native biodiversity and ecological processes that maintain representative natural communities across a range of successional stages. Managed grazing, for example, will be used to reduce the cover of invasive, non-native species that damage the ecological function of some landscapes. The natural community–level conservation measures will benefit Covered Species and other native species; however, many of the Covered Species have specific habitat and management needs. Natural community–level goals, objectives, and conservation measures are summarized in Table 5-8. Natural community protection and restoration commitments are summarized in Tables 5-3 and 5-4, respectively. All protection commitments are independent of the level of loss, while restoration commitments include both a component that is independent of loss and a component that is based on a ratio of restored acres to lost acres.

5.2.6.1 Vernal Pool Complex and Grassland Natural Communities

Goal VPCG-1. Interconnected vernal pool complex and grassland natural communities with functional ecological processes that sustain native species.

The following landscape-level biological objectives will contribute to this goal:

a. Achieving **Objective L-1.1**, *Establish a Large, Interconnected Reserve System,* will provide a large, interconnected Reserve System with all natural communities in the Plan Area represented primarily within the RAA. The protection of large, interconnected reserves in the RAA will greatly reduce future fragmentation of vernal pool complexes by urban and suburban development and adverse effects related to adjacent urban development (e.g., urban runoff).

b. Achieving **Objective L-2.4**, *Conserve North–South Connectivity*, will result in the protection and restoration of north-south connectivity in the Valley RAA through an interconnected network of vernal pool complexes and grasslands.

c. Achieving **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species,* will result in an increase in native species diversity and relative cover of native plant species, and reduction in the introduction and proliferation of non-native plants and animals. This objective will benefit the vernal pool complex natural community by reducing competition with non-native species for space, light, and nutrients and reducing threats to the species' biochemical and hydrologic requirements that result from heavy infestations of invasive plant species. Grazing is an important tool in vernal pool systems for controlling invasive species abundance and cover (Marty 2005; Pyke and Marty 2005). In the absence of grazing, non-native species abundance increases, and diversity of native species declines. The increase in cover of non-native vegetation causes a decrease in hydroperiod, likely because the abundant non-native vegetation results in increased evapotranspiration rates (Marty 2005). Literature also suggests that invasive plants in vernal pools can lead to higher respiratory oxygen consumption relative to photosynthetic oxygen generation (Rogers 1998) and thus low oxygen conditions can stress vernal pool aquatic wildlife.

The natural community–level biological objectives contributing to natural community goal G-1, and the rationale for each objective, are as follows:

Objective VPCG-1.1. *Protect Existing Vernal Pool Complexes.* Protect 17,000 acres of existing vernal pool complex, including 790 wetted acres of vernal pool constituent habitat[5] (Table 5-3), to build a vernal pool Reserve System in large, contiguous blocks based on reserve units (minimum size of 200 acres unless agreed to by the Wildlife Agencies), primarily in the Valley RAA, and provide for the conservation of the covered vernal pool branchiopods in the Plan Area.

Objective VPCG-1.1 Rationale. The assembly of the Reserve System in the western portion of the Plan Area will substantially increase the amount of protected vernal pool complexes and constituent vernal pools and seasonal wetlands in the Plan Area, thereby reducing fragmentation that can disrupt hydrologic processes and gene flow. The vernal pool protection commitment is large enough to assemble a Reserve System of interconnected vernal pool complexes that spans the north-south axis of the Valley RAA. Protecting large, interconnected vernal pool landscapes will provide sufficient upland habitat for the protection of vernal pool plant pollinators, provide for dispersal of vernal pool plants and animals, and sustain important predators, such as raptors that prey on rodents and rabbits (U.S. Fish and Wildlife Service 2005).

The proportion of vernal pools to seasonal wetlands that will be protected will be equal to or greater than this proportion within vernal pool complexes lost as a result of Covered Activities. After restoration and creation is successfully completed (**VPCG-1.2**), a total of at least 820 wetted acres (790 acres protected and 30 acres restored), and up to 1,690 wetted acres if the proposed maximum allowable loss of wetland and aquatic community occurs (790 acres protected and 900 acres restored), of vernal pool constituent habitats will be protected and restored on the Reserve System (Tables 5-3 and 5-4). The vernal pool complex acre commitment and vernal pool complex reserve design criteria (see Section 5.3.1.5.2, *Vernal Pool Complexes and Grassland Natural Communities*) are intended to be large enough to ensure that extensive amounts of vernal pools, seasonal wetlands, and swales are protected within an upland matrix to facilitate the conservation and recovery of covered vernal pool branchiopods within the Plan Area, consistent with the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and Wildlife Service 2005) and Section 2820 (a)(4)(C) of the NCCP Act. Section 5.2.6.1, *Vernal Pool Complex and Grassland Natural Communities*, describes how the Plan's conservation strategy for the vernal pool complex and grassland natural community is consistent with the recovery plan for these species.

Objective VPCG 1.2. *Restore/Create Vernal Pool Complexes.* In addition to the protection of 17,000 acres of existing vernal pool complex, restore/create 3,000 acres of vernal pool complex in the Reserve System by Year 35, independent of effects. Within the 20,000 acres of protected and restored/created vernal pool complex, restore/create vernal pool constituent habitats to provide habitat for covered vernal pool branchiopods (Table 5-5). At least 30 wetted acres of vernal pools will be restored/created independent of effects (Table 5-4). Assuming all effects occur, an additional 870 acres of vernal pool constituent habitat will be restored as mitigation (Table 5-4). If the proposed maximum allowable effect occurs, restoration totals will be 900 acres of vernal pool constituent habitat, of which a minimum of 326 acres would be delineated as vernal pool wetlands (Table 5-4). At least 34 percent of

[5] Vernal pool constituent habitat includes delineated vernal pools, seasonal wetlands, and seasonal swales when seasonal wetlands and seasonal swales are a component of vernal pool complex.

all effects on vernal pool constituent habitat will be mitigated as vernal pool wetlands (up to 290 acres). The proportion of vernal pool wetlands to seasonal wetlands that will be restored/created will be equal to or greater than the proportion lost as a result of Covered Activities.

Objective VPCG-1.2 Rationale. Vernal pool complexes have been degraded in western Placer County and throughout their range in southern Oregon and California by direct disturbance, invasion of non-native species, and by alteration of hydrological patterns. For many complexes, habitat restoration may be necessary to regain proper functioning of a vernal pool ecosystem (U.S. Fish and Wildlife Service 2005).

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and Wildlife Service 2005) recognizes that vernal pool restoration and creation may be valuable recovery tools for some vernal pool species. Although vernal pool fairy shrimp and vernal pool tadpole shrimp are known to occupy restored and created pools, data on long-term persistence of these species in restored and created pools are lacking. For this reason, the recovery plan states that the order of preference for recovery of vernal pool species is, first, protection of existing habitat, followed by restoration of former or degraded habitat, and lastly, creation of vernal pools if necessary to maintain the range of vernal pool habitat. The Plan therefore relies primarily on protection of existing vernal pool complexes, but includes a restoration and creation component to supplement the vernal pool complex protection and to expand and connect existing vernal pool complexes in the Plan Area.

The acre commitment for restoration of vernal pool complex will support vernal pools at densities comparable to naturally occurring vernal pool complexes in the Plan Area. The result will be a substantial increase in the amount of interconnected vernal pool complexes in the Reserve System, thereby reducing landscape-level fragmentation and increasing permeability for Covered Species.

Objective VPCG-1.3. *Protect Grasslands.* Protect 2,740 acres of grassland natural community (i.e., non-vernal pool complex grassland), including 350 acres in the Valley RAA and 2,390 acres in the Foothills RAA (Tables 5-3).

Objective VPCG-1.3 Rationale. In the Valley, grasslands are interspersed with vernal pool complexes (vernal pool complexes comprise vernal pool constituent habitats and upland grasslands; see Chapter 3, *Physical and Biological Resources*, for descriptions of communities) and other natural communities. Most grasslands within the Valley have vernal pool constituent habitats interspersed within them, and will therefore be protected as vernal pool complexes. The grassland protection commitment, in conjunction with **Objectives VPCG 1.1** and **VPCG 1.2**, is intended to connect vernal pool complexes within a large, interconnected Reserve System of grassland and vernal pool complexes that will support grassland-dependent Covered Species and other native species. Large, interconnected grasslands are expected to benefit Swainson's hawk, western burrowing owl, and tri-colored blackbird by providing foraging and nesting habitat, and giant garter snake and western pond turtle by providing habitat for aestivation, resting and nesting.

Objective VPCG-1.4. *Restore Grasslands.* In addition to the protection of 2,740 acres of existing grassland natural community, restore 1,000 acres of grassland in the Reserve System in the Valley, independent of effects (Table 5-4).

Objective VPCG-1.4 Rationale. An extensive amount of grassland has been converted to agriculture and for urban and suburban development in western Placer County and throughout California, fragmenting remaining grasslands. The Plan will restore grasslands from existing agricultural lands. The grassland restoration commitment is intended to expand and connect existing grasslands and vernal pool complexes to reduce fragmentation and increase permeability across the grassland/vernal pool complex landscape.

Grasslands will be restored to sustain important habitat functions such as foraging, dispersal, and shelter for Covered Species and other native species. Grassland restoration will increase the extent, connectivity, and quality of grassland habitat available for use by Covered Species and other native species and thus contribute to their conservation. Covered Species expected to benefit from restored grasslands include Swainson's hawk, western burrowing owl, tri-colored blackbird, giant garter snake, and western pond turtle.

The restored grasslands will be planted with a mixture of native and naturalized grasses and forbs, and managed to encourage native biodiversity, but will not require a predominance of natives for the restored lands to contribute to the 1,000-acre restoration commitment. Creation and maintenance of large areas of native grassland can be very costly and often unsuccessful, and the Covered Species do not require grasslands dominated by native grasses and forbs to benefit from grassland restoration. Once grassland restoration sites are selected, restoration designs will include success criteria for the proportion of native species (e.g., in terms of biomass, percent cover, or other appropriate metrics) based on the site conditions and comparable reference sites, if available. These success criteria will be identified in site-level restoration plans (Section 5.3.3.2.1, *Site-level Restoration Plans*). This objective is intended to be met Plan-wide; some restoration sites may only be able to maintain the same proportion of natives pre-restoration, while others will increase it. Management goals for the control of non-native invasive species on restored and protected grasslands will be established in the reserve unit management plans.

Goal VPCG-2. Vernal pool complex and grassland communities managed and enhanced to promote regeneration and recruitment of Covered Species and support native biodiversity.

Vernal pool complexes and grasslands will be enhanced throughout the Reserve System. The following landscape-level biological objective will contribute to this goal.

- Achieving **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species,* will result in an increase in native species diversity and relative cover of native plant species, and reduction in the introduction and proliferation of non-native plants and animals in vernal pool complexes and grasslands. This will contribute to the resiliency and long-term stability of this natural community. Biodiversity is relatively high in vernal pools; a single vernal pool may support over 100 species of native plants and animals (U.S. Fish and Wildlife Service 2005). Vernal pool complexes have been degraded by fragmentation and associated edge effects (e.g., runoff of pollutants), invasion of non-native species, alteration of disturbance regimes (e.g., over or under-grazing), and alteration of hydrological regimes. These factors can cause a loss in native biodiversity. Many ecosystem processes are sensitive to declines in biodiversity; declines in regional and local biodiversity can reduce ecosystem resistance to environmental perturbations such as drought. Ecosystem processes such as soil nitrogen

levels, water use, plant productivity, and pest and disease cycles can become more variable as diversity declines (Naeem et al. 1999). Although the maintenance and increase of native biodiversity in vernal pools will not restore vernal pool complexes to pre-settlement levels of biodiversity, it is expected to help maintain or increase the biodiversity of vernal pool complexes in the Plan Area. Furthermore, maintaining or increasing the cover of vernal pool plants relative to invasive species will help to minimize competition posed by invasive plants with native plant species, and improve overall habitat suitability for native wildlife.

The natural community–level biological objectives contributing to natural community goal VPCG-2, and the rationale for each objective, are as follows:

Objective VPCG-2.1. *Enhance Vernal Pool Vegetation and Hydrology.* Enhance the vegetation and hydrology of degraded vernal pools and seasonal wetlands in the Reserve System to a self-sustaining natural hydroperiod (timing, frequency, and duration of inundation), and to sustain the vernal pool complex natural community, including associated covered vernal pool species.

Objective VPCG-2.1 Rationale. Altered hydrology of vernal pool complexes can change the timing, frequency, and duration of vernal pool inundation, which can create conditions that render vernal pools unsuitable or less suitable for vernal pool species (U.S. Fish and Wildlife Service 2005, 2007). Vernal pool hydrology has been altered by hydrologic barriers such as roads or canals, and the diversion of urban runoff and agriculture. Diversion of urban runoff and agriculture can increase pond timing and duration, converting vernal pools to perennial ponds that are incapable of supporting vernal pool species. Many vernal pools in the Plan Area have become degraded as a result of past agricultural practices. This objective will provide for the enhancement of existing, degraded vernal pools and seasonal wetlands by rehabilitating them to the appropriate hydrological conditions for sustaining covered vernal pool species within the Reserve System. This objective will also provide for the enhancement of native vegetation within the vernal pools through control of invasive species and thatch build-up.

Objective VPCG-1.1 requires the protection of at least 790 acres of vernal pool constituent habitats consisting of covered vernal pool branchiopod habitat, but this acreage may include vernal pools and seasonal wetlands that have been degraded and have low habitat value for covered vernal pool branchiopods (Tables 5-3). **Objective VPCG-2.1** requires that degraded vernal pools and seasonal wetlands in the Reserve System be enhanced to increase their habitat value for the covered vernal pool branchiopods.

Objective VPCG 2.2. *Increase Ground Squirrel Population.* Within protected and restored vernal pool complex and grassland communities, increase the population of ground squirrels to enhance prey populations and habitat value for wildlife species.

Objective VPCG 2.2 Rationale. Achieving this objective will increase burrow availability in protected and restored grasslands and the upland matrix of the restored and protected vernal pool complexes to benefit western burrowing owl, California red-legged frog, and other native species. California ground squirrels excavate burrows that provide substantial benefits to Covered Species, particularly western burrowing owl and California red-legged frog. A large proportion of animal species that inhabit these grasslands are either fossorial (i.e., adapted to digging and life underground) or burrow-

dependent, attributes that require access to constant underground habitats, presumably for temperature regulation and for protection from fire and predators. Additionally, ground squirrels are prey for Swainson's hawks and other raptors. However, ground squirrels have been the target of widespread poisoning campaigns in California, where they threaten levees or are perceived as pests. Loss and fragmentation of grasslands have also reduced ground squirrel distribution and abundance. By increasing the abundance and distribution of ground squirrels in the vernal pool complex and grassland natural communities, many native species will benefit.

5.2.6.2 Aquatic/Wetlands Complex Natural Communities

Goal AW-1. A Reserve System sustaining functional fresh emergent marshes, seasonal wetlands,[6] and lacustrine habitats (e.g., ponds), and the hydrologic processes that support them to benefit Covered Species and promote native biodiversity.

The following landscape-level biological objectives will contribute to this goal:

a. Achieving **Objective L-1.1**, *Establish a Large, Interconnected Reserve System*, will provide a large, interconnected Reserve System will greatly reduce future fragmentation of wetlands, ponds, and associated uplands by urban and suburban development and adverse effects related to adjacent urban development (e.g., urban runoff).

b. Achieving **Objective L-3.1**, *Implement Low Impact Development Standards*, will reduce the amount of stormwater reaching aquatic and wetland areas, and help to maintain natural stream channel functions and habitat.

c. Achieving **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species*, will benefit the aquatic/wetlands natural community through reducing or eliminating invasive species that degrade the habitat value of this community.

The natural community–level biological objectives contributing to natural community goal AW-1 and the rationale for each objective are as follows:

Objective AW-1.1. *Protect Aquatic/Wetlands Complex Natural Community.* Protect 600 acres of aquatic/wetlands complex natural community (400 acres in the Valley and 200 acres in the Foothills). The 600 acres of aquatic/wetlands complex will include at least 586 acres of wetlands (e.g., fresh emergent marsh, lacustrine, non-vernal pool seasonal wetland), of which at least 256 acres will be fresh emergent marsh (Table 5-3).

Objective AW-1.1 Rationale. The assembly of the Reserve System will substantially increase the amount of protected aquatic/wetlands complex natural community in the Plan Area. After restoration and creation is successfully completed (Table 5-4), a total of at least 606 wetted acres (and up to 989 wetted acres if the proposed maximum allowable effects on wetland and aquatic community occurs) of wetland and aquatic complex community will be protected and restored on the Reserve System. The protection and restoration commitments (**Objectives AW-1.1** and **AW-1.2**) provide for the conservation and recovery of some of the Covered Species in the Plan Area, in

[6] The aquatic/wetlands complex natural community includes seasonal wetlands that are not a component of vernal pool complexes. Seasonal wetlands that are associated with vernal pool complexes are included within the Vernal Pool Complex natural community.

addition to mitigating indirect effects and the direct effects on up to 260 acres of aquatic/wetland constituent habitats.

The protection commitments for the wetland and aquatic natural community are intended to be large enough with commitments for each constituent habitat to protect the range of wetland and aquatic types in the Plan Area. The net effect will be an increase in acreage and ecological function of wetland and aquatic communities, which provides habitat for giant garter snake, western pond turtle, California red-legged frog, tricolored blackbird, California black rail, and a diversity of native species.

Wetland and aquatic communities will be protected, restored, and created within a matrix of upland natural communities (e.g., grasslands and oak woodlands) to protect watershed integrity and to provide adjacent habitat for Covered Species necessary for nesting, migrating, dispersing, and aestivating.

Objective AW-1.2. *Restore/Create Aquatic/Wetland Complex Natural Community.* In addition to the protection of 600 acres of existing aquatic/wetland complex, restore and create aquatic/wetland natural community by restoring fresh emergent marsh, lacustrine, and non-vernal pool seasonal wetland constituent wetlands. At least 20 acres of fresh emergent marsh will be restored independent of effects. Additional restoration/creation will occur dependent on effect at a 1.5:1 ratio of restored/created to affected aquatic/wetland types. In the Valley, at least 40 percent of the restoration dependent on effects will be fresh emergent marsh. In the Foothills, at least 50 percent of the restoration dependent on effects will be fresh emergent marsh. The remaining 10 percent may occur in the Valley or the Foothills. Restoration dependent on effect may result in an additional 390 acres of aquatic/wetland type wetlands restored/created as mitigation. If the proposed maximum allowable effect on aquatic/wetland complex occurs, independent and dependent restoration will total 410 wetted acres of aquatic/wetland complex community of which a minimum of 196 acres would be delineated as fresh emergent marsh (Table 5-4).

Objective AW-1.2 Rationale. The restoration and creation of at least 20 acres of fresh emergent wetland, and up to 410 additional acres of aquatic/wetland complex constituent habitats (fresh emergent marsh, lacustrine, and/or non-vernal pool seasonal wetland) if the proposed maximum allowable effects occur, will result in a net increase in the aquatic/wetland complex natural community in the Plan Area. Aquatic/wetland type wetlands will be restored and created to mitigate in-kind for affected habitat. Aquatic/wetland creation will occur when suitable land is not available for restoration.

Aquatic/wetland complex natural communities will be restored and created to provide habitat (e.g., fresh emergent marshes and basking sites around the perimeter of ponds) for Covered Species, including giant garter snake, western pond turtle, California red-legged frog, tricolored blackbird, and California black rail. Aquatic/wetland complex communities will be restored and created within a matrix of upland natural communities (e.g., grasslands and oak woodlands) to protect watershed integrity and to provide adjacent habitat for Covered Species necessary for nesting, migrating, dispersing, and aestivating.

Objective AW-1.3. *Maintain and Enhance Wetlands and Ponds.* Maintain and enhance hydrological functions, native biodiversity, and habitats for populations of Covered Species in all protected aquatic/wetland complexes within the Reserve System.

Objective AW-1.3 Rationale. Wetlands and ponds will be maintained and enhanced throughout the Reserve System. Achieving this objective will ensure that appropriate hydrologic conditions and ecosystem functions are maintained and enhanced to support aquatic/wetland complex communities in the Reserve System, consistent with performance standards as described in Conservation Measure 2, *Manage and Enhance the Reserve System*, and in Chapter 7, *Monitoring and Adaptive Management Program*. These hydrologic conditions include inundation regimes suitable to provide habitat for Covered Species. Ecosystem functions will be maintained and enhanced, for example, to provide suitable vegetation structure and composition in aquatic/wetland complex communities. Vegetation provides cover and basking sites for Covered Species and native species. However, excessive and invasive vegetation reduces the quality and extent of aquatic and open water habitats for Covered Species and other native species. Fencing of wetlands and ponds and rotational grazing are two methods that will be used to manage sustainable grazing in these habitats.

Where predators such as bullfrog and bass are present, ponds may be drained to remove those aquatic predators. Plan Area ponds provide habitat for western pond turtle and California red-legged frog. These ponds are frequently dominated by non-native predators (e.g., bullfrog). Bullfrogs and several species of bass are known to prey upon the eggs and tadpoles of California red-legged frog, as well as western pond turtle hatchlings and juveniles (Moyle 1973; Holland 1991). Hatchlings of wood ducks, mallards, and even Canada geese often fall prey to largemouth bass.

5.2.6.3 Riverine and Riparian Complex Natural Communities

Goal RAR 1. Functional riverine and riparian communities that benefit Covered Species and promote native biodiversity in the Plan Area.

The following landscape-level biological objectives will contribute to this goal:

a. Achieving **Objective L-1.1**, *Establish a Large, Interconnected Reserve System*, will greatly reduce future fragmentation of riverine and riparian natural communities, and associated uplands, by urban and suburban development and adverse effects related to adjacent urban and suburban development (e.g., urban runoff).

b. **Objective L-2.1.** *Protect Habitat Linkages* will allow Covered Species and native species to move between protected natural communities within and adjacent to the Plan Area.

c. **Objective L-2.2.** *Maintain and Enhance Reserve System Permeability* will provide for wildlife movement, by not adding barriers and by removing or modifying existing barriers in the Reserve System.

d. **Objective L-2.3.** *Establish East–West Corridors* will stablish corridors for east-west movement by Covered Species and other native species along the Stream System by protecting and restoring interconnected riverine and riparian natural communities.

e. **Objective L-3.1.** *Implement Low Impact Development Standards* will improve development standards and minimize effects from Covered Activities in the Plan Area.

f. **Objective L-3.2.** *Reduce Non-native Species and Increase Native Species* will increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of non-native plants and animals

The natural community–level biological objectives contributing to natural community goal RAR-1, and the rationale for each objective, are as follows:

Objective RAR-1.1. *Protect Riverine/Riparian Complex.* Protect 2,200 acres of riverine/riparian complex natural community, which will include at least 1,410 acres of riparian constituent habitat (960 acres in the Valley and 451 acres in the Foothills). This portion of the Reserve System will include 88.6 linear miles of streams (riverine).

Objective RAR-1.2. *Protect Riverine Constituent Habitat.* Protect at least 88.6 linear stream miles of riverine within the riverine/riparian complex natural community.

Objectives RAR-1.1 and RAR-1.2 Rationale. The assembly of the Reserve System will substantially increase the amount of protected riverine and riparian constituent habitats in the Plan Area. The riverine and riparian protection commitments are large enough (with contribution from **Objective RAR 1.3** to expand and connect fragmented patches of riparian community) to protect corridors for movement from the Valley floor to the Foothills, which will contribute to achieving Landscape **Objective 2.3**, *Establish East–West Corridors*.

The protection commitments for the riverine and riparian constituent habitats are intended to be large enough to protect, along with enhancement and restoration (**Objectives RAR 1.3**, **1.4**, **1.5**, **1.6**, and **1.7**), functioning hydrologic systems that provide habitat value for native biota while continuing to meet urban requirements for flood control, drinking water, agriculture, and recreation. For western Placer County streams, this generally means providing the channel width and depth to convey most flood flows while maintaining both aquatic and terrestrial habitat complexity necessary to ensure water quality and suitable streambed conditions for all life stages of aquatic Covered Species.

The riverine and riparian commitment is intended to be large enough to ensure that extensive amounts of high quality spawning, rearing, and migrating habitat are protected for the covered salmonids within the Raccoon Creek, Doty Ravine, and Auburn Ravine, and Dry Creek watersheds, consistent with the Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead (National Marine Fisheries Service 2014).

After restoration is successfully completed, at least 2,232 acres (and up to 3,625 acres if the proposed maximum allowable loss of riverine/riparian complex community occurs) of riverine/riparian communities will be protected and restored on the Reserve System. These protection and restoration commitments provide for the conservation and recovery of Covered Species in the Plan Area, in addition to mitigating indirect effects and the direct effects on 490 acres of the riverine/riparian complex natural community.

The protection of 88.6 miles of streams in Plan Area A and B (see Section 5.3.1.3.4, *Conservation in Plan Area B*) and restoration of fish passage both upstream and downstream of existing barriers (**Objective RAR 1.5**) will provide for the conservation and recovery of riverine Covered Species in the Plan Area, in addition to mitigating direct and indirect effects on 551 miles of streams in the Plan Area. The protection of these streams will overlap the riverine/riparian complex community protected.

Objective RAR-1.3. *Restore Riverine/Riparian Complex.* A minimum of 32 acres of riparian constituent habitat will be restored, independent of effects. In addition, impacts on riverine/riparian constituent habitat and the Stream System will be mitigated by restoration of riverine and riparian constituent habitat at ratio of 1.52:1. If the proposed maximum allowable effects on riverine/riparian complex and the Stream System occur (490 acres and 426 acres, respectively, for a total estimated effect of 916 acres), up to an additional 1,425 acres of riverine/riparian complex will be restored.[7] Of the 1,425 acres of riverine and riparian constituent habitat restoration, 1,250 acres must be restored as riparian constituent habitat. Also see Table 5-4. Effects on salmonid habitat (i.e., spawning or migrating) will be mitigated in kind. Other natural communities interspersed within riverine/riparian complex may be restored as part of riverine/riparian upland complex (e.g., valley oak woodland, fresh emergent wetlands).

Objective RAR-1.3 Rationale. Extensive amounts of riverine/riparian complex have been lost or degraded in the Plan Area, thereby fragmenting remaining habitat, particularly of riparian constituent habitat. Restoration of riverine/riparian complex will substantially increase the amount of this community in the Plan Area

This objective provides for the restoration of riverine/riparian complex as mitigation for the effects of Covered Activities on the Stream System (see Section 6.3.3.4, *Stream System Condition 3, Stream System Mitigation: Restoration,* for details), which includes direct effects on 490 acres of riverine/riparian complex and direct effects on another 426 acres of the Stream System. The effects on the Stream System (426 acres) will be determined when the Stream System boundary is assessed (see Section 6.3.3.1.1, *Stream System Boundary*). Where the affected Stream System includes constituent habitats, effects will be mitigated by restoration of those habitats. The Stream System also includes other communities, in addition to constituent habitats (e.g., grassland, valley oak woodland). Effects on other such communities within the Stream System will also be mitigated at a ratio of 1.52:1 by restoration of riverine/riparian constituent habitats to mitigate the irreversible loss of the valuable ecosystem services provided by land within the Stream System.

The majority (over 74 percent) of riverine/riparian complex will be restored as constituent habitat. Riverine/riparian complex includes a diverse mosaic of riverine, riparian communities and other closely associated communities, including fresh emergent wetlands, seasonal wetlands, off-channel wetlands, and stands of valley oak woodland. This objective allows for up to 22 percent of riverine/riparian complex restoration to include these closely associated communities.

[7] This total includes an additional 22 acres of riparian constituent habitat restoration to address effects on uplands associated with riverine/riparian complex.

The restoration of 32 acres of riparian vegetation independent of effect, and additional riparian vegetation dependent on effect, will be sited in spawning, rearing, and migrating habitat primarily along Raccoon Creek, Doty Ravine, and Auburn Ravine to optimize habitat values for covered fish species. Restoration of riverine/riparian complex dependent on effect will be implemented in-kind for effects on salmonid habitat. For example, if 20 acres of riverine/riparian complex are affected in spawning habitat on Raccoon Creek, 30.4 acres of riverine/riparian complex will be restored in spawning habitat on Raccoon Creek, with at least 74 percent restored as riparian vegetation.

Riparian restoration will be focused on expanding and connecting existing fragments of riparian communities to restore corridors for movement in the Plan Area, which will contribute to achieving Landscape **Objective 2.3**, *Establish East–West Corridors.*

The riverine/riparian complex natural community provides important ecosystem functions. Achieving this objective will improve riparian-related ecosystem functions such as providing shade that moderates water temperatures in adjacent streams, slowing water velocities during flood events, reducing inputs of nutrients (e.g., nitrogen) and pollutants into streams, providing habitat for terrestrial and aquatic invertebrates, prey species for covered salmonids and native biota, and stabilizing banks against erosion.

The riverine/riparian complex natural community provides important habitat for many Covered Species and other native species in the Plan Area. Riparian restoration, for example, will restore habitat for Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, amphibians, and the covered salmonids. Swainson's hawk nests in riparian habitats in the Valley. Valley elderberry longhorn beetle occur almost entirely within riparian communities. For salmonids, the riparian vegetation provides shade that regulates water temperature and large woody material that provides cover and in-stream habitat complexity. Flooded riparian zones also provide rearing habitat for the covered salmonids.

Objective RAR-1.4. *Enhance Riparian Vegetation.* Enhance the cover, structural diversity, and native species diversity of the riparian constituent habitat in the Reserve System.

Objective RAR 1.4 Rationale. Riparian constituent habitat will be enhanced throughout the Reserve System. Achieving this objective will increase native biodiversity and relative cover of native plant species, increase structural diversity, and improve habitat function for Covered Species and native biota. High species diversity promotes natural community resilience, and native biodiversity in riparian systems generates structural diversity that constitutes habitat for many riparian wildlife species. Success criteria for individual enhancement sites will be developed within each reserve unit management plan.

Objective RAR-1.5. *Remove or Modify Fish Barriers.* Initiate partnerships with managing agencies and remove or modify two high-priority fish passage barriers, including the barrier at Doty Ravine at Garden Bar Road and one other barrier identified in Table 3-5. When partnerships allow, remove or modify up to three more of the fish passage barriers identified in Table 3-5.

Objective RAR-1.5 Rationale. This objective is intended to contribute to recovery for covered salmonids by protecting and restoring movement corridors for covered salmonids and other native species between the Valley and the Foothills, and between reserves within and adjacent to the Plan Area, consistent with Section 2820(a)(4)(B) of the NCCP Act. Riverine and riparian habitats are naturally existing corridors for covered salmonids. Numerous barriers in Plan Area streams impede the up and down-stream movement of covered and other native fish. Removing or modifying barriers to fish movement will restore access to valuable habitat and will improve movement into and out of the Plan Area by covered salmonids. Removing or modifying fish barriers will require partnerships and agreements with landowners to conduct the action. The PCA commits to removing the Doty Ravine barrier at Garden Bar Road and one other high-priority site identified in Table 3-5. Funding is provided in the Plan for up to five fish passage barrier removals or modifications. The remaining three will be implemented if partnerships and agreements can be reached with landowners.

Objective RAR-1.6. *Modify Unscreened Water Diversions.* Screen, consolidate, relocate, remove, or otherwise modify all unscreened water diversions on salmonid streams in the Reserve System.

Objective RAR-1.6 Rationale. Numerous water diversions throughout the Plan Area are unscreened, many of which are associated with barriers to fish passage in the Plan Area (Bailey 2005; Jones & Stokes Associates 2005). The *Recovery Plan for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead* (National Marine Fisheries Service 2014) identifies unscreened diversions as an entrainment threat to juvenile salmonids, which reduces survival (e.g., National Marine Fisheries Service 2014). Screening water diversions will reduce entrainment in Plan Area streams and improve survival of juvenile salmonids. The PCA expects to take control over an unknown number of unscreened diversions as lands are acquired in fee title or conservation easement for the Reserve System. As these unscreened diversions are brought into the Reserve System they will be screened, removed, or otherwise modified to meet this objective and provide for the conservation of the covered salmonids. Some unscreened diversions outside of the Reserve System (i.e., not protected through fee title or conservation easement) may be screened or removed as part of the fish passage barrier removal or modification projects (see **Objective RAR-1.5**).

Objective RAR-1.7. *Enhance Streams.* Enhance stream reaches within the Plan Area to promote habitat complexity and function (e.g., diversity of in-stream habitat, shaded riverine habitat, floodplain inundation). The PCA will improve in-channel features of Plan Area streams sufficient to meet a 1.5:1 ratio of enhanced to affected. In-channel enhancement measures will be located in the same watershed and salmonid habitat type (e.g., spawning, migrating, if the effects occur in a salmonid stream) in which the effects occur. The enhancement measures may be implemented in streams on the Reserve System and elsewhere within Plan Area A, Plan Area B3, *Raccoon Creek Floodplain Conservation*, and Plan Area B4, *Fish Passage Channel Improvement* (Figure 5-4).

Objective RAR 1.7 Rationale. This objective is intended to improve habitat complexity and function for Covered Species and native biota in Plan Area A and B streams. Increasing channel complexity contributes to biological diversity, richness, and sustainability of the aquatic ecosystem, and benefits salmonid rearing habitat.

Increasing channel complexity consistent with this objective will provide in-stream refuge cover for covered salmonids, amphibians, and native species, consistent with the, *Recovery Plan for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead*(National Marine Fisheries Service 2014). This will provide for more suitable natural conditions for fish and other aquatic species while moderating water temperatures, providing in-stream cover for fish and other aquatic species, and helping to create food sources for covered fish species. This will also facilitate the movement of animals and plants (e.g., dispersal of seeds of riparian species) along riverine and riparian corridors that traverse the Plan Area.

Table 5-2. Acquisition Commitments (acres)

Communities and Constituent Habitats	Total in Plan Area A	Acquired Acres		Existing Protected Areas	Available for Acquisition[c]	Acquisition Commitment + Existing Protected Areas as % of Total in Plan Area A
		Acquisition Commitment[a]	*Estimated Acquisition (Flexible)*[b]			
Vernal Pool Complex (VPC)	**45,065**	**17,000**		**7,067**	**20,115**	**53%**
Vernal Pool Constituent Habitats	2,237	790	-	555	882	60%
Vernal Pool Wetland	790	250	-	226	303	60%
Seasonal Wetland in VPC	845	-	*304*	209	327	61%
Seasonal Swales	602	-	*236*	120	253	59%
Vernal Pool Complex Uplands[b]	42,829	-	*16,210*	6,512	19,233	-
Grassland	**34,760**	**7,150**	**-**	**1,097**	**13,635**	**24%**
Aquatic/Wetland Complex	**3,433**	**600**	**-**	**591**	**1,594**	**35%**
Aquatic/Wetland Constituent Habitats	*2,850*	586	-	*407*	*1,321*	
Fresh Emergent Marsh	1,112	256	-	193	540	40%
Lacustrine	1,061	-	*181*	93	452	26%
Non-VP Seasonal Wetland	677	-	*148*	121	328	40%
Aquatic/Wetlands Complex Uplands[b]	583	-	*14*	184	273	-
Riverine/Riparian Complex	**6,685**	**2,200**	**-**	**458**	**3,390**	**40%**
Riverine/Riparian Constituent Habitats	*5,519*	1,718	-	*412*	2,732	
Riverine	868	-	*308*[d]	126	425	50%
Riparian	4,651	1,410	-	286	2,306	36%
Riverine/Riparian Complex Uplands[b]	1,167	-	*482*	46	658	
Valley Oak Woodland	**1,364**	**190**	**-**	**21**	**396**	**15%**
Oak Woodland	**50,870**	**10,110**	**-**	**6,122**	**14,946**	**32%**
All Natural Communities	**142,179**	**37,250**	**-**	**15,357**	**54,075**	**37%**

Communities and Constituent Habitats	Total in Plan Area A	Acquired Acres		Existing Protected Areas	Available for Acquisition[c]	Acquisition Commitment + Existing Protected Areas as % of Total in Plan Area A
		Acquisition Commitment[a]	*Estimated Acquisition (Flexible)*[b]			
Agriculture	**24,954**	**10,050**	-	**232**	**14,706**	**41%**
Rice Agriculture	19,580	2,000	-	185	14,430	11%
Field Agriculture	2,757	-	-	10	221	-
Orchard and Vineyard Agriculture	2,618	-	-	37	54	-
All Agriculture		**-**	**8,050**	**-**	**-**	**-**
Non-natural	**42,698**	**-**	**-**	**369**	**-**	**-**
Managed Open Water	5,317	-	-	-	-	-
Rural Residential	18,871	-	-	32	-	-
Urban	18,510	-	-	337	-	-
Total All Land	**209,832**	**47,300**[e]	**-**	**15,957**	**68,781**	**37%**

Source: MIG|TRA February 23, 2016

Notes:

[a] Acquisition Commitment: The acquisition of land, through purchase of fee title or conservation easement, to protect natural communities or Covered Species' habitat.

[b] Estimated flexible acquisition is an estimate of the acres of constituent habitats that will be acquired in reserves incidental to and as part of the land acquired to achieve the acquisition commitment. More or less of these constituent habitats can be acquired as long as the acquisition commitments for communities and other constituent habitats are met.

[c] Available for Acquisition: The extent of Reserve Acquisition Area land and Potential Future Growth Area Stream System after direct loss from Covered Activities is deducted.

[d] Includes 88.6 stream miles of riverine identified in **Objective RAR-1.2**. The 88.6 miles of a protection are a requirement within the Plan.

[e] Some values in the table may not sum exactly to the total due to rounding. The values in the Acquisition Commitment column are fixed regardless of any rounding errors.

5.2.6.4 Oak Woodland Natural Communities

Goal OW-1. Functional oak woodland communities, including the oak woodland community and valley oak woodland community[8] that benefit Covered Species and promote native biodiversity.

The following landscape-level biological objectives will contribute to this goal:

a. Achieving **Objective L-1.1**, *Establish a Large, Interconnected Reserve System*, will greatly reduce future fragmentation of oak woodland natural communities by urban and suburban development and adverse effects related to adjacent urban development (e.g., urban runoff). The natural community–level biological objectives contributing to natural community goal OW-1, and the rationale for each objective, are as follows:

Objective OW-1.1. *Protect Oak Woodlands.* Protect 10,110 acres of a diversity of oak woodland land-cover types (e.g., mixed-oak woodland, blue oak woodland, interior live oak woodland) (Table 5-3).

Objective OW-1.1 Rationale. Oak woodlands are among California's most diverse natural communities, with more than 300 vertebrate species relying on these areas. More than a third of all California's oak woodlands has been lost since its settlement by Europeans; of an estimated original 10 to 12 million acres, only some 7 million remain (Placer County 2008a). Of the remaining oak woodlands, only about four percent are formally protected.

- The assembly of the Reserve System will substantially increase the amount of protected oak woodlands in Plan Area A. The protection of 10,110 acres of oak woodlands is intended to protect existing landscapes of large blocks of oak woodlands, representative of a diversity of oak woodland land-cover types (e.g., blue oak woodland, interior live oak woodland, oak-foothill pine woodland) in the north Foothills. This area supports the largest remaining patches of oak woodlands in Plan Area A. After protection (**Objective OW-1.4**) and restoration are complete, at least 415 acres (and up to 475 acres if the proposed maximum allowable effects on valley oak woodland occurs) of valley oak woodland will be protected on the Reserve System. Protecting this landscape will prevent further loss and fragmentation of these oak woodlands (Tables 5-3 and 5-4).
- Protecting and restoring (see **Objective OW-1.2**, *Restore Oak Woodlands*, below) at least 10,210 acres of oak woodland in the Foothills will likely improve fuels management in the Foothills (Tables 5-3 and 5-4). A fuels management plan will be developed for the Reserve System, including the Foothill oak woodland reserves (**Objective L-3.3**, *Manage Fire*). Managing fuels on the Foothill reserves is anticipated to benefit residents and businesses in the Foothills by improving fuels management across a large portion of the Foothills.

[8] The oak woodland community includes the diversity of oak woodland land-cover types (i.e., blue oak woodland, interior live oak woodland, mixed oak woodland, oak-foothill pine woodland, and oak savanna) that occur primarily in the Foothills. A small amount of oak woodland extends into the upper elevations of the Valley portion of Plan Area A. Valley oak woodlands are stands dominated by valley oaks with a canopy cover greater than 30 percent.

Objective OW-1.2. *Restore Oak Woodlands.* In addition to the protection of 10,110 acres of oak woodlands, restore 100 acres of oak woodlands, independent of effects (Tables 5-3 and 5-4).

Objective OW-1.2 Rationale. Oak woodlands in Plan Area A have been removed and fragmented for agriculture and development. While much of the oak woodlands in the north Foothills have regenerated where orchards have been abandoned, patches remain fragmented, possibly in areas where oak regeneration has been limited or anthropogenic activities on agricultural and rural residential lands have precluded regeneration. Restoration is an important tool for reducing fragmentation of oak woodlands on the Reserve System, as well as compensating for loss of oak woodlands from Covered Activities. Restoration will be focused in areas to expand and connect existing patches of oak woodland.

Objective OW-1.3. *Maintain and Enhance Oak Woodlands*. Maintain and enhance all oak woodlands within the Reserve System by promoting regeneration and recruitment of representative species and managing vegetation and invasive plants.

Objective OW-1.3 Rationale. Oak woodlands will be maintained and enhanced throughout the Reserve System. As described in Chapter 3, *Physical and Biological Setting*, lack of regeneration may be a threat to the persistence of blue oak woodland and valley oak woodland in Plan Area A. Therefore, techniques that are specifically designed to maintain and enhance regeneration are likely to be especially important for these natural communities.

Objective OW-1.4. *Protect Valley Oak Woodlands.* Protect 190 acres of valley oak woodland (an estimated 100 acres in the Foothills and 90 acres in the Valley).

Objective OW-1.4 Rationale. The assembly of the Reserve System will substantially increase the amount of protected valley oak woodlands in Plan Area A. Valley oak woodland was formerly distributed throughout the Sacramento and San Joaquin Valleys (Holland 1986). Upward of 90 percent of valley oak woodland in the Central Valley has been cleared for agriculture and urban expansion (Standiford 2014) and only remnant patches remain. In western Placer County, valley oak woodland has a limited distribution, particularly in the Valley portion of Plan Area A. Protection of valley oak woodland in Plan Area A will prevent further loss and fragmentation of this rare community and allow for the management of these woodlands to maintain and enhance regeneration (**Objective OW-1.3**).

Objective OW-1.5. *Restore Valley Oak Woodlands.* In addition to the protection of 190 acres of valley oak woodland, restore 225 acres of valley oak woodlands independent of effect (Tables 5-3 and 5-4). Additional restoration will occur dependent on effects in the Valley only at a 1.5:1 ratio of restored to affected valley oak woodland (the mitigation ratio does not apply to loss of valley oak woodland in the Foothills). If the proposed maximum allowable effects on valley oak woodland occur (40 acres), an additional 60 acres of oak woodland would be restored, for a maximum total restoration of 285 acres (Table 5-4).

Objective OW-1.5 Rationale. Valley oak woodland restoration is an important component of the conservation of this natural community in Plan Area A, as identified in the Placer County Oak Management Plan (Placer County 2008a). The restoration of at

least 225 acres of valley oak woodland will result in a net increase in the valley oak woodland in Plan Area A.

Valley oak woodlands in Plan Area A have been removed and fragmented for agriculture and development (Placer County 2008a). Remaining patches of valley oak woodland may be threatened by inadequate regeneration, which is perceived as a problem for valley oaks in California (Tyler et al. 2006). Restoration is an important tool for reducing fragmentation of valley oak woodlands on the Reserve System, as well as compensating for loss of oak woodlands from Covered Activities. Restoration will be focused in areas to expand and connect existing patches of oak woodland.

Collectively, achieving these biological objectives will result in conservation, restoration, and management of natural communities to maintain the ecological integrity of large habitat blocks, ecosystem function, and biological diversity consistent with NCCP requirements.

5.2.6.5 Agriculture and Other Open Space

Goal AO-1. A Reserve System with integrated open space that precludes development, enhances Reserve System connectivity, and provides opportunities for protecting, restoring, and managing habitat for Covered Species and other native species.[9]

Objective AO-1.1. *Protect Agricultural Lands and Other Open Space*. Protect at least 8,240 acres of agricultural lands or natural communities in the Valley, including patches of natural vegetation, such as trees and shrubs that may be used by Covered Species, and provide large, contiguous blocks of open space between protected natural communities, agricultural land, and urban/suburban land uses in the Reserve System (Table 5-3).

Objective AO-1.1 Rationale. Since agriculture is an important component of the economy and culture of Placer County, the Plan seeks to achieve a sustainable balance of agriculture and conservation within the landscape. The commitment for agriculture and other open space protection is large enough to assemble an interconnected Reserve System of natural communities and agricultural land in the Valley RAA. **Objective GGS-1.1** ensures that at least 2,000 of the 8,240 acres will be rice land (or wetland equivalent; see Section 5.2.7.5, *Giant Garter Snake, Objective GGS-1.1 Rationale*) grown and managed (including securing the necessary water rights) annually to benefit giant garter snake. The remaining 6,240 acres will not be required to be maintained in any particular crop type, and therefore will not count toward meeting the USFWS federal permit requirements or habitat commitments for mitigation for any Covered Species. The crops planted on the 6,240 acres will vary depending on market demand, future water availability, climate change, and a host of other factors. The 6,240 acres, while not required to meet NCCP requirements, will provide the following additional benefits under the NCCP Act to conserve representative natural and semi-natural landscapes: maintain the ecological integrity of large habitat blocks, ecosystem function, and biologically diversity (Fish and Game Code 2820 (a)(4)(A)) and sustain the effective movement and interchange of organisms between habitat areas in a manner that

[9] Row crops and other agriculture types will be included as part of the Reserve System, but will not be used to mitigate for impacts on land-cover types other than agricultural, including effects on higher value, natural land-cover types.

maintains the ecological integrity of the habitat areas within the Plan Area (Fish and Game Code 2820 (a)(4)(E)) (Table 5-3).

1. **Breeding and Foraging Habitat**. Rice production is the primary agricultural crop in the Valley; 19,580 acres out of 24,954 acres (79 percent) of agriculture land is devoted to rice. The balance comprises orchards (10 percent) and row crops (11 percent), with alfalfa comprising less than one percent. Rice cultivation with flood irrigation provides an important substitute for wetlands during the summer, and provides habitat for many aquatic plants, insects, crustaceans, small mammals, and resident waterfowl. One study found that 28 mammal, 27 amphibian and reptile, and 122 bird species spend all or a portion of their life cycles in rice fields or associated levees, canals, and riparian areas. This includes five of the Covered Species: Swainson's hawk, burrowing owl, tricolored blackbird, western pond turtle, and giant garter snake (Brouder and Hill 1995). Although a large percentage of the 8,240 acres of protected agricultural lands are expected to remain in rice, only the 2,000 acres committed to remain in rice will count toward the Covered Species' commitments because the remainder may be converted to other habitat types. Even with conversion to other crop types, however, these agricultural lands will provide benefits to native species in the Plan Area. Alfalfa and row crops, for example, are expected to provide foraging habitat for species such as Swainson's hawk, western burrowing owl, and other native species (Haug et al. 1993; Estep 1989), even though they currently provide only minor benefits in the Plan Area because they are limited in extent. Conversion to orchards is the greatest threat to habitat values on these lands, as described in #2, below; however, orchards are likely to provide dispersal habitat for native species.

   Even when the crops themselves do not provide foraging or breeding habitat value for native wildlife, features on the agricultural lands often provide these values. For example, hedgerows provide valuable resources such as food and shelter, to insects, birds, bats and small mammals when the majority of the land is agricultural (Lincolnshire Biodiversity Action Plan 2003). Other common agricultural practices that increase habitat value for wildlife include herbaceous field borders, filter strips, grassed waterways, windbreaks, and riparian forest buffers (Clark and Reeder 2007).

2. **Dispersal Habitat.** Many native wildlife species will be able to move through the agricultural landscape between patches of natural communities, particularly through agricultural lands supporting features that provide movement habitat for the species. For example, hedgerows provide dispersal habitat for insects, birds, and small mammals when the majority of the land is agricultural (Lincolnshire Biodiversity Action Plan 2003). Herbaceous field borders, filter strips, grassed waterways, windbreaks, and riparian forest buffers can provide for the movement of wildlife through agricultural landscapes (Clark and Reeder 2007). Orchards can provide habitat connectivity for many native species, such as bobcats (*Lynx rufus*) and other mammalian carnivores (Nogiere et al. 2015).

3. **Connectivity and Conservation Opportunities.** The Valley consists of a mosaic of large patches of vernal pool complex, grassland, valley oak woodland, and riverine and riparian complex natural communities with rice land and other agricultural land in the Valley (Figure 5-2). Protecting agricultural land will preclude future

development from permanently fragmenting the landscape in the Valley RAA. An advantage of preventing development on agricultural lands is that these lands, unlike developed lands, will be available for potential conversion to natural communities in the future. Furthermore, the PCA may choose to protect natural communities rather than agricultural lands to meet this objective. The 8,240 protected acres may consist of natural communities rather than agricultural land. If the PCA finds vernal pool complexes or other natural communities that are available for protection beyond the acre commitments for those natural communities, the PCA may acquire and protect these lands in lieu of protecting agricultural land. This approach will maximize habitat values for Covered Species and other native species in the Reserve System.

On all the protected agricultural lands, common practices can be implemented to increase the habitat value for wildlife, and landowners may voluntarily choose to adopt these practices in agreement with the PCA. These practices include use of hedgerows, herbaceous field borders, filter strips, grassed waterways, windbreaks, and riparian forest buffers (Clark and Reeder 2007). Landowners may also choose to restrict use of pesticides in their easements. These practices are described in Section 5.3.2.3.5, *Agriculture and Other Open Space*.

The Plan's Covered Activities will result in the loss of up to 2,900 acres of agricultural land throughout Plan Area A, including an estimated 2,000 acres of rice and 900 acres of other agricultural land-cover types. With the exception of rice for giant garter snake, the Plan will not mitigate effects on Covered Species that use agricultural lands through protection and management of agricultural lands; rather, the Plan will mitigate loss of agricultural Covered Species' habitat through protection, restoration, management and enhancement of natural communities supporting habitat for these species.

5.2.7 Species-level Biological Goals and Objectives

Species-level goals and objectives supplement goals and objectives at the landscape and community levels with conservation measures tailored to meet the needs of individual species. Conservation of Covered Species will be facilitated by protecting, maintaining, enhancing and restoring and creating appropriate habitat for these species within the context of broader landscape- and community-level goals (e.g., improve or maintain desirable vegetation structure and hydrological regimes, eliminate invasive exotics) (Brussard et al. 2004).

Some Covered Species are not known to regularly occur in Plan Area A (e.g., California red-legged frog, giant garter snake). For such species, goals, objectives, and corresponding conservation measures are designed to facilitate the expansion (or re-colonization) of populations into Plan Area A by protecting, enhancing, and restoring their habitats.

5.2.7.1 Swainson's Hawk

Goal SWHA-1. Habitat to provide for a sustained population of Swainson's hawks in the Plan Area.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving **Objectives L-1.1**, *Establish a Large, Interconnected Reserve System*, and **L-1.2**, *Protect Habitat Linkages,* will result in large, interconnected blocks of habitat for Swainson's hawk in the Reserve System, thereby minimizing the energetic costs of traveling between fragmented habitat areas.

b. Achieving **Objective RAR-1.1**, *Protect Riverine/Riparian Complex,* will protect Swainson's hawk riparian nesting habitat in the Valley.

c. Achieving **Objective OW-1.4**, *Protect Valley Oak Woodlands,* will protect valley oak woodland in the Valley, which is nesting habitat for Swainson's hawk.

d. Achieving **Objective RAR-1.3**, *Restore Riverine/Riparian Complex,* will restore riparian community along Plan Area streams in the Valley, providing nesting habitat for Swainson's hawk.

e. Achieving **Objective OW-1.5**, *Restore Valley Oak Woodlands,* will restore valley oak woodland in the Valley, which is nesting habitat for Swainson's hawk.

f. Achieving **Objective VPCG-1.1**, *Protect Vernal Pools,* will protect vernal pool complex, which provides foraging habitat for Swainson's hawk.

g. Achieving **Objective VPCG-1.3**, *Protect Grasslands,* will protect grassland in the Valley, which provides foraging habitat for Swainson's hawk.

h. Achieving **Objective VPCG-1.2**, *Restore/Create Vernal Pools,* will restore/create vernal pool complex, which provides foraging habitat for Swainson's hawk.

i. Achieving **Objective VPCG-1.4**, *Restore Grasslands,* will restore grassland in the Valley, which will provide foraging habitat for Swainson's hawk.

j. Achieving **Object VPCG-2.2**, *Increase Ground Squirrel Population*, will increase prey and the foraging habitat value of grasslands for Swainson's hawks.

Elsewhere in the Sacramento Valley, Swainson's hawk forage primarily alfalfa, tomato, and other similar crops (Estep 1989). However, these agricultural crops are planted in small amounts in the Plan Area. For example, approximately 176 acres of the Valley are planted in alfalfa, less than 0.5 percent of the natural communities within Plan Area A. Within Plan Area A, Swainson's hawk forages primarily in grassland habitats (e.g., vernal pool complex grassland, annual grassland, pasture and irrigated pasture) (Pandolfino, pers. comm.). The Plan will protect and restore a total of 20,923 acres of suitable grassland foraging habitats for Swainson's hawk on the Reserve System in the Valley (see **Objective SWHA-1.1** for rationale for protecting and restoring Swainson's hawk nesting habitat and Table 5-6 for acreage commitments for each Covered Species). These objectives provide for the conservation and recovery of Swainson's hawks in Plan Area A, in addition to mitigating loss of 16,267 acres of modeled Swainson's hawk foraging habitat (Table 4-11, *Species Permanent Effects*). Swainson's hawks generally forage within 10 miles of their nests (California Department of Fish and Game 1995). Within the Valley RAA, all grassland, vernal pool grassland complex, and pasture to be protected and restored to achieve **Objectives VPCG-1.1**, **VPCG-1.2**, **VPCG-1.3**, and **VPCG-1.4** is located well within 10 miles of nesting habitat (riparian woodland, valley oak woodland, and isolated, large, sparsely distributed trees along field borders in other open land-cover types such as annual grassland, along roadsides, and agricultural fields) and will provide suitable foraging habitat.

The total 20,923 acres of protected and restored foraging habitat described above does not include agricultural land that will be protected as part of AG 1.1 because the Plan does not

commit to planting a minimum acreage of specific crops for the benefit of Swainson's hawk. (The 16,267 acres of modeled habitat that will be lost to Covered Activities, however, includes 125 acres of agricultural crops, including irrigated pasture and alfalfa.) The majority of the agricultural land protected for AG 1.1 is anticipated to be rice land, which provides minimal habitat for Swainson's hawk because Swainson's hawk does not regularly forage in flooded habitats. The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

Objective SWHA-1.1. *Protect Swainson's Hawk Nest Trees.* Protect at least four active Swainson's hawk nest trees (i.e., nesting within the last 5 years) in the Reserve System. The protected nest trees must be a minimum of 1 mile from each other, or a qualified biologist must otherwise demonstrate that each protected nest tree corresponds to a separate pair of Swainson's hawks rather than multiple nests within a single territory.

Objective SWHA-1.1 Rationale. This objective is intended to ensure that active nest trees are protected within the Reserve System. A Swainson's hawk nest is assumed active if it has been used within the previous 5 years, because Swainson's hawks may re-use nest trees in subsequent years.

In the Valley portion of Plan Area A, Swainson's hawk nests in riparian woodland and valley oak woodland. Swainson's hawk also nests in isolated, large, sparsely distributed trees along field borders in other open land-cover types, such as annual grassland, along roadsides, and agricultural fields. Five recorded nests within Plan Area A have been active since 2010 (California Department of Fish and Wildlife 2016). Of the five active nests, one is protected within an Existing Protected Area and four are located within the RAA. There have been no active nests in the PFG documented since 2003, when three nests were found in the PFG. The Plan anticipates that it is feasible to protect at least four active nest trees on the Reserve System, as an extensive amount of breeding habitat (and foraging habitat with isolated trees suitable for nesting) will be protected within the Reserve System. Furthermore, the nests recorded to be active most recently occur in the RAA, where most of the Reserve System will be acquired.

Achieving the natural community objectives listed above will result in the protection and restoration of at least 1,988 acres of nesting habitat for Swainson's hawk within the Reserve System (based on the habitat model described in Appendix D, *Species Accounts*). See Table 5-7 for Covered Species' protection and restoration commitments. These protection and restoration objectives, in addition to **SWHA-1.1**, provide for the conservation and recovery of Swainson's hawk in Plan Area A, in addition to mitigating indirect effects and the direct effects on 149 acres of riparian and Valley oak woodland Swainson's hawk nesting habitat.

Objective SWHA-1.2. *Protect Swainson's Hawk Foraging Habitat***.** As part of the 20,932 acres of foraging habitat that will be protected and restored on the Reserve System, protect at least 741 acres of modeled foraging habitat surrounding each of the four nest trees protected to achieve Objective SWHA-1.1 for a total of 2,964 acres of suitable Swainson's hawk foraging habitat.

Objective SWHA-1.2 Rationale. Estimates indicate that under optimal conditions, individual nesting pairs require a minimum of approximately 741 acres of suitable foraging habitat; however, foraging ranges are geographically and temporally variable and are dependent largely on cover type and phenology and their relationship to prey

availability (Fitzner 1978; Bechard 1982; Estep 1989; Babcock 1995). Swainson's hawks in Placer County rely primarily on the grasslands, including grasslands within vernal pool complexes, for foraging. Protection of foraging habitat surrounding the nest sites will ensure that Swainson's hawks nesting in the area have access to foraging areas, and the carrying capacity of the habitat will be increased through enhancement measures described below.

Objective SWHA-1.3. *Enhance Foraging Habitat***.** Maintain or increase prey availability and improve foraging habitat by strategically planting shrubs or placing debris piles or other substrate that provides cover and refugia for fossorial mammals and other prey species, on at least four sites, each within a mile of one of the four protected nest trees.

Objective SWHA-1.3 Rationale. Achieving this objective will increase cover and refugia for fossorial mammals within and on the borders of Swainson's hawk foraging habitat to increase prey availability for this species. Hedgerow plantings may occur on the borders of agricultural lands adjacent to protected Swainson's hawk habitat, even if the agricultural land is not counted as Swainson's hawk foraging habitat due to lack of crop restrictions. Providing refuge habitat for prey species adjacent to agricultural settings will allow areas that have been harvested or with temporarily reduced or eliminated populations of prey to re-establish more quickly. The amount of shrubs or debris piles to be planted or placed will depend on the conditions of the sites protected, and the need and opportunities for enhancing habitat at each site.

Objective SWHA-1.4. *Protect Isolated Trees*. Protect at least 20 isolated trees with the potential to be used as nesting sites for Swainson's hawk, within the protected grasslands.

Objective SWHA-1.4 Rationale Although the Plan does protect and restore riparian and oak woodland that will provide Swainson's hawk nesting habitat, Swainson's hawks also utilize isolated nest trees within the mosaic of agricultural lands and grasslands. If Swainson's hawks are affected within the PFG, the protection of additional potential nest sites with surrounding foraging habitat may allow these displaced birds to move to the protected isolated trees.

5.2.7.2 California Black Rail

Goal BLRA-1. A sustained population of California black rail within the Plan Area.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving **Objectives L-1.1,** *Establish a Large, Interconnected Reserve System*, and **L-1.2,** *Protect Habitat Linkages*, will benefit California black rail by minimizing fragmentation and providing connectivity of this species' habitat in the Plan Area.

b. Achieving Landscape **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species,* will minimize and potentially reduce invasive, non-native species that may adversely affect California black rail habitat.

c. Achieving **Objectives AW-1.1**, *Establish Wetlands and Ponds*, and **AW-1.2**, *Restore and Enhance Wetlands and Ponds,* will provide fresh emergent marsh habitat for California black rail in the Reserve System. A species-specific objective (**BLRA 1.1**) is necessary to ensure

that a sufficient amount of fresh emergent marsh is specifically protected, restored, and managed to provide habitat for California black rail.

d. Achieving **Objective AW-1.3**, *Maintain and Enhance Wetlands and Ponds,* will enhance the protected and restored wetlands for California black rail. **Objective BRLA-1.1**, below, stipulates that black rail habitat will be managed specifically for the species' needs.

The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

Objective BLRA-1.1. *Protect, Restore/Create, and Manage and Enhance California Black Rail Habitat.* Within the protected and restored/created aquatic/wetlands complex (**AW-1.1** and **AW-1.2**) include at least 10 fresh emergent marsh sites that provide suitable habitat for supporting California black rail. At least 5 of the 10 fresh emergent marsh sites must be existing marsh sites. Up to 5 of the 10 sites may be restored/created marshes that will be managed. Each wetland will be at least 2 acres in size, and occupancy must be demonstrated in at least five of the wetlands by Year 45 of the proposed permit term.

Objective BLRA-1.1 Rationale. This objective is intended to ensure that suitable habitat is protected on the Reserve System and is occupied by California black rail. The occupancy commitment is based on the 58 percent occupancy rate of potentially suitable habitat in the Sierra Nevada Foothills north of the Plan Area (Richmond et al. 2008). Details regarding the occupancy requirements are provided in CM1, *Establish the Reserve System*, Section 5.3.1.6.2, *California Black Rail*.

California black rail occurs in a small proportion of the fresh emergent marshes in Plan Area A. Specifically, the wetlands this species occupies in the Sierra Nevada Foothills consist of generally small patches (e.g., the average size of occupied wetland sites from extensive surveys of marshes in the Sierra Nevada Foothills was 3.2 acres, with a median marsh area of 1.7 acres [Richmond et al. 2008]) of perennial emergent wetlands dominated by erect, rooted, herbaceous hydrophytes that normally remain standing from the end of one growing season until the beginning of the next (Richmond et al. 2010).

The habitat characteristics of California black rail are fairly well understood and straightforward to restore and create, and it is expected that black rail would colonize and persist in suitable, restored habitat, as many of the occupied wetlands in the Sierra Nevada Foothills have been created by water from irrigation conveyance systems (Richmond et al. 2008). Indeed, Richmond et al. (2008) observed several cases of colonization within 1 year of marsh creation. Black rails also occupy artificial wetlands that have been created by maintaining semi-permanent flows of irrigation water at Spenceville and Daugherty Hill Wildlife Areas (Richmond et al. 2010). Therefore, it is expected that suitable created and restored habitat on the Reserve System will be colonized by California black rail.

Empty, but suitable, habitat patches are vital to maintaining the viability of the California black rail metapopulation in the Sierra Nevada Foothills (Richmond et al. 2010). In this area, California black rail is thought to occur as a metapopulation, where each wetland is a habitat patch that provides habitat that can support a small population, which is isolated from other patches. Occupied patches may go extinct, and empty patches are colonized. When a metapopulation is at equilibrium (i.e., stable in

size), a certain percent of patches are occupied, and the rate of extinction is balanced by colonization of empty patches. Therefore, a number of suitable habitat patches on the Reserve System may be empty at any given time. Unoccupied wetlands that provide suitable habitat, or could provide suitable habitat (after restoration and/or enhancement), will also be acquired to facilitate the expansion and persistence of the Sierra Nevada Foothill metapopulation of California black rails in Plan Area A. Because the likelihood of colonization of empty patches increases with decreasing distance to occupied sites, new wetlands created for black rail will be located close (e.g., within 0.6 mile) to occupied sites (see Conservation Measure 1, *Establish Reserve System*, for more details), as recommended by Richmond et al. (2010).

The PCA will select sites and manage California black rail habitat to ensure that these lands provide suitable habitat for the species. For example, California black rail requires fresh emergent marsh with consistent water depth maintained at less than 1.2 inches year-round (Richmond et al. 2008).

5.2.7.3 Western Burrowing Owl

Goal BUOW-1. Sufficient habitat to maintain or increase the population size of overwintering western burrowing owls within the Reserve System, and to promote the expansion of a breeding population of burrowing owls onto the Reserve System.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving **Objectives L-1.1**, *Establish a Large, Interconnected Reserve System*, and **L-1.2,** *Protect Habitat Linkages*, will benefit western burrowing owl by minimizing fragmentation and providing connectivity of this species' habitat in the Plan Area.

b. Achieving **Objectives VPCG-1.1**, *Protect Existing Vernal Pool Complexes,* **VPCG-1.2**, *Restore/Create Vernal Pool Complexes,* **VPCG-1.3**, *Protect Grasslands,* and **VPCG-1.4***, Restore Grasslands*, will result in the protection and restoration of habitat for western burrowing owl within the Reserve System.

c. Achieving **Objective VPCG-2.2**, *Increase Ground Squirrel Population,* will result in increased ground squirrel populations in the vernal pool complexes and grasslands in the Reserve System, which will increase availability of burrows for western burrowing owl.

The species-level biological objective contributing to this goal, and the rationale for the objective, are as follows.

Objective BUOW-1.1. *Protect and Manage Ground Squirrel Colonies.* Protect and manage at least three ground squirrel colonies on three separate sites, within protected grasslands providing suitable habitat for western burrowing owl. Protect one ground squirrel colony by Year 15 and at least two more by Year 30. If this cannot be accomplished due to a lack of existing ground squirrel colonies, substitute each ground squirrel colony with at least five artificial burrows in suitable western burrowing owl habitat.

Objective BUOW-1.1 Rationale. Extensive observations by bird watchers in Plan Area A indicate that there is little or marginal breeding habitat in Plan Area A, possibly because burrows suitable for nesting are not available. The only record of western burrowing owl breeding in Plan Area A is by a pair that nested in 2012 and 2013 in an

artificial burrow on the Swainson's Grassland Preserve on Highway 65, north of Lincoln. To protect opportunities for western burrowing owls to establish in the Reserve System, the PCA will protect and manage at least three ground squirrel colonies. Western burrowing owls frequently use ground squirrel burrows for nesting. However, ground squirrel colonies are not common in the Plan Area. Therefore, if there are not sufficient opportunities to protect ground squirrel burrows, the PCA will create and manage artificial burrows in suitable breeding habitat. Artificial burrow systems are an effective means of creating and managing breeding habitat for burrowing owls (e.g., Barclay et al. 2011) when management of natural habitat does not provide suitable breeding habitat (e.g., recolonization of large numbers of ground squirrels). The artificial burrows are expected to be sufficient to maintain or increase the burrowing owl population in the Plan Area, provided the PCA also encourages ground squirrel populations on the protected habitat consistent with **Objective VPCG-2.2**, to provide burrows for resident owls.

5.2.7.4 Tricolored Blackbird

Goal TRBL-1. Habitat for a sustained population of tricolored blackbird in the Plan Area.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving **Objectives L-1.1**, *Establish a Large, Interconnected Reserve System*, and **L-1.2**, *Protect Habitat Linkages*, will protect tricolored blackbird by minimizing fragmentation and providing connectivity of this species' habitat in the Plan Area.

b. Achieving **Objective AW-1.1**, *Protect Wetlands and Ponds,* will protect nesting habitat for tricolored blackbird in the Reserve System; however, a species-specific objective is necessary to ensure that a minimum amount of nesting habitat is protected and restored within a complex of suitable habitat, including proximity to open water and foraging habitat.

c. Achieving **Objective AW-1.2**, *Restore/Create Wetlands and Ponds*, will restore and create nesting habitat for tricolored blackbird in the Reserve System; however, a species-specific objective is necessary to ensure that a minimum amount of nesting habitat is protected and restored within a complex of suitable habitat, including proximity to open water and foraging habitat.

d. Achieving **Objective AW-1.3**, *Maintain and Enhance Wetlands and Ponds,* will maintain or increase nesting habitat value for tricolored blackbird.

e. Achieving **Objectives VPCG-1.1**, *Protect Vernal Pools*, and **VPCG-1.3**, *Protect Grasslands,* will protect foraging habitat for tricolored blackbird in the Reserve System. It may also result in the protection of patches of blackberry shrubs in the grasslands, providing tricolored blackbird nesting habitat.

f. Achieving **Objective VPCG-1.2**, *Restore/Create Vernal Pools,* will restore vernal pool complex, which provides foraging habitat for tricolored blackbird.

g. Achieving **Objective VPCG-1.4**, *Restore Grasslands,* will restore grassland in the Valley, which will provide foraging habitat for tricolored blackbird.

The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

Objective TRBL-1.1. *Protect, Manage, and Enhance Tricolored Blackbird Nesting Habitat.* Of the protected wetland and aquatic natural community (**Objective AW-1.1**), protect, manage, and enhance 187 acres of modeled tricolored blackbird nesting habitat in the Valley Reserve System.

Objective TRBL-1.2. *Protect, Restore, Manage, and Enhance Tricolored Blackbird Foraging Habitat.* Within the protected vernal pool grassland natural community (**Objective VPCG-1.1**), protected grassland natural community (**Objective VPCG-1.2**), restored vernal pool complex (**Objective VPCG-1.2**), and restored grassland (**Objective VPCG-1.5**), protect, restore, manage, and enhance at least 22,138 acres of foraging habitat for tricolored blackbird adjacent to (and no farther than 3 miles from) protected and restored nesting habitat within the Reserve System. Protection to meet this objective will be prioritized where tricolored blackbird are known to forage most.

Objective TRBL-1.3. *Protect Tricolored Blackbird Colony Sites.* Protect at least two tricolored blackbird colony breeding sites by Year 15 and another three tricolored blackbird colony sites by Year 40 (for a total of at least five). All five protected breeding colony sites must support a minimum of 1,500 individuals in at least one season during the proposed permit term. Protection of these sites will contribute to the commitment to protect, manage, and enhance tricolored blackbird habitat, **Objective TRBL-1.1**. The PCA will prioritize acquisition sites recently used by large colonies (which can vary over time), including wetlands in Yankee Slough, which supports a large tricolored blackbird colony but is only partially protected.

Objective TRBL-1.4. *Protect, Restore, Manage, and Enhance Tricolored Blackbird Foraging Habitat near Colony Sites.* Of the 22,138 acres of foraging habitat protected or restored for **Objective TRBL-1.2**, at least 200 acres of foraging habitat must be adjacent to (and no farther than 3 miles from) each nest colony site protected on the Reserve System.

Objective TRBL-1.5. *Protect and/or Restore/Create Open Water near Tricolored Blackbird Colony Sites.* Protect and/or restore/create open accessible water within 1,640 feet of each nest colony site protected on the Reserve System.

Objective TRBL-1.6. *Restore Tricolored Blackbird Nesting Habitat.* Within the fresh emergent wetlands to be restored for **Objective AW-1.2**, the PCA will restore/create 87 acres of aquatic/wetland complex that provides modeled nesting habitat for tricolored blackbird (i.e., some of the aquatic/wetlands to be restored for **Objective AW-1.2** will occur in the Foothills, outside of the nesting range of tricolored blackbird). Of the 87 acres, restore and/or create at least five fresh emergent wetlands that provide suitable nesting habitat for tricolored blackbird. These wetlands will be at least 2 acres in size, within 1,640 feet of open water, and will have at least 200 acres of suitable foraging habitat adjacent to nesting habitat that is protected. Expanding an existing fresh emergent wetland may count toward achieving this objective if at least 2 acres are restored/created adjacent to an existing wetland.

Objectives TRBL-1.1 through TRBL-1.6 Rationale. These objectives are intended to be implemented together to protect, restore/create, and enhance suitable complexes of habitat for tricolored blackbird on the Reserve System. Habitat complexes include three basic requirements that tricolored blackbird has for selecting its breeding colony site: (1) open accessible water within approximately 1,640 feet of a colony site (Hamilton 2004); (2) a protected nesting substrate, including either flooded or thorny or spiny

vegetation; and (3) suitable foraging habitat providing adequate insect prey within a few miles of the nesting colony (Hamilton et al. 1995; Beedy and Hamilton 1997, 1999).

Objective TRBL-1.1, *Protect Tricolored Blackbird Nesting Habitat,* and **Objective TRBL 1.6***, Restore Tricolored Blackbird Nesting Habitat.* Achieving these objectives will protect existing and modeled wetland nest colony habitat and restore suitable wetland nest colony habitat. Tricolored blackbirds historically nested primarily in freshwater marshes dominated by cattails or tules (*Scirpus* spp.) (Neff 1937, as cited in Beedy 2008). Throughout the Sacramento Valley, with the loss and degradation of native nesting habitat, an increasing number of nest colonies are now found on non-native Himalayan blackberry (Cook 1996; Kelsey 2008). In Plan Area A, the majority of nest colonies found since 2000 have been in Himalayan blackberry. While **Objective TRBL-1.3** will protect active nest colony sites, which will likely be in Himalayan blackberry, the Plan's tricolored blackbird conservation strategy focuses on the protection, restoration/creation, and enhancement of wetland nest colony habitat (e.g., fresh emergent wetland with open accessible water). In the Valley RAA, fresh emergent wetland complexes generally include open water habitat necessary for nest colony site selection. Similarly, restored fresh emergent wetland complexes will include areas of marshes dominated by cattails or tules and will have patches of open water.

Fresh emergent wetland complexes protected to achieve this objective may be enhanced (**Objective AW-1.3**) and/or restored (**Objective AW-1.2**) to improve habitat for tricolored blackbird. Enhancement and restoration may include, but is not limited to planting and expanding the extent of emergent vegetation, securing a reliable source of water to maintain (or create) open water conditions and fresh emergent vegetation.

Objective TRBL-1.2, *Protect and Restore Tricolored Blackbird Foraging Habitat*: Achieving this objective will protect and restore suitable modeled tricolored blackbird foraging habitat adjacent to modeled nest colony habitat. Tricolored blackbirds tend to forage within 3 miles of a nest colony in natural communities such as grassland, pasture, wet and dry vernal pool complexes and other seasonal wetlands, riparian habitats, and open marsh borders (Hamilton et al. 1995).

Objective TRBL-1.3, *Protect Tricolored Blackbird Colony Sites:* Achieving this objective will protect at least five active or recently active (i.e., colonies were documented nesting at a site within prior 10 years) tricolored blackbird breeding colony sites in the Reserve System, independent of effects, to contribute to the species' recovery. Protection of tricolored blackbird colonies in restored sites count toward meeting this objective, if the species colonizes the restored site. Tricolored blackbirds frequently use the same colony site in subsequent years; protecting active or recently active colony sites will ensure that active and/or recently active colony sites are protected on the Reserve System. The Tricolored Blackbird Portal (Information Center for the Environment 2016)[10] documents 21 colony sites and aggregations in Plan Area A, of which 15 are active or recently active. Within a breeding season, surveys have found tricolored blackbirds at 2-

[10] The Plan relies on data provided by the Tricolored Blackbird Portal to identify potential breeding colony sites for planning purposes. The Portal does not necessarily identify whether a site supported a breeding colony. For example, the Portal may show that birds were seen at a site during the Statewide Tricolored Blackbird Survey, but the colony may have abandoned the site after the survey prior to breeding. The subsequent abandonment may not be noted on the Portal.

6 colony sites in Plan Area A. Regular monitoring of colony sites has confirmed breeding at four sites in 2014 and five in 2015 (Dan Airola pers. comm.). Of the 15 active or recently active colony sites found in Plan Area A, six are in the RAA, 3-4 are protected in EXR, and five are in the PFG. Covered Activities are expected to directly or indirectly affect the five known active or recently active colony sites within the PFG.

Objective TRBL-1.4: *Protect and/or Restore Tricolored Blackbird Foraging Habitat near Colony Sites.* Achieving this objective will protect and/or restore suitable foraging habitat within close proximity (no more than 3 miles) to the active nest colony sites protected for

Objective TRBL-1.3. Tricolored blackbirds tend to forage within 3 miles of a nest colony in natural communities such as grassland, pasture, wet and dry vernal pool complexes and other seasonal wetlands, riparian habitats, and open marsh borders (Hamilton et al. 1995).

Objective TRBL-1.5: *Protect and/or Restore/create Open Water near Tricolored Blackbird Nesting Sites.* Achieving this objective will protect and/or restore/create accessible open water (i.e., water without extensive emergent vegetation) within 1,640 feet of active or recently active nest colony sites. Tricolor blackbird requires open accessible water within approximately 1,640 feet of a colony site (Hamilton 2004). Taken together, **Objectives TRBL-1.1** through **TRBL-1.6** provide for the conservation of tricolored blackbird in Plan Area A, in addition to mitigating loss of 55 acres of modeled nesting habitat and 17,015 acres of modeled tricolored blackbird foraging habitat by protecting 187 acres of modeled nesting habitat, 18,138 acres of modeled foraging habitat (Table 5-6), protecting and restoring suitable nest complexes of nest colony habitat, and protecting at least seven active or recently active nest colony sites.

5.2.7.5 Giant Garter Snake

Goal GGS-1. Protected suitable giant garter snake habitat to facilitate the expansion of giant garter snake into the Reserve System.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving **Objective L-1.1**, *Establish a Large, Interconnected Reserve System*, and **L-2.1**, *Protect Habitat Linkages,* will provide a large, interconnected Reserve System containing upland and aquatic habitat for the giant garter snake, enabling the species to disperse between habitat areas and facilitating genetic exchange if the species occupies Plan Area A in the future.

b. Achieving **Objective L-2.2**, *Maintain and Enhance Reserve System Permeability,* will facilitate giant garter snake movement through the Reserve System, if the species occupies Plan Area A in the future.

c. Achieving **Objective L-3.1**, *Implement Low Impact Development Standards,* will protect water quality for giant garter snake in its aquatic habitat, if present.

d. Achieving **Objective L-3.3**, *Increase Native Species and Reduce Invasive Non-native Species,* will minimize predation of young giant garter snakes, if present in the Reserve System, by invasive predators.

e. Achieving **Objective AW-1.1**, *Protect Aquatic/Wetlands Complex Natural Communities,* **Objectives VPCG-1.1**, *Protect Vernal Pools*, and **Objective VPCG-1.3***, Protect Grasslands*, will provide upland and aquatic habitat for giant garter snake. These, in addition to the rice land objective below (**Objective GGS-1**, *Protect and Manage Rice for Giant Garter Snake*), will result in the protection of a total estimated 1,763 acres of upland habitat and 2,702 acres of aquatic habitat for giant garter snake.

The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

Objective GGS-1.1. *Protect and Manage Giant Garter Snake Habitat.* Of the 8,240 acres of protected agricultural lands (**Objective AG-1.1**), protect and manage at least 2,000 acres of rice annually including securing the necessary perennial water supply to support giant garter snake in the western portion of the Valley RAA to provide habitat for giant garter snake. Where fresh emergent marsh is acquired in lieu of rice, sufficient perennial water supply must be maintained to support giant garter snake.

Objective GGS-1.1 Rationale. This objective is intended to ensure that suitable habitat is protected and managed for giant garter snake along the western edge of the Valley RAA, where the species is most likely to be present. Rice lands also provide important habitat for native waterfowl, wading birds (e.g., herons, egrets, ibis), shorebirds, and birds that prey upon them such as peregrine falcon.

Rice lands, associated waterways (e.g., slow moving streams, canals) and upland banks, and field edges provide important habitat for giant garter snake in the Sacramento Valley (U.S. Fish and Wildlife Service 1999a). The protection commitment of 2,000 acres will provide habitat to facilitate the expansion of giant garter snake into Plan Area A, in addition to mitigating the loss of 2,000 acres of rice land in Plan Area A. Because not all fields will be flooded and planted in rice every year, the PCA will acquire a surplus large enough to ensure that at least 2,000 acres of rice are planted and managed for giant garter snake annually. The actual location of the 2,000 acres of fields planted in rice may vary slightly from year to year (e.g., to allow fields to fallow). The PCA will ensure that these fields are connected hydrologically through canals and ditches to allow giant garter snake to access suitable habitat.

The rice lands protected will include associated drainage and irrigation channels, upland areas along channel edges, and field banks to provide upland overwintering and movement habitat for giant garter snake. Alternatively, the PCA will protect or restore fresh emergent wetlands to provide the functional equivalent of rice lands for giant garter snake.

Because there are no known occurrences of giant garter snake in Plan Area A, the PCA will focus acquisition of rice lands (and preservation and restoration of fresh emergent wetland) adjacent to potential dispersal corridors in the western portion of the RAA, to facilitate the colonization of the Reserve System. Giant garter snake inhabits slow-moving waterways and canals (U.S. Fish and Wildlife Service 1999a) and could potentially disperse from the nearby population cluster a few miles west of Plan Area A in Sutter County by way of the slow moving streams and canals that connect this population cluster to the RAA. These stream systems connect habitat in the RAA to the population cluster by way of the East Side Canal, Cross Canal, and Pleasant Grove Creek Canal (Figure 5-3). The PCA will coordinate with the Yuba-Sutter Regional Conservation

Plan to conserve giant garter snake habitat that is connected between the two Plan Areas.

Rice lands to be protected for giant garter snake will be managed to provide four basic elements needed by giant garter snake: (1) adequate water during the snake's active season (March 1 to September 30), (2) emergent herbaceous wetland vegetation for escape and foraging habitat, (3) grassy banks and openings in waterside vegetation for basking, and (4) higher elevation upland habitat for cover and refuge from flooding. Summer aquatic habitat is essential because it supports the frogs, tadpoles, and small fish that the giant garter snake preys upon.

The PCA will develop a water management plan within 12 months of acquisition for rice lands on the Reserve System that will be managed to provide habitat for giant garter snake. These will be reviewed and approved by the Wildlife Agencies and integrated into Reserve Management Plans. If the protected rice fields cannot be flooded during some years due to drought or market conditions, the PCA will ensure that water remains in the conveyance channels, providing aquatic habitat and adjacent uplands for giant garter snake.

The 2,000 protected acres may consist of protected and restored fresh emergent marsh where these wetlands occur within the mapped range of giant garter snake in Plan Area A (Figure 5-3). If the PCA restores fresh emergent marsh beyond the minimum acre commitment for fresh emergent marsh and/or finds fresh emergent marsh that is available for protection beyond the minimum acre commitment for fresh emergent marsh, the PCA may restore and/or acquire and protect these lands in lieu of protecting rice land. This approach will maximize habitat values for Covered Species and other native species in the Reserve System.

The protection of 2,702 acres of modeled aquatic habitat and 1,763 acres of modeled upland habitat will mitigate the loss of 1,438 acres of aquatic habitat and 483 acres of upland habitat as a result of Covered Activities, and will provide habitat to facilitate expansion of the giant garter snake into the Reserve System consistent with Goal GGS-1.

5.2.7.6 Western Pond Turtle

Goal WPT-1. Habitat for a sustained population of western pond turtle within the Reserve System.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving **Objectives L-1.1**, *Establish a Large, Interconnected Reserve System,* and **L-2.1**, *Protect Habitat Linkages,* will provide a large, interconnected Reserve System containing upland and aquatic habitat for the western pond turtle and enabling the species to disperse between primary habitat areas, facilitating genetic exchange.

b. Achieving **Objective L-2.2**, *Maintain and Enhance Reserve System Permeability,* will facilitate western pond turtle movement through the Reserve System.

c. Achieving **Objective L-3.1**, *Implement Low Impact Development Standards*, will protect water quality for western pond turtle in its aquatic habitat in Plan Area A.

d. Achieving **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species,* could minimize degradation of western pond turtle habitat that could otherwise result from invasion of non-native plants (e.g., controlling plants that invade open basking sites). Achieving this objective through the control of non-native invasive animal species will minimize predation of young western pond turtles by invasive predators and reduce competition for basking sites by non-native turtles.

e. Achieving **Objective RAR-1.1**, *Protect Riverine/Riparian Complex*, **Objective RAR-1.2**, *Protect Riverine Habitat Constituent*; **Objective VPG-1.1**, *Protect Vernal Pools*, **Objective VPG-1.3**, *Protect Grasslands*, **Objective OW-1.1**, *Protect Foothill Oak Woodlands*, and **Objective VOW-1.4**, *Protect Valley Oak Woodlands*, will result in the protection of upland and aquatic habitat for western pond turtle.

f. Achieving **Objective RAR-1.3**, *Restore Riverine/Riparian Complex,* **Objective VPG-1.2**, *Restore/Create Vernal Pools,* **Objective VPG 1.4**, *Restore Grasslands,* and **Objective OW-1.2**, *Restore Foothill Oak Woodlands*, will result in the restoration of upland and aquatic habitat for western pond turtle.

g. Achieving **Objective RAR-1.7**, *Enhance Streams,* will increase basking sites and cover for western pond turtle within the Stream System.

The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

Objective WPT-1.1. *Protect and Enhance Western Pond Turtle Habitat.* Within the natural communities protected, include at least 2,800 acres of aquatic and 3,859 acres of upland habitat for western pond turtle. Enhance the protected habitat to provide specific habitat requirements for western pond turtle.

Objective WPT-1.2. *Restore Western Pond Turtle Habitat.* Within the natural communities restored, include at least 1,850 acres of aquatic habitat and 1,930 acres of upland habitat for western pond turtle. Sites chosen for restoration of aquatic habitat for western pond turtle will be adjacent to suitable upland nesting habitat.

Objectives WPT-1.1 and WPT-1.2 Rationale. Although the landscape and natural community biological goals and objectives will substantially contribute toward the protection and restoration of western pond turtle habitat, these objectives ensure that sufficient acreage in the Reserve System will be protected and restored for western pond turtle. Habitat for western pond turtle includes aquatic habitat and upland habitat within 150 feet of aquatic habitat for nesting and refuge. The 10,439 acres of protected and restored habitat are considerably larger than the 2,157 acres (750 acres of aquatic habitat and 1,407 acres of upland habitat) of western pond turtle habitat that will be lost as a result of Covered Activities.

5.2.7.7 Foothill Yellow-legged Frog

Goal FYLF-1. Habitat to facilitate the expansion of foothill yellow-legged frog into the Plan Area.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving Landscape **Objective L-1.1**, *Establish a Large, Interconnected Reserve System*, **Objective L-2.1**, *Protect Habitat Linkages,* **Objective L-2.2**, *Maintain and Enhance Reserve*

System Permeability, and **Objective L-2.3**, *Establish East–West Corridors*, will benefit the foothill yellow-legged frog by providing upland and aquatic habitat, minimizing edge effects of development, and facilitating movement and genetic exchange between populations.

b. Achieving Landscape **Objective L-3.1**, *Implement Low Impact Development Standards,* will minimize degradation of foothill yellow-legged frog aquatic habitat that can result from urban stormwater run-off.

c. Achieving Landscape **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species,* will minimize and potentially reduce invasive, non-native species that may adversely affect covered foothill yellow-legged frog, such as bullfrogs.

d. Achieving **Objective RAR-1.2**, *Protect Riverine Habitat Constituent,* will provide at least 88.6 miles of streams in Plan Area A; however, a species-specific objective (**Objective FYLR-1.1**) is necessary to ensure that a sufficient amount of foothill yellow-legged frog riverine habitat is protected on the Reserve System.

e. Achieving **Objective RAR-1.1**, *Protect Riverine/Riparian Complex,* will provide riparian vegetation in the Foothills region; a species-specific objective (**Objective FYLF-1.2**) is necessary to ensure that a sufficient amount of foothill yellow-legged frog riparian vegetation habitat is protected on the Reserve System.

f. Achieving **Objective RAR-1.3**, *Restore Riverine/Riparian Complex,* will provide restored riparian natural community in the Foothills; however, a species specific objective (**Objective FYLF-1.1**) is necessary to ensure that a minimum amount of this restoration is adjacent to stream habitat suitable for foothill yellow-legged frog.

g. Achieving **Objective RAR-1.7***, Enhance Streams,* will enhance stream habitat for foothill yellow-legged frog by providing increasing channel complexity, thereby increasing biodiversity and food availability, and increasing in-stream refugia for this species, and by replenishing gravel along streams, which will provide gravel bars behind which foothill yellow-legged frogs lay eggs.

The species-level biological objectives contributing to this goal, and the rationale for the objectives, are as follows.

Objective FYLF-1.1. *Protect Foothill Yellow-legged Frog Riverine Habitat.* Within the 88.6 miles of streams to be protected for **Objective RAR-1.2**, protect 6 miles of streams in the Foothills that provide habitat for foothill yellow-legged frog.

Objective FYLF-1.2. *Protect Foothill Yellow-legged Frog Riparian Habitat*. Within the 450 acres of riparian vegetation to be protected in the Foothills for **Objective RAR-1.1**, protect 83 acres of riparian vegetation in the Foothills that provides foraging and movement habitat for foothill yellow-legged frog.

Objective FYLF-1.3. *Restore Riparian Habitat for Foothill Yellow-legged Frog.* Within the restored riparian natural community (**Objective RAR-1.3**, *Restore Riverine/Riparian Complex*), restore at least 83 acres adjacent to stream habitat suitable for supporting foothill yellow-legged frog, and include open areas suitable for supporting the species.

Objectives FYLF-1.1 through 1.3 Rationale. These objectives are intended to ensure that suitable habitat for foothill yellow-legged frog is protected and restored on the Reserve System. Achieving **Objectives FYLF-1.1** through **1.3** will provide for the conservation and recovery of foothill yellow-legged frog in Plan Area A by protecting 6

miles of in-stream habitat (this is the amount of modeled habitat available for protection), protecting 83 acres of adjacent riparian habitat, and restoring 83 acres of riparian habitat for foothill yellow legged frog, including open areas suitable for supporting the species. In addition, these objectives will mitigate for indirect effects and the direct effects on 155 acres foothill yellow-legged frog modeled habitat.

There are no known populations of foothill yellow-legged frog in Plan Area A; however, much of the suitable habitat in Plan Area A has not been systematically surveyed for the occurrence of this species. The known occurrences closest are 3 or more miles from the eastern border of Plan Area A. Potential habitat for foothill yellow-legged frog occurs in the stream and riparian habitat of the Bear River, Raccoon Creek and its upper tributaries, Auburn Ravine, Pleasant Grove Creek, and Dry Creek and its upper tributaries (see Appendix D, *Species Accounts*). If foothill yellow-legged frogs are found within the Plan Area, the PCA will prioritize acquisition on occupied sites, because they use the same sites for breeding year after year.

5.2.7.8 California Red-legged Frog

Goal CRLF-1. Protected, occupied California red-legged frog habitat in the Plan Area.

Objective CRLF-1.1. *Protect Occupied California Red-legged Frog Habitat.* Protect at least 2 acres of occupied California red-legged frog habitat in Plan Area B by Year 2, and an additional 2 acres by Year 5.

Objective CRLF-1.1 Rationale. Achieving this objective will ensure that habitat occupied by California red-legged frog is protected by the Plan. Within the Plan Area, California red-legged frog is known to occur only at the Big Gun Conservation Bank (Figure 2-4), although suitable habitat for California red-legged frog occurs elsewhere in the Foothills region of the Plan Area.

Goal CRLF-2. Protected and restored, suitable California red-legged frog habitat in the Plan Area.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving Landscape **Objective L-1.1**, *Establish a Large, Interconnected Reserve System,* **Objective L-2.1**, *Protect Habitat Linkages,* and **Objective L-2.2**, *Maintain and Enhance Reserve System Permeability*, will provide a large, interconnected Reserve System with California red-legged frog upland and aquatic habitat to facilitate the expansion of the California red-legged frog population in Plan Area A.

b. Achieving Landscape **Objective L-2.5**, *Conserve Upland Natural Communities Surrounding Aquatic/Wetlands Complex Natural Communities*, will ensure that upland habitat will be protected in association with aquatic habitat for this species.

c. Achieving Landscape **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species*, will minimize and potentially reduce invasive, non-native species that may adversely affect California red-legged frog, such as bullfrogs or non-native fish species.

d. Achieving **Objective AW-1.1**, *Protect Wetlands and Ponds,* and **Objective AW-1.2**, *Restore/Create Wetlands and Ponds,* will provide wetland and aquatic natural communities in the Reserve System; however, a species-specific objective (**Objective CRLF-1.1**) is

necessary to ensure that a sufficient amount of California red-legged frog aquatic habitat is protected and restored in the Reserve System.

e. Achieving **Objective AW-1.3**, *Maintain and Enhance Wetlands and Ponds,* will enhance the protected and restored wetlands for California red-legged frog.

f. Achieving **Objectives RAR-1.1**, *Protect Riverine/Riparian Complex*, and **Objective RAR-1.2**, *Protect Riverine Habitat Constituent,* will provide riparian and riverine natural community in the Reserve System, providing habitat for the California red-legged frog and facilitating dispersal of this species; however, a species-specific objective (**CRLF-2.1**) is necessary to ensure that a sufficient amount of California red-legged frog is protected in the Reserve System.

g. Achieving **Objective RAR-1.3**, *Restore Riverine/Riparian Complex*, will provide restored riparian vegetation in the Reserve System; however, a species-specific objective (**Objective CRLF-2.2**) is necessary to ensure that a sufficient amount of California red-legged frog is restored in the Reserve System. The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

Objective CRLF-2.1. *Protect Suitable California Red-legged Frog Habitat.* In addition to **Objective CRLF-1.1**, and within the natural communities protected in **Objective AW-1.1** and **Objective RAR-1.1**, protect 1,168 acres of aquatic and 12,484 acres of upland habitat for California red-legged frog in the Foothills.

Objective CRLF-2.2. *Restore Suitable California Red-legged Frog Habitat.* Of the natural communities restored and created in **Objective AW-1.2** and **Objective RAR-1.3**, restore and create 1,241 acres of aquatic and 160 acres of upland California red-legged frog habitat in the Reserve System in the Foothills RAA within a matrix of suitable upland habitat (e.g., oak woodland and grassland).

Objectives CRLF-2.1 and 2.2 Rationale. Achieving these objectives will protect, restore, and create habitat suitable for the colonization and expansion of a California red-legged frog into Plan Area A, as well as mitigate the effects on 672 acres of modeled aquatic and 8,551 acres of upland modeled habitat for California red-legged frog. Most of the known California red-legged frog populations on the western slope of the Sierra Nevada Foothills have been eliminated or fragmented. The population nearest to Plan Area A occurs within south-central Placer County, approximately 14 miles east of the eastern border of Plan Area A, near Michigan Bluff (California Department of Fish and Wildlife 2016). While there are no known extant populations of California red-legged frog within Plan Area A, potentially suitable habitat may support the expansion of a California red-legged frog population should individuals colonize habitat from populations neighboring Plan Area A or from not-yet-discovered populations within Plan Area A.

5.2.7.9 Fish

Goal FISH-1. Increased spawning, rearing, and migratory success of covered salmonids in the Auburn Ravine, Raccoon Creek, and Dry Creek watersheds.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving Landscape **Objective L-1.1**, *Establish a Large, Interconnected Reserve System,* **Objective L-2.1**, *Protect Habitat Linkages*, and **Objective L-2.3**, *Establish East–West Corridors,* will provide a large, interconnected Reserve System, including corridors for east-west movement along stream systems, benefitting the covered fish species by providing for fish movement and protecting watershed health.

b. Achieving Landscape **Objective L-3.1**, *Implement Low Impact Development Standards,* will minimize degradation and removal of covered fish habitat that can result from urban stormwater run-off.

c. Achieving Landscape **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species,* will minimize and potentially reduce invasive, non-native species that may adversely affect covered fish species.

d. Achieving **Objective RAR-1.1**, *Protect Riverine/Riparian Complex,* and **Objective RAR-1.2**, *Protect Riverine Habitat Constituent*, will provide for the protection of riparian natural community and streams, thereby providing habitat for covered fish species; however, additional species-specific objectives (**Objectives FISH-1.1**, **1.2**) are necessary to ensure that a sufficient amount of riparian and riverine natural communities will protect spawning, rearing, and migrating habitat in salmonid-bearing streams in the Plan Area.

e. Achieving **Objective OW-1.1**, *Protect Oak Woodlands*, **Objective OW-1.2,** *Restore Oak Woodlands*, **Objective VPCG-1.1**, *Protect Existing Vernal Pool Complexes*, **Objective VPCG-1.2**, *Restore/Create Vernal Pool Complexes*, **Objective VPCG-1.3**, *Protect Grasslands*, and **Objective VPCG-1.4**, *Restore/Create Vernal Pool Complexes*, will provide for the protection and restoration of upland areas to support watershed health and thereby benefit covered fish species; however, an additional species-specific objective (**Objective FISH-1.3**) is necessary to ensure that a minimum amount of the protected uplands are sited to protect the Raccoon Creek watershed to benefit the covered fish species.

f. Achieving **Objective RAR-1.3**, *Restore Riverine/Riparian Complex,* will provide for the restoration of riparian natural community, thereby providing habitat for covered fish species.

g. Achieving **Objective RAR-1.5**, *Remove or Modify Fish Barriers,* will restore migration corridors for covered salmonids between the Valley and the Foothills, and between reserves within and adjacent to the Plan Area.

h. Achieving **Objective RAR-1.7**, *Enhance Streams*, will improve habitat complexity and function for covered fish species in the Plan Area, consistent with the Central Valley Chinook and Steelhead Recovery Plan (National Marine Fisheries Service 2014).

The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

Objective FISH-1.1. *Protect Salmonid Spawning and Migrating Habitat.* Of the 88.6 stream miles protected in the Reserve System (**Objective RAR-1.2**), protect 25 stream miles of salmonid spawning habitat and 10 miles of salmonid migrating habitat primarily on stream reaches along Raccoon Creek, Doty Ravine (a major tributary to Raccoon Creek), and Auburn Ravine.

Objective FISH-1.2. *Protect Riparian Habitat for Fish.* Of the riparian natural community protected in the Reserve System (**Objective RAR-1.1**), protect 558 acres of riparian habitat along salmonid spawning stream reaches and 342 acres of riparian habitat along salmonid migrating reaches, primarily along Raccoon Creek, Doty Ravine, and Auburn Ravine.

Objectives FISH-1.1 and 1.2 Rationale. Achieving these objectives will protect in-stream, riverine, and adjacent riparian and floodplain spawning, rearing, and migrating habitat to secure extant populations and promote viable populations of covered salmonids in the Plan Area consistent with the Central Valley Chinook and Steelhead Recovery Plan (National Marine Fisheries Service 2014).

Central Valley steelhead and Central Valley fall-/late fall-run Chinook salmon occur primarily within the Auburn Ravine, Raccoon Creek, and Dry Creek watersheds. Protection will focus primarily within the Raccoon Creek watershed, the stream system supporting the covered salmonids that is most fully contained within the RAA and is mostly likely to provide the greatest conservation benefit to covered salmonids. Opportunities for protection of riparian and stream segments within Auburn Ravine and Dry Creek will be more limited than for Raccoon Creek, as these watersheds occur primarily in the PFG and run through small, developed parcels (especially Dry Creek). The lower Bear River (extending from Camp Far West Reservoir downstream to its confluence with the Feather River) supports remnant and/or stray wild and/or hatchery salmon (National Marine Fisheries Service 2014). The Plan does not prioritize the lower Bear River for protection because of the river's low potential to support viable populations of steelhead (National Marine Fisheries Service 2014) and because the river in the Plan Area is already managed under state and federal jurisdictions.

Objective FISH-1.3. *Protect Oak Woodlands for Fish.* Of the 12,490 acres of oak woodland and grassland protected in the Foothills (**OW-1.1**, **VPCG-1.3**), protect 9,869 acres in the Raccoon Creek watershed to protect and improve water quality and watershed integrity in the Raccoon Creek watershed, the primary salmonid stream system within the RAA.

Objective FISH-1.3 Rationale. The Raccoon Creek watershed is the most intact, least fragmented watershed among the salmonid bearing watersheds in the Plan Area, particularly in the Foothills, where spawning habitat is located. This objective is intended to enhance watershed resiliency in Raccoon Creek by protecting and restoring (in combination with **OW-1.2**, *Restore Oak Woodlands*) large blocks of intact, high quality oak woodlands and Foothill grasslands , consistent with the Central Valley Chinook and Steelhead Recovery Plan (National Marine Fisheries Service 2014). Protecting the integrity of the upper Raccoon Creek watershed will help to improve in-stream conditions downstream in the Valley RAA through enhanced water quality and maintenance of necessary flows for salmonids. This objective will benefit covered salmonids, and other covered aquatic species including western pond turtle, California red-legged frog, and foothill yellow-legged frog.

5.2.7.10 Valley Elderberry Longhorn Beetle

Goal VELB-1. Habitat to support a sustained population of valley elderberry longhorn beetle within the Reserve System.

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving Landscape **Objectives L-1.1**, *Establish a Large, Interconnected Reserve System*, **2.1**, *Protect Habitat Linkages*, **2.2**, *Maintain and Enhance Reserve System Permeability*, and **2.3**, *Establish East–West Corridors*, will benefit the valley elderberry longhorn beetle by minimizing edge effects of development and facilitating movement and genetic exchange between populations.

b. Achieving Landscape **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species,* will minimize and potentially reduce invasive, non-native species that may adversely affect valley elderberry longhorn beetle habitat.

c. Achieving **Objective RAR-1.1**, *Protect Riverine/Riparian Complex,* will protect riparian natural community, which will provide habitat for valley elderberry longhorn beetle.

d. Achieving **Objective OW-1.4**, *Protect Valley Oak Woodlands,* will protect valley oak woodland natural community, which will provide habitat for valley-elderberry longhorn beetle.

e. Achieving **Objective RAR-1.3**, *Restore Riverine/Riparian Complex,* will provide restored riparian natural community; however, a species-specific objective (**Objective VELB 1.1**) is necessary to ensure that a minimum amount of this restoration provides elderberry shrubs sufficient to sustain populations of valley elderberry longhorn beetle. The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

f. Achieving **Objective RAR-1.4**, *Enhance Riparian Vegetation*, will increase native biodiversity and control invasive vegetation in elderberry habitat to enhance survivorship and regeneration of elderberry.

The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

Objective VELB-1.1. *Restore Valley Elderberry Longhorn Beetle Habitat.* Within the restored riverine/riparian complex natural community (**Objective RAR-1.3**), plant elderberry shrubs and associated riparian species sufficient to offset loss of valley elderberry longhorn beetle consistent with USFWS' Conservation Guidelines for Valley Elderberry Longhorn Beetle (U.S. Fish and Wildlife Service 1999b) or current USFWS guidelines.

Objective VELB-1.1 Rationale. This objective will ensure that the restored riparian natural community in the Reserve System will include appropriate habitat components for valley elderberry longhorn beetle. This objective will also mitigate for indirect effects and the direct effects on 476 acres of riparian habitat associated with the valley elderberry longhorn beetle host plant, and the additional riparian protection and restoration (**RAR-1.1** and **1.2**) will further provide for the species' conservation.

5.2.7.11 Vernal Pool Branchiopods

Goal VPB-1: Sustained populations of vernal pool fairy shrimp and vernal pool tadpole shrimp within the Reserve System**.**

The landscape- and natural community–level biological objectives will contribute to this goal as follows.

a. Achieving **Objective L-1.1**, *Establish a Large, Interconnected Reserve System,* will provide an interconnected Reserve System with all natural communities in the Plan Area represented primarily within the RAA. A large, interconnected landscape will reduce future habitat loss and fragmentation in the Plan Area. Large, interconnected reserves of vernal pool complexes are less likely to be adversely affected by adjacent disturbances related to urban development, such as urban runoff and human-related habitat degradation (off-road vehicles, trampling) than small, isolated vernal pool complexes.

b. Achieving **Objective L-3.2**, *Reduce Non-native Species and Increase Native Species,* will result in an increase in native species diversity and relative cover of native plant species, and reduction in the introduction and proliferation of non-native plants and animals. This objective will benefit the covered vernal pool branchiopod species by reducing competition with non-native species for space, light, and nutrients, and reducing threats to the species' biochemical and hydrologic requirements that result from heavy infestations of invasive plant species.

c. Achieving **Objective VPCG-1.1**, *Protect Existing Vernal Pool Complexes,* will result in the protection of 17,000 acres of existing vernal pool complex, including 790 wetted acres of vernal pool constituent habitats[11] comprising at least 250 acres of delineated vernal pools consisting of covered vernal pool branchiopod habitat, to build a vernal pool Reserve System in large, contiguous blocks (at least 1,000 acres in size including non-vernal pool grasslands), primarily in the Valley RAA.

d. Achieving **Objective VPCG-1.2**, *Restore/Create Vernal Pool Complexes,* will result in the restoration and enhancement of at least 3,000 acres of vernal pool complex in the Reserve System, including at least 30 acres delineated as vernal pools that provide habitat for covered vernal pool branchiopods and native plant species. It will also result in the restoration/creation of up to 900 additional acres of vernal pool constituent habitats of which at least 326 acres will be of delineated vernal pools, to meet a 1.5:1 ratio of restored to affected vernal pools, seasonal wetlands (where seasonal wetlands are part of a vernal pool complex), and seasonal swales. As described above, under the rationale for **Objective VPCG-1.2**, the Plan's conservation strategy is consistent with the recovery plan for vernal pool fairy shrimp and vernal pool tadpole shrimp in that it emphasizes vernal pool complex protection (17,000 acres) over vernal pool complex restoration and creation (3,000 acres). The restoration and creation of vernal pool complex will expand and connect habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp. Long-term monitoring and adaptive management with stringent occupancy criteria will ensure that the restored and created vernal pool complexes will benefit vernal pool fairy shrimp and vernal pool tadpole shrimp, as described below, in the rationale for the species-specific objectives.

[11] Vernal pool constituent habitats includes vernal pools, seasonal wetlands, and seasonal swales when seasonal wetlands and seasonal swales are a component of vernal pool complex.

e. Achieving **Objective VPCG-2.1**, *Enhance Vernal Pool Vegetation and Hydrology*, will result in the enhancement of natural hydrology to benefit Covered Species and other native vernal pool species in the Reserve System. This will provide the appropriate hydrological conditions for sustaining vernal pool fairy shrimp and vernal pool tadpole shrimp within the Reserve System. The species-level biological objectives contributing to this goal, and the rationale for each objective, are as follows.

Objective VPB-1.1. *Maintain Vernal Pool Fairy Shrimp Occupancy in the Reserve System.* Within the 20,000 acres of protected, restored, and created vernal pool complex, maintain a vernal pool fairy shrimp occupancy rate[12] that is equal to or greater than the occupancy rate of vernal pools lost as a result of Covered Activities.

Objective VPB-1.2. *Maintain Vernal Pool Tadpole Shrimp Occupancy in the Reserve System.* Within the 20,000 acres of protected, restored, and created vernal pool complex, maintain a vernal pool tadpole shrimp occupancy rate that is equal to or greater than the occupancy rate of vernal pools lost as a result of Covered Activities.

Objectives VPB-1.1 and VPB-1.2 Rationale. Because the Plan Area has not been thoroughly surveyed for vernal pool fairy shrimp or vernal pool tadpole shrimp, the distribution of these species in vernal pools throughout the Plan Area is unknown. The vernal pool fairy shrimp occurs in a small proportion of all vernal pools in Placer County and vernal pool tadpole shrimp is scarce in Placer County (Helm Biological Consulting 2012). There is a risk that vernal pools to be lost as a result of Covered Activities could support substantially more vernal pool fairy shrimp or vernal pool tadpole shrimp than the vernal pools in the Reserve System. These objectives reduce that risk by ensuring that the occupancy rate in the Reserve System for each species is at least as high as the occupancy rate in the areas to be lost. In this case, the Occupancy Rate Standard (defined under *Initial Survey Phase,* below) serves as an index of total population size—a higher proportion of occupied protected, restored, and created vernal pools should translate to a larger protected, restored, and created population, all else being equal.

The requirement to construct and inoculate 1 vernal pool with vernal pool tadpole shrimp by Year 25 (if an occupancy rate for vernal pool tadpole shrimp cannot be set and the PCA has not already protected or restored a vernal pool occupied by vernal pool tadpole shrimp) would ensure enough time to complete the full 15-year monitoring period and to implement contingency actions if occupancy by vernal pool tadpole shrimp is not achieved.

The PCA will monitor and adaptively manage vernal pools in the Reserve System to achieve these objectives. Chapter 7, *Monitoring and Adaptive Management Program*, describes how the PCA will monitor vernal pools to measure occupancy rates on affected sites and in the Reserve System. This monitoring approach will help to establish Occupancy Rate Standards for vernal pools in the Reserve System, and the PCA will monitor and adaptively manage vernal pools in the Reserve System to achieve these objectives.

Goal VPB-2: A sustained population of Conservancy fairy shrimp in Plan Area A**.**

[12] The occupancy rate will be calculated as both the percentage of the number of pools occupied and the percentage of the area of pools occupied (the Pool-based Occupancy Rate Standard and the Area-based Occupancy Rate Standard, respectively).

Objective VPB-2.1. *Protect Conservancy Fairy Shrimp Occurrences.* Protect two previously unknown (at the time of Plan development) and unprotected Conservancy fairy shrimp occurrences for the first occurrence taken, prior to such take. Protect three additional occurrences for each additional occurrence taken, prior to such take.

Objective VPB-2.1 Rationale. A single male Conservancy fairy shrimp was detected in Placer County in the spring of 2007, and the species was detected again in one of 37 pools sampled on March 27, 2012 (the number of individuals and sex found in 2012 was not reported in the CNDDB [California Department of Fish and Wildlife 2016]). This occurrence is already protected at the Mariner Conservation Bank. The USFWS indicated in the 5-year review for this species that it did not have sufficient information to determine if this detection represents a population, or an anomaly, and that further surveys are required to determine if the Placer County locality represents a sustainable population of this species (U.S. Fish and Wildlife Service 2007b). This species is typically associated with large, cool-water pools, which are not characteristic of the vernal pools found in Placer County. There are no recovery goals for this species in Placer County (U.S. Fish and Wildlife Service 2005). However, further surveys within the two watersheds that straddle the known occurrence may indicate that there are additional occurrences of Conservancy fairy shrimp in the county. Activities covered under the Plan will not take any Conservation fairy shrimp until new occurrences are found and protected. The protection of two new occurrences for the first occurrence lost, and three new occurrences for each additional occurrence lost, will ensure that if there is a metapopulation of Conservancy fairy shrimp in the Plan Area, the population will be sustained.

5.3 Conservation Measures

This section describes the conservation measures the PCA will implement to achieve the biological goals and objectives described in Section 5.2.5, *Landscape-level Biological Goals and Objectives*; Section 5.2.6, *Natural Community–level Biological Goals and Objectives*; and Section 5.2.7, *Species-level Biological Goals and Objectives.* The conservation measures are described in this section with enough detail to guide reserve acquisition, management and enhancement, and restoration strategies to achieve the goals and objectives. Management-related conservation measures (i.e., conservation measures related to management of the Reserve System) may be modified during implementation through the monitoring and adaptive management program, with review and approval from the Wildlife Agencies. Management-related conservation measures are the measures described in Section 5.3.2, *Conservation Measure 2: Manage and Enhance the Reserve System*.

Because of the large scope of this Plan and its long timeframe, conservation measures are intended to be flexible. Thus, natural community–level measures provide broad management guidelines and principles such that future land managers can implement specific techniques that are best suited to site conditions, are informed by data from monitoring, and are improved through the adaptive management process. Preserving this flexibility is an important part of the conservation strategy.

In some cases, prescribed conservation measures include the phrase, “where appropriate” or a similar phrase used to identify actions that are dependent on site-specific conditions and ecological contexts. Implementation of such “where appropriate” actions will depend on the on-the-ground assessment of ecological conditions by the PCA’s reserve managers. All such actions must be

consistent with the Plan's biological goals and objectives. In addition, if the PCA proposes such an action, and the action is not identified in a prescribed conservation measure, the measure will be subject to the Wildlife Agencies' review and approval.

The conservation measures presented in this section are divided into four parts. Conservation Measure 1, *Establish Reserve System*, describes the Plan's requirements for Reserve System assembly, including reserve design criteria and acre commitments for natural and semi-natural communities and Covered Species' habitats; during implementation, the PCA will turn to this conservation measure for guidance regarding prioritization and acquisition of lands for the Reserve System. Conservation Measure 2, *Manage and Enhance Reserve System,* describes the actions necessary to maintain and improve the ecological conditions of natural communities and Covered Species' habitat on the Reserve System and along streams outside the Reserve System; during implementation, the PCA will turn to this measure for guidance regarding the preparation and implementation of reserve management plans, which will include site-specific management and enhancement actions. Conservation Measure 3, *Restore and Create Natural Communities and Covered Species' Habitat*, describes restoration and creation actions the PCA will implement to increase the acres of natural communities and Covered Species' habitat; during implementation, the PCA will turn to this measure for guidance related to restoration/creation requirements and the preparation and implementation of site-specific restoration/creation plans. Conservation Measure 4, *Plan Area-wide Actions*, describes actions the PCA will implement throughout the Plan Area (i.e., actions that are not limited to the Reserve System), such as implementation of LIDS and public outreach.

5.3.1 Conservation Measure 1: Establish Reserve System

5.3.1.1 Introduction

This conservation measure describes how the PCA will establish the Reserve System to benefit the Covered Species, natural communities, and ecosystems of the Plan Area. Reserve System assembly is described in terms of land acquisition procedures, land acquisition methods, and land selection criteria. These components, applied as described in this measure, will ensure the Reserve System meets applicable biological goals and objectives related to the acreage, configuration, and quality of lands.

This conservation measure provides guidance for meeting the biological objectives, as they relate to establishment of the Reserve System. Table 5-8 indicates the biological goals and objectives that each conservation measure is intended to achieve and references the subsections in Conservation Measure 1, *Establish Reserve System*, relevant to each objective. Each of these subsections corresponds to a specific conservation measure and is coded and numbered for ease of reference.

Reserve System design will focus on maintaining landscape-level processes, natural and semi-natural communities, and habitat for Covered Species. The Reserve System will provide adequate representation of community types within the Plan Area. Priorities for acquisition into the Reserve System will emphasize the acquisition of habitat occupied by Covered Species.

Conservation Measure 1, *Establish Reserve System,* addresses acquisition for both protection and restoration purposes. The total acquisition of all Reserve System lands is quantified in Table 5-2. Specific protection commitments to achieve protection-related objectives are provided in Table 5-3. Restoration commitments are described in Conservation Measure 3, *Restore and Create Natural Communities and Covered Species' Habitat.*

Table 5-3. Natural Community and Constituent Habitat Protection Commitments (acres)

Communities and Constituent Habitats	Total in Plan Area A	Acquired Acres		Conservation Zones (estimated/non-required in italics[b])				
		Total Protection Commitment[a]	*Estimated Protection (Flexible)[b]*	Valley North RAA	Valley South RAA	Valley Anywhere[c]	Foothills North RAA	Foothills Anywhere[b]
Vernal Pool Complex (VPC)	**45,065**	**17,000**	-	**8,430**	**5,170**	**3,400**	**-**	**-**
Vernal Pool Constituent Habitats	2,237	790	-	392	240	158	-	-
Vernal Pool Wetland	790	250	-	124	76	50	-	-
Seasonal Wetland in VPC	845	-	*304*	*153*	*94*	*62*	-	-
Seasonal Swales	602	-	*236*	*115*	*71*	*46*	-	-
Vernal Pool Complex Uplands	42,829	-	*16,210*	*8,038*	*4,930*	*3,242*	-	-
Grassland	**34,760**	**2,740**	**-**	**160**	**120**	**70**	**2,000**	**390**
Aquatic/Wetland Complex	**3,433**	**-**	***600***	**210**	**110**	**80**	**130**	**70**
Aquatic/Wetland Constituent Habitats	2,850	586	-	210	110	80	121	65
Fresh Emergent Marsh	1,112	256	-	98	51	37	45	24
Lacustrine	1,061	-	*181*	*57*	*30*	*22*	*47*	*26*
Non-VP Seasonal Wetland	677	-	*148*	*55*	*29*	*21*	*29*	*15*
Aquatic/Wetlands Complex Uplands	583	-	*14*	-	-	-	*9*	*5*
Riverine/Riparian Complex	**6,685**	**-**	***2,200***	**910**	**370**	**320**	**310**	**290**
Riverine/Riparian Constituent Habitats	5,519	1,718	-	696	283	245	256	239
Riverine	868	-	*308[f]*	*150*	*61*	*53*	*23*	*22*
Riparian	4,651	1,410	-	546	222	192	233	218
Riverine/Riparian Complex Uplands	1,167	-	*482*	*214*	*87*	*75*	*54*	*51*
Valley Oak Woodland	**1,364**	**190**	**-**	**70**	**-**	**20**	**-**	**100**
Oak Woodland	**50,870**	**10,110**	**-**	**70**	**20**	**20**	**8,820**	**1,180**
All Natural Communities	**142,179**	**32,840**	-	**9,850**	**5,790**	**3,910**	**11,260**	**2,030**

Communities and Constituent Habitats	Total in Plan Area A	Acquired Acres		Conservation Zones (estimated/non-required in italics[b])				
		Total Protection Commitment[a]	*Estimated Protection (Flexible)*[b]	Valley North RAA	Valley South RAA	Valley Anywhere[c]	Foothills North RAA	Foothills Anywhere[b]
Agriculture	**24,954**	**8,240**	-	-	-	**8,240**	-	-
Rice	19,580	2,000	-	-	-	2,000	-	-
Field	2,757	-	-	-	-		-	-
Orchard	2,618	-	-	-	-	-	-	-
Any Agriculture[d]		-	*6,240*	-	-	*6,240*	-	-
Total All Protection[e]		**41,080[e]**		**9,850**	**5,790**	**12,150**	**11,200**	**2,090**

Source: MIG|TRA February 11, 2016

Notes:

[a] The protection commitment is all of a community acquired (see Table 5-2 for acquisition commitments) minus any area converted to another community through restoration. The protection commitment does not include any areas added through restoration (see Table 5-4).

[b] Estimated of flexible protection is an estimate of the area of community or constituent habitats that will be protected in reserves incidental to and as part of the land acquired as the protection commitment. More or less of these constituent habitats can be acquired as long as the protection commitments are met. The protection commitments are also flexible within the conservation zones for constituent habitats and upland components of complexes with flexible protection estimates.

[c] Anywhere protection commitments can be acquired anywhere within the Valley conservation zone or Potential Future Growth Area (PFG) for "Valley Anywhere" and the Foothills conservation zone or PFG for "Foothills Anywhere." See Section 5.3.1.3.6, *Conservation Zones*, for details.

[d] Any Agriculture: Includes rice, field crops, orchards, and vineyards and may be substituted by any natural community.

[e] Some values may not sum exactly to the total due to rounding. The values in the Total Protection Commitment column are fixed regardless of any rounding errors.

[f] Includes 88.6 stream miles of riverine identified in **Objective RAR-1.2**. The 88.6 miles of a protection are a requirement within the Plan.

Although the Reserve System will be developed primarily within the RAA, the Plan does not utilize a *hardline reserve map because it is a willing seller program.* Acre commitments for each natural and semi-natural community and Covered Species' habitat are established by conservation zone, to ensure that the spatial distribution of the Reserve System will meet the biological goals and objectives of the Plan, including conservation needs of Covered Species. Each conservation zone in the RAA has the necessary mosaic of lands available to acquire and restore at levels described in the acreage objectives for each natural and semi-natural community and Covered Species.

Because the Plan is based on willing sellers, in-holdings and land-cover types that do not consist of natural and semi-natural communities or Covered Species' habitat (e.g., occasional home sites, driveways, agricultural related structures), may occur within the Reserve System. These land-cover types will not be counted toward meeting the commitments of the Plan.

The remainder of Conservation Measure 1, *Establish Reserve System*, consists of the following sections:

- Section 5.3.1.2, *Tracking Progress toward Reserve System Assembly*, describes the Plan's commitment to track Reserve System assembly and ensure that conservation stays ahead of loss.
- Section 5.3.1.3, *Reserve System Components*, describes the roles of the RAA, the Reserve System in relation to the RAA, the Stream System, buffer zones, Plan Area B, and existing conservation lands that will contribute to the Reserve System.
- Section 5.3.1.4, *Landscape-level Reserve Design*, describes the acquisition-related conservation measures for meeting landscape-level biological goals and objectives.
- Section 5.3.1.5, *Natural Community–level Reserve Design*, describes acquisition requirements for meeting natural community–level biological goals and objectives. This includes guidance for acquisition needed to protect and restore/create natural communities.
- Section 5.3.1.6, *Species-level Reserve Design*, describes additional acquisition requirements for meeting species-level biological goals and objectives. This includes guidance for acquisition needed to protect and restore/create natural communities.

The acquisition commitments for assembling the Reserve System, including both protected and restored communities, are provided in Table 5-2*.* Table 5-3 provides the acres for each natural and semi-natural community and constituent habitat elements that will be protected, and Table 5-4 provides the acres of each natural community that will be restored. Table 5-5 provides a summary overview of the protection and restoration commitments and permanent direct and temporary direct effects.

Table 5-4. Natural Community Restoration Commitments (acres)

Communities and Constituent Habitats	Independent of Effects[a]	Dependent on Effects[b]			Totals
	Restoration	Direct Effects	Guidelines[c]	Restoration	Restoration Totals[d, e]
Vernal Pool Complex (VPC)	**3,000**	**12,550**	**NA**	**-**	**3,000**
Vernal Pool Constituent Habitats	30	580	Ratio 1.5:1	870	900
Vernal Pool Wetland	30	185	≥34% of 870	296	326
Seasonal Wetland in VPC	-	223	-	331	331
Seasonal Swales	-	172	-	244	244
Vernal Pool Complex Uplands	-	-	-	-	2,100
Grassland	**1,000**	**6,900**	**NA**	**-**	**1,000**
Aquatic/Wetland Complex	**20**	**260**	**NA**	**390**	**410**
Aquatic/Wetland Constituent Habitats	20	260	Ratio 1.5:1	390	410
Fresh Emergent Marsh (FEM)	20	105	≥40% FEM must be in the Foothills: ≥50% FEM must be in the Valley 10% FEM can be either	176	196
Lacustrine	-	103	-	144	144
Non-VP Seasonal Wetland	-	52	-	71	71
Aquatic/Wetlands Complex Uplands	-	-	-		-
Riverine/Riparian Complex and Other Stream System	**32**	**916**	**NA**	**1,393**	**1,425**
Riverine/Riparian Constituent Habitats	32	490	See ratios below	1,393	1,425
Riverine[f]	-	115	Ratio 1.52:1	175	175
Riparian	32	375	Ratio 1.52:1	570 +648	1,250
Other Stream System	-	426	Ratio 1.52:1	Mitigated as Riparian	NA
Riverine/Riparian Constituent Habitat and Other Stream System Total	**32**	**916**	Ratio 1.52:1	**1,393**	**1,425**
Riverine/Riparian Complex Uplands	-	-	-	-	-

Communities and Constituent Habitats	Independent of Effects[a]	Dependent on Effects[b]			Totals
	Restoration	Direct Effects	Guidelines[c]	Restoration	Restoration Totals[d, e]
Valley Oak Woodland	**225**	**140**	**-**	**60**	**285**
Plan Area A - Valley, Plan Area B[g]		40	Ratio 1.5:1	60	60
Foothills		100		-	-
Oak Woodland	**100**	**6,210**	**NA**	**-**	**100**
All Natural Communities[h]	**4,375**	**25,700**		**1,845**	

Source: MIG|TRA February 11, 2016

Notes:

[a] Commitment Independent of Effects: restoration that will occur independently of the extent of Covered Activities.

[b] Commitment Dependent on Effects: restoration that will occur in proportion to the extent of Covered Activities as mitigation. The commitment is the application of the mitigation ratio and the minimum percentage of specific constituent habitats. The amount is based on the proposed maximum allowable take under the permit (see Table 4-1).

[c] Guidelines: not applicable (NA) indicates that there is no restoration tied to direct effect. Ratio shows where mitigated applies at a ratio 1.5 acres restored to 1 acre lost. Minimum shows the proportion of the constituent habitat to be restored as the indicated specific habitat. For example, direct loss of vernal pool constituent habitats is mitigated at a ratio 1.5:1, and at least 34% of that restoration total must be as vernal pools.

[d] Restoration Totals: the sum of restoration from both independent and dependent commitments.

[e] Rehabilitation (as defined by USACE) may count toward meeting restoration commitments in Table 5-4 on a case-by-case basis upon approval by USFWS and CDFW

[f] Riverine will be mitigated as in-stream enhancements as described in Section 5.3.2.4.3, *Riverine/Riparian Complex Natural Communities.*

[g] Valley oak woodland direct effect mitigation applies only in Plan Area A - Valley and Plan Area B.

[h] Some values may not sum exactly to the total due to rounding.

Table 5-5. Summary of Effects and Conservation (acres)

Community & Constituent Habitat	Total in Plan Area A[a]	Plan Effects				Conservation Strategy						Total[l]
		Permanent		Temporary		Acquisition		Protection		Restoration/Creation		
		Proposed Maximum[b]	Flexible[c]	Proposed Maximum[d]	Flexible[e]	Commitment[f]	Estimated[g]	Commitment[h]	Estimated[i]	Commitment[j]	Proposed Maximum[k]	
Vernal Pool Complex	**45,065**	**12,550**	**-**	**455**	**-**	**17,000**	**-**	**17,000**	**-**	**3,000**	**-**	**20,000**
Vernal Pool Constituents - Total	2,237	580	-	30	-	790	-	790	-	30	870	1,690
Vernal Pool Wetland	790	185	-	15	-	250	-	250	-	30	296	576
Seasonal Wetland in VPC	845	-	223	-	8	-	304	-	304	-	331	634
Seasonal Swales	602	-	172	-	7	-	236	-	236	-	244	480
Vernal Pool Complex Uplands	42,829	-	11,970	-	425	-	16,210	-	16,210	2,970	2,100	18,310
Grassland	**34,760**	**6,900**	**-**	**235**	**-**	**7,150**	**-**	**2,740**	**-**	**1,000**	**-**	**3,740**
Aquatic/Wetland (A/W) Complex	**3,433**	**-**	**260**	**-**	**105**	**600**	**-**	**600**	**-**	**20**	**390**	**1,010**
A/W Constituents - Total	2,850	260	-	105	-	586	-	586	-	20	390	996
Fresh Emergent Marsh	1,112	105	-	50	-	256		256		20	176	452
Lacustrine	1,061	-	103	-	28	-	181	-	181	-	144	324
Non-VP Seasonal Wetland	677	-	52	-	27	-	148	-	148	-	71	219
A/W Complex Uplands		-	-	-	-	-	14	-	14	-	-	14
Riverine/Riparian Complex[m]	**6,685**	**-**	**490**	**-**	**165**	**2,200**	**-**	**2,200**	**-**	**32**	**1,393**	**3,625**
Riverine/Riparian Constituents - Total	5,519	490	-	165	-	1,718	-	1,718	-	32	1,393	3,143
Riverine	868	-	115	-	50	-	308	-	308	-	175	483
Riparian	4,651	375	-	115	-	1,410	-	1,410	-	32	1,218	2,660
Riverine/Riparian Uplands	1,167	-	-	-	-	-	482	-	482	-	-	482
Valley Oak Woodland	**1,364**	**140**	**-**	**25**	**-**	**190**	**-**	**190**	**-**	**225**	**60**	**475**
Oak Woodland	**50,870**	**6,210**	**-**	**180**	**-**	**10,110**	**-**	**10,110**	**-**	**100**	**-**	**10,210**
All Natural Communities	**142,179**	**26,550**	**-**	**1,165**	**-**	**37,250**	**-**	**32,840**	**-**	**4,375**	**1,845**	**39,060**
Agriculture	**24,954**	**-**	**3,550**	**-**	**170**	**10,050**	**-**	**8,240**	**-**	**-**	**-**	**8,240**
Rice	19,580	2,060	-	90	-	2,000	-	2,000		-	-	2,000
Any Agriculture	-	-	1,490	-	80	-	8,050	-	6,240	-	-	6,240
All Communities Combined[n]	**167,133**	**30,100**	**-**	**1,335**	**-**	**47,300**	**-**	**41,080**	**-**	**4,375**	**1,845**	**47,300**

Community & Constituent Habitat	Total in Plan Area A[a]	Plan Effects				Conservation Strategy						Total[l]
		Permanent		Temporary		Acquisition		Protection		Restoration/Creation		
		Proposed Maximum[b]	Flexible[c]	Proposed Maximum[d]	Flexible[e]	Commitment[f]	Estimated[g]	Commitment[h]	Estimated[i]	Commitment[j]	Proposed Maximum[k]	

Source: MIG|TRA February 11, 2016

Notes:

[a] Total in Plan Area A: The baseline condition is shown for Plan Area A, which is where nearly all Covered Activities will take place. Plan Area B is geographically large, but the Covered Activities there are limited to narrowly defined public-works corridors and stream restoration sites; inclusion of acreage from Plan Area B would misrepresent the extent of the landscape subject to potential effects.

[b] Permanent Effect –Represents the proposed maximum amount of permanent direct effects (loss) of natural community or constituent habitat to be covered under the Plan.

[c] Permanent Effect – Flexible: Represents estimates of direct, permanent effects on constituent habitat. These are proposed to be flexible limits within the larger proposed limits on communities. See Section 4.3.1, *Methods for Land Conversion and Permanent Direct Effect*. Flexibility was created because actual loss during Plan implementation may differ from the effects estimates. This is acceptable as long as the losses in the "Proposed Maximum" column are not exceeded.

[d] Temporary Effect – Proposed Maximum: Represents the proposed maximum amount of temporary direct effects on community or constituent habitat that would be covered under the Plan. See Section 4.3.2, *Methods for Assessing Temporary Direct Effects*.

[e] Temporary Effect – Flexible: Represents estimates of temporary effects with proposed flexible limits. See Section 4.3.1, *Methods for Land Conversion and Permanent Direct Effect*, and 4.3.2, *Methods for Assessing Temporary Direct Effects.* Flexibility was created because actual loss during Plan implementation may differ from the effects estimates. This is acceptable as long as the losses in the "Proposed Maximum" column are not exceeded.

[f] Acquisition - Commitment: Land that will be acquired for the Reserve System, including the existing protected areas proposed for enrollment into the Reserve System. See Table 5-2.

[g] Acquisition - Estimated: An estimate of the community or constituent habitats that will be acquired in reserves incidental to and as part of the land acquired as the acquisition commitment. More or less of these constituent habitats can be acquired as long as the acquisition commitments are met. See Table 5-3.

[h] Protection - Commitment: All of a community acquired minus any area converted to another community through restoration. Note that this does not include any areas added through restoration. See Table 5-3.

[i] Protection - Estimated: The estimated amount of a constituent habitat, complex uplands, or community that will be protected. The protection commitments ensure that the most important communities and constituents are the focus of conservation efforts. See Table 5-3.

[j] Restoration/Creation - Commitment: The amount of restoration/creation that will occur independently of the extent of Covered Activities, as presented in Table 5-4.

[k] Restoration/Creation – Proposed Maximum: Is the amount of restoration/creation that will occur in proportion to the extent of Covered Activities as mitigation. The commitment is the application of the mitigation ratio and the minimum percentage of specific constituent habitats. The amount is based on the maximum allowable take that the Plan proposes to cover (see Table 4-1). See Table 5-4.

[l] Total: At the end of the proposed permit term, the communities and habitats in the Reserve System will be the sum of commitments for protection and restoration/creation. The values for other communities or constituent habitats are estimates of the composition of the final Reserve System for communities, constituent habitats, and complex uplands that have a flexible component to protection and/or restoration.

[m] "Other Stream System" is not included in this table, as presented in Table 5-4. Area that is part of the Stream System is included within each respective community (see Section 3.3.1.2, *Mapping*).

[n] Values are subject to rounding

Table 5-6 provides the acres of modeled habitat that will be protected and restored for each Covered Species. The protection and restoration commitments in Table 5-6 are based on the community-level and constituent habitat protection commitments (Table 5-3) and community-level and constituent habitat restoration commitments (Table 5-4). Achieving all of the community-level and constituent habitat protection and restoration commitments will therefore meet all of the species-level protection and restoration commitments identified in Table 5-6. The table also shows the percent of total available modeled habitat in the Plan Area that will be protected and restored in the Plan Area, if the proposed maximum allowable effects occur.

Covered Species' habitat is modeled at a finer scale than the community-level protection and restoration commitments are presented. Therefore, the amount of a protection or restoration commitment for species' modeled habitat may not equal the sum of the community protection or restoration commitments for communities that compose a species' modeled habitat. For example, western pond turtle nesting habitat is modeled to include any natural (i.e., non-agriculture, undeveloped) land-cover type within feet of aquatic habitat (see model description in Appendix D, *Species Accounts*). This amount is a fraction of the protection and restoration commitments at the natural community level.

Table 5-6. Covered Species' Protection and Restoration Commitments (acres)

Species/Habitat Type[a]	Habitat in Plan Area A	Existing Protected Areas	Habitat Protected[b]	Habitat Restored	Habitat in Reserve (Protected + Restored)	Habitat in Reserve + Existing Protected Areas, as Proportion of Habitat in Plan Area A
Birds						
Swainson's Hawk						
Nesting Habitat	1,968	301	1,268	720	1,988	116%
Foraging Habitat	54,574	7,726	17,003	3,920	20,923	52%
Total	56,542	8,027	18,271	4,640	22,911	55%
California Black Rail						
Year-round Habitat	1,112	193	256	175	432	56%
Western Burrowing Owl						
Year-round Habitat	55,101	7,869	17,129	4,126	21,255	53%
Tricolored Blackbird						
Nesting Habitat	633	188	187	87	274	73%
Foraging Habitat	60,974	7,994	18,138	4,000	22,138	49%
Total	61,608	8,181	18,325	4,087	22,412	50%
Reptiles						
Giant Garter Snake						
Aquatic Habitat	19,511	660	2,702	529	3,231	20%
Upland Habitat	3,537	549	1,763	449	2,212	78%
Total	23,049	1,209	4,465	978	5,443	29%
Western Pond Turtle						
Aquatic Habitat	10,244	1,053	2,800	1,850	4,650	56%
Upland Habitat	14,263	1,970	3,859	1,930	5,789	54%
Total	24,507	3,023	6,659	3,780	10,439	55%

Species/Habitat Type[a]	Habitat in Plan Area A	Existing Protected Areas	Habitat Protected[b]	Habitat Restored	Habitat in Reserve (Protected + Restored)	Habitat in Reserve + Existing Protected Areas, as Proportion of Habitat in Plan Area A
Amphibians						
Foothill Yellow-legged Frog						
Year-round Habitat	1,837	11	83	83	167	10%
California Red-legged Frog						
Aquatic Habitat	8,532	119	1,168	1,241	2,409	30%
Upland Habitat	75,306	5,986	12,484	160	12,644	25%
Total	83,838	6,105	13,652	1,401	15,053	25%
Invertebrates						
Valley Elderberry Longhorn Beetle						
Year-round Habitat	6,367	472	2,313	1,553	3,866	68%
Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp[c]						
Wetland Habitat	2,237	555	790	900	1,690	101%
Vernal Pool Complex	44,278	7,067	17,000	3,000	20,000	61%
All Land Area[d]	**209,832**	**15,957**	**41,080**	**6,220**	**47,300**	**30%**

Source: MIG|TRA February 23, 2016

Notes:

[a] Based on modeled habitat for terrestrial species; see Chapter 3, *Physical and Biological Setting*. The covered fish habitat is measured by stream miles (see text).

[b] Habitat Protected is all habitat acquired less any land altered for restoration as another land-cover type.

[c] The Plan does not model habitat for Conservancy fairy shrimp because its known distribution in the Plan Area is restricted to a single vernal pool and because the type of vernal pool this species typically occurs in (large and turbid pools) (Helm 1998; U.S. Fish and Wildlife Service 2007b) is not found in the Plan Area.

[d] Values are subject to rounding.

5.3.1.2 Tracking Progress toward Reserve System Assembly

The Reserve System will be assembled over the term of the Permit, according to the Stay-Ahead provision (see Section 8.4.3, *Stay-Ahead Provision*). Demonstrating progress toward assembly of the Reserve System is a requirement under the ESA and the NCCP Act.[13] The Stay-Ahead provision in this Plan described in Section 8.4.3, *Stay-Ahead Provision*, addresses this requirement.

The timing and sequence of Reserve System assembly relative to adverse effects of Covered Activities are critical to the success of the Plan. Progress toward assembling the Reserve System must stay ahead of progress toward proposed total maximum take allowed under the permit. This Stay-Ahead provision applies for each community. This ensures that reserve assembly is keeping pace with loss and that the PCA is making steady progress toward completing the Reserve System. This will be demonstrated by showing that, at any given time, the cumulative conservation expressed as a percentage of the protection commitment is greater than the cumulative take expressed as a percentage of the maximum extent of effects as proposed in the Plan.

The timing of completion of the restoration/creation commitments in Table 5-4 depends on the type of restoration/creation commitment (see Section 5.2.1, *Approach to Developing Conservation Commitments,* for definitions of conservation commitments independent of effects and conservation commitments dependent on effects). Further details regarding timing of vernal pool restoration are provided in CM3 VPCG-1, *Vernal Pool Complex Restoration/Creation*, under *Timing of Vernal Pool Restoration/Creation*.

5.3.1.3 Reserve System Components

5.3.1.3.1 The Reserve System, Reserve Acquisition Area, and Potential Future Growth Area

The Plan identifies the RAA as the region of the Plan Area where the majority of the Reserve System will be assembled. The RAA comprises a largely contiguous arc of land extending from the North Foothills west to Sutter County in the Valley and south almost to Sacramento County (see Section 1.2.5, *Plan Designations and the Stream System Definition*, and Figure 1-5). The entirety of the RAA is approximately 69,000 acres, largely in private ownership and primarily in agricultural use. Approximately 45,300 acres (approximately 96 percent of the Reserve System) of the RAA will be acquired through fee title or easement for inclusion into the Reserve System. Land in the RAA that is not acquired into the Reserve System will most likely remain in agriculture and may contribute passively to regional biological values depending on the land-cover type and management practices.

A small portion of the Reserve System (approximately 2,000 acres) may be acquired in the PFG , as long as the land meets size and connectivity requirements specified in CM1 L-2, and the biological goals and objectives of the Plan. Any lands acquired within the PFG will be subject to Wildlife Agency review and approval.

The RAA is intended to guide the Permittees and the PCA in future acquisition of lands for the Reserve System (Figure 5-1). The RAA map is designed to geographically separate the RAA, and the future Reserve System, from future development (i.e., within the PFG) to facilitate the assembly of a

[13] The NCCP Act requires that implementation of conservation actions be "roughly proportional in time and extent to the impact on habitat or Covered Species authorized under the plan" (Fish and Game Code Section 2820(b)(9)).

large, contiguous Reserve System. The intent is to reconcile conflicts between conservation and future growth in such a way that the future Reserve System would achieve the Plan's biological goals and objectives over the term of the permit. The RAA includes landscapes, communities, and Covered Species representative of the Plan Area. The RAA is intended to work in conjunction with the protection and avoidance of the Stream System (see Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*) throughout the Plan Area (i.e., within the RAA and PFG); see Section 5.3.1.3.2, *Placer County Conservation Plan Stream Systems*).

The RAA map was developed through the efforts of a technical team, and two stakeholder advisory processes (the Biological Working Group and Ad Hoc Committee). Consideration was first given to areas that could accommodate landscapes of key natural communities (e.g., vernal pool complex, grassland, oak woodland) and Covered Species with large home ranges (e.g., Swainson's hawk) and specific habitat needs (e.g., fresh emergent marsh for California black rail). This level of design also considered expanding existing conservation lands to create larger reserves.

The use of the RAA map, along with the acquisition strategy (CM1 L-2, *Reserve Acquisition Strategy*), allows enough flexibility to enable the PCA to assemble the Reserve System within the constraints of a willing seller program while ensuring that the assembled Reserve System will meet the biological goals and objectives of the Plan. Land acquisition will be undertaken in accordance with a detailed set of requirements while maintaining flexibility in how the Reserve System is ultimately assembled.

5.3.1.3.2 Placer County Conservation Plan Stream Systems

Protection of the Stream System, which includes riparian communities, aquatic habitat, and other aquatic resources, is vital for ensuring the long-term viability of Covered Species. Figure 3-10 depicts the location of the Stream System. Only those areas protected as described above will contribute toward the protection commitments in the biological goals and objectives.

In addition to protecting the Stream System within the Reserve System, Covered Activities will avoid or minimize effects within the Stream System (see S**e**ction 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*). Covered Activities that affect natural communities within the Stream System boundary must contribute to restoration of the Stream System at a ratio of 1.52:1 by paying a Stream System fee (see Section 6.3.3.3.1, *Stream System Fee*). Covered Activities throughout the Plan Area must also implement LIDS (**Objective L-3.1**).

5.3.1.3.3 Buffer Zones

Fuel Buffers

In accordance with state law,[14] all applicable Covered Activities will remove all brush, flammable vegetation, or combustible growth within at least 30 feet and up to 100 feet of occupied dwellings or structures.

Fuel buffers on the Reserve System will be managed to minimize fuel loads while maintaining and enhancing habitat for Covered Species. Fuel management compatible with Covered Species' habitat requirements may include livestock grazing, controlled burning, mowing, and thinning vegetation in woodlands. Fuel management that does not adversely affect Covered Species and is compatible with

[14] California Government Code Section 51182 and Public Resources Code 4291.

Covered Species' habitat requirements is permitted within fuel buffer zones, and these fuel buffer zones count toward the community protection commitments.

The area used for fuel buffers on the Reserve System that is intensively managed to reduce fuels and that adversely affects Covered Species and their habitat will not count toward the community protection commitments. Intensive management includes regular disking (at least annual), spraying with herbicides, complete and permanent vegetation removal, and other measures that reduces the quality of Covered Species' habitat. If it needs to occur, disking will not be done more than 30 feet from the reserve boundary. A fuel buffer that is intensively managed to reduce fuels within 250 feet of a vernal pool constituent habitat, or the "immediate watershed" of a vernal pool constituent habitat if it is less than 250 feet from the vernal pool constituent habitat, will not count toward the community protection commitments, nor will the vernal pool constituent habitat count toward the protection commitment. The PCA must therefore ensure that an adequate fuel buffer is in place adjacent to dwellings or structures and that fuel management will not adversely affect land that counts toward the Reserve System acre commitments.

When the PCA acquires land for the Reserve System adjacent to or within the PFG or adjacent to existing development that has no buffer zone or an inadequate buffer zone, the PCA may create one on the reserve according to the terms described in this section. Reserve management plans will identify the location and types of fuel management and buffers to be applied on the reserve.

New development (e.g., rural development) in or adjacent to the RAA, or adjacent to existing Plan Reserves, mitigation and conservation banks or any other property protected by an in-perpetuity conservation mechanism for natural lands will incorporate, where practicable, adequate defensible space (i.e., for fuel management) within the boundaries of the new development (see Section 6.3.1.2, *General Condition 2, Conservation Lands: Development Interface Design Requirements*).

Aquatic and Wetland Buffers

Where aquatic and wetland constituent habitats are present in the Reserve System, buffers are necessary to avoid the indirect effects from new development that may occur adjacent to the Reserve System. The width of the buffers will be as specified in Section 6.3.2.1.2, *Community Condition 1.2, Avoidance for Non-vernal Pool Constituent Habitat Wetlands,* and Section 6.3.2.2.1, *Community Condition 2.1, Riverine and Riparian Avoidance*. Aquatic and wetland constituent habitats that do not have a sufficient buffer between the aquatic or wetland constituent habitat and new development will not count toward meeting protection commitments because their proximity to development can greatly reduce their habitat value. Aquatic and wetland constituent habitats that do not have a sufficient buffer between the aquatic or wetland constituent habitat and existing development will count toward meeting the protection commitments. Except for areas subject to intensive fuel management (see *Fuel Buffers*, above), these aquatic and wetland buffer zone may count toward terrestrial (including riparian) community protection commitments.

5.3.1.3.4 Conservation in Plan Area B

It is intended that the majority of the Reserve System will be established within Plan Area A (see Section 2.5.2, *Plan Area Components,* and Figure 2-4). Conservation activities may occur in portions of Plan Area B to achieve biological goals and objectives. Cooperative conservation measures in these areas could also benefit the Reserve System by expanding the resources available for a reserve, increasing contiguous reserve size, or improving connectivity. Figure 5-4 depicts the

location of conservation opportunities that could occur in Plan Areas B3 and B4. Lands that may meet these needs throughout Plan Area B are:

- Raccoon Creek Floodplain Conservation (B3). Conservation activities in this area may focus on watershed protection (including acquisition) and stream restoration along the Raccoon Creek floodplain within Sutter County.
- Fish Passage Channel Improvement (B4). Conservation activities in this area may focus on activities to improve fish passage and habitat enhancement within channels west of Placer County in Sutter County. These activities will be primarily one-time actions (e.g., vegetation management, plantings); they do not include land acquisition.
- Big Gun Conservation Bank (B5). Protection of occupied California red-legged frog habitat at the Big Gun Conservation Bank east of Auburn.

Conservation measures performed by the Permittees, including land acquisition, land management, and monitoring activities, within Plan Area B will count toward applicable Plan commitments. These actions will be covered by the state and federal permits. Monitoring and management within the Big Gun Conservation Bank will meet or exceed the Plan's requirements for monitoring and management. (See Section 8.4.7, *Private Mitigation and Conservation Banks*).

5.3.1.3.1 The Role of Existing Protected Areas in the Conservation Strategy

Existing Protected Areas

There are 15,957 acres of EXR in the Plan Area. These areas comprise open space lands currently protected by public agencies or private conservation organizations. About 13 percent of the EXR are proposed for enrollment within the Reserve System as Jump Start lands (see *Existing Protected Areas to be Enrolled into the Reserve System*, below). EXR that will not be enrolled in the Reserve System will help achieve the Plan's biological goals and objectives because they contribute to the landscape of protected communities in the Plan Area, provide habitat for Covered Species, are a source of Covered Species that may disperse to future Plan reserves and can be the nuclei for future Reserve System acquisitions (e.g., the PCA will acquire lands adjacent to EXR to expand and connect EXR).

The biological resources, presence of Covered Species' habitat, status of protection (e.g., County Park, existing easements), size, and location of EXR in the Plan Area are described in Appendix H, *Existing Open Space Lands*.

A large portion of the existing protected lands in the Plan Area are protected through the Placer Legacy Program. In 2000, Placer County began acquiring open space lands for agricultural, recreational, and habitat protection purposes through the Placer Legacy Program. Since that time, the Placer Legacy Program has acquired or co-acquired over 7,000 acres of Placer County's natural and agricultural landscapes.

Existing Protected Areas to Be Enrolled into the Reserve System

Some EXR acquired through the Placer Legacy Program using non-mitigation funds will be included in the Reserve System as *Enrolled Lands.* These lands will count toward the Plan's protection commitments for communities and Covered Species' habitat. These lands will also "jump-start" reserve acquisition, enabling the PCA to meet the Stay-Ahead provision for the Plan (see Section 8.4.3, *Stay-Ahead Provision*, and Section 8.4.4, *Jump Start*). Table 8-1 lists the specific jump-start sites

and amounts of natural communities within each site enrolled in the Reserve System. On some of the EXR, a portion has been acquired as mitigation for past non-Plan activities, and a portion has been acquired through other funds associated with the Placer Legacy Program. The portions of these Existing Protected Lands that have been acquired as mitigation for past non-Plan activities will not be incorporated into the Reserve System as Enrolled Lands, existing protected areas that are enrolled in the PCCP Reserve System, and will not contribute toward the Plan's acre commitments. Enrolled Lands must conduct their management and monitoring according to the requirements and guidelines outlined in the Plan. In some cases, this new obligation will represent an improvement over the type and level of habitat and species management and monitoring practices that are currently in place. In other cases, this requirement will simply standardize management and monitoring to provide a cohesive Reserve System throughout Plan Area A and ensure consistent management and monitoring in perpetuity.

The following existing protected areas will be included within the Reserve System and will count as Jump-start lands:

- **Hidden Falls Regional Park (Hidden Falls):** This park is currently used for passive recreational uses including hiking, biking, and equestrian activities. Daytime picnicking is allowed, but no overnight use is permitted. Fishing is allowed on Raccoon Creek consistent with state regulations, but recreational hunting is prohibited. Hidden Falls has associated existing parking lots and staging area, bridges and trails, and overlooks and will have a future outdoor nature center.
- **Big Hill Area:** The Big Hill Area includes the Harvego Bear River Preserve. Other properties in this area could be proposed for future enrollment into the Reserve System subject to Section 8.2.6.5, *Review of Reserve Land Acquisition Proposals*. The Harvego Bear River Preserve primarily includes blue oak woodland habitat. Although a reserve unit management plan has not yet been developed, preliminary planning shows that it will include trails, a potential future parking lot, and related facilities. Recreational hunting may be requested via the California Department of Fish and Wildlife's (CDFW's) Shared Habitat Alliance for Recreation Enhancement program in the future, subject to the terms and conditions of Section 6.3.6, *Reserve Management Conditions*.
- **Doty Ravine Preserve:** This preserve will contribute valuable vernal pool grassland and riparian habitat to the Reserve System. The only recreational activities that will be allowed will be docent-led tours of the site by Placer Land Trust and other education and research.
- **Swainson's Grassland Preserve:** Native grasslands within this preserve provide essential feeding grounds for Swainson's hawk. The only recreational activities that will be allowed are docent-led tours of the site by Placer Land Trust and other education and research

These lands will meet all applicable criteria for incorporation into the Reserve System (Section 8.4.1, *Criteria for Reserve System Lands*).

5.3.1.3.2 Conservation Zones

Conservation acquisitions will be distributed across the Plan Area to link and provide spatial diversity of protected communities. The main geographical considerations are (1) division between West (Valley) and East (Foothills), (2) division between North and South, (3) location of the Stream System drawn around Plan Area watercourses, and (4) the designation of the RAA (Figure 5-1). Although the majority of conservation acquisition will occur in the RAA, there are appreciable conservation opportunities in the PFG, particularly in the Valley, for vernal pool complex lands and

in the Stream System throughout both Valley and Foothills. These geographic considerations lead the Plan to identify five conservation zones, which will guide acquisition and set commitments for the Reserve System.

Although the focus of acquisition will be on land in the RAA, the conservation zones include the EXR because the Plan's Reserve System will be building off of the EXR. The combination of the EXR and the new reserves created by the Plan will contribute to natural community and Covered Species' goals. Four EXR have been identified as being suitable for partial inclusion into the Reserve System (see Section 5.3.1.3.5, *The Role of Existing Protected Areas in the Conservation Strategy*), as identified on Figure 5-1. Thus, the conservation zones correspond to the Conservation and Rural Development Areas identified in Chapter 2, *Covered Activities*.

Because the Valley RAA ranges over 20 miles across five watersheds, it is useful to subdivide it into two conservation zones: Valley North and Valley South. The Valley division follows Nicolaus Road, which roughly places the Bear River and Raccoon Creek watersheds in Valley North and the Markham Ravine, Auburn Ravine, Pleasant Grove Creek, and Dry Creek watersheds in Valley South.

The five conservation zones are shown on Figure 5-1 and listed in Table 5-3.

1. **Valley North Conservation Zone.** Valley North Conservation Zone (Valley North) comprises 57 percent of all Valley RAA (24,684 acres) plus the EXR (4,051 acres). Valley North contains roughly 60 percent of the remaining Valley RAA vernal pool complex lands; therefore, a minimum 8,430 acres of vernal pool complex protection will be protected in this conservation zone. Valley North includes the Bear River and Raccoon Creek watersheds and will provide the majority of Valley aquatic/wetland complex, which includes habitat for California black rail, tricolored blackbird, and western pond turtle. Riverine/riparian protection benefits these species and also covered salmonids. Reserves here will contribute to linkages with the Foothills along the Bear River and Raccoon Creek, maintain connectivity between the Valley North and Valley South conservation zones, and protect linkages along lower Raccoon Creek in Sutter County.
2. **Valley South Conservation Zone.** Valley South Conservation Zone. (Valley South) comprises 43 percent of the combined Valley RAA (18,367 acres) plus the EXR (3,279 acres). Valley South has roughly 40 percent of the remaining Valley RAA vernal pool complex lands; therefore, a minimum 5,170 acres of vernal pool complex will be protected in this conservation zone. Valley South includes 55 percent of current lands in rice cultivation and will most likely be the largest source of rice land acquisition. Much of the 2,000 acres of rice land to be protected as giant garter snake habitat will most likely be located in Valley South. Reserves in Valley South will contribute to linkages along Auburn Ravine, which is important for salmonid habitat, and Markham Ravine. Reserves in the southern portion of Valley South will maintain or restore connectivity across the barrier, which will result from the proposed Placer Parkway, and connect the Pleasant Grove Creek and Curry Creek watersheds, which may play a role in giant garter snake dispersal from Sutter County on the west.
3. **Valley PFG.** Valley PFG includes approximately 2,350 acres of natural communities mapped in the Stream System. These lands along Auburn Ravine and Dry Creek have direct biological value for salmonids and add to connectivity. There are several thousand acres of vernal pool complex, which are suitable for inclusion in the Reserve System along the western edge of the Valley PFG, adjacent to the RAA.

4. **Foothills North Conservation Zone**. Foothills North encompasses the entire Foothills RAA, and includes 22,752 acres of natural and semi-natural communities and 6,102 acres of EXR. At least 85 percent of protection of communities within the Foothills will occur in the Foothills North Conservation Zone, primarily for protection of oak woodland and the Bear River and Raccoon Creek stream systems.
5. **Foothills PFG.** The Foothills PFG includes 3,614 acres of communities mapped in the Stream System. These lands along Auburn Ravine and in the upper Doty Creek and Dry Creek watersheds provide spawning habitat for salmonids and provide east-west connectivity from the Valley to the Foothills.

Protection commitments identified as flexible may be achieved by protecting amounts that differ from the estimates for respective conservation zones shown in Table 5-3, as long as the corresponding non-flexible protection commitments are achieved. For example, the amount and location of seasonal swales associated with vernal pool complexes protected within each conservation zone in the Valley can differ from the flexible estimates shown above as long as at least a total of 790 acres of vernal pool constituent habitats, including at least 250 acres of vernal pool wetlands, are protected in each Valley conservation zone as specified above.

The potential location of linkages is illustrated on Figure 5-1. The PCA will prioritize acquisitions that contribute to protection of these linkages. Reserve lands along the axes of these linkages will provide east-west connectivity (**Objective L-2.3**), mainly along major watersheds, and north-south connectivity (**Objective L-2.4**), mainly across watersheds. Linkage names and orientation are as follows:

- Bear River Watershed (N-S). Connect oak woodland reserves to oak woodlands in Nevada and Yuba Counties throughout the Bear River watershed.
- Yankee Slough – Raccoon Creek Watershed (E-W). Connect Valley reserves to Foothill reserves.
- Raccoon Creek – Doty Creek Corridor (E-W). Connect existing protected areas and reinforce riparian protection for salmonids.
- Lower Raccoon Creek. Maintain connectivity between the Valley North and Valley South conservation zones and a linkage along lower Raccoon Creek in Sutter County.
- Markham Ravine (E-W). Connect reserves with EXR to the east; may play a role in giant garter snake dispersal.
- Auburn Ravine (E-W). Connect reserves with EXR to the east; important for salmonids.
- Cross Placer Parkway (N-S). Remediate barrier created by the proposed Placer Parkway. Connect Pleasant Grove Creek watershed to Curry Creek watershed; may play a role in giant garter snake dispersal.
- Curry Creek (E-W). Connect reserve lands to Sutter County on the west and avoided stream systems to the east; may play a role in giant garter snake dispersal.
- Miners Ravine (E-W). Connect stream system reserve opportunities in Miners Ravine to tributaries of Dry Creek; important for salmonids.

Table 5-2 shows the Plan goal of acquisition of 47,300 acres of natural and semi-natural lands. Of this total acquired, the Plan proposes to maintain 41,080 acres (87 percent) in their original (or enhanced) condition for habitat protection; the 6,220-acre balance would be available for

restoration to other communities. The Plan sets commitments for protection of communities and constituent habitats for the conservation zones, as presented in Table 5-3.

Table 5-3 identifies minimum protection commitments for the three RAA Conservation Zones: Valley North, Valley South, and Foothills North. Table 5-3 shows that 20 percent of the overall acquisition and protection in the Valley is designated as "Valley Anywhere." The "anywhere" designation means that acreage may be obtained in any of the conservation zones or in the PFG. Similarly, 15 percent of the overall acquisition and protection in the Foothills is designated as "Foothills Anywhere." This approach allows some implementation flexibility between North and South in the Valley and allows conservation in the Valley and Foothills PFGs.

Reserve Contiguity

Reserve design principles (see CM1 L-2, *Reserve Acquisition* Strategy) favor conservation of large blocks of land, minimizing fragmentation, and minimizing edge effects with incompatible land uses. Overall, these principles are reflected by the term *reserve contiguity*. As applied in the Plan, reserve contiguity means contiguous conservation management across adjacent parcels of land. Given the past land use history, all the Plan Area is broken up into parcels, divided by public or private access roads. Although the acquisition goal is to assemble reserves in large, interconnected blocks, there are very few parcels in either the Valley or the Foothills that are larger than 160 acres (quarter section). Although adjacent parcels are often under common ownership, they are usually physically divided by access roads as well as legally by parcel lines. As the PCA is able to acquire parcels, it will remove access roads where biologically feasible and when needed to meet the Plan's biological goals and objectives. More important, barriers to natural hydrology will be removed, thereby restoring some physical continuity between adjacent reserve parcels (i.e., where those reserve parcels are not separated by roads or other barriers that cannot feasibly be modified). Even where roads cannot be eliminated, the consistent conservation management of adjacent parcels will provide most of the reserve design benefits of large blocks of land.

5.3.1.4 Landscape-level Reserve Design

CM1 L-1, Reserve Assembly Process

The land acquisition process is described in Section 8.4, *Establishing the Reserve System*. All land acquisition will be approved by CDFW and USFWS to ensure consistency with the biological goals and objectives. All land acquisition that includes suitable habitat for covered fish will also be approved by NMFS to ensure consistency with the biological goals and objectives for covered fish.

CM1 L-2, Reserve Acquisition Strategy

General Land Acquisition Guidelines

To be incorporated into the Reserve System and counted toward the Plan's land acquisition commitments, lands must meet all applicable criteria in this section; must be included in a Reserve Management Plan, as described in Chapter 5, *Conservation Strategy*; and must be included in the Monitoring and Adaptive Management Plan. Acquisitions may be counted toward meeting the land acquisition commitments of the Plan before the Reserve Management Plan has been completed if the PCA owns the land or if the property owner is bound by a conservation easement or other agreement that requires preparation of a management plan consistent with the requirements in this chapter.

To be incorporated into the Reserve System and counted toward Plan land acquisition commitments, all lands must meet the following criteria. Additional criteria for vernal pool complex lands are provided in Section 5.3.1.5.2, *Vernal Pool Complexes and Grassland Natural Communities*.

- They must contribute to meeting the goals and objectives of the Plan, as described in Chapter 5, *Conservation Strategy*.
- They must permanently protect the biological functions and values that contribute to the Plan. Permanent protection must be ensured by a conservation easement consistent with the requirements of Section 8.4.9, *Conservation Easements*. For lands owned by the PCA or a Permittee, permanent protection must be ensured through a conservation easement recorded in favor of a Wildlife Agency or an appropriate third-party easement holder approved by the Wildlife Agencies.
- They must have no hazardous materials or property encumbrances that conflict with Plan goals and objectives. Any rights-of-way or utility easements that are maintained or used regularly cannot be counted toward land acquisition commitments because of the disturbance that occurs within these areas. The PCA will ascertain the frequency and type of use in these rights-of-way and utility easements and determine whether the affected areas should be counted toward land acquisition commitments.
- If a property has mineral rights separate from the surface rights, these mineral rights must not be severed from the surface rights. If the mineral rights are severed from the surface rights and the PCA cannot acquire the mineral rights, the property must meet the criteria described in Chapter 8, Section 8.4.2.6.2, *Mineral Resources Assessment.*

The Reserve System will be assembled primarily within the Valley and Foothill regions of the RAA (Figure 5-1) and the Stream System (for acquisition of Riverine and Riparian Complex habitats), based on the location and availability of natural communities and populations of Covered Species, the acquisition commitments for the each of the conservation zones (Table 5-3 and Table 5-6), and the Stay-Ahead requirement (Section 5.3.1.2, *Tracking Progress toward Reserve System Assembly,* and Section 8.4.3, *Stay-Ahead Provision*). The PCA will use the following criteria to direct land acquisition and the reserve assembly process:

- Acquire land adjacent to (or near to) existing reserves to expand and connect protected habitat. The assembly of the Reserve System will be a dynamic process; as new reserves are acquired, they will be acquired to expand upon and connect existing reserves where possible. Land acquired for the Reserve System within the proposed Conservation Zones (Figure 5-1) will start with a core area in each zone and prioritize building the Reserve System outward from there. This is done to ensure that, if full buildout is not reached under the Plan, the Reserve System will not be a patchwork of small reserves that will not provide the landscape-level conservation benefit intended for the Plan.
- When a suitable parcel adjacent to an existing reserve is not available for acquisition, acquire habitat close to an existing reserve to minimize distance(s) between reserves.
- Prioritize acquisition of large blocks of habitat occupied by Covered Species over small blocks of habitat occupied by Covered Species.
- Acquire parcels with less edge (i.e., length of boundary, perimeter) in proportion to total habitat over parcels with large amount of edge in proportion to total habitat. For example, given the same type of habitat, a large, square-shaped parcel is preferable to a long, narrow parcel of the

same total area. These criteria may not apply to riverine/riparian, which are naturally more linear and narrower (i.e., have more edge) than other natural communities in the Plan Area.

- Focus acquisition on reserves that support populations of Covered Species. Species-specific reserve occupancy requirements are described below in Section 5.3.1.6, *Species-level Reserve Design.* In some instances, there may not be time to conduct thorough enough pre-acquisition surveys to determine the presence of Covered Species on a parcel. In such cases, the PCA will use databases of known occurrences of nearby Covered Species and an assessment of habitat quality to guide acquisition, in addition to review and approval by USFWS, NMFS (where acquisition includes salmonid streams), and CDFW.
- Focus acquisition of parcels to be used for restoration of natural communities in areas where restoration will reduce habitat fragmentation.

Reserve Design Criteria in the PFG

The Plan intends that the Reserve System will be located primarily within the RAA; however, important resources occur in the PFG that may be worth protecting and incorporating into the Reserve System. Two thousand acres or more of vernal pool complex and other communities may be acquired in the PFG, primarily in the Valley. The potential reserve sites in the PFG would have to meet the following criteria:

- A minimum of 200 acres of a natural community or communities, unless it is located adjacent to the RAA, an existing reserve (either a PCCP reserve or a non-PCCP reserve protected in perpetuity), or the Stream System. The 200 acres may be composed of semi-natural, other agriculture, and non-natural communities if they will be restored to a natural community or communities. If Conservancy fairy shrimp occurs on the site, then the site may be as small as 20 acres (see CM2 VPB-2). In general, the size of the site may be smaller than 200 acres, pending review and approval by the Wildlife Agencies.
- Occupied by a Covered Species that is rare in the Plan Area (e.g., vernal pool tadpole shrimp, California black rail [which may persist in small wetlands] are present).
- Ability to be suitably managed in perpetuity in a manner consistent with other Reserve System lands and consistent with the adaptive management requirements described in the PCCP (Chapter 7, *Monitoring and Adaptive Management Program*).

In addition to meeting the above criteria, all Reserves in the PFG must provide buffers, as described in Section 5.3.1.3.3, *Buffer Zones*.

Field Verification Prior to Acquisition

Land-cover data, species occurrence data, and species' habitat distribution models were developed for this Plan at a regional scale. These data and models were used to develop a sound conservation strategy for the Plan Area at this regional scale and are not intended for site-specific planning because of the limitations described in Chapter 3, *Physical and Biological Setting*.

To account for some of the uncertainty inherent in this conservation strategy, biological resources in potential reserves will be verified in the field prior to land acquisition. The PCA will conduct pre-acquisition assessments on potential reserve lands to evaluate whether they are likely to meet Plan requirements. The PCA will develop standard protocols and a report template for pre-acquisition assessment prior to the first acquisition occurring during Plan implementation.

Types of information collected during these assessments will include an evaluation of location, quantity, quality, and presence of Covered Species; Covered Species' habitat; and communities present as well as other site conditions or infrastructure that would benefit or not conflict with the Plan's biological goals and objectives. The site's restoration and enhancement potential will also be evaluated. This information will help the PCA prioritize acquisition of reserve lands based on their relative contribution toward meeting the biological goals and objectives.

The biological suitability of the site for the Reserve System will be determined on the basis of the following information:

- The results of past biological surveys, updated land-cover mapping, assessments of habitat suitability for Covered Species, air photograph interpretation, and the biological resources present or expected on the site
- An evaluation of the site's enhancement and restoration potential
- An evaluation of the site's existing and potential biological value in the context of the remaining unmet biological goals and objectives and land acquisition requirements
- The presence of communities and Covered Species' habitat as needed to meet protection commitments specified in Table 5-3 and 5-6

CM1 L-3, Connectivity and Conservation within the Region

The PCA will connect the final Reserve System with conservation lands outside Placer County associated with other regional conservation efforts (Figure 5-5). This will include protecting stream systems to provide connectivity along these systems that flow through and beyond the Plan Area. These efforts will focus on the major stream corridors of the Bear River, Raccoon Creek, Auburn Ravine, and Dry Creek, which support runs of Central Valley steelhead and Central Valley fall-/late fall-run Chinook salmon moving between the Pacific Ocean through the Sacramento River system to spawning grounds in Plan Area A. These riverine and associated riparian corridors also provide critical connections for other aquatic and terrestrial species moving through urban or cultivated agricultural areas. The PCA will also protect and manage giant garter snake habitat to provide dispersal corridors that may facilitate the colonization of habitat in Plan Area A from adjacent areas to the west in Sutter County. Providing connectivity with conservation lands outside the Plan Area will enhance regional connectivity for a diversity of native species.

CM1 L-4, Connectivity within Plan Area

Protecting and increasing connectivity between natural communities within the Plan Area is important to the persistence of many populations. Figure 5-1 shows potential linkages for east-to-west connectivity in riverine and riparian complex habitats; achieving this connectivity will meet **Objective L-2.3**, *Establish East–West Corridors*. Connectivity within watersheds will be achieved by expanding and linking reserves with terrestrial, riparian, aquatic, and stream habitats, particularly within the Bear River, Raccoon Creek, Markham Ravine, Auburn Ravine, and Pleasant Grove-Curry Creek watersheds (see Figure 3-7). Acquisition of lands for both protection and restoration, in conjunction with project-level avoidance of stream zones (see Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*), will enhance connectivity within watersheds, from the western boundary of the Plan Area in the Central Valley to the upper reaches of the watersheds in the Foothills in the eastern portion of the Plan Area. The conservation strategy

emphasizes restoration of riparian habitat (CM1 RAR-2, *Siting Riparian Restoration*) to reconnect fragmented habitat.

- Although the Dry Creek and American River watersheds in the Plan Area provide important functions and values to some Covered Species (e.g., Dry Creek watershed is important for salmonids), for the most part these watersheds are too fragmented and developed to consider for long-term preservation and inclusion into the Reserve System. Only a small amount of the northwest corner of the Dry Creek watershed is in the RAA. The balance of the Dry Creek watershed is in the non-participating cities and the PFG, and all of the American River watershed is in the PFG and non-participating cities. Instead, the conservation strategy for these watersheds will focus on protection of specific Covered Species, with a particular emphasis on salmonids and those species dependent upon viable riparian corridors, such as valley elderberry longhorn beetle, western pond turtle, and foothill yellow-legged frog.
- The conservation strategy proposes to enhance regional connectivity by creating a large, interconnected Reserve System within the RAA (Figure 5-1). When the conservation acquisition commitments are achieved, the Reserve System is expected to provide:
    - North-south connectivity within and across the North Valley and South Valley RAA (Figure 5-1) through an interconnected network of vernal pool grassland reserves extending from the border of Plan Area A with Sutter County, east and north to the border of Yuba County. This area has been identified as an "Essential Connectivity Area" by the California Essential Habitat Connectivity Project (Spencer et al. 2010). Completing the conservation acquisition commitments completes **Objective L-2.4**, *Conserve North–South Connectivity.*
    - Connectivity of foothill oak woodlands with protected oak woodlands to the north (see Section 2.4.2, *Placer County*).
    - Connectivity for Central Valley steelhead and Chinook salmon between the Sacramento River to spawning grounds in Plan Area streams.
    - A network of reserves within Plan Area A that will prevent further fragmentation of the landscape and increase permeability (e.g., movement) for species to move through Plan Area A and to habitats adjacent to Plan Area A.

CM1 L-5, Protection of Uplands Surrounding Wetlands

- The PCA will focus on protecting land where fresh emergent wetlands, riparian areas, or ponds are connected to upland areas. To accomplish this, the PCA will acquire upland natural communities such as grasslands and oak woodlands adjacent to ponds, wetlands, and riparian areas to protect the watersheds supporting these areas and provide a mosaic of wetland, aquatic, and upland natural community types.

5.3.1.5 Natural Community–level Reserve Design

5.3.1.5.1 Restoration Site Reserve Design for All Natural Communities

CM1 NC-1, Siting Restoration

The PCA will identify and select, subject to Wildlife Agency review and approval, potential restoration on the basis of their physical processes and hydrologic, geomorphic, and soil conditions

to ensure successful restoration can occur and be self-sustaining. Such an approach increases the likelihood of successful restoration and reduces long-term management and maintenance costs.

The PCA will identify and select potential restoration sites based on the following criteria.

- Sites will be prioritized where there is evidence that the targeted natural communities occurred there in the past.
- The site provides sufficient physical processes and hydrologic, geomorphic, and soil conditions to ensure successful restoration can occur and be self-sustaining.
- The restoration site is able to support Covered Species, support implementation of species-specific conservation measures, and meet species-specific biological goals and objectives. For example, sites chosen for restoration of aquatic habitat for western pond turtle would be adjacent to suitable upland nesting habitat.
- The site is close to habitat occupied by Covered Species associated with each of the restored natural community types.
- The site will expand and/or connect existing natural communities.
- The restoration site is consistent with the landscape-level reserve design criteria identified in Section 5.3.1.4, *Landscape-level Reserve Design*.

Additional natural community and species-specific restoration criteria are identified in Section 5.3.1.5, *Natural Community–level Reserve Design;* Section 5.3.1.6, *Species-level Reserve Design*; Section 5.3.3.3, *Natural Community–level Restoration/Creation*; and Section 5.3.3.4, *Species-specific Restoration Actions*.

5.3.1.5.2 Vernal Pool Complexes and Grassland Natural Communities

This section addresses natural community requirements for vernal pool complexes and grasslands. For Covered Species-specific requirements, including occupancy requirements, see Section 5.3.1.6, *Species-level Reserve Design.*

CM1 VPCG-1, Vernal Pool Complex Protection

Total Vernal Pool Complex Protection Requirement and Location

By Year 45 of the proposed permit term, the PCA will acquire 17,000 acres of vernal pool complex in the Valley RAA. The 17,000 acres of protected vernal pool complex will comprise a vernal pool Reserve System in large, contiguous blocks. Acquisition will be primarily in the Valley RAA, divided between the North Valley and South Valley conservation zones, as shown on Figure 5-1. Acquisition may include 2,000 acres or more of high-quality vernal pool complex in the PFG if the land meets criteria set out in Section 5.3.1.5.2, *Vernal Pool Complex and Grassland Natural Communities*, and the subsection titled *Vernal Pool Complex Reserve Design Criteria*, below. Vernal pool complex lands will be subject to Wildlife Agency review and approval.

Vernal Pool Constituent Habitats and Delineated Vernal Pools

Vernal pool complex includes vernal pools and seasonal wetlands and swales and the surrounding upland watersheds supporting the pools (see Section 3.3.1, *Communities, Land Cover, and Constituent Habitat*). *Vernal pool constituent habitats* are defined as wetlands delineated as vernal pools along with other seasonal wetlands and swales associated with the vernal pool complex. These

other seasonal wetlands and swales may lack the distinctive flora and many of the physical characteristics that characterize vernal pools, but where they are associated with vernal pools in vernal pool complex lands, they may serve as habitat for covered vernal pool branchiopod species. For this reason, the Plan addresses the combined conservation of delineated vernal pools in the strict sense and vernal pool constituent habitats.

To ensure that the vernal pool complex acquired contains adequate Covered Species' wetland habitat, the vernal pool complex acquired will contain at least 790 wetted acres of vernal pool constituent habitats, of which a minimum of 250 acres (32 percent) must be vernal pools. This (32 percent) is equivalent to the estimated proportion of vernal pools within vernal pool constituent habitats in the Plan Area as a whole. At least 50 percent of the vernal pool complex acquired will be at high (greater than 5 percent density of vernal pool constituent habitat) or intermediate wetland density (i.e., 1 to 5 percent density of vernal pool constituent habitat).

Advance Acquisition of Vernal Pool Complex Lands and 2-year Proposed Maximum Extent of Take

In addition to protecting and restoring (Section 5.3.3.3.1, *Vernal Pool and Grassland Natural Communities*) a minimum amount of vernal pool complex (and at least 50 percent as intermediate and high density vernal pool complex) and vernal pool constituent habitats, the Plan provides multiple assurances that vernal pool complexes, vernal pool constituent habitats, and covered vernal pool branchiopods will be protected and restored, as follows.

1. The PCA will stay ahead of the loss of vernal pool complex and vernal pool constituent habitats by protecting and restoring vernal pool complex and vernal pool constituent habitats in accordance with the Stay-Ahead provisions described in Section 8.4.3, *Stay-Ahead Provision*.
2. The Plan ensures that the PCA will protect, restore, and create vernal pools at a rate and quality equal to, or greater than, occupied pools lost to Covered Activities (Section 5.3.1.6.10, *Vernal Pool Branchiopods* and Chapter 7, *Monitoring and Adaptive Management*, Section 7.5.11.1, *Document and Monitor Status of Vernal Pool Covered Species*).
3. The Plan requires that restoration/creation of vernal pool constituent habitats be completed before the end of the permit term to allow enough time for restored/created pools to be monitored and adaptively managed to ensure that those pools are suitable for, and support, covered vernal pool branchiopods (i.e., restoration/creation of vernal pool constituent habitats independent of effect will be completed by Year 35, and restoration/creation of vernal pool constituent habitats dependent on effect will be completed by Year 40) (Section 5.3.3.3.1, *Vernal Pool and Grassland Natural Communities*).

Additionally, to ensure that more high-quality vernal pools and vernal pool complexes are protected than taken and that the PCA exceeds its rough proportionality requirement early in the permit term, the PCA will provide acquisition in advance of effects (advanced acquisition) and set an associated take limit. By the end of Year 2, the PCA will protect vernal pool complex containing a minimum of 160 acres of vernal pool constituent habitats, of which at least 53 acres will be delineated as vernal pools (21 percent of the total vernal pool constituent habitat to be protected). In addition, no more than 1,800 acres of vernal pool complex and 80 wetted acres of vernal pool constituent habitats (15 percent of the total allotted effects) will be authorized for take under the Plan until the advance acquisition goal described above has been met. The advance acquisition will also mitigate effects on vernal pool constituent habitat.

The advance acquisition of these vernal pool complex lands will be subject to Wildlife Agency review and approval and must meet the criteria for Reserve System lands in Section 8.4.1, Criteria for Reserve System Lands. The jump-start lands listed in Table 8-1 will not contribute towards meeting the advance acquisition goal. However, any additional advanced acquisition of vernal pool complex and vernal pool constituent habitats acquired before permit issuance will count towards the advance acquisition goal.

The advance acquisition will include lands occupied by covered vernal pool branchiopods, as determined through occupancy surveys[15]; however, advance acquisitions will not have to meet an occupancy rate requirement. These lands may or may not be used to contribute toward the overall occupancy rate on the Reserve System, as determined by the PCA.

Sections 8.4.3, Stay-Ahead Provision, and 8.12, Schedule and Milestones, provide additional information on the timing of community protection and ensure that land acquisition will keep pace with or stay ahead of effects to this natural community through compliance with the NCCPA rough proportionality requirement.

Vernal Pool Complex Reserve Design Criteria

The PCA will meet the following criteria when acquiring areas to protect and restore vernal pools and vernal pool grassland complexes in the Reserve System:

- The minimum area for protection of a vernal pool complex is 200 acres if the area is within the PFG and not contiguous with other reserve lands, the RAA, or the Stream System and not expected to be contiguous during the permit term. The protected land may consist of one or more properties. Smaller parcels may also be acquired upon Wildlife Agency approval if they are occupied by a Covered Species that is rare in the Plan Area, such as vernal pool tadpole shrimp.
- Areas to be protected or incorporated will have on-site and off-site hydrological conditions that ensure that vernal pool resources can be maintained, enhanced, and/or restored to function in perpetuity. Off-site hydrological conditions that detrimentally affect vernal pools on the site to be acquired must be remedied before a site can count toward the protection commitment.
- No outfall or similar storm drainage facility can be directed to, or constructed within, areas to be acquired for protection and restoration of vernal pool complexes unless such facilities are directed to intermittent or perennial streams or storm drainage facilities and where such discharges do not affect the hydrology of protected vernal pools constituent habitat. The purpose of this stipulation is to avoid inundation of vernal pools beyond the natural hydro-period.
- Lands to protect vernal pool complexes must be able to allow grazing, or other suitable means for reducing thatch and controlling invasive species, and ensure ecological integrity.
- The interface between urban/suburban land uses and reserve lands shall be minimized to decrease edge effects, as described in General Condition 2, *Reserve-Development Interface Design Requirements* (see Chapter 6, *Program Participation and Conditions on Covered Activities*).

[15] At least one wet season survey, and surveys may cease once a parcel is determined to be occupied by a Covered vernal pool brachiopod.

CM1 VPCG-2, Reserve Design for Vernal Pool Restoration/Creation

The PCA will acquire sufficient lands to restore/create 3,000 acres of vernal pool complex. Vernal pool restoration/creation sites will meet the following site selection criteria:

- The PCA will prioritize vernal pool restoration sites that have evidence of historical vernal pools based on soils, remnant topography, remnant vegetation, historical aerial photos, or other historical or site-specific data.
- The site supports suitable soils and landforms for vernal pool restoration.
- Any sites identified for restoration/creation will not affect any vernal pools on-site.
- The adjacent land use is compatible with restoration/creation and long-term management to maintain natural community functions (e.g., not within 250 feet of urban or rural residential areas or the PFG). To minimize edge effects from adjacent urban and suburban land, the PCA will not restore/create vernal pools or seasonal wetlands within 250 feet from the boundary of any development (i.e., development covered under the Plan), unless the PCA can demonstrate that a location closer than 250 feet will still provide for maintenance of adequate hydrology and protection from indirect effects in the event of future development (for additional detail, see Section 5.3.1.3.3, *Buffer Zones*). Sites that contribute to establishment of a large, interconnected vernal pool complex Reserve System (e.g., adjacent to existing protected vernal pool complex) will be prioritized. All restoration or creation activities will require Wildlife Agency approval.
- Sufficient land is available for protection to provide the necessary vernal pool complex restoration/creation, including surrounding grasslands, to ensure the local watershed is sustaining vernal pool hydrology.
- Vernal pool density is representative of intact vernal pool complex in the vicinity of the restoration site. Restoration will not result in a density of vernal pools greater than 10 percent density, unless it can be demonstrated by historical or other data (e.g., aerial photograph) that a higher density is appropriate. The intention is to mimic historic conditions for high value vernal pool complexes.
- The site is close to known populations of covered vernal pool species.

The PCA will prioritize vernal pool restoration sites that have evidence of historical vernal pools based on soils, remnant topography, remnant vegetation, historical aerial photos, or other historical or site-specific data.

Vernal pool restoration/creation requirements and guidelines are provided in CM3 VPCG-1, *Vernal Pool Complex Restoration/Creation.*

CM1 VPCG-3, Grassland Protection

The PCA will protect grasslands consistent with **Objective VPCG-1.3**, *Protect Existing Vernal Pool Complexes* (Table 5-8).

5.3.1.5.3 Aquatic/Wetlands Complex Natural Communities

This section addresses natural community requirements for the aquatic/wetlands complex natural community. For Covered Species–specific requirements, including occupancy requirements, see Section 5.3.1.6, *Species-level Reserve Design*.

CM1 AW-1, Aquatic/Wetlands Complex Protection

The PCA will protect aquatic/wetlands complex consistent with **Objective AW-1.1**, *Protect Aquatic/Wetland Complex Natural Community* (Table 5-8). The location and type of wetland or pond to be protected will be driven largely by species-level requirements, described in Section 5.3.1.6, *Species-level Reserve Design.*

5.3.1.5.4 Riverine and Riparian Complex Natural Communities

This section addresses natural community requirements for riverine and riparian complex natural communities. For Covered Species-specific requirements, including occupancy requirements, see Section see Section 5.3.1.6, *Species-level Reserve Design.*

CM1 RAR-1, Riverine and Riparian Protection

The PCA will protect riverine and riparian complex natural communities to meet **Objective RAR-1.1**, *Protect Riverine/Riparian Complex* (Table 5-8). The PCA will protect stream and riparian segments on stream reaches primarily within the RAA through land acquisition. Priority will be given to protecting large intact riparian stands and riverine and riparian segments that are inhabited by one or more Covered Species, are adjacent to existing reserves, are identified in specific watershed management plans, and/or provide connectivity between reserves and/or existing riparian habitat.

The PCA will focus protection of riverine and riparian habitats in the following stream systems where they occur in the RAA:

- Bear River in the Valley and Foothills (where the Bear River is within Placer County)
- Raccoon Creek in the Valley and Foothills
- Doty Ravine in the Valley and Foothills
- Markham Ravine in the Valley
- Auburn Ravine in the Valley
- Pleasant Grove Creek in the Valley
- Curry Creek in the Valley

The stream systems are shown on Figure 3-10. The characteristics of the Plan Area streams inhabited by covered fish are summarized in Table 3-18.

Opportunities for protection of riverine and riparian natural communities may be limited in the PFG because the extent and distribution of existing and future development in the PFG is much larger than the RAA, and smaller parcel sizes in the PFG limit the ability to acquire larger, contiguous reserves. Protection in the PFG may occur when opportunities for protection are available and protection would meet criteria for Reserve System lands (Section 8.4.1, *Criteria for Reserve System Lands*). Stream systems (e.g., Dry Creek and its tributaries) that run through the PFG, however, will be protected from future development through the Stream System through avoidance measures (Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*).

CM1 RAR-2. Reserve Design for Riparian Vegetation Restoration

The PCA will acquire lands for riparian vegetation restoration to meet **Objective RAR-1.3**, *Restore Riverine/Riparian Complex* (Table 5-8). Some riparian restoration opportunities in the Plan Area have been identified for the Plan by North Fork Associates through aerial photograph interpretation (North Fork Associates 2009). Actual use of these sites for restoration will depend on site-specific conditions. Figure 5-6 displays potential restoration opportunities along upper and lower Raccoon Creek, upper and lower Yankee Slough, lower Markham Ravine, Auburn Ravine, lower Pleasant Grove Creek, and Curry Creek. Existing watershed resource management plans also identify potential opportunities for restoration in the Pleasant Grove/Curry Creek, Auburn Ravine, Raccoon Creek, and Dry Creek watersheds. Additional opportunities for riparian restoration may be identified through site assessments.

5.3.1.5.5 Oak Woodland Natural Communities

The PCA will undertake acquisition to expand the size of existing oak woodland reserves and to provide linkage to existing reserves within the Reserve System and/or to protected natural communities beyond the Plan Area. This section addresses natural community requirements for oak woodland natural communities. For Covered Species-specific requirements, including occupancy requirements, see Section 5.3.1.6, *Species-level Reserve Design*.

CM1 OW-1, Oak Woodland Protection

The PCA will protect oak woodlands to meet **Objectives OW-1.1**, *Protect Oak Woodlands,* and **OW-1.4**, *Protect Valley Oak Woodlands* (Table 5-2). The oak woodland natural community (**OW-1.1**) comprises all oak woodland land-cover types except for valley oak woodland. The valley oak woodland community (**OW-1.4**) comprises the valley oak woodland land-cover type (see Section 3.3.1, *Communities, Land Cover, and Constituent Habitat*). Protection of oak woodland in the Foothills will include small-patch ecosystems imbedded within oak woodland landscapes; woodlands include small patches of foothill chaparral, cliff/rock outcrops seeps, and other localized land-cover types.

CM1 OW-2, Reserve Design for Oak Woodland Restoration

The PCA will prioritize the selection of sites for which there is evidence that the site supported oak woodlands in the past, soil and hydrologic conditions are suitable for successful restoration, and restoration improves Reserve System connectivity.

Valley oak restoration will take place primarily on deep, well-drained alluvial soils, often along river bottoms, while oak woodlands in the Foothills (e.g., blue oak woodland) will be restored in the Foothills region of the RAA. Restoration sites will be selected where restoration will enhance oak woodland regeneration (e.g., restoration efforts will be targeted toward regenerating existing oak woodlands, in addition to planting in areas where oak woodland is currently absent, but historically occurred).

Restoration feasibility (e.g. likelihood of success) can be evaluated only on a site-specific basis by a qualified restoration practitioner. Issues such as existing soil and vegetation conditions, existing uses, the presence of animals and insects with the potential to affect plantings, site-specific accessibility, and the availability of water all have a bearing on feasibility (Harris 2013).

5.3.1.5.6 Agricultural Land

CM1 AO-1, Agricultural Land and Other Open Space Protection

The PCA will protect at least 6,240 acres of agricultural lands and 2,000 acres of rice land or fresh emergent marsh equivalent in the Valley consistent with **Objective AO-1.1**, *Protect Agricultural Lands and Other Open Space*. The 6,240 acres of agricultural lands will be protected under perpetual agricultural or conservation easements and will not count toward fulfilling any federal permit requirements for mitigation for Covered Species, except for 2,000 acres of rice or fresh emergent marsh equivalent to be protected for giant garter snake (CM1 GGS-1, *Acquisition for Protection of Giant Garter Snake Habitat*), which will count toward fulfilling USFWS federal permit requirements. The 2,000 acres of rice will be owned in fee title, if feasible.

Except for the 2,000 acres of rice, the easements for agricultural lands are not required to include restrictions as to the types of crops grown (see Section 5.3.2.3.5, *Agriculture and Other Open Space,* for the types of restrictions and practices that may occur on these lands but are not a requirement of the HCP/NCCP). Much of these lands are expected to be used for crops that provide habitat for Covered Species, such as rice land, and grains, but other than the 2,000 acres required to be maintained as rice, the agricultural land protection will not count toward the Covered Species' habitat commitments. The PCA will focus acquisition of agricultural lands in areas that will link patches of vernal pool complexes, grasslands, stream systems, and other natural community types. Acquisition requirements specific to rice are provided under CM1 GGS-1, *Acquisition for Protection of Giant Garter Snake Habitat.* Section 5.3.2.3.5, *Agriculture and Other Open Space,* describes management and enhancement actions that may be implemented on the agricultural lands to enhance their value for native wildlife.

If the PCA finds vernal pool complexes or other natural communities that are available for protection beyond the acre commitments for those natural communities, the PCA may protect these lands in lieu of protecting agricultural land.

5.3.1.6 Species-level Reserve Design

This section describes species-level reserve design criteria for species with reserve design needs that are not specifically met at the natural community level.

5.3.1.6.1 Swainson's Hawk

CM1 SWHA-1, Protection of Swainson's Hawk Habitat

Within the protected natural communities described in Section 5.3.1.5, *Natural Community–level Reserve Design,* the PCA will include at least four active Swainson's hawk nest trees. An active nest tree is defined as active if Swainson's hawk has successfully nested at the site within the previous 5 years. The PCA will protect 741 acres of modeled foraging habitat surrounding each protected nest tree, for a total of 2,964 acres of suitable Swainson's hawk foraging habitat in the Reserve System. The PCA will also protect at least 20 isolated trees with the potential to be used as nesting sites for Swainson's hawk, within the protected grasslands.

5.3.1.6.2 California Black Rail

CM1 BLRA-1, Siting California Black Rail Habitat Protection and Restoration

The California black rail habitat protection or restoration/creation commitment must include the following characteristics as adapted from Richmond et al. 2010:

- **Water duration:** Fresh emergent marshes with permanently or semi-permanently flooded water regimes will be prioritized for conservation. California black rails in the Sierra Nevada Foothills are most often found in wetlands with perennial standing or flowing water, often consisting of irrigation water, although they are occasionally found in seasonally or intermittently flooded or saturated hydrologic regimes. In the Plan Area, irrigation water and perennial springs and streams provide persistent water sources during the driest season, from mid-April through mid-October. Wetlands that are fed primarily by rainfall or seasonal springs or streams are more likely to dry out as summer progresses and therefore are less likely to support California black rails.
- **Water depth:** The PCA will prioritize sites with shallow water, particularly on gently sloping terrain. California black rails use habitat with shallower water than other North American rails, generally of a depth less than 1.2 inches. These shallow water conditions are typically found on gentle slopes rather than in depressions.
- **Vegetation:** The PCA will prioritize sites with dense emergent wetland vegetation cover. California black rails depend on dense vegetation cover. Appropriate vegetation structure (high stem densities and canopy coverage), is more important than plant species composition.
- **Patch size:** The PCA will acquire sites with California black rail habitat patches that are at least 2 acres in size, and will prioritize acquisition of sites with larger patches. Richmond et al. (2010) found that wetlands with at least one black rail detection were significantly larger than wetlands with no detections (mean area 3.2 acres compared to 1.2 acres, respectively).
- **Landscape factors:** The PCA will prioritize sites that are no more than 0.6 mile from other occupied sites to maximize potential dispersal abilities.

Sites selected for restoration or creation of California black rail habitat must include the appropriate site conditions to sustain habitat for this species following restoration or enhancement.

The PCA will protect and/or restore at least five occupied California black rail sites by Year 45. Occupancy of wetland sites will be demonstrated at Year 20 and at 5-year intervals thereafter, until Year 45. California black rail occurs as a metapopulation in the Sierra Nevada Foothills, with California black rails colonizing isolated wetland patches and also going extinct from those patches (see Section 5.2.7.2, *California Black Rail*, and Appendix D, *Species Accounts,* for more details). Because of the population dynamics at a local wetland patch (e.g., a patch can go extinct or be colonized), occupancy does not need to be demonstrated regularly at the same wetland site. As long as the total number of required wetland sites are occupied within a time interval, the occupancy requirement will be met. At least three sites must be demonstrated occupied by Year 20, and the following numbers of sites must be demonstrated to be occupied for each time interval.

1. Years 0 through 20: three sites
2. Years 21 through 25: three sites
3. Years 26 through 30: three sites

4. Years 31 through 35: four sites
5. Years 36 through 40: four sites
6. Year 45: five sites

Once a wetland has been determined to be occupied, that wetland will be counted toward meeting the occupancy requirement for that time interval. For example, if one wetland is demonstrated to be occupied in Year 3 and two different wetlands are demonstrated to be occupied in Year 19, then the occupancy requirement will have been met for the Years 0 through 20 time interval (i.e., three sites will have been demonstrated occupied by Year 20).

For California black rail, a wetland is considered occupied if a California black rail is detected twice during the breeding season (March through July)[16] in a wetland, visually or by sound. To be considered occupied, the two black rail detections must occur at least 10 days apart to ensure that the detected bird is not a transient individual temporarily using that wetland.

A number of suitable habitat patches on the Reserve System may be empty at any time. Unoccupied wetlands that provide suitable habitat, or could provide suitable habitat (after restoration and/or enhancement), will also be acquired to facilitate the expansion and persistence of the Sierra Nevada Foothills metapopulation of California black rails.

Five occupied California black rail sites will be protected, and up to two sites occupied by California black rail may be taken, provided that at least two protected and/or restored sites are occupied by California black rail prior to take of the occupied sites. Take of occupied sites cannot exceed the number of protected and/or restored sites that are occupied; therefore, at least one protected or restored site must be occupied prior to take of the first occurrence, and at least two protected and/or restored sites must be occupied prior to take of the second occurrence. Take may occur before the Year 20 milestone to protect three occurrences, as long as protected and/or restored sites are occupied and the number of occupied sites taken does not exceed the number of protected and/or restored sites occupied. After the required five protected and/or restored sites have been demonstrated to be occupied, a third and fourth occupied site may be taken, provided that three additional protected and/or restored sites are occupied prior to take of each subsequent occupied site. In total, no more than four occupied sites may be taken (provided that at least 11 protected and/or restored sites will be occupied). Take of additional occurrences at a 3:1 ratio of protected to taken may occur prior to Year 45, if the milestone to protect five occurrences is met before Year 45.

Suitable wetlands may be regularly colonized or abandoned by California black rail. Therefore, if surveys determine that a wetland is occupied (Section 6.3.5.7, *Species Condition 2, California Black Rail*), the wetland is not assumed to be permanently occupied. If subsequent surveys (i.e., in subsequent year[s]) demonstrate that the wetland is no longer occupied, the wetland may be affected by Covered Activities without counting toward the proposed maximum effect for occupied wetlands.

[16] The breeding season in the Sierra Nevada Foothills is unknown but runs from approximately March through July elsewhere in California (Eddleman et al. 1994).

5.3.1.6.3 Western Burrowing Owl

CM1 BUOW-1, Protection of Ground Squirrel Colonies

The PCA will protect at least three ground squirrel colonies on three separate sites, within protected grasslands providing suitable habitat for western burrowing owl. The PCA will protect one ground squirrel colony by Year 15 and at least two more by Year 30. If this cannot be accomplished due to a lack of existing ground squirrel colonies, the PCA will substitute each ground squirrel colony with at least five artificial burrows in suitable western burrowing owl habitat, as described under CM2 BUOW-1**,** in Section 5.3.2, *Conservation Measure 2: Manage and Enhance the Reserve System*.

CM1 BUOW-2, Prioritization of Occupied Areas

The PCA will prioritize protection of western burrowing owl habitat on sites that support or recently supported western burrowing owl (all overwintering/non-breeding season occurrences) and sites that support populations of ground squirrels. A site is presumed to be recently active if western burrowing owl were documented on the site (during either the breeding season or overwintering season) within the previous 5 years. Acquisition will consist of suitable western burrowing owl habitat such as grasslands and vernal pool complexes where the burrow sites are located outside of the inundated area. Adjacent tree cover may be a deterrent to burrowing owl occupancy due to the increase in potential predators (other raptors) and the reduction in visibility for the burrowing owls associated with the tree canopy; therefore, acquisition directly adjacent to riparian and/or other tree cover will not be prioritized for western burrowing owl.

Priority will be given to acquisition of breeding sites.

5.3.1.6.4 Tricolored Blackbird

CM1 TRBL-1 Reserve Design for Tricolored Blackbird

The Reserve System will include the following components for tricolored blackbird:

- At least 187 acres of nesting habitat.
- At least 22,138 acres of foraging habitat within three miles of protected nesting habitat. The PCA will identify priority foraging habitat for protection by locating areas that are frequently used by foraging tricolored blackbirds. This may be done through pre-acquisition surveys, or by road-side surveys of foraging habitat, when access to survey foraging habitat is not available.
- At least two tricolored blackbird colonies by Year 15 and another three colonies by Year 30, for a total of five colonies, with at least 200 acres of protected foraging habitat within 3 miles of each protected colony.
- At least five breeding colonies that have each supported a minimum of 1,500 individuals for at least one breeding season during the permit term.
- Open water within 1,640 feet of each protected nest colony.
- At least 87 acres of restored or created nesting habitat. This will include at least five fresh emergent wetlands that provide suitable nesting habitat for tricolored blackbird. These wetlands will be at least 2 acres in size, within 1,640 feet of open water, and will have at least 200 acres of suitable foraging habitat adjacent to nesting habitat that is protected. Expanding an

existing fresh emergent wetland may count toward achieving this objective if at least 2 acres are restored/created adjacent to an existing wetland.

5.3.1.6.5 Giant Garter Snake

CM1 GGS-1, Giant Garter Snake Habitat Protection

The PCA will include in the Reserve System lands for giant garter snake protection to meet **Objective GGS-1.1**, *Protect and Manage Giant Garter Snake.* Because there are no known occurrences of giant garter snake in the Plan Area, the PCA will focus acquisition of giant garter snake habitat adjacent to irrigation canals and the slow-moving streams associated with Raccoon Creek, Auburn Ravine, King Slough, Pleasant Grove, and Curry Creek. These streams connect habitat in the RAA to a population cluster a few miles west of Plan Area A in Sutter County, by way of the East Side Canal, Cross Canal, and Pleasant Grove Creek Canal (Figure 5-3).

Acquisition will focus on facilitating the colonization of the Reserve System by giant garter snake however, if giant garter snake is found, priority will be given to occupied sites. Land acquisition will include the necessary acquisition of water rights or other mechanisms to ensure adequate perennial water supply to support the species. While rice fields are dry, the PCA will ensure that suitable water is maintained in associated canals and ditches to provide a perennial water supply.

5.3.1.6.6 Western Pond Turtle

CM1 WPT-1, Western Pond Turtle Habitat Protection

The PCA will include in the Reserve System, lands for the protection of western pond turtle habitat to meet **Objective WPT-1.1**, *Protect Western Pond Turtle Habitat* (Table 5-8). Acquisition will include protection of 2,800 acres of suitable aquatic habitat and 3,859 adjacent upland for nesting, as defined in the species model description in Appendix D, *Species Accounts.*

5.3.1.6.7 Foothill Yellow-legged frog

CM1 FYLF-1, Foothill Yellow-legged Frog Habitat Protection

The PCA will include in the Reserve System lands for the protection of yellow-legged frog habitat to meet **Objectives FYLF-1.2**, *Protect Foothill Yellow-legged Frog Habitat,* and **FYLF-1.3**, *Restore Riparian Habitat for Foothill Yellow-legged Frog* (Table 5-8). Foothill yellow-legged frog occurs in rocky gravelly stream segments with gentle flows from mid-March through May, with sunny banks and nearby open vegetation. Although there are no known populations of foothill yellow-legged frog in the Plan Area, potentially suitable habitat has been identified by Dudek (2014) in the Foothills and is described in the Species Account in Appendix D, *Species Accounts*. The PCA will focus acquisition of these stream segments, within modeled habitat as described in Appendix D, *Species Accounts*.

5.3.1.6.8 California Red-legged Frog

CM1 CRLF-1, Purchase of California Red-legged Frog Conservation Credits at the Big Gun Conservation Bank

To meet **Objective CRLF-1.1**, *Protect California Red-legged Frog Habitat*, the PCA will purchase at least two California red-legged frog conservation credits (one credit equals 1 acre) at the Big Gun

Conservation Bank near Michigan Bluff by Year Two and an additional two credits by Year Five, for a total of four credits equal to the protection of 4 acres.

CM1 CRLF-2, California Red-legged Frog Habitat Protection

The PCA will include in the Reserve System lands for the protection and restoration of California red-legged frog habitat to meet **Objective CRLF-2.1**, *Protect Suitable California Red-legged Frog Habitat* (Table 5-8).

5.3.1.6.9 Covered Fish Species

CM1 FISH-1, Fish Habitat Protection

The PCA will include in the Reserve System lands for the protection of fish habitat to meet **Objective Fish-1.1**, *Protect Salmonid Spawning and Migrating Habitat* (Table 5-8).

- At least 25 stream miles of salmonid spawning habitat and 10 miles of salmonid migrating migratory habitat, primarily on stream reaches along Raccoon Creek, Doty Ravine, and Auburn Ravine.
- At least 558 acres of riparian habitat along salmonid spawning stream reaches and 342 acres of riparian habitat along salmonid migrating reaches, primarily along Raccoon Creek, Doty Ravine, and Auburn Ravine.
- At least 9,869 acres of oak woodlands and grasslands in the Foothills of the Raccoon Creek watershed to protect and improve water quality and watershed integrity in this watershed.

CM2 FISH-1, Reserve Design for Fish Habitat Restoration

The PCA will acquire at least 142 acres along spawning reaches and 74 acres along salmonid migrating reaches for restoration of riparian habitat. Up to an additional 110 acres will be acquired along salmonid streams to restore riparian habitat to meet a 1.5:1 ratio of restored: affected. Restoration of riparian habitat to benefit covered salmonids will occur primarily along Raccoon Creek, Doty Ravine, and Auburn Ravine.

5.3.1.6.10 Vernal Pool Branchiopods

CM1 VPB-1, Protection and Restoration of Occupied Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat

The PCA will prioritize acquisition of sites that are known to be occupied by vernal pool fairy shrimp and vernal pool tadpole shrimp if the sites have long-term viability. The PCA will also restore and create vernal pools to maintain long-term occupancy by vernal pool fairy shrimp and vernal pool tadpole shrimp. The requirements here will apply to each species independently. The following approach ensures that vernal pools occupied by vernal pool branchiopods are protected, restored, and created at a rate and quality equal to, or greater than, occupied pools lost to Covered Activities.

The approach has two phases: an Initial Survey Phase and an Occupancy Phase, described below.

Initial Survey Phase

The Initial Survey Phase is the period of time within which surveys will be required for all Covered Activities affecting vernal pool branchiopod sites, such that Occupancy Rate Standards can be

established. The *Occupancy Rate Standards* are the target occupancy rates for vernal pool fairy shrimp and vernal pool tadpole shrimp on the Reserve System. The Occupancy Rate Standards will be measured as, a) the proportion of occupied vernal pools relative to the number of vernal pools sampled, expressed as a percentage, and b) the size of the occupied vernal pools (i.e., area) relative to the total area sampled, expressed as a percentage. Separate Occupancy Rate Standards will be set for vernal pool fairy shrimp and vernal pool tadpole shrimp (see the Occupancy Phase section below, for a description of the Occupancy Rate Standards).

The Initial Survey Phase will last until a minimum of 37 wetted acres of existing vernal pools (i.e., 20 percent of 185 acres of the maximum estimated direct effects to vernal pools over the permit term [Chapter 4, *Effects of Covered Activities*, Section 4.5.1.1.1, *Vernal Pool Complex and Grassland Communities*) have been surveyed for vernal pool fairy shrimp and vernal pool tadpole shrimp. Existing data (i.e., data collected prior to issuance of the state and federal permits) collected within the PFG will count toward the requirement to survey a minimum of 37 wetted acres of vernal pools if the surveys were conducted using USFWS-established or –approved protocols, and data are sufficient to quantify occupancy rates, as defined below (see Occupancy Phase). The 37 acres represents a sample of the PFG from which to derive the Occupancy Rate Standards for vernal pool fairy shrimp and vernal pool tadpole shrimp for the entirety of the permit term. Once the Occupancy Rate Standards are established and approved by the Wildlife Agencies, no further vernal pool occupancy surveys for vernal pool fairy shrimp and vernal pool tadpole shrimp will be required for sites to be affected by Covered Activities.

In addition, the following criteria will guide Initial Survey Phase requirements:

- Only data collected during wet season surveys from natural, exiting pools will count toward the 37 wetted acres (i.e., restored or created pools will not count toward the 37 wetted acres and calculation of the Occupancy Rate Standards).
- Surveys will be performed consistent with Wildlife Agency-approved standards to allow data to be collected in a way that can be used to calculate Occupancy Rate Standards and to streamline the data-collection process (see Chapter 6, *Conditions on Covered Activities*, Section 6.3.5.15, *Species Condition 10*, *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp* for more details on the survey requirements). For example, surveys on a project site cannot be stopped and presence assumed for the entire project site, if a federally listed large branchiopod is found. Rather, all vernal pools must be surveyed to assess presence/absence. However, if presence is confirmed for both species in an individual vernal pool, surveys may be stopped for that vernal pool..

If existing data do not satisfy requirements for the 37 wetted acres, additional data will be collected during the Initial Survey Phase and combined with existing data to calculate the Occupancy Rate Standards. Vernal pools surveyed for covered branchiopods within the PFG that are enrolled or proposed for enrollment into the Reserve System can count toward the 37 wetted acres survey requirement for vernal pools.

All vernal pools protected (consistent with Section 5.3.1.5.2, *Vernal Pool Complexes and Grassland Natural Communities*) during the Initial Survey Phase will count toward the total 790-acre vernal pool constituent habitat protection commitment, and toward the long-term occupancy commitment, once the Occupancy Rate Standards have been established.

The advanced acquisition of 160 acres of vernal pool constituent habitats, of which at least 53 acres will be vernal pools (see Section 5.3.1.5.2, *Vernal Pool Complexes and Grassland Natural Communities,* for discussion of advanced acquisition), will ensure compliance with Stay-Ahead provisions during the Initial Survey Phase. Target occupancy rates established by the Occupancy Rate Standards will be enforced after the Initial Survey Phase.

Occupancy Phase

The Occupancy Phase begins after the Initial Survey Phase and lasts until the end of the permit term. During the Occupancy Phase, surveys will no longer be required on sites affected by Covered Activities. Sampling will be required on the Reserve System to demonstrate that protected, restored, and created vernal pools meet the Occupancy Rate Standards.

Determining Occupancy Rate Standards

The Occupancy Rate Standards will be assessed relative to both the number and the area of pools. The purpose of the Occupancy Rate Standards is to ensure that the occupancy of sites taken through Covered Activities is not higher than the overall occupancy rate of protected, restored, and created sites.

The *Area-based Occupancy Rate Standard* is defined as the total wetted area of vernal pools occupied by a covered branchiopod species divided by the total wetted area of vernal pools surveyed, and is expressed as the percentage of the wetted area occupied.

- Area-based Occupancy Rate Standard will be set for vernal pool fairy shrimp and a separate Area-based Occupancy Rate Standard will be set for vernal pool tadpole shrimp.
- If a covered branchiopod occurs in a vernal pool, the entire area of that vernal pool will be considered occupied.
- To calculate the Area-based Occupancy Rate Standard, the area of vernal pools occupied by a covered branchiopod will be divided by the total area of vernal pools subject to surveys. For example, if 25 vernal pools with a total area of 4 acres are deemed occupied by vernal pool fairy shrimp out of a sample of 400 vernal pools with a total of 100 wetted acres, then the Area-based Occupancy Rate Standard is 4 percent for vernal pool fairy shrimp.

The *Pool-based Occupancy Rate Standard* is defined as the total number of vernal pools occupied by a covered branchiopod species divided by the total number of vernal pools surveyed and expressed as the percentage of occupied pools.

- Pool-based Occupancy Rate Standards will be set for vernal pool fairy shrimp and a separate Standard will be set for vernal pool tadpole shrimp.
- If a covered branchiopod occurs in a vernal pool, the entire vernal pool is considered occupied.
- To calculate the calculate the *Pool-based Occupancy Rate Standard*, the total number of occupied vernal pools will be divided by the total number of vernal pools surveyed. For example, if 15 vernal pools are occupied by vernal pool fairy shrimp out of 300 vernal pools surveyed, then the Pool-based Occupancy Rate Standard is 5 percent for vernal pool fairy shrimp.

Because vernal pool tadpole shrimp are extremely rare in the Plan Area, if a Pool-based or Area-based Occupancy Rate Standard of 1 percent or greater cannot be established, the PCA will protect or restore 1 vernal pool occupied by vernal pool tadpole shrimp. The PCA may elect to implement one of the following: (1) purchase 1 vernal pool tadpole shrimp credit from a conservation bank

within the Plan Area to satisfy this requirement; or (2) complete construction of a vernal pool inoculated with vernal pool tadpole shrimp cysts from local occupied vernal pools by Year 25. Occupancy must be demonstrated for at least 15 years, as described in Section 7.5.11, *Vernal Pool Branchiopods*.

Compliance with the Occupancy Rate Standards

The PCA will be required to maintain occupied vernal pools at a rate equal to or greater than the Occupancy Rate Standards for vernal pool fairy shrimp and vernal pool tadpole shrimp during the Occupancy Phase. The Occupancy Rate Standards apply to all protected, restored, and created pools on the Reserve System, combined. Restored and created pools will only be included (i.e., combined with the occupancy rate of protected pools) in the calculation of occupancy rates on the Reserve System once the occupancy monitoring period of 15 years is complete for that pool (Section 5.3.3.3.1, *Vernal Pool and Grassland Natural Communities*). See Section 7.5.11, *Vernal Pool Branchiopods,* for how compliance with the Occupancy Rate Standards will be verified.

Section 7.5.11, *Vernal Pool Branchiopods,* provides detail regarding the survey protocols, the sampling procedure to be used after the Initial Survey Phase to assess occupancy rates in the Reserve System, timelines and milestones for evaluating whether the Occupancy Rate Standards are being met, and procedures to follow if the Standards have not been met at specified milestones. CM3 VPB-1, *Translocation of Vernal Pool Cysts,* describes the role of the inoculation of restored and created vernal pools in meeting the Occupancy Rate Standards. Protocols for salvage, storage, and inoculation into restored and created vernal pool cysts will be developed by the end of Year 3 and will require Wildlife Agency approval.

CM1 VPB-2, Protection of Conservancy Fairy Shrimp Occurrences

The following measures will be implemented to meet **Objective VPB-2.1**, *Protect Conservancy Fairy Shrimp.*

- Pre-project, USFWS protocol-level surveys will always be required for Conservancy fairy shrimp in the two watersheds that straddle the known occurrence of this species (Figure 5-7). The results of the protocol-level survey will be valid for 5 years after completion, which means no more than 5 years may lapse between the survey and PCA approval of the Covered Activity.
- The PCA and project proponent will protect two Conservancy fairy shrimp occurrences (in addition to the occurrence already protected at the Mariner Conservation Bank) for the first occurrence taken. Take of additional occurrences would require a 3:1 protection (three protected occurrences for each occurrence taken).
- Standard USFWS avoidance criteria (i.e., avoid the occupied pool and a 250-foot upland buffer surrounding the pool, with potential to modify based on the actual size of the contributing watershed) will apply if the project proponent elects to avoid taking a Conservancy fairy shrimp occurrence.
- For land supporting a Conservancy fairy shrimp occurrence to qualify for inclusion into the Reserve System, the occurrence and contributing watershed must be protected, and the protected area must be at least 20 acres.

5.3.2 Conservation Measure 2: Manage and Enhance the Reserve System

This conservation measure provides guidance for meeting the biological objectives presented in Section 5.2.5, *Landscape-level Biological Goals and Objectives*, Section 5.2.6, *Natural Community–level Biological Goals and Objectives,* and Section 5.2.7, *Species-level Biological Goals and Objectives,* as they relate to management and enhancement of the Reserve System. Table 5-2 indicates the biological goals and objectives that each conservation measure is intended to achieve and references the subsections in Conservation Measure 2, *Manage and Enhance Reserve System,* relevant to each objective. The conservation measure is organized as follows.

- Section 5.3.2.1, *Reserve Unit Management Plans*, describes the process for development of reserve management plans and the required contents of management plans.
- Section 5.3.2.2, *Landscape-level Management and Enhancement*, describes management and enhancement actions to be implemented at the landscape level, such as increasing permeability in the Reserve System.
- Section 5.3.2.3, *Natural Community–level Management and Enhancement*, describes management and enhancement requirements and techniques for each community.
- Section 5.3.2.4, *Species-level Management and Enhancement Measures*, describes management and enhancement to meet Covered Species' needs that are not met through landscape- or natural community–specific measures.

5.3.2.1 Reserve Unit Management Plans

The centerpiece of the conservation strategy is land acquisition in accordance with the reserve design criteria outlined above in Sections 5.3.1.4, *Landscape-level Reserve Design*, 5.3.1.5, *Natural Community–level Reserve Design*, and 5.3.1.6, *Species-level Reserve Design*. The specific location of individual reserves and condition of resources within these reserves will not be known until they are identified; therefore, site-specific management and enhancement objectives, performance standards, and techniques cannot be developed until suitable sites are identified, surveyed, and acquired.

Two reserve unit management plan templates will be used for the entire Reserve System: one for the Valley and one for the Foothills. Reserve management plan templates will serve as guiding management plans for the entire Reserve System and for the development of reserve unit management plans. Reserve unit management plans will be developed for individual reserve units—multiple parcels in the same area with similar management needs—based on the appropriate template (i.e., whether the reserve unit is in the Valley or Foothills). Reserve unit management plans will be updated through the adaptive management and monitoring process. Reserve-unit management plans will tailor the appropriate management plan template to the conditions of each reserve unit (e.g., communities and Covered Species present, site-specific management needs).

The PCA will prepare reserve-unit management plans for each reserve unit in collaboration with the Wildlife Agencies, USACE, and the U.S. Environmental Protection Agency when wetlands are present; current agricultural (for rice protected and managed for giant garter snake) or grazing lessees, if any, will be subject to review and approval of the Wildlife Agencies (see Section 8.2.6.6, *Review of Reserve Management Plans*). Initial preparation and periodic updates of reserve management plans

will serve as a formal mechanism for some of the Wildlife Agency approval processes specified in the Plan. Management plans will also serve to inform other agencies and the general public.

5.3.2.1.1 Development of Reserve Unit Management Plans

Preparation of reserve unit management plans will tier off the PCCP conservation strategy and reserve management plan templates. Reserve unit management plans will incorporate the PCCP conservation strategy that applies to that reserve unit (e.g., a new reserve unit in the Valley with vernal pool complexes will incorporate vegetation management plans for vernal pool complexes) as reserve units are added to the Reserve System.

Initial inventory and drafting of reserve unit management plans will be completed within 3 years of acquisition of the land for that reserve, at which time it will be provided to the Wildlife Agencies for review and approval (see Section 7.2.2.1.1, *Document Baseline Conditions*). If a newly acquired parcel (in fee title or conservation easement) is incorporated into an existing reserve unit, the existing reserve unit management plan may need to be updated to incorporate the new parcel. If an update is necessary, it will be completed within 12 months of acquisition of the land for that reserve, at which time it will be provided to the Wildlife Agencies for review and approval. As additional lands are added to a reserve unit, existing unit policies, goals, and management actions may be applied to the new areas as long as they are applicable. If conditions on a new area warrant a revision, the reserve unit management plan will be revised to reflect changed management. Changes to the Reserve Management Plans will be reviewed and approved by the Wildlife Agencies.

The key elements of the reserve unit management plan will be developed in coordination with the landowner and included in the conservation easement when this form of ownership interest is acquired. The management plan will include details on the techniques that will be used to achieve these goals. See Chapter 8, *Plan Implementation*, for the required elements of these easements, including the prohibitions on uses that would degrade the conservation value of the easement land.

Until reserve unit management plans are developed and formally approved for a new reserve management unit; land management may occur according to the guidelines in this chapter. Reserve unit management plans will be modified periodically as appropriate pursuant to the Plan's adaptive management program (Chapter 7, *Monitoring and Adaptive Management Program*) to respond to new scientific information and changing conditions in the reserve areas. The PCA will formally review and, where appropriate, systematically revise reserve unit management plans at least every 5 years. This review will be based on an evaluation of the success of management methods (i.e., knowledge gained through the monitoring and adaptive management program) in achieving objectives of the reserve, as well as on results of other outside research.

5.3.2.1.2 Content of Reserve Unit Management Plans

Reserve unit management plans will identify, on the basis of site-specific conditions and reserve objectives, the management and maintenance actions necessary to ensure that desired ecosystem characteristics and functions are maintained and enhanced. Reserve unit management plans will also include measurable, site-specific targets to assess the success of management actions within an adaptive management framework. Reserve management will be based on the management plan templates and the landscape-, community-, and species-level conservation measures described in this chapter and can be modified within an adaptive management framework (Chapter 7, *Monitoring and Adaptive Management Program*). Reserve unit management plans will also address and minimize the conflicts that may arise when managing for multiple species and habitats.

Although reserve unit management plans will identify restoration sites as appropriate, restoration will be implemented consistent with separate, site-specific restoration plans as described in Section 5.3.3.2.1, *Site-level Restoration Plans.* The reserve unit management plans will describe how restored lands will be managed after restoration is complete and success criteria have been met (i.e., after lands are restored, they will be managed consistent with other lands in the Reserve System).

The PCA will be responsible for securing and providing signage for reserve boundaries. Where approved, the reserve management plan will provide details on allowable uses on the reserves.

At a minimum, all reserve unit management plans will address the following:

- Biological goals and objectives of the reserve unit
- Biological inventory of the site
- Community and Covered Species' habitat management, enhancement, and restoration
- Monitoring and adaptive management
- Fire management
- Reserve buffer on adjacent development sites
- Invasive species

The following sections will be included where relevant:

- Water and aquatic resources
- Management of rice lands
- Other agricultural lands (i.e., non-rice land)
- Maintenance of infrastructure
- Recreational use
- Mosquito and vector control
- Measures to reduce the risk of spreading infectious disease

The following sections describe the components to be included in reserve unit management plans.

Biological Goals and Objectives of the Reserve Unit

The reserve unit management plan will identify the applicable biological goals and objectives for that reserve unit. This is intended to show how the reserve unit (and management actions conducted within the reserve unit) contributes to achieving the overall biological goals and objectives of the Plan. The reserve unit management plan will outline the corresponding conservation measures necessary to achieve the biological goals and objectives.

Biological Inventory

The reserve unit management plan will include an inventory of the conservation values of the site at the time the easement is enacted or land is acquired in fee title, including habitat values for relevant Covered Species (see Section 7.2.2.1.1, *Document Baseline Conditions*). It will also include a description of land use surrounding the reserve unit that may affect species' use of the reserve.

Natural Community and Covered Species' Habitat Management, Enhancement, and Restoration

Each reserve unit management plan will include a discussion of the management and enhancement of natural communities and Covered Species' habitat. Habitat for Covered Species will be managed and enhanced by managing vegetative structure (e.g., height of grass in grasslands, density of canopy layers in woodlands) and species composition (e.g., removal or control of invasive species, seeding and planting of native species), among other means. This section should include a description of the management and enhancement tools, livestock stocking rates, and sites where grazing will be restricted (e.g., sensitive habitats such as wetlands that would be adversely affected by grazing). Techniques for managing vegetation are also applied for managing invasive species and fuel loads, which will also be included in reserve management plans (see below).

Enhancement measures for each reserve unit will be determined on a case-by-case basis, based on the conditions of a reserve, to promote recruitment of Covered Species by managing vegetation, controlling invasive species, and promoting hydrological and other natural processes. Management and enhancement measures will be based on existing information, including knowledge of historic management regimes and observed outcomes of ongoing management, while incorporating new information resulting from research and monitoring. Site-specific enhancement methods and monitoring techniques needed to enhance natural communities and Covered Species' habitats and ameliorate or eliminate threats cannot be adequately defined until conditions are assessed on the ground. Various alternative methods and techniques for enhancing natural communities and Covered Species' habitat are described in Section 5.3.2.3, *Natural Community–level Management and Enhancement*, and Section 5.3.2.4, *Species-level Management and Enhancement Measures.* If these approaches do not provide the desired outcomes, then the PCA will utilize adaptive management to achieve the biological goals and objectives. Specific management regimes will be tailored to site-specific conditions after acquisition because threats and specific environmental conditions vary among geographic areas and species.

Priorities for enhancement measures for specific sites, and the techniques for implementing each action, will be identified in reserve unit management plans based on the specific threats that occur at each site. Enhancement efforts will be monitored and enhancement techniques will be refined within an adaptive management framework.

Although reserve unit management plans will identify restoration sites as appropriate, restoration will be implemented consistent with separate, site-specific restoration plans as described in Section 5.3.3.2.1, *Site-level Restoration Plans.* The reserve unit management plans will describe how restored lands will be managed after restoration is complete and success criteria have been met (i.e., after lands are restored, they will be managed consistent with other lands in the Reserve System). Appendix K, *Conservation Easement Template*, provides two management plan templates (one each for the Valley and Foothills) and the components to be included in these plans.

Monitoring and Adaptive Management

Each reserve unit management plan will describe species and/or habitat monitoring requirements, including monitoring schedules and reporting requirements, applicable to the reserve unit. The monitoring element of reserve management plans will be based on the adaptive management program described in Chapter 7, *Monitoring and Adaptive Management Program*. Specific reserve unit management plans should describe how results from monitoring will be used to adjust management actions within the decision-making structure of the adaptive management process.

Each reserve unit management plan will also include a description of provisions for compliance inspections, including access and landowner notification.

Fire Management

Each reserve unit management plan will include a discussion on fire management. This section will be based on the system-wide fire management plan to be developed for the Reserve System (see CM2 L-2, *Development and Implementation of Fire Management Plans*, Section 5.3.2.2, *Landscape-level Management and Enhancement*). The fire management section of each reserve unit management plan will include minimum impact suppression techniques and best management practices (BMPs), as recommended in the Guidelines for Wildfire Management on Reserves (Appendix F, *Fuel Management*).

Fuel management on the Reserve System will be compatible with the habitat requirements of Covered Species and consistent with achieving the biological goals and objectives of the Plan. Fuel management will not adversely affect Covered Species and their habitat, except in limited circumstances where intensive fuel management (e.g., disking) is necessary in buffer zones (see Section 5.3.1.3.3, *Buffer Zones*), or where fire access roads need to be established in the Reserve System. The methods and intensity of fuel management will vary, depending on natural community type (e.g., oak woodlands vs. vernal pool complexes), the amount of fuel on the reserve, the location of the reserve relative to human populations and structures, emergency vehicle access and other factors.

The fire management section will also include the following elements specific to each reserve unit:

- A map of fire access roads, gates, and wildfire buffers
- Identification of the fuel management activities in fuel buffer zones, including buffer zones that will be intensively managed to reduce fuels and therefore will not be credited toward the natural community protection commitments (see Section 5.3.1.3.3, *Buffer Zones*)
- Identification of fuel-load management methods and criteria for their application
- Criteria and procedures for use of prescribed fire for management purposes
- A description of fire-suppression criteria, if any, and procedures, resources, and responsibilities, including criteria, for selecting fire-fighting water sources
- A discussion of restoration and rehabilitation of vegetation following a fire
- A discussion of how fuel management activities will be designed to reduce or eliminate adverse effects on nesting birds

Fire is an important natural component of local ecosystems. Therefore, some wildfires should be allowed to burn naturally to provide periodic disturbances that will benefit natural communities and Covered Species, if feasible, within the larger land use context. The fire management plan will include a clear decision system to determine when a wildfire will be left to burn and when it must be partially or wholly contained to prevent damage to structures, prevent injuries, or cause excessive disturbance to natural communities.

Reserve fire management plans will be coordinated with the California Department of Forestry and Fire Protection and any other firefighting agency that has responsibility for Reserve System lands. Copies of all fire plans, including maps of access roads and gates, will be provided to all firefighting units. Additionally, the plans may include prescribed burn guidelines for management of fire-

dependent natural systems. This includes coordination with other land management entities to ensure adequate availability of burn permits from the Placer County Air Pollution Control District. Any proposed burning as part of the Plan is required to meet the District's current Regulation 3: *Open Burning*.

The development of the fire management plan will include, based on the location of existing access roads and gates, an assessment of the need to develop additional fire access roads located to minimize effects on sensitive species and communities and the need for new access roads, which could affect sensitive species and habitats, to be constructed under emergency conditions (i.e., during fires). Reserve managers are required to coordinate with fire services to identify restoration and/or enhancement sites so they can be avoided.

Invasive Species

Each reserve management plan will include a discussion on management of invasive species. This section should incorporate management tools for controlling and, if possible, eradicating invasive plants and animals that threaten habitat value for Covered Species. Actions to control invasive species that are described for natural communities (CM2 L-1, *Vegetation Management and Invasive Plant Control,* Section 5.3.2.2, *Landscape-level Management and Enhancement*) will also be incorporated as relevant into individual reserve management plans.

Water and Aquatic Resources

Each reserve unit that supports aquatic resources with a managed water supply will include a discussion on water management in the reserve unit management plan, including irrigation water for restoration and enhancement, as well as long-term water management. Examples include wetlands that provide a consistent supply of water for California black rail and water during the active season for giant garter snake. The reserve unit management plan will describe the strategy for providing water, including the source, volume of water, where water will be provided, and timing of water provisioning.

Management of Rice Lands

Reserve unit management plans supporting the 2,000 acres of rice land to be conserved consistent with **Objective GGS-1.1**, *Protect and Manage Giant Garter Snake Habitat* (Section 5.2.7.5, *Giant Garter Snake*), will include a section on rice management. The reserve unit management plan for rice lands will describe the agricultural practices that will be undertaken to ensure compatibility with the biological goals and objectives of that reserve management unit. The reserve unit management plan will also include limitations on permitted practices to reduce adverse effects of some practices on Covered Species.

Rice lands owned in fee title by the PCA may continue in agricultural use under lease to farmers where that use is consistent with the biological goals and objectives for the site. Some rice lands will be protected under conservation easements; in these cases, the PCA will prepare the reserve unit management plans in cooperation with the landowner that are consistent with the terms of the conservation easement.

Reserve unit management plans on rice lands conserved for giant garter snake are necessary to provide sufficient enforceable terms in conservation easement agreements to ensure that protected rice lands will be managed in a manner that will achieve biological objectives and meet permit terms and conditions (e.g., monitoring requirements). These plans will describe the agricultural practices

that will be undertaken to ensure the land's suitability as habitat for Covered Species. Site-specific conservation measures designed to maintain and enhance habitat for giant garter snake will be documented in the reserve unit management plan. Reserve management plans for reserves with rice land will include the components listed below, in addition to the items required for all plans.

- A statement of which Covered Species may be affected by agricultural use and how agricultural use is beneficial to or and consistent with species objectives.
- A schedule of major farming activities (e.g., tiling, planting, harvesting).
- A description of grazing rotation regimen, including rotational interior fencing regimes (e.g., timing, density, and types of stock). If necessary, establish residual dry matter standards. Any grazing on giant garter snake habitat will be limited to sheep or goats because cattle grazing can result in the removal of upland refugia and the trampling of vegetative cover for the snake. Controlled grazing by sheep or goats has less impact on the habitat and, if managed correctly, can serve as a valuable tool in restoring and maintaining habitat (U.S. Fish and Wildlife Service 2012).
- A description of how roads and field margins will be maintained and who will be responsible for this maintenance.
- An Integrated Pest Management Plan (see CM2 AO-3, *Implementation of Integrated Pest Management*, Section 5.3.2.3.5, *Agricultural and Other Open Space*).
- A list of herbicides and pesticides that may be applied and a schedule for application (herbicides and pesticides are not a Covered Activity under the Plan; therefore, all herbicide and pesticide use must avoid take of listed species and Plan Covered Species).

It is assumed that agricultural reserve lands are not open to the public, although access on a site-specific basis may be allowed (i.e., docent led tour, scientific research projects, or special hunts).

Other Agricultural Lands (i.e., Non-rice Land)

Each reserve unit management plan that includes non-rice land agriculture (i.e., field agriculture and orchard and vineyard agriculture) will describe any agricultural use restrictions. The reserve unit management plan will identify measures that may be implemented to improve upon or provide habitat for Covered Species and native flora and fauna as described in CM2 AO-4, *Other Management and Enhancement Opportunities*.

The key elements in reserve unit management plans that include non-rice land agriculture will be negotiated with the land owner and included in the agricultural conservation easement when this form of ownership interest is acquired (see Section 8.4.9.3, *Conservation Easements on Agricultural Lands*).

Reserve unit management plans for reserves with non-rice land agriculture will include a description of how roads and field margins will be maintained and who will be responsible for this maintenance.

Maintenance of Infrastructure

Each reserve unit management plan will include a map showing the location of existing infrastructure, such as roads, firebreaks, fences, gates, pumps, wells, water control structures, ditches, canals, drains, power lines and buildings. The management plan will include a schedule for

inspecting infrastructure to determine the need for maintenance. Work needed to maintain infrastructure (e.g., firebreaks, fences) will be conducted as soon as practicable once needs have been identified. The management plan will also identify periods during which maintenance activities should be conducted to avoid or minimize adverse effects on natural communities and Covered Species. Each reserve unit management plan will include a hazardous materials management/spill prevention plan, which will identify procedures that must be followed if hazardous materials are encountered or a spill occurs on the reserve.

Allowable Recreational Uses

The reserve unit management plans will describe the allowable recreational uses consistent with Section 6.3.6.1.1, *Restrictions on Recreational Uses in Future Reserves Acquired during Plan Implementation*. Allowable recreational uses in Jump-Start lands are described separately in Section 6.3.6.3, *Reserve Management Condition 3, Jump Start Lands*.

Mosquito and Vector Control

Reserve unit management plans will have a section on mosquito and vector control that will describe the BMPs that the Placer Mosquito and Vector Control District (PMVCD) would implement to manage mosquito populations on the Reserve System. Creating and restoring wetlands within the Reserve System could have the potential to create conditions that attract mosquitoes. To protect the public, mosquito populations in Placer County are monitored and controlled by the PMVCD. The PMVCD would also provide these services within the Reserve System, although such activities are not covered under the Plan and must therefore avoid take of Covered Species.

The majority of BMPs that the PMVCD may implement would focus on managing the aquatic, larval stage of mosquitoes. Many of the BMPs to manage mosquito populations would be applied to restored and created wetland features, managed water and vegetation, and maintained wetland infrastructure. Mosquito and vector control activities are not Covered Activities under the Plan; therefore, all mosquito and vector control activities must avoid take of listed species and Plan Covered Species. The PCA will work with the PMVCD to ensure that mosquito and vector control activities on the Reserve System are implemented as consistent as possible with the biological goals and objectives of the Plan.

Measures to Reduce the Risk of Spreading Infectious Disease

Biologists, reserve managers, and technicians will follow guidelines for minimizing disease transmission when they are conducting fieldwork with covered amphibians (i.e., California red-legged frog and foothill yellow-legged frog). The PCA, with assistance from the Wildlife Agencies, will develop and adopt guidelines for minimizing the risk of spreading infectious diseases, such as chytridiomycosis, which affects amphibians, within the Reserve System.

5.3.2.2 Landscape-level Management and Enhancement

CM2 L-1, Vegetation Management and Invasive Plant Control

Grazing by livestock will be the primary means for managing vegetation in the Reserve System. Depending on site-specific conditions, and within an adaptive management framework, other techniques besides grazing may be used, including limited controlled burning in combination with grazing, mowing with machinery, or hand-pulling (U.S. Fish and Wildlife Service 2005). The

approach may vary by site, depending on the potential effect on listed taxa in the area, local concerns such as air quality, costs, and potential effects on Covered Species.

Reserve managers will use grazing as the primary means to manage invasive vegetation. Prescribed grazing can also reduce the risk of wildfire, as managed grazing is a very effective way to reduce ladder fuels and overall fuel loads (City of Rocklin 2009; Franklin et al. 2006, as cited in Fry 2008). The techniques and timing of fuel load reduction, however, will be designed to avoid adverse effects on Covered Species as well as unintended damage to oak seedlings and wildlife.

When management measures to control invasive species and manage vegetation could affect nesting birds, techniques will be used to minimize effects on nesting birds (e.g., if controlled burns are used, they will be conducted outside the nesting season).

Prescribed burns will be applied in compliance with the system-wide fuel management plan to be developed for the Reserve System (see CM2 L-2, *Development and Implementation of Fire Management Plans*, Section 5.3.2.2, *Landscape-level Management and Enhancement*). See Appendix F, *Fuel Management*, for further discussion of wildfire fuels management.

Additional detail regarding vegetation management and invasive plant control, specific to natural communities, are provided in Section 5.3.2.3*, Natural Community-level Management and Enhancement*.

CM2 L-2, Development and Implementation of Fire Management Plans

The PCA will develop a system-wide fire management plan for the Reserve System, which will require review and approval from the Wildlife Agencies. This plan will be developed using guidance from Appendix F, *Fuel Management*. Reserve unit management plans will include site-specific measures based on the system-wide fire management plan.

CM2 L-3, Maintenance and Enhancement of Reserve System Permeability

The Reserve System will be maintained and enhanced to maintain or increase permeability. The permeability of the Reserve System will be increased by the actions listed below.

- Removing fences that serve as barriers or hazards to wildlife movement or retrofitting them to allow wildlife movement (some fencing will be needed to help manage and control livestock as well as for human-access controls).
- Improving culverts and other road crossings to make them more attractive to and safer for wildlife (see Section 5.3.3.3.3, *Riverine and Riparian Complex Natural Communities*, CM2 RAR-2, *Removal and/or Modification of Barriers to Fish Passage*, for specific in-stream enhancements for covered salmonid passage).
- Managing grassland vegetation and thatch to facilitate dispersal of amphibians, such as California red-legged frog, for which dense vegetation may hinder movement.

Most fences in the Reserve System will remain and be used for management purposes, such as grazing management. Those that are unnecessary will be removed to increase Reserve System permeability. Additional fences may be installed to better manage grazing timing and locations. Most existing roads in the Reserve System will be used for management or monitoring purposes, but those that are unnecessary will be removed and decommissioned (i.e., returned to a natural condition) to reduce hazards to wildlife and the erosion potential associated with dirt and gravel

roads. Additional roads may be added to establish access for management or monitoring purposes. These access routes will conform to the natural contours of the surrounding landscape and be maintained only to the extent necessary for access.

Culverts that create a one-way barrier[17] along waterways will be removed or retrofitted to allow movement of fish and aquatic amphibians both upstream and downstream. In most cases, retrofitting involves replacing small obstructive culverts with larger, straight culverts to allow species to move through more readily. In some instances culverts may be replaced with clear-span bridges to increase the habitat quality of the waterway where it flows under the roadway. This approach enhances the habitat (both aquatic and terrestrial) under the roadway for animal movement. In addition, existing culverts or bridges may be enhanced to increase wildlife movement through or under these permanent barriers. For example, fencing could be installed along the roadway to guide wildlife species away from the roadway and through under-crossings.

5.3.2.3 Natural Community–level Management and Enhancement

5.3.2.3.1 Vernal Pool Complex and Grassland Natural Communities

Site-specific management and enhancement needs cannot be adequately defined until conditions are assessed on the ground. Specific management regimes will be tailored to site-specific conditions after acquisition because threats and specific environmental conditions vary among geographic areas and species (U.S. Fish and Wildlife Service 2005).

If proposed approaches cannot achieve the biological goals and objectives, alternative techniques will be used as described in this section. Priorities for enhancement measures for specific sites and the techniques for implementing each action will be identified in reserve management plans based on the specific threats that occur at each site. Management efforts will be monitored and management techniques will be refined within an adaptive management framework. Measures for maintaining and enhancing vernal pool complexes and grasslands will focus on controlling and reducing these threats.

CM2 VPCG-1, Vernal Pool Complex and Grassland Vegetation Management

Reserve managers will implement grazing, disking, controlled burns (not all techniques are expected to be implemented on each parcel; some will depend on the land use context of the landscape), and other grassland management practices on a rotational basis to create a diversity of grassland structural types within the landscape to benefit grassland species with different microhabitat requirements, as informed by monitoring and improved through adaptive management. Reserve managers may need to control non-native vegetation in restored and created vernal pools, particularly if the land has been used for agricultural production. In such cases, reserve managers may need to remove the agricultural seed-bank, which may include such pasture species as vetch and alfalfa. Particularly invasive plants may need to be removed or controlled within vernal pools.

Effective methods have not been developed to control many invasive species that occur in the vernal pool grasslands of the Plan Area. The PCA, or other entity delegated by the PCA, will monitor and develop management techniques within an adaptive management framework to create more effective control methods to ensure the biological goals and objectives of the Plan are met.

[17] One-way barriers occur when species can move in one direction but not the other (e.g., fish moving downstream but not upstream).

Prescribed Grazing

Grazing will be the primary method used to control invasive vegetation, maintain appropriate hydroperiods in vernal pools, and reduce wildfire fuels in vernal pool complexes and grasslands. Grazing can be used to help protect remnant native grasslands (should any remaining remnants still occur in the Plan Area) from invasion by non-native annual grasses and invasive plants. Low to moderate levels of grazing appear to benefit vernal pool complex ecosystems by reducing the cover and competition of non-native annual grasses, resulting in higher diversity of native plants (Robins and Vollmar 2002, as cited in Jones & Stokes Associates 2004; Marty 2005).

Grazing in annual grasslands will also be used to reduce fuel loads (see Appendix F, *Fuel Management*). Large amounts of standing dead material can be found in late summer in years of abundant rainfall when grazing pressure has not been intense enough (Mayer and Laudenslayer 1988, as cited in Jones & Stokes Associates 2004). Grazing will also be used to increase native forb diversity in annual grasslands by reducing competition from non-native invasive species.

Over-grazing can also affect water quality. Techniques for reducing the effects of grazing on water quality include reducing the number of livestock, removing livestock from vernal pool complexes during late spring (when livestock tend to congregate in pools to cool off), providing stock ponds and well water pumped into troughs as supplements to vernal pools as drinking sources, and utilizing types of cattle that are less likely than others to congregate in and around pools.

Prescribed Burning and Fire Management

Prescribed burning may be used as a tool in limited circumstances in combination with grazing to manage invasive vegetation in vernal pool grassland complexes. Should fire be considered as a management tool in vernal pool grassland complexes, the effects of prescribed burning on Covered Species, native wildlife, the relative cover of native and invasive species, vernal pool hydroperiod, and other ecosystem functions will be assessed in a pilot study before being implemented as a management tool. If burns are implemented in the Reserve System as a management tool in grassland and vernal pool complexes, considerations will include the blooming and seeding times of the targeted invasive species (and native species that may be adversely affected by fire), the land use history of the site, and the likely condition of the native seed bank. Fires shall be conducted at a time when the seeds of the targeted invasive plants will be destroyed, provided this does not impose a greater risk of damaging native seeds. Single burns are generally unsuccessful at improving native diversity and cover to grasslands; multiple burns are usually required.

If used, controlled burning will be used in conjunction with grazing or mowing to control infestations of invasive species. If native vegetation on a site has been particularly denuded, supplementary seeding of native species may be required. Fire suppression equipment will be kept out of vernal pools.

CM2 VPCG-2, Vernal Pool Complex Enhancement of Hydrologic Conditions

Degraded vernal pools in the Reserve System will be hydrologically enhanced using the following techniques:

- Mechanical recontouring of vernal pools to restore the characteristic depth from the overlying soil surface to the impermeable layer beneath. In some cases, this may also involve removing ditches, raised roads, trails, and other barriers to restore surface flow. Enhancing vernal pool topography within areas that have been degraded by agricultural use may include ceasing tillage

and irrigation practices, removing silt accumulated from agricultural use, and repairing damage caused by agricultural vehicles.

- Diverting excess surface runoff (e.g., from agriculture and roads), and removing permanent water sources that adversely affect vernal pool hydroperiod. In some cases, vernal pools may be connected to permanent sources of water through human-caused alterations to the landscape, which can adversely modify vernal pool hydroperiod. In these cases, the hydrological conditions of vernal pools may need to be restored by isolating pools from permanent water sources to restore seasonal inundation. Before water is diverted from pools, however, a full evaluation of existing conditions will be conducted (e.g., current extent of hydroperiod; ability to maintain suitable hydroperiod should historic hydrology be restored) to assess which species could benefit from diversion and which species could be negatively affected.
- Enhancing vernal pool water quality. In some cases, polluted runoff may be affecting vernal pools. The main method for restoring vernal pool water quality is to divert polluted runoff or filter it before it reaches the vernal pools. However, similar to removing permanent water sources (above), altering drainage patterns could have negative consequences for the species in those pools. In some cases, runoff from roads and impediments to drainage can create good habitat for vernal pool species, even though they would not have historically been there (Marty pers. comm.). Therefore, before water is diverted from pools, the PCA will conduct a full evaluation of existing conditions (e.g., current extent of hydroperiod; ability to maintain suitable hydroperiod should polluted water be diverted) to assess which species could benefit from diversion, and which species could be negatively affected.

Should polluted water sources be diverted, techniques for restoring vernal pool water quality may include using drainage ditches or retention basins to divert runoff that originates from surfaces such as roads, agriculture, or other urban hardscapes. In addition, outfall or similar storm drainage facilities may be redirected or diverted. In some cases, roads and trails may be removed or converted to boardwalks.

CM2 VPCG-3, Ground Squirrel Population Enhancement

Ground squirrel populations have been historically controlled through hunting and rodenticide to reduce damage to structures (e.g., levees) and agriculture. However, not all areas in the Plan Area may have historically supported ground squirrels, possibly because suitable soil conditions are not available.

Where California ground squirrels occur, they can play a key role in the grassland natural community. For instance, ground squirrels create large burrow systems in grasslands. Such disturbance helps maintain plant species diversity. Ground squirrels also provide a prey base for raptors and mammals. In addition, their burrows provide nest and food cache sites for burrowing owls and refugia for California red-legged frog (U.S. Fish and Wildlife Service 2002).

To help restore ground squirrel populations to grassland ecosystems within the Reserve System, existing rodent control measures (e.g., poisoning,[18] hunting, and trapping) will be minimized. Minimizing existing ground squirrel control measures may be sufficient to increase squirrel populations in some areas. The use of rodenticides or other rodent control measures will be

[18] Use of rodenticides is not a Covered Activity under the Plan.

prohibited in reserves, except for the agriculture and open space protected to achieve **Objective AO-1.1**.

5.3.2.3.2 Aquatic/Wetlands Complex Natural Communities

The PCA will implement the following management and enhancement actions in and around wetlands and ponds on the Reserve System. Techniques and requirements for implementing each of these actions are described below.

CM2 AW-1, Aquatic/Wetlands Complex Vegetation Control

The PCA will remove and/or control non-native, invasive vegetation in wetlands and ponds; provide open water areas free of vegetation; and reduce the cover of annual grass and thatch in wetlands.

Vegetation Management

Vegetation management measures include removing and/or controlling invasive plant species and enhancing habitat to facilitate the restoration, establishment, and/or maintenance of appropriate native vegetation and vegetative structure.

Vegetation may need to be removed from ponds where little open water remains to improve open water habitat for western pond turtle, California red-legged frog, and giant garter snake. Vegetation can be removed by limited grazing by livestock. Grazing to control vegetation (including invasive species) in wetlands and ponds will be managed and monitored closely to ensure that effects caused by overgrazing (e.g., excessive trampling of native vegetation, soil compaction and erosion, eutrophication caused by excessive deposition of cattle urine, and bank destabilization) are minimized or avoided. Other techniques, where ecologically appropriate, such as prescribed burns, herbicide application (using products that have been approved for aquatic communities and do not result in take of listed species), and hand and mechanical removal will be used to remove or control invasive plant species or maintain open water habitat.

CM2 AW-2, Fencing Wetlands and Ponds

The PCA will install fencing, where ecologically appropriate, to manage grazing on portions of wetlands and ponds.

While some grazing may be used to manage vegetation in wetlands and ponds, overgrazing by livestock and rooting by feral pigs can degrade aquatic/wetlands complex natural communities. Fencing and rotational grazing are two methods that can be used to manage sustainable grazing in these habitats. The need for, and location of, fencing will be site specific and determined on a case-by-case basis. Some access to ponds by livestock, however, will be used to help prevent excessive plant growth that can lead to rapid sedimentation of ponds.

Where necessary to protect wetlands and tricolored blackbird colonies from being trampled by livestock, tricolored blackbird nesting habitat and colony sites will be fenced to restrict access by livestock. Additionally, wetlands providing habitat for California black rail will be protected from livestock with fences.

CM2 AW-3, Sediment Removal

The PCA will periodically remove sediment and improve water retention in wetlands and ponds, as necessary, using methods that minimize effects on Covered Species and other native species.

At the time of acquisition and/or establishment of conservation easements, wetlands and ponds on the Reserve System may be in disrepair. Repairs may be made to improve water retention to improve habitat for Covered Species. Sediment removal may be needed to improve habitat for Covered Species.

CM2 AW-4, Non-native Predator Control

The PCA will eradicate or reduce non-native predators (e.g., bullfrogs, invasive fish) that threaten Covered Species populations in wetlands and ponds on the Reserve System.

Bullfrogs and several species of centrarchids are known to prey on the eggs or tadpoles of the California red-legged frog, as well as western pond turtle hatchlings or juveniles (Moyle 1973; Holland 1991, as cited in Jones & Stokes Associates 2004). Hatchlings of wood ducks, mallards, and even Canada geese often fall prey to largemouth bass.

Non-native Predator Control

Techniques that may be used to control invasive animals generally include trapping programs such as those used to control bullfrogs, manipulating habitat (e.g., periodic draining of ponds), or hand capturing. Other methods may be utilized subject to Wildlife Agency review and approval.

CM2 AW-5, Basking Habitat Enhancement

Where aquatic habitat for California red-legged frog or western pond turtle is protected and the site provides opportunities for enhancing basking habitat, the PCA will employ enhancement techniques applicable to the site conditions.

Basking Habitat Enhancement

Mowing and focused disking (i.e., disking at specific times and locations that are not harmful to the habitat) are useful to create openings in emergent and other marsh vegetation, which improves wildlife use, provides basking area, and aids in wildlife viewing and disease monitoring (Mensik, 1990; Mensik and Reid 1995, cited in Silveira 2007). Coarse woody material or anchored basking platforms will be installed in wetlands and ponds to improve basking habitat for Covered Species.

CM2 AW-6, Provision of Vegetative Cover

The PCA will increase vegetative cover for native wildlife in aquatic/wetlands complex, except in areas that are kept clear as open water. The PCA will plant native emergent vegetation (e.g., *Typha* spp. and *Bolboschoenus* spp.) as needed in existing wetlands to enhance habitat value for Covered Species.

CM2 AW-7, Maintenance of Water Depths and Hydrological Cycles

The PCA will maintain appropriate water depths and hydrological cycles for particular Covered Species (i.e., western pond turtle, California black rail). In wetlands where the water level is managed by the PCA, the PCA will not raise water levels during the nesting season (March 1 through August 15) to avoid flooding nests of wetland nesting birds (e.g., California black rail).

CM2 AW-8, Maintenance and Enhancement of Water Quality

The PCA will monitor hydrologic conditions on the Reserve System and potential sources of pollutants. The PCA will remove or reduce point and non-point sources of pollution on Reserves and divert point and non-point sources of pollution from outside Reserves away from aquatic/wetlands complex natural communities.

Maintenance and Enhancement of Water Quality

Techniques for minimizing pollutants that flow into wetlands include use of filter and buffer strips around wetlands, and minimizing the use of herbicides around wetlands. Any herbicide use will maintain a buffer of at least 100 feet around elderberry shrubs if present. Herbicide and pesticide uses are not Covered Activities.

Enhancement of pond and wetland habitats must be balanced with the need to minimize mosquito abundance or proliferation. Encouraging adequate populations of mosquito predators, such as frogs, swallows, and bats, offers an approach to mosquito control that is compatible with management for Covered Species. The PCA will provide access for staff of the Placer Mosquito and Vector Control District to monitor and control mosquitoes at Aquatic/Wetlands Complex sites when warranted (see Section 5.3.2.1.2, *Content of Reserve Unit Management* Plans). Vector control is not a Covered Activity under the Plan; therefore, vector control cannot result in take of listed or Covered Species unless separate incidental take authorization is granted for such activities.

5.3.2.3.3 Riverine/Riparian Complex Natural Communities

The PCA will implement the following management and enhancement actions in riverine/riparian complex natural communities on the Reserve System.

Techniques and requirements for implementing each of these actions are described below.

CM2 RAR-1, Riparian Vegetation Management

Riparian vegetation will be managed to enhance the cover, structural diversity, and species diversity of riparian constituent habitat based on site conditions and as appropriate. Management to achieve these goals will include invasive plant removal and replacement with native plant species, appropriate grazing, and other techniques.

Management will include control or removal of invasive plants that are detrimental to the integrity and function of the riparian system such as red sesbania (*Sesbania punicea*), tree-of-heaven (*Ailanthus altissima*), giant European reed (*Arundo donax*), black locust (*Robinia pseudoacacia*) and Himalayan blackberry. Invasive plants removed may be replaced with native riparian plants to increase native cover and reduce the risk of further spread of invasives. To benefit valley elderberry longhorn beetle the PCA will focus control of invasive vegetation in habitat where elderberry shrubs are found. Vegetation management methods may include hand removal, mowing, mechanical removal, mastication, spot-burning, tarping, and grazing. Invasive plant control will be conducted to minimize effects on native species.

Inappropriately applied, grazing can affect riverine and riparian systems through trampling, erosion, and overgrazing. Livestock access to creeks can cause excessive vegetation removal, bank instability, and ultimately sediment and fecal deposition into local waters. When used, grazing will be managed to minimize effects on the riparian and riverine community. The following measures

may be applied on a site-specific basis to protect riverine and riparian habitats within the Reserve System:

- Livestock access to targeted river and stream segments will be restricted by using exclusion fences and by providing alternative water sources.
- Sediment suspension at livestock crossings will be reduced by armoring stream crossings (e.g., rock fords), installing bottomless culverts, or other employing bioengineered techniques.
- Where grazing is used to manage riparian vegetation (e.g., fuel loads, control of invasive species), grazing will be limited in riparian habitats to levels that will ensure that a complex vegetation structure with a well-developed understory will be restored and maintained.
- Restrict grazing from riparian vegetation during the bird breeding season (March 15 to August 15) to help protect nests from direct damage from cattle.

In-stream Enhancement

The PCA will enhance the in-stream, riverine component of the riverine and riparian natural community to improve habitat for covered fish, amphibians, birds, and reptile species (i.e., western pond turtle), natural community function, connectivity, and water quality. Enhancement will occur in streams on the Reserve System and outside of the Reserve System (i.e., in stream lengths not protected through fee title or conservation easements), in partnership with private and public landowners. Stream enhancement projects undertaken outside of the Reserve System may include such actions as removing/modifying barriers to fish passage, and project-specific measures for engineering projects (e.g., adding course woody material and other in-channel improvements to mitigate for stream crossings such as bridges and culverts).

In-stream enhancement is described below in CM2 RAR-2, RAR-3, and RAR-4. The degree to which each of these enhancement actions is implemented at a given location will depend on site-specific conditions at the location during implementation. Much of the information regarding site-specific conditions will be identified during initial studies.

CM2 RAR-2, Removal and/or Modification of Barriers to Fish Passage

The PCA will initiate partnerships with managing agencies or private parties to remove or modify two high-priority fish passage barriers: the barrier at Doty Ravine at Garden Bar Road and one other barrier identified in Table 3-5. When partnerships allow, the PCA will remove or modify up to three more of the fish passage barriers identified in Table 3-5 (see Figure 5-8). The PCA cannot remove or modify any of these barriers without the cooperation of private landowners and the owner/operator of the barrier. As part of this conservation measure, the PCA will initiate partnerships with managing agencies and landowners to identify and prioritize removal or modification of these barriers, and to provide planning, technical, and financial support.

Barriers to fish passage in the Plan Area include beaver dams, culverts, seasonal flashboard dams, pipeline crossings, concrete dams, and natural waterfalls or cataracts (Bailey and Buell 2005). Because of the modified flow regime in western Placer County, juvenile steelhead (both rearing and emigrating stages) and adult fall-run Chinook salmon are the most vulnerable salmonid life stages to barriers to passage. These life stages are most likely to suffer mortality during low-flow conditions or at unscreened water diversion intakes and temporary flashboard dams.

The Plan has prioritized the removal and modification of barriers based on recommendations in Bailey and Buell (2005) and the Raccoon Creek Watershed Assessment (cbec, inc., eco engineering and H.T. Harvey & Associates 2017) (Table 3-5). The PCA will initiate partnerships with managing agencies to eliminate or modify barriers to passage for all salmonid life stages in Auburn Ravine, Raccoon Creek (including Doty Ravine), and Dry Creek watersheds through barrier removal or modification projects or through partnership with conservation organizations that have projects for enhancing fish passage. Projects to enhance fish passage may include removal of dams or other barriers, redesign of culverts, alteration of a barrier structure to alter flows and enhance surface roughness, construction of fish ladders over impassable structures, additions of weirs and other flow-reducing structures to shorten pool-to-pool vertical distance, and modifying associated unscreened water diversions. Bailey and Buell (2005) and the Raccoon Creek Watershed Assessment (cbec, inc., eco engineering and H.T. Harvey & Associates 2017) identify potential approaches to enhancing passage at barriers in Plan Area streams. The actual methods used to enhance fish passage will depend on site-specific conditions.

Fish passage barriers were prioritized for removal or modification to improve fish passage, based on benefits of removal to covered salmonids and feasibility. The following fish passage barrier sites were identified as high priorities for modification or removal, in no particular order (identified as Fish Passage Enhancement Projects on Figure 5-8):

- Hemphill Dam
- Cottonwood Dam
- Doty Ravine: Garden Bar Road Culvert
- Nelson Lane Dam
- Gaging Station at Raccoon Creek and Waltz Road near the Sutter county line

Other dams and diversion structures that could also be removed or modified include the Lincoln Ranch Duck Club Dam, Coppin Dam, Davis Dam, and the Tom Glenn Dam. The PCA may also work with the Nevada Irrigation District to improve fish passage at the Nevada Irrigation District Doty Ravine south diversion structure, Camp Far West Canal, and Goldhill Dam or other structures identified in the future. The order in which barriers are removed or modified will generally be from downstream to upstream in a given tributary to provide access by fish (in some cases a barrier may be modified before a semi-permeable barrier is modified downstream). The location of the above barriers to fish passage are summarized in Table 3-5.

CM2 RAR-3, Modify Unscreened Water Diversions

The PCA will modify all unscreened diversions on salmonid streams in the Reserve System. In some cases, diversions on the Reserve System may be owned or held under easement by a water agency or a private party. In such cases, the PCA will work with these parties to modify unscreened diversions, where feasible and if agreed to by the owner or easement holder. The PCA will work directly with Reclamation's Anadromous Fish Screen Program and CDFW's Fish Screen and Passage Program on this action to ensure the most effective outcome.

Many of the barriers identified for removal or modification in **Objective RAR-1.5** and CM2 RAR-2 have associated unscreened water diversions. The 2002 *Auburn Ravine/Raccoon Creek Restoration Plan*, *Anadromous Fish Screening and Passage Opportunities in Western Placer County and Southern Sutter County* (Bailey 2005), and *Assessment of Habitat Conditions for Chinook Salmon and Steelhead*

in Western Placer County, California (Jones & Stokes Associates 2005) identify several unscreened diversions in Plan Area salmonid streams. The PCA may work with managing agencies and private landowners to modify unscreened water diversion in association with barrier removal or modification, if such unscreened water diversions are not on the Reserve System. Screens may be removed when diversions are discontinued.

There are several potential methods for modifying unscreened diversions. The most common method is to install a screen over the diversion to reduce the potential for entrainment of fish. Relocation of a diversion, in combination with screening, to a location with lower quality habitat could reduce the likelihood that individual fish would be present near the diversion. Consolidating multiple unscreened diversions into a single screened diversion in a location of lower habitat value would reduce the number of entrainment threats. The daily timing of diversion operation could be optimized to avoid active periods of covered salmonids. Individual diversions could be removed due to a switch to other water sources, including groundwater.

CM2 RAR-4, Improvement of In-channel Features

The PCA will remove or modify in-channel features to improve habitat functions for Covered Species (e.g., covered fish, foothill yellow-legged frog, California red-legged frog, western pond turtle) and natural communities and enhance or rehabilitate aquatic ecosystem processes. The PCA will improve in-channel features, as described in, but not limited to, this conservation measure and CM2 RAR-3, to meet a 1.5:1 ratio of enhanced to affected (measured in stream miles). Covered Activities anticipated to affect in-channel features include, for example, stream crossings such as bridges, culverts, and pipelines and bank stabilization projects (see Chapter 4, *Effect of Covered Activities*).

In-channel conservation measures may include, but are not limited to:

- Reconstruction of the channel geometry to a more natural local slope, length, sinuosity, and dimensions
- Removal of non-native vegetation and re-vegetating with native plants to influence physical processes
- Installation of large woody material and other in-stream structural elements, such as rocks and boulders, to improve channel complexity and in-stream cover conditions for covered fish species and to promote recruitment of woody material
- Removal of armored levees along stream channels and replacement with earthen levees to allow natural geomorphic processes
- Replenishment and/or cleaning of spawning gravel

The type of in-channel enhancement measure implemented by the PCA will depend on the conditions of the stream reach to be enhanced and the type of in-channel feature(s) that is affected by Covered Activities. In-channel enhancement measures implemented to meet a 1.5:1 ratio of enhanced to affected will be located in the same watershed and salmonid habitat type (e.g., spawning, migrating, if the effects occur in a salmonid stream) in which the effects occur. Additional in-channel enhancement (i.e., non-project-specific enhancement) may occur in any Plan Area stream.

Channel enhancement may entail reconstruction of a channel or incremental process restoration (installation of a natural structural feature to induce change in a channel) to reduce the extent of

channelization. Channel enhancement/restoration guidelines and designs are presented in Flosi et al. 1998 and Circuit Rider Productions (2004). Successful channel enhancement is also expected to restore bank stability and reduce bank erosion, thereby improving aquatic habitat and water quality. During implementation, the effects of the enhancement on local channel geometry will be carefully considered and proper hydraulic analysis performed (Flosi et al. 1998).

Gravel Replenishment and Cleaning

The PCA will replenish and/or clean spawning gravel in areas within stream reaches that are identified during initial studies as having degraded spawning gravels, and where gravel augmentation will effectively benefit salmonids.

The addition of spawning gravel may increase the area of spawning habitat in Plan Area streams; however, conditions in streams may limit the benefit of gravel augmentation (e.g., augmented gravel may be quickly washed away or filled with sediment). Prior to gravel augmentation, the retention of gravel and development of spawning habitat will be assessed through detailed investigations by a fluvial geomorphologist during initial studies. Plan Area stream reaches tend to be narrow. High flows in narrow reaches may transport spawning gravel downstream and out of the spawning habitat reaches. Fine sediment may also be mobilized and deposited in the gravel, minimizing benefits of gravel augmentation. Presently, Auburn Ravine is the most likely stream to benefit from gravel augmentation because the level of fines is lower than in other streams, and the channel is much wider (the wider channel may help distribute and retain spawning gravel) (Jones & Stokes Associates 2004).

Gravel replenishment will consist of supplying gravel of appropriate size for use by steelhead and Chinook salmon to suitable locations based on flow conditions, depth, and typical water temperatures during the spawning period. Gravel replenishment can be used in streams deficient in spawning gravel due to dams or other artificial structures that prevent gravel recruitment or transport.

As part of this conservation measure, the PCA may clean spawning gravels in spawning riffles with sufficient gravel supply but with degraded conditions due to fine sediment load. Clean gravel is necessary for successful salmonid egg incubation because it allows sufficient hyporheic (inter-gravel) flow to deliver fresh, oxygen-rich water and remove carbon dioxide-rich water. Gravel that is filled with silt clogs the hyporheic spaces, preventing sufficient water circulation. Cleaning may be conducted using hand tools if compacted, or water pumps and rakes if silted. Site-specific conditions will dictate the method to be used. All cleaning and replenishment activity will occur during periods when spawner, egg, and alevin life stages are not present.

Gravel replenishment and cleaning will most likely require occasional maintenance. The PCA will monitor spawning beds to assess the condition of gravels and maintain gavels (e.g., by additional replenishment or cleaning) as conditions warrant (see Chapter 7, *Monitoring and Adaptive Management Program*). Two primary processes responsible for providing a clean gravel supply—(1) sufficient flow to clean the gravel and prevent riparian encroachment and (2) new gravel recruitment during floodflows from upstream sources—are not expected to change as a result of Covered Activities. Some reduction in suspended fine sediments, a third primary process, is expected as a result of other actions in the Plan, including General Condition 1 and Stream System Conditions 1 through 4. Together, in-channel enhancement techniques can serve to moderate in-channel flows, allow the deposition of sediment to improve channel and bank formation processes, reduce sediment loading in river and stream systems, increase the extent and quality of spawning

reaches, and provide an overall improvement in the quantity and quality habitat for Covered Species.

Conservation Opportunities in Plan Area B4: In-channel Improvement and Riparian Restoration

In addition to project-specific mitigation (i.e., improvement of in-channel features sufficient to meet a 1.5:1 ratio of enhanced to affected), the PCA may conduct in-channel improvement measures and riparian restoration within and along the salmonid-bearing channels west of Placer County in Sutter and Sacramento Counties (e.g., Raccoon Creek, Doty Ravine, and Auburn Ravine). The Plan does not commit to conducting in-channel improvement in Plan Area B (Figure 5-4); actions may be conducted if funding is available. In-channel improvement and riparian restoration conducted by the PCA in Plan Area 4 will not contribute toward meeting project-specific mitigation requirements.

CM2 RAR-5, Non-native Animal Species Control

The PCA will implement measures designed to control non-native predatory fish to reduce their effects on covered salmonids, amphibians, western pond turtle, and other native species. These will include the development of harvest management programs, reducing predation at weirs, diversion dams, and related structures, and improving in-stream refuge from predatory fish, as suggested in the NMFS Recovery Plan (National Marine Fisheries Service 2014).

Invasive, non-native animals often out-compete native animals for food and habitat and/or decrease native populations through predation. In western Placer County streams, the most ubiquitous invasive fish species include bluegill, sunfish, carp, and bullhead (Bailey 2003). The need to control invasive species and methods to be used will be site-specific and evaluated within a monitoring and adaptive management framework. Each reserve unit management plan will include a section on management of pest animal species (Section 5.3.2.1, *Reserve Unit Management Plans*).

Harvest management programs could include directing a concerted effort by fishers to target the harvest of non-native fish species. This could occur through bounty programs or fishing tournaments in conjunction with CDFW.

Reducing predation at weirs, diversion dams, and related structures would occur primarily by modifying the structures to reduce deep, slow-moving pools; shaded areas that attract ambush predators such as centrarchids; and other hiding spots for predatory fish. Such structural modifications could occur in conjunction with CM2-RAR-1, *Removal and/or Modification of Barriers to Fish Passage*, wherever possible.

Improving in-stream refuge consists of creating hiding spots for smaller juvenile salmonids, such as in large woody material or shallow water habitat. Installation of these habitat types will be included under CM4 RAR-3, *Improvement of In-channel Features*, described above.

5.3.2.3.4 Oak Woodland Natural Communities

The PCA will implement the following management and enhancement actions in oak woodland natural communities on the Reserve System.

CM2 OW-1, Oak Woodland Vegetation Enhancement and Management

The PCA will develop specific management and enhancement guidelines in reserve-unit management plans. Management techniques are detailed below and will be implemented to

- Enhance oak woodland regeneration, especially for stands of valley oak and blue oak
- Manage invasive plants in the understory
- Reduce fuel loads to reduce the chance of catastrophic wildfires

Vegetation Enhancement and Management

Various management techniques will be used to manage and enhance oak woodlands on the Reserve System. Placer County's Oak Woodland Management Plan and Native Tree Mitigation Policy Report (2008) contain numerous suggestions for managing oak woodlands. The Interim County Guidelines for Evaluating Development Impacts on Oak Woodlands (Placer County 2008b), which apply to California Environmental Quality Act analysis for projects proposed in oak woodlands, also provide guidance for protecting oak woodlands before, during, and after development occurs. Those documents are incorporated herein by reference. Prescribed grazing, hand and mechanical thinning, and burning, as described under CM2-L1, will be the primary techniques for controlling vegetation and promoting oak regeneration. Additionally, invasive plants in oak woodlands can be controlled on a large scale with disking and on a small scale with mowing, mulching, hoeing, or judicious use of herbicides (Brussard et al. 2004; McCreary 2001; Tu et al. 2001). Any herbicide use will maintain a buffer of at least 100 feet around elderberry shrubs, if present.

Planting and Protecting Seedlings and Saplings

In addition to restoring oak woodland (see Section 5.3.3.3.4, *Oak Woodland Natural Communities*), the PCA will facilitate and enhance regeneration of oak woodlands by planting acorns and seedlings within existing oak woodlands and protecting seedlings with shelters, as described below in CM3 OW-1, *Oak Woodland Restoration*, Section 5.3.3.3.4, *Oak Woodland Natural Communities.* Selective protection of stump-sprouts after stands have been thinned for fuel management may also be used to facilitate regeneration (Brussard et al. 2004; Standiford and Tinnin 1996; McCreary 2001). Other methods include controlling non-native plants that compete with seedlings for resources; controlling non-native animals that feed on acorns, seedlings, and saplings; implementing livestock management; implementing approaches against sudden oak death; and incorporating fire into management regimes.

CM2 OW-2, Control of Invasive Animals that Limit Oak Regeneration

Non-native animals (e.g., feral pigs, wild turkey) can severely affect oak woodlands (Brussard et al. 2004, McCreary 2001, Sweitzer and Van Vuren 1998). The PCA will develop and implement a feral pig control program through coordination with the Placer Land Trust, CDFW, community members and neighbors. The Placer Land Trust is currently working with the CDFW, Placer County Agricultural Department Wildlife Serves, other agencies, community members, neighbors, and landowner partners to develop a strategy that will help reduce the negative effects of feral pig populations on Placer Land Trust preserves and neighboring lands. Feral pig control is currently occurring on Placer Land Trust properties and adjacent lands with a cooperative agreement with CDFW wildlife officers to trap and remove feral pigs (permit #6954). Planned management activities include a fall pig hunt with the CDFW to assess the viability of hunting as a component of land management. If successful, this hunting program may serve as a model for pig control in the Reserve System. As an alternative, Henry W. Coe State Park in Santa Clara County has been operating a successful pig-trapping program for several years (Sweitzer and Loggins 2001), which could also be used as a model for pig control in Placer County.

5.3.2.3.5 Agricultural and Other Open Space

The only agricultural lands on the Reserve System that will required to be maintained and managed for Covered Species (and thus count toward fulfilling the USFWS permit requirements) are the 2,000 acres of rice lands that will be protected to provide habitat for giant garter snake. The PCA will implement the management and enhancement actions described in CM2 AO-1, *Provision of Patches of Native Vegetation in Rice Lands*; CM2 AO-2, *Development and Implementation of a Water Management Plan*; and CM3 AO-3, *Implementation of Integrated Pest Management,* on these lands. An additional 6,240 acres of agricultural lands will be protected but will not count toward the Covered Species' habitat protection commitments because landowners will not be required to restrict crop types on these lands. The PCA will coordinate with landowners to implement the management and enhancement actions described in CM2 AO-4, *Other Management and Enhancement Opportunities,* on these lands.

CM2 AO-1, Provision of Patches of Native Vegetation in Rice Lands

The PCA will maintain and/or restore patches of emergent vegetation in canals, irrigation ditches, sloughs, ponds, and borders of rice fields to provide habitat for Covered Species (e.g., giant garter snake, tricolored blackbird), where opportunities exist on the rice lands to provide these features. Rice field ditches on the 2,000 acres will be managed to provide shelter and species diversity. Allowing emerging marsh vegetation (e.g., cattails) and other vegetation (e.g., native blackberry) to become established will provide nesting substrate, food sources and protection to species such as tricolored blackbird and giant garter snake.

The PCA will also maintain and enhance patches (e.g., 200 feet on either side of aquatic habitat of) grassland along the borders of waterways (e.g., canals, irrigation ditches) and rice fields to provide basking sites for giant garter snake. Edges of canals, irrigation ditches, and agricultural fields can also be planted with grassland (preferably native grass species) to provide basking sites for giant garter snake.

CM2 AO-2, Development and Implementation of a Water Management Plan

The PCA will develop and implement a water management plan for the 2,000 acres of rice lands within 12 months of acquisition of the first parcel to be managed for giant garter snake to provide water suitable for giant garter snake during the spring and fall and to ensure that suitable water is maintained in associated canals and ditches when rice fields are dry, to provide a perennial water supply.

Giant garter snakes require water and vegetative cover during the active phase of their life cycle (March 1 through September 30). Summer aquatic habitat is essential because it supports the frogs, tadpoles, and small fish, which the giant garter snake preys upon.

CM2 AO-3, Implementation of Integrated Pest Management

The PCA will implement Integrated Pest Management (IPM) on the 2,000 acres of rice lands maintained for giant garter snake. IPM involves using the best pest management practice that will benefit not only the cropping system, but also the environment. In many cases, IPM utilizes multiple methods of control that are based on economic and pest thresholds. Prudent use of agrichemicals that are part of an IPM plan will benefit not only the economics of production but water birds and the overall environment. Use of agrochemicals is not a Covered Activity; therefore, such use cannot result in take of Covered Species.

CM2 AO-4, Other Management and Enhancement Opportunities

On the 6,240 acres of protected agricultural land that will not be required to have crop use restrictions, landowners may choose to voluntarily accept agricultural conservation easements that provide for any of the following measures to enhance value for Covered Species and other native species in the Plan Area.

- **Restrict conversion to orchards and vineyards**. Orchards and vineyards provide little to no value for the Covered Species, although orchards can provide habitat connectivity for many native species, such as bobcats (*Lynx rufus*) and other mammalian carnivores (Nogiere et al. 2015). A landowner may agree to accept an agriculture easement that prohibits conversion to orchards and vineyards, thereby increasing the habitat value for Covered Species such as Swainson's hawk and tricolored blackbird.
- **Restrict pesticide use.** A landowner may agree to accept an agriculture easement that prohibits use of certain types of pesticides on the protected agricultural land. Certain types of insecticides may be particularly important to restrict. Recent regional population declines of the tricolored blackbird correlate with declines in insect abundance, which are potentially a result of the use of insecticides, particularly neonicitinoids (Meese 2014).
- **Provide habitat elements through measures associated with common agricultural practices.** A landowner may agree to create and maintain features on the agricultural landscape that enhance values for native species. In many cases, these features will already be present and a landowner may simply agree to maintain them. The PCA will prioritize acquisition of easements on agricultural lands that provide these features. These features may include:

Filter strips: These are areas of herbaceous vegetation planted between row crop fields and bodies of water. They are typically designed to reduce the sediment and contaminant load in surface runoff, but also provide habitat for wildlife and beneficial insects, and enhance watershed functions (Clark and Reeder 2007).

Riparian forest buffers: These are plantings consisting of three zones: an unmanaged woody zone adjacent to a water body, a managed zone of woody vegetation, and a zone of herbaceous vegetation (grasses and sometimes forbs) adjacent to the cultivated field. Riparian forest buffers benefit water quality, and also provide important wildlife habitat. In landscapes where cover is limiting, they provide important habitat and travel corridors for large mammals. They also benefit aquatic species by providing shade, lowering water temperatures, and creating a source of coarse woody material. Plant species diversity and associated structural heterogeneity provide a variety of perching and nesting sites for birds and lead to a greater variety of microhabitats for invertebrates and small mammals (Clark and Reeder 2007).

Grassed waterways: These are an in-field features, engineered to direct runoff within a field and prevent erosion and gully formation. The combination of being embedded in a row crop matrix rather than being along a field edge, being narrow, and being composed of a relatively homogenous grass mixture leads grassed waterways to offer less habitat potential for wildlife than filter strips or riparian forest buffers. However, grassed waterways host a variety of wildlife including small mammals, snakes, and nesting birds (Clark and Reeder 2007).

Windbreaks: These are strips of trees or shrubs planted in a field to reduce wind-caused soil erosion, conserve moisture, and protect crops and/or livestock. Windbreaks attract birds and small mammals, and provide habitat for mammalian predators and raptors, including Swainson's hawk

(Clark and Reeder 2007). Landowners may plant trees suitable for Swainson's hawk in their windbreaks (i.e., trees that grow at least 20 feet in height).

Herbaceous field borders: These are areas of managed, herbaceous vegetation, which can be planted along crop field edges regardless of the erosion potential of the border. Herbaceous field buffers reduce erosion from wind and water, protect soil and water quality, manage harmful insect populations, and provide wildlife food and cover. Grassland bird species often nest in herbaceous field borders (Clark and Reeder 2007).

Hedgerows: Hedgerows consist of rows of trees, shrubs, perennial grasses, forbs, rushes, and sedges that surround farm fields. This is a generic term that may include some of the categories described above. They may be relics of cleared land, a result of natural plant dispersal, or established through direct plantings. Hedgerows benefit biodiversity by providing habitat for many species, including migratory songbirds, native bees, and beneficial predatory insects (Long and Anderson 2010).

5.3.2.4 Species-level Management and Enhancement Measures

Most of the conservation needs for the Covered Species will be met through the landscape-level and natural community–level conservation measures described above. Additional species-specific actions necessary to conserve Covered Species are described below. California red-legged frog, foothill yellow-legged frog conservation, covered fish, valley elderberry longhorn beetle, and vernal pool branchiopod measures are captured at the landscape and natural community levels above and are not discussed in this section. Similarly, giant garter snake conservation measures are provided for in the agricultural (rice) lands section above, and this species is not discussed in this section.

5.3.2.4.1 California Black Rail

In addition to the management and enhancement measures for wetlands and ponds that will benefit California black rail (Section 5.3.2.3.2, *Aquatic/Wetlands Complex Natural Communities*), the PCA will implement the following management and enhancement actions to benefit California black rail.

CM2 BLRA-1, Maintenance and Enhancement of the Hydrology of California Black Rail Habitat

The PCA will manage and enhance California black rail habitat (both protected and restored) to maintain the habitat characteristics described in CM1 BLRA-1, *Acquisition for Protection and Restoration of California Black Rail Habitat*, above. This will include (1) maintaining a consistent water supply (irrigation water is a common source for this species in the Sierra Nevada Foothills), (2) maintaining water depths of less than 1.2 inches that do not fluctuate during the year, and (3) maintaining emergent wetland vegetation that is dense and has high canopy closure. Vegetation management is further described in CM2 BLRA-2, *Protection of California Black Rail Habitat from Grazing and Other Vegetation Management Activities*, below.

If water sources supporting fresh emergent wetlands on the Reserve System are removed or altered (i.e., a leak in an irrigation canal that provided water/habitat is fixed), the PCA will implement measures to ensure enough water to maintain suitable hydrological conditions, so that there is no net loss of fresh emergent wetlands or take of California black rail through loss of habitat. .

CM2 BLRA-2, Protection of California Black Rail Habitat from Grazing and Other Vegetation Management Activities

Livestock Exclusion

Wetlands will be protected from livestock with fences if monitoring indicates that grazing is having a detrimental effect on California black rails or degrading habitat, and other measures are not effective at avoiding these adverse effects.

The PCA will protect California black rail wetlands from livestock grazing by fencing wetlands and grazing wetlands outside of the breeding season (March 1 to August 15).

Invasive Plant Removal

Invasion of wetlands by non-native plants can reduce the quality of habitat for black rails. Although the removal of non-native plants will improve the overall health of occupied wetlands, it may be necessary to minimize the short-term effects of such removal. Techniques include manual removal that minimizes disturbance to rails and limiting activities during the nesting season.

5.3.2.4.2 Western Burrowing Owl

In addition to the management and enhancement measures for vernal pool complex and grassland natural communities that will benefit western burrowing owl (Section 5.3.2.3.1, *Vernal Pool Complex and Grassland Natural Communities*), the PCA will implement the following management and enhancement actions to benefit this species.

CM2 BUOW-1, Protect Ground Squirrel Colonies or Install Artificial Burrows

Extensive observations by bird watchers in the Plan Area indicate that there is little or marginal breeding habitat in the Plan Area, possibly because burrows suitable for nesting are not available. The only record of breeding in Plan Area A is by a pair that nested in 2012 and 2013 in an artificial burrow on the Swainson's Preserve (see Appendix D, *Species Accounts*).

The PCA will strive to protect at least three ground squirrel colonies as described above for CM1 BUOW-1. Ground squirrel colonies, however, are scarce in the Plan Area. Therefore, if three ground squirrel colonies cannot be protected, the PCA will substitute each ground squirrel colony with at least five artificial burrows in suitable western burrowing owl habitat. To the extent that this option is used, artificial burrows will be placed on at least five reserve units (a reserve unit consists of multiple parcels in the same area with similar management needs), with at least four artificial burrows per reserve unit.

Artificial burrows require regular maintenance, and the PCA will regularly monitor and maintain burrows (including replacing burrows), as needed. The PCA will use the best available methods (e.g., Barclay 2007, 2008), as approved by the Wildlife Agencies, for creating and maintaining artificial burrows.

5.3.2.4.3 Tricolored Blackbird

In addition to the management and enhancement measures for wetlands and ponds and for vernal pool complex and grassland natural communities that will benefit tricolored blackbird (Section 5.3.2.3, *Natural Community-level Management and Enhancement*), the PCA will implement the following management and enhancement actions to benefit this species.

CM2 TRBL-1, Maintenance and Enhancement of Nesting Habitat for Tricolored Blackbird

The PCA will manage and enhance fresh emergent wetland vegetation to provide suitable tricolored blackbird nesting habitat in the Reserve System as follows (based on Kyle 2011).

- Burn, mow, or disc bulrush/cattail vegetation every 2 to 5 years to remove dead growth and encourage the development of new vegetative structure
- Maintain large continuous stands of bulrush/cattail that are at least 30 to 45 feet wide to provide adequate space for breeding as well as protection from predators
- Provide a 50:50 to 60:40 ratio of bulrush/cattail marsh to open water in areas intended to support tricolored blackbird nesting

CM2 TRBL-2, Protection of Himalayan Blackberry Supporting Tricolored Blackbird Nest Colonies

The PCA will protect stands of Himalayan blackberry that has supported an active tricolored blackbird nest colony within the prior 3 years. The PCA will manage invasive vegetation in all natural communities. In the Plan Area, tricolored blackbirds nest predominantly in non-native Himalayan blackberry. Himalayan blackberry stands on the Reserve System currently or ever known to be used for nesting will not be removed unless the colony site has been abandoned for at least 10 breeding seasons. Where stands of Himalayan blackberry are to be removed, those that supported tricolored blackbird colonies more than 3 years prior will be removed gradually, over 3 to 4 years, to transition from non-native vegetation to native vegetation that is structurally similar, such as native blackberry. Alternatively, Himalayan blackberries removed will be replaced with native vegetation suitable for tricolored blackbird nesting. Furthermore, removal of non-native vegetation that supported a nesting colony will not be performed during the nesting season (March 1 to August 15).

CM2 TRBL-3, Predator Management Plan

The PCA will monitor sources of predation on tricolored blackbird nests and if monitoring indicates detrimental effects on tricolored blackbirds, develop a predator management plan.

Colonies nesting in cattail marshes may be vulnerable to predation of nest contents by black-crowned night herons (Hamilton and Meese 2006) and other species. It may be necessary to develop a non-lethal predator management plan (e.g., repeated flushing of black-crowned night heron colonies to encourage relocation away from tricolored blackbird colonies), especially at sites where monitoring indicates that colonies nesting in wetland habitats are suffering high levels of nest predation. If management activities may result in take of non-Covered Species protected by other laws, as defined by those laws (such as the Migratory Bird Treaty Act), then the PCA may need to secure additional approvals or permits pursuant to other applicable laws.

5.3.2.4.4 Swainson's Hawk

CM2 SWHA-1, Swainson's Hawk Foraging Habitat Enhancement

The PCA will strategically plant shrubs or place debris piles or other substrate that provides cover and refugia for fossorial mammals and other prey species, within the Reserve System in Swainson's hawk foraging habitat. Shrubs or debris piles, or a combination thereof, will be placed on at least four sites, each within a mile of one of the four protected Swainson's hawk nest trees. The number of shrubs or debris piles to be placed will depend on the site conditions and the need or opportunity

for such placement. For example, a site that lacks cover or refugia for prey will be prioritized over a site that already provides ample cover or refugia.

5.3.2.4.5 Western Pond Turtle

CM2 WPT-1, Western Pond Turtle Habitat Enhancement

Sites in the Reserve System that support western pond turtles will be enhanced as needed to provide basking areas, where basking opportunities are limited for the species. Western pond turtles may use a variety of features for basking, including rocks, sand, mud, downed logs, partially submerged branches of near-shore vegetation, or aquatic vegetation (Hayes et al. 1999). They are also known to bask on planks, barrels, and other items. Where basking opportunities are limited, the PCA will install basking structures in areas that are not vulnerable to predation.

Non-native turtles including red-eared sliders compete with western pond turtles (Hayes et al. 1999). If the presence of non-native turtles appears to be negatively affecting western pond turtle populations in the Reserve System, the PCA will implement a program to reduce or eliminate the non-native turtles from areas occupied by western pond turtle.

5.3.3 Conservation Measure 3: Restore and Create Natural Communities and Covered Species' Habitat

5.3.3.1 Introduction

This conservation measure describes how the PCA will restore and create natural communities and Covered Species' habitat within the Reserve System. All communities and habitat restored and created to meet the Plan's commitments will be protected on the Reserve System. Although Conservation Measure 1, *Establish Reserve System*, above, describes how restoration and creation lands will be sited within the Reserve System, this conservation measure describes specific restoration and creation requirements and techniques.

This conservation measure provides guidance for meeting the biological goals and objectives presented in Section 5.2.5*, Landscape-level Biological Goals and Objectives*; Section 5.2.6, *Natural Community–level Biological Goals and Objectives*; and Section 5.2.7, *Species-level Biological Goals and Objectives,* as they relate to restoration and creation. Table 5-8 indicates the biological goals and objectives that each conservation measure is intended to achieve, and references the subsections in Conservation Measure 3, *Restore and Create Natural Communities and Covered Species' Habitat,* relevant to each objective.

Success criteria for restoration and creation will be based in part on reference sites in the region. Reference sites, where possible, will be selected based on their condition as representative of high quality communities in the Plan Area. If suitable reference sites are not available in the Plan Area or the region, the PCA will coordinate with the Resource Agencies to establish success criteria for the habitats in the Plan Area. Use of reference sites will allow restoration and creation plans to incorporate any unique regional characteristics of these habitats.

Where the Plan discusses *restoration* or *creation*, it intends that activities be directed to restore and, in some cases, create natural communities or Covered Species' habitat types that are absent under existing conditions. Restoration or creation as defined under the Plan, will increase the area of the natural community or Covered Species' habitat. Thus, the definition of restoration in the HCP/NCCP

differs somewhat from the definition used by USACE (U.S. Army Corps of Engineers 2008) in that the USACE definition of restoration includes both *establishment* and *rehabilitation*. Under the USACE definition, rehabilitation does not involve an increase in aquatic resource area.

For many of the natural communities in the Plan Area, it is not possible to draw a meaningful distinction between restoration and creation. Data on the historic condition of the Plan Area before historic land use alteration is largely unavailable; therefore, the prior distribution of habitat types must be inferred from edaphic, physiographic, or climatic factors. As discussed in Chapter 3, *Physical and Biological Setting*, however, reasonably foreseeable climate change may necessitate creation of habitat in areas that historically supported a different natural community. Decisions on habitat restoration will be based on prevailing conditions and subject to Wildlife Agency review and approval before being incorporated into reserve management plans.

In many cases where restoration will occur, historic land-cover type is no longer present, and the existing land cover that has been mapped in the land-cover database (see Chapter 3, *Physical and Biological Setting,* for description of land-cover mapping) is different from the historic land cover. Restoration of historic land-cover types, and creation of different land-cover types, will necessarily convert the existing land cover into the desired land-cover type. For example, restoration will convert agricultural land to grassland, and restoration and creation will convert grassland to vernal pools and vernal pool complexes. Table 5-4 presents the amount of each natural community type that will be protected on the Reserve System after restoration is completed by Year 40 of the proposed Permit Term. Ultimately, restoration will establish higher quality vegetation and aquatic habitats than what exists prior to restoration.

Restoration and creation will count toward meeting the restoration and creation commitments (Table 5-4) upon completion of construction. Rehabilitation may also count toward meeting commitments in Table 5-4 on a case-by-case basis upon approval by USFWS and CDFW. As part of the restoration and creation success criteria monitoring process (Chapter 7, *Monitoring and Adaptive Management*), the PCA will identify whether the restoration or creation meets the success criteria. For restoration and creation that does not meet success criteria, the PCA will adaptively manage and monitor until success criteria are met. If it is determined that the restoration and creation is incapable of meeting success criteria, the criteria may be revised in cooperation with the Wildlife Agencies to better fit characteristics and intrinsic conditions of the site, or replacement restoration/creation will be identified.

Restoration and creation will entail a variety of methods, depending on the community being restored/created. Actions may include earthmoving and re-contouring of vernal pools, inoculating created vernal pools with cysts and seeds of vernal pool branchiopods and plants, respectively, and planting native species to revegetate areas (e.g., valley oak). Restoration methods are discussed in Section 5.3.3.3, *Natural Community–level Restoration/Creation*, for each natural community. The goal of restoration is to return ecological function to natural communities and ecosystems. Success criteria will be developed based on site-specific conditions, conditions at reference sites, and the biological goals and objectives.

5.3.3.2 Timing of Restoration

All restoration/creation construction independent of effect will be completed by Year 35 (i.e., for all natural communities and constituent habitats). This will allow sufficient time for monitoring and adaptive management to ensure that the relevant success criteria and occupancy standards are met.

To ensure that the PCA makes steady progress toward the total restoration/creation commitment independent of effects (Table 5-4), milestones are established for natural community types and constituent habitats in Table 5-7. Milestones are established for Years 15, 25, and 35. The interim milestones for restoration/creation independent of effect (Years 15 and 25) will be achieved when the restoration/creation activities have been completed (e.g., ground-moving activities, planting) for each acreage milestone. The PCA will monitor performance standards, report to the Wildlife Agencies, and take remedial actions in the event performance standards are not met when the interim milestones have been reached.

Table 5-7. Commitments by Time Period for Restoration/Creation Independent of Effect[a]

Natural Community and Constituent Habitat	Restoration/Creation Commitment Independent of Effect (acres)[b]	Year 15	Year 25	Year 35
Vernal Pool Complex	3,000	1,000	2,000	3,000
Vernal Pool Wetland	*30*	*10*	*20*	*30*
Grassland	1,000	333	667	1,000
Aquatic/Wetland Complex				
Fresh Emergent Marsh	*20*	*7*	*13*	*20*
Riverine/Riparian Complex				
Riparian	*30*	*10*	*20*	*30*
Valley Oak Woodland	225	75	150	225
Oak Woodland	100	33	67	100

[a] Restoration/creation requirements independent of effect will occur independently of the extent and pace of effects of Covered Activities.

[b] Source: Table 5-5.

All restoration/creation dependent on effect will be completed by Year 40 (i.e., for all natural communities and constituent habitats). The later milestone for the completion of the restoration/creation commitments dependent on effect is to allow an additional 5 years of mitigation from projects that affect natural communities and constituent habitats to finance restoration/creation before the restoration/creation must be completed. Section 5.3.3.3.1, *Vernal Pool and Grassland Natural Communities,* describes special provisions for vernal pools restored/created after Year 35 but by Year 40.

5.3.3.2.1 Site-level Restoration Plans

Detailed restoration plans and specifications will be developed for individual restoration sites or stream reaches based on specific geomorphic, soil, hydraulic, and hydrologic conditions; extent and quality of existing natural communities; existing wildlife use; and the potential for adverse effects (e.g., disturbance and/or removal of existing habitat). Restoration plans will be subject to Wildlife Agency review and approval. Restoration plans will satisfy the requirements listed below:

- Collect and analyze baseline data (e.g., soil type and suitability for riparian planting, low-flow conditions, past land use history/alterations, adjacent land uses)
- Identify suitable reference sites
- Define restoration goals and objectives

- Identify target Covered Species for which the site will be restored, and success criteria to evaluate occupancy by target Covered Species
- Identify suitable/feasible restoration measures
- Develop conceptual restoration designs
- Develop detailed restoration designs (plans and specifications) that identify and describe construction methods, planting areas and methods, planting species (including collection and propagation methods), and maintenance requirements
- Prepare an adaptive management and monitoring plan based on the guidelines in Chapter 7, *Monitoring and Adaptive Management Program*, which includes descriptions of responsible parties, monitoring methods and schedule, indicators (e.g., vegetative cover), success criteria (e.g., 20 percent cover by Year 5), and adaptive management measures (e.g., replanting with different species)

5.3.3.3 Natural Community–level Restoration/Creation

5.3.3.3.1 Vernal Pool and Grassland Natural Communities

CM3 VPCG-1, Vernal Pool Complex Restoration/Creation

The PCA will implement vernal pool complex restoration/creation to meet **Objective VPCG-1.2**, *Restore/Create Vernal Pool Complexes* (Table 5-8). Vernal pools and swales will be restored or created to mitigate in-kind for loss of Covered Species' habitat. The PCA will prioritize restoration over creation. At least 3,000 acres of vernal pool complex will be restored/created on other communities such as grassland, rice, or field agriculture. Vernal pool constituent habitats will be restored on suitable portions of the 3,000 acres restored/created to vernal pool complex and on as much as 6,000 acres of existing vernal pool complex that can accommodate additional wetlands (see below).

Timing of Vernal Pool Restoration/Creation

The restoration/creation of vernal pool constituent habitat independent of effect will be completed by Year 35, whereas restoration/creation of vernal pool constituent habitats dependent on effect will be completed by Year 40 (see Section 5.3.3.2, *Timing of Restoration)*. The timing of restoration is driven primarily by the need to ensure that the success criteria and the vernal pool branchiopod Occupancy Rate Standard have been met by the end of the proposed 50-year permit term. The PCA will monitor the hydrology and floral characteristics of the restored and created vernal pools for a period of 10 years (See *Success Criteria*, below, and Section 7.4.3, *Monitor Natural Communities*). The PCA will also monitor the restored/created vernal pool constituent habitats for occupancy by vernal pool fairy shrimp and vernal pool tadpole shrimp for a period of 15 years, as described in Section 7.5.11, *Vernal Pool Branchiopods*. There will not be sufficient time for vernal pool constituent habitats restored/created after Year 35, however, to be monitored for the entire 15 years.

To ensure that restoration/creation of vernal pool constituent habitats initiated after Year 35 will meet vernal pool branchiopod Occupancy Rate Standards (in combination with protected vernal pool constituent habitats), the PCA and the Wildlife Agencies will meet at Year 30 to evaluate the occupancy of vernal pool branchiopods in past vernal pool constituent habitat restoration/creation. At this Year 30 milestone, the PCA and Wildlife Agencies will determine the likelihood of meeting the

Occupancy Rate Standard for vernal pool constituent habitat restoration projects that begin after Year 35 (see Section 5.3.2.3.1, *Vernal Pool and Grassland Natural Communities*). If at the Year 30 milestone, the occupancy rate in restored/created vernal pool constituent habitats is not enough to meet the Occupancy Rate Standard (in combination with protected vernal pool constituent habitats) after 15 years of monitoring, the PCA and Wildlife Agencies may increase the restoration/creation commitment to account for anticipated restoration/creation occupancy success rates.

Vernal Pool Restoration/Creation in Existing Vernal Pool Complexes, Grasslands, and Agricultural Lands

The PCA will restore and create vernal pools and other vernal pool constituent habitats on as much as 6,000 acres of land now mapped as vernal pool complex land, which can accommodate additional wetlands, typically in existing low- and medium-density vernal pool complexes with less than 5 percent existing vernal pool constituent habitat density, as well as on grasslands without existing vernal pools, and agricultural lands (e.g., field crops and rice lands). Where restoration/creation occurs on agricultural lands, the associated upland matrix will be restored to grasslands, resulting in vernal pool complex lands. Seasonal wetlands may be restored along floodplain benches of intermittent streams or in grassland swales.

Provision of Suitable Hydrological Conditions

Restored and created vernal pools will be located in sites that provide suitable hydrologic conditions that will meet success criteria (e.g., average wetted area, size and depth of pools to provide habitat for Covered Species) and on soil types that are known to support vernal pool fairy shrimp and vernal pool tadpole shrimp (Rogers 2014). Restored and created vernal pools must be able to function based upon existing hydrology without augmentation. Their design should allow these wetlands to be inundated multiple times throughout the wet season with inundation occurring regularly, depending on the precipitation amount and duration of each storm cycle.

Creation of vernal pools within a vernal pool complex of existing pools can alter the hydrology of the existing pools and can affect ground-nesting bees and other upland plants and animals (U.S. Fish and Wildlife Service 2005). To minimize effects on existing vernal pool complexes, vernal pools will only be created in areas where they will be isolated hydrologically from existing pools and when adequate amounts of surrounding upland habitat are protected, as demonstrated in site-level restoration plans.

Reference Pools

To restore vernal pool habitat, the PCA will use nearby, natural high-quality pools in the Plan Area as models or references for the development of each vernal pool restoration plan. In doing so, the PCA will consider the natural geographic, topographic and edaphic characteristics of the site where the pool or complex is to be restored (U.S. Fish and Wildlife Service 2005). Each restoration plan will consider the size and depth of pools to be constructed, hydrologic connections within complexes, depth from soil surface to hardpan, and upland area to pool-area ratios (U.S. Fish and Wildlife Service 2005).

Success Criteria for Vernal Pool Restoration

Clearly defined outcomes will be identified for all restoration/creation projects. The success criteria are as follows but may be modified if needed based on site-specific conditions (e.g. soils, hydrology,) or to be consistent with current success criteria used in the Southeastern Sacramento Valley vernal

pool region (as success criteria may evolve over time), with review and approval of the Wildlife Agencies:

Hydrologic Standards

1. The restored/created vernal pools shall be inundated to a depth within 10 percent of the range of maximum depths observed within the reference vernal pools.
2. The restored/created vernal pools shall be inundated for a duration within 10 percent of the range of durations observed within reference vernal pools.

Flora Standards

1. The restored/created vernal pools shall have an absolute cover of obligate and facultative wetland species that is greater than or equal to 75 percent of the mean absolute cover in reference vernal pools or within the range of the reference pools. Restored or created vernal pools that exceed the range of the reference pools will also be considered successful.
2. The number and relative cover of vernal pool endemic species for each restored/created vernal pool shall be greater than or equal to 75 percent of the mean relative cover of native species in the reference vernal pools, or fall within the range of the reference pools. Restored or created vernal pools that exceed the range of the reference pools will also be considered successful.
3. The average number and relative cover of vernal pool endemic species of the restored/created vernal pools shall have a native species richness value that meets or exceed the average number and relative cover of vernal pool endemic species for the reference pools. Constructed vernal pools that fail to meet success criteria in #2 will be excluded from the average.
4. The absolute cover and number of non-native or invasive species for each constructed vernal pool must fall within the range of the reference vernal pool data. Constructed vernal pools that are below the range of the reference pools will also be considered successful.
5. The average number and relative cover of non-native or invasive species in the constructed vernal pools must be less than the average number and relative cover of non-native or invasive species in the reference pools. Constructed vernal pools that fail to meet success criteria in #4 will be excluded from the average.
6. The monitoring protocol for determining whether success criteria have been met is provided in Section 7.4.3, Monitor N*atural Communities*. The constructed wetlands will be monitored for a period of 10 years. In addition, the restored/created vernal pools will be monitored for occupancy of vernal pool fairy shrimp and vernal pool tadpole shrimp as described in Section 7.5.11, *Vernal Pool Branchiopods*. The monitoring period for determining occupancy of vernal pool branchiopods is 15 years. Restored and created vernal pools will be included (i.e., combined with the occupancy rate of protected pools) in the calculation of occupancy rates on the Reserve System once the occupancy monitoring period of 15 years is complete for that pool (see Section 5.3.1.6.10, *Vernal Pool Branchiopods*). See Chapter 7, *Monitoring and Adaptive Management*, Section 7.5.11.3, *Evaluate Species' Response to Vernal Pool Restoration/Creation*, for criteria for determining occupancy of restored and created pools by vernal pool fairy shrimp and vernal pool tadpole shrimp. These success criteria may be modified and improved, with approval from the Wildlife Agencies, as new information becomes available through the monitoring and adaptive management program described in Chapter 7, *Monitoring and Adaptive*

Management Program. The PCA will apply these success criteria to all vernal pool restoration/creation projects.

The PCA will seek review and approval by the Wildlife Agencies to determine site-specific aspects of a vernal pool complex that needs to be restored. The PCA will also coordinate with the Wildlife Agencies to ensure that scientifically based and site-specific restoration methods are implemented while restoring the hydrological and ecological processes in the vernal pool and upland habitats of each site.

Vernal Pool Restoration and Creation Methods

The PCA will implement the following restoration methods for vernal pool restoration and creation.

- The PCA will restore remnant natural vernal pool and swale topography by excavating or recontouring historical vernal pools and swales to natural bathymetry based on their characteristic visual signatures on historical aerial photographs, other historical data, and the arrangement and bathymetry of vernal pools and swales at a reference site. The PCA will prioritize restoration over creation. If necessary to achieve the vernal pool restoration and creation acre commitment (**Objective VPCG-1.2**, *Restore/Create Vernal Pool Complexes*) or to expand vernal pool complexes, the PCA will create vernal pool and swale topography in areas where there is no visual signature or record of prior vernal pool occurrence, provided soil and topographic conditions are suitable for successful vernal pool creation. Created vernal pools will be designed to correspond with the arrangement and bathymetry of vernal pools and swales at a reference site. The rehabilitation of vernal pools (as defined by USACE) may also count towards the vernal pool restoration commitments on a case-by-case basis upon approval by USFWS and CDFW.
- The reference site will consist of existing vernal pool complex supporting covered vernal pool species in the Plan Area.
- Vernal pools being restored and created will be inoculated with soils and eggs or cysts of vernal pool Covered Species that have been procured from pools that will be affected when such inocula are available.
- Vernal pool inocula will come from pools similar to those to be inoculated. The affected pools will be the usual source of inocula; however, inocula may be taken from mitigation banks or other vernal pools in the Reserve System on a case-by-case basis upon approval by USFWS and CDFW.
- Inocula will be collected in a manner consistent with the dry-season sampling guidelines provided in *Survey Guidelines for Listed Large Branchiopods* (U.S. Fish and Wildlife Service 2015), except that there are no proposed limits on the surface area to be removed from pools that are slated to be lost due to development.
- All inocula placed in restored vernal pools shall be spread evenly and sparsely onto the restored vernal pool substrate to introduce vernal pool organisms. Inocula will be applied to restored habitat during the dry season and in a dry-season condition.

CM3 VPCG-2, Grassland Restoration

The PCA will restore grasslands to meet **Objective VPCG-1.4**, *Restore Grasslands* (Table 5-2). Restored grasslands will comprise native and naturalized grasses and forbs, primarily from

agricultural land. Small-scale grassland restoration may occur in patches where vegetation is absent or has been severely degraded or where intensive vegetation management has removed invasive species.

Restoration Methods

Specific restoration methods will necessarily be site specific. Success will be based on the percent cover of targeted grassland species in the restored grasslands. The site-level restoration plans (Section 5.3.3.2.1, *Site-level Restoration Plans*) will include targets for the proportion of native species (e.g., in terms of biomass, percent cover, or other appropriate metrics) based on the site conditions and comparable reference sites, if available. These targets will be identified in site-level restoration plans. In general, restoration sites may be prepared for seeding and planting with methods such as burning, disking, mowing, mulching, and in limited circumstances, herbicide treatment. Planting techniques may include small transplants (e.g., plugs) and a variety of methods of seeding (e.g., seed drills, hydroseeding). Post-planting, restored grasslands will be managed primarily with grazing, but techniques may also include burning, mowing, and hand-pulling, and limited application of herbicides to control particularly invasive weeds, if necessary (see below for grassland enhancement and management techniques). Use of herbicides is not a Covered Activity under the Plan. Herbicide use will maintain a buffer of at least 100 feet around elderberry shrubs if present. The plant species selected for a restoration site will come from the range of species naturally occurring on similar sites in the Plan Area. Native species that have been extirpated from nearby sites may also be seeded/planted to restore native flora. Species will be selected to match site-specific characteristics (e.g., soil type, moisture regime) (Stromberg et al. 2007). Seeds will come from local sources adapted to the environment of the Plan Area.

To increase the diversity of forbs within vernal pool complex uplands and grasslands, the PCA may collect forb seeds from nearby reference sites and disperse the seeds by hand. It is sometimes desirable to disperse seeds onto gopher mounds because the mounds provide suitable microhabitat for germination and growth (Weiss pers. comm.).

The PCA will consider soil and site conditions when identifying appropriate locations for grassland restoration. The PCA will compare the restoration sites to reference locations to assess restoration success.

The restored grasslands will be planted with native species and managed to encourage native biodiversity but will not require a predominance of natives for the restored lands to contribute to the 1,000-acre commitment. As long as the restored grasslands have some native component (i.e., they can still be dominated by non-native species that do not substantially reduce grassland function), the grassland restoration will count toward the restoration commitment. Rather than completely eliminating non-natives, grassland restoration focuses on increasing native biodiversity by planting natives, controlling or removing non-native invasive species, and improving native wildlife habitat functions by increasing habitat extent and connectivity.

5.3.3.3.2 Aquatic/Wetland Complex

CM3 AW-1, Aquatic/Wetlands Complex Restoration/Creation

The PCA will implement aquatics/wetland complex restoration/creation to meet **Objective AW-1.2**, *Restore/Create Aquatic/Wetland Natural Community.* Ponds and wetlands will be restored and created to mitigate in-kind for loss of habitat. Aquatic/wetlands complex creation will occur when

suitable land is not available for restoration. Ponds and wetlands will be restored and created to provide habitat (e.g., fresh emergent wetlands and basking sites around the perimeter of ponds) for Covered Species, including tricolored blackbird, California black rail, California red-legged frog, and western pond turtle.

Restoration/Creation Methods

Wetlands will be restored on suitable soils and in areas where wetlands historically occurred. Restoration and creation of fresh emergent wetlands and ponds will generally involve manipulating hydrology and re-contouring pools to provide suitable depth and size.

Wetlands will be designed for specific Covered Species, including giant garter snake, western pond turtle, tricolored blackbird, and California black rail. For example, fresh emergent wetlands will be restored or created in grasslands or open oak woodlands for California black rail. Water levels will be maintained year-round at depths suitable for California black rail (stable at less than 1.2 inches year-round) (Richmond et al. 2008). Wetlands will be planted with and managed to support rush, cattail, and other associated species that create the vegetative structure suitable for California black rail.

Ponds will not be created or restored within a 100-year floodplain in streams to avoid effects on streams and prevent stranding of fish in ponds or the unintended introduction of non-native invasive animals in adjacent streams. Ponds will be created so that they can be drained to control bullfrogs and other non-native invasive animals.

Native plants appropriate for site-specific soil and hydrologic conditions will be planted in restored and created wetlands and ponds. Invasive, non-native plants that invade restored/created sites will be removed or controlled to allow native vegetation to develop and manage desired conditions for Covered Species.

The native plants will be grown from soil, seed, or plant stock from local wetland sites. Native plants may be grown from non-local sources, subject to Wildlife Agency review and approval. Emergent species such as cattails, bulrushes, and willows provide habitat and cover for California red-legged frog and western pond turtle in deepwater portions (i.e., greater than 3 feet deep); however, shallow areas should be kept clear and remain unshaded to provide habitat for rearing California red-legged frog tadpoles (U.S. Fish and Wildlife Service 2002).

BMPs to Reduce the Potential for Mosquito Production

Wetland restoration and creation can have a significant effect on mosquito production. Features that can reduce the potential for mosquito production should be taken into consideration when wetland restoration and creation projects are being designed. Incorporating design features can prevent expansion of unintended mosquito populations. BMPs to be considered for wetland restoration and creation include the following:

- Include, when possible, independent inlets and outlets in the design of each wetland unit (except for vernal pool complexes and other wetland types that do not have outlets and inlets).
- Provide adequate water control structures for complete draw down and rapid flooding.
- Design swales with adequate slopes so the majority of the wetland can be drawn down.

- Install cross-levees where appropriate to improve the ability to rapidly flood and irrigate. "Underwater" levees that isolate irrigation water during the spring, but can be overtopped during fall and winter flooding, can also be built.
- Construct or improve ditches with at minimum slope of 2:1 and four-foot depth to prevent unwanted vegetation growth and/or unnecessary seepage. Consider a 3:1 slope or greater to discourage damage from burrowing animals and minimize potential seepage problems.
- Construct, improve, or maintain levees to quality standard (minimum greater than 3:1 slopes and greater than 80 percent compaction) to ensure stability and prevent unwanted seepage. Consider slopes 5:1 or greater in areas prone to overland flooding and levee erosion.
- Excavate deep channels or basins to maintain permanent water greater than 2.5 feet deep within a portion of managed seasonal wetlands. This provides year-round habitat for mosquito predators, which can inoculate seasonal wetlands when they are irrigated or flooded. This BMP will not be applied to vernal pool and other wetlands because many species of mosquito predators (e.g., mosquitofish [*Gambusia affinis*]) also prey upon vernal pool branchiopods and amphibians such as California red-legged frog (U.S. Fish and Wildlife Service 2002, 2005). Non-native mosquito predators will not be added to Reserve System.
- Maintain separate permanent water reservoirs used to convey water to seasonal wetlands. Vernal pools will not be included in any artificial reservoir or drainage system. These provide year-round habitat for mosquito predators, which inoculate seasonal wetlands when they are irrigated or flooded.

5.3.3.3.3 Riverine and Riparian Complex Natural Communities

CM3 RAR-1, Riparian Natural Community Restoration

The PCA will restore riparian constituent habitat to meet **Objective RAR-1.3**, *Restore Riverine/Riparian Complex.* The PCA will restore riparian vegetation by planting cuttings, seedlings, and/or seeds of a representative diversity of native overstory and understory riparian species in the floodplain and banks to expand riparian woodland and vegetation where conditions warrant such restoration. Grazing will be restricted in riparian restoration sites to protect restoration efforts. Elderberry shrubs and associated riparian species will be planted to restore habitat for valley elderberry longhorn beetle and to offset loss of habitat for this species (**Objective VELB-1.1**). Within areas potentially supporting foothill yellow-legged frog, the PCA will include open areas along streams to provide suitable habitat for this species.

Restoration Methods

Plants and seeds will be collected locally to ensure that genetically appropriate plants are used and to increase the probability of survival (Circuit Rider Productions 2004). Native plants and seeds may be collected from non-local sources subject to Wildlife Agency review and approval. Plantings may be protected from browsing by plastic tubes, fencing, or other devices to increase their likelihood of survival. Plants may also be watered with drip irrigation where necessary (e.g., in riparian zones that are not regularly flooded), and protected from over-growth and competition by non-native species (e.g., through mowing, hand-pulling, and the select use of herbicides). (Note that herbicide use is not a Covered Activity under the Plan and therefore cannot result in take of Covered Species.) Herbicide use will maintain a buffer of at least 100 feet around elderberry shrubs, if present.

Restoration projects will be designed to establish a diversity of native plants, provide habitat for fish and wildlife, reduce erosion, and require minimal annual management once vegetation has established.

5.3.3.3.4 Oak Woodland Natural Communities

CM3 OW-1, Oak Woodland Restoration

The PCA will restore oak woodlands to meet **Objectives OW-1.2**, *Restore Oak Woodlands,* and **OW-1.5**, *Restore Valley Oak Woodlands.* Oak woodland restoration will restore oak woodlands to the landscape where oak woodland no longer occurs. Oak woodland enhancement includes actions to facilitate and enhance oak regeneration in existing stands (see Section 5.3.2.3.4, *Oak Woodland Natural Communities*), which may use many of the methods described below.

Oak Woodland Restoration Methods

Restoration methods will generally include planting and/or seeding oaks suitable for site-specific conditions (e.g., soil type, aspect [e.g., north- vs. south-facing slope]). Valley oak restoration will take place primarily on deep, well-drained alluvial soils, often along river bottoms in the Valley.

5.3.3.4 Species-specific Restoration Actions

5.3.3.4.1 California Black Rail

CM3 BLRA-1, California Black Rail Habitat Restoration/Creation

The PCA will restore/create fresh emergent marsh to provide habitat for California black rail and meet the restoration component of **Objective BLRA-1.1**, *Protect, Restore/Create, and Manage and Enhance California Black Rail Habitat* (Table 5-8). The habitat characteristics of California black rail are fairly well understood and straightforward to restore and create. Wetlands restored to support California black rail will be restored to provide the conditions that are described in Section 5.3.1.6.2, *California Black Rail.* It is expected that black rail would colonize suitable restored habitat because many of the occupied wetlands in the Sierra Nevada Foothills have been created by water from leaks in water conveyance systems (Richmond et al. 2008). Therefore, it is expected that suitable created and restored habitat on the Reserve System will be colonized by California black rail.

Suitable wetlands will be restored and created on gently sloped lands and will have a consistent year-round source of water to support suitable hydrological conditions.

Restored and created wetlands will be restored with native plants to provide suitable habitat structure and species composition. Re-vegetation techniques include planting seeds or propagating and planting mature plants of native emergent vegetation. The location for this restoration or creation is described in CM1 BLRA-1, *Reserve Design for California Black Rail Habitat Protection and Restoration.*

5.3.3.4.2 Tricolored Blackbird

CM3 TRBL-1, Tricolored Blackbird Habitat Restoration

The PCA will restore/create aquatic/wetland complex to provide nesting habitat for tricolored blackbird and meet the restoration component of **Objective TRBL-1.2**, *Protect, Restore, Manage, and*

Enhance Tricolored Blackbird Foraging Habitat (Table 5-8). The restoration of fresh emergent marsh, which will provide habitat for tricolored blackbird, will be based on recommendations in Kyle (2011). The marsh will comprise large, continuous stands of bulrush and cattail that are at least 30 to 45 feet wide. The restored sites will consist of large cattail patches surrounded by open water to limit access by predators as this is ideal for successful tricolored colonies. Standing water of 8 to 12 inches will be provided underneath cattail patches to discourage predators from entering a colony site. If choosing between cattails and tules, cattails may be preferred because cattails tend to support denser, larger colonies than tule marshes. The marsh will provide a 50:50 to 60:40 ratio of bulrush/cattail marsh to open water in areas intended to support tricolored blackbird nesting. The locations of tricolored blackbird habitat restoration are described above under CM1 TRBL-1, *Reserve Design for Tricolored Blackbird.*

5.3.3.4.3 Vernal Pool Branchiopods

CM3 VPB-1, Translocation of Vernal Pool Branchiopod Cysts

Protection of existing occurrences and high-quality habitat will be the approach of first priority for conserving covered vernal pool branchiopods. The Plan will also employ vernal pool restoration and creation techniques to conserve vernal pool branchiopods in the Plan Area. **Objectives VPB-1.1**, *Maintain Vernal Pool Fairy Shrimp Occupancy in the Reserve System*, and **VPB-1.2**, *Maintain Vernal Pool Tadpole Shrimp Occupancy in the Reserve System*, provide occupancy commitments, thereby ensuring that the associated species will be adequately represented in the Reserve System, including both the protected and the restored and created vernal pools.

As described in Section 5.3.1.6.10, *Vernal Pool Branchiopods*, the PCA will conduct protocol-level surveys in vernal pools in the Plan Area to estimate an occupancy rate and set Occupancy Rate Standards for each species. The period of time within which the Occupancy Rate Standards are determined (methods described in Section 7.5.11, *Vernal Pool Branchiopods*) is defined as the *Initial Survey Phase* of Plan implementation. During the Initial Survey Phase, restored and created vernal pools inoculated with vernal pool branchiopods will *not* count toward the determination of the overall occupancy rate on the Reserve System. After the Initial Survey Phase, the PCA will evaluate occurrences reintroduced and introduced into the Reserve System according to success criteria (see Section 7.5.11, *Vernal Pool Branchiopods*), and reintroduced and introduced occurrences will count toward the overall occupancy commitment once success criteria are met.

Translocations of vernal pool branchiopods into restored and created vernal pools will be consistent with the description of vernal pool inoculation described above in Section 5.3.2.3.1, *Vernal Pool and Grassland Natural Communities*. Additionally, translocation of vernal pool branchiopods will meet the following requirements.

- Translocation will occur primarily to locations where the vernal pool branchiopods have *not* been documented prior. Translocations to locations where they have previously been documented may also occur, subject to Wildlife Agency review and approval.
- Pools that are being restored/created to support vernal pool fairy shrimp and vernal pool tadpole shrimp will be inoculated with soil collected from the pool(s) that will be affected (see Section 6.3.2.1.4, *Community Condition 1.3, Salvage of Vernal Pool Constituent Habitat*, and *Species Condition 8, Conservancy Fairy Shrimp,* for salvage of seeds and soil). In limited cases, soil may be collected from occupied pools protected on the Reserve System or other local protected sources (e.g., a local mitigation bank), with approval from the Wildlife Agencies. This may be

necessary to create pools that are occupied by vernal pool tadpole shrimp, as they occur infrequently in the Plan Area, and are thus not expected to reliably occur in soils collected from pools that will be affected.

The PCA will begin translocating vernal pool branchiopods into the restored and created vernal pools in the early phase of Plan implementation to provide sufficient time for pools to meet success criteria, and to refine translocation and pool restoration and creation methods over time.

Success criteria for vernal pool branchiopod occupancy are described in Section 7.5.11, *Vernal Pool Branchiopods*.

5.3.3.4.4 Valley Elderberry Longhorn Beetle

CM3 VELB-1, Valley Elderberry Longhorn Beetle Habitat Restoration

As part of riparian natural community restoration (CM3 RAR-1, Section 5.3.3.3.3, *Riverine and Riparian Complex Natural Communities*) the PCA will restore riparian vegetation to reconnect isolated patches of habitat, plant elderberry shrubs, and transplant elderberry shrubs occupied or potentially occupied by valley elderberry longhorn beetle. To expand the extent of habitat for existing valley elderberry longhorn beetle populations, the PCA will restore and enhance populations of elderberry shrubs in suitable areas adjacent to sites that are already occupied by valley elderberry longhorn beetle.

Locating restoration to expand and connect isolated patches of riparian habitat will increase the likelihood of successful colonization of unoccupied sites. Plantings and transplants of elderberry should occur adjacent to existing stands of riparian vegetation or restored stands to avoid creating small, isolated elderberry patches. Restoration of riparian habitat will include the planting of enough elderberry shrubs and associated riparian species sufficient to offset loss of valley elderberry longhorn beetle consistent with USFWS' Conservation Guidelines for Valley Elderberry Longhorn Beetle (U.S. Fish and Wildlife Service 1999b) or current USFWS guidelines. Transplants, including seedlings/cuttings, will come from (among other local sources) elderberry shrubs that may be otherwise affected (see Section 6.3.5.12, *Species Condition 7, Valley Elderberry Longhorn Beetle*). Sites will be evaluated for suitability as source of transplants based on the size and density of its population of elderberry shrubs and valley elderberry longhorn beetles and the likelihood that donating occupied elderberry shrubs could adversely affect genetics of the donor population. In addition to mature elderberry transplants, sites may also be restored by planting seedlings and cuttings. Transplanting should occur when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves because transplanting during the non-growing season will reduce shock to the plant and increase transplantation success (U.S. Fish and Wildlife Service 1999b).

5.3.4 Conservation Measure 4: Plan Area-wide Actions

This conservation measure describes conservation measures that the PCA will implement Plan Area-wide, outside the Reserve System.

5.3.4.1 Landscape-level Plan Area-wide Actions

CM4 L-1, Low-impact Development Standards

As described in further detail in Chapter 6, *Program Participation and Conditions on Covered Activities*, the County and the City will establish and implement applicable LIDS through the creation of a LIDS ordinance within 12 months of the of adoption of the Plan. The LIDS goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source.

5.3.4.2 Natural Community–level Plan Area-wide Actions

5.3.4.2.1 Vernal Pool Complex and Grassland Natural Communities

CM4 VPCG-1, Conduct Outreach to Private Landowners

The PCA will encourage landowners through community outreach to conduct land use practices compatible with vernal pool maintenance and recovery. Recommended practices may include using low-density grazing with removal of cattle before May 1 to reduce waste deposition in drying vernal pools, applying little to no pesticides or herbicides, limiting perennial water connections to vernal pools (to decrease non-native competition by bullfrogs, crayfish, mosquito fish, etc.), working with the Partners for Fish and Wildlife Program of USFWS to maintain/enhance habitat values, minimizing edge effects (such as road runoff), and allowing collection of genetic data (U.S. Fish and Wildlife Service 2005).

5.3.4.2.2 Aquatic/Wetlands Complex Natural Communities

CM4 OW-1, Conduct Public Outreach

The PCA will work with private landowners who own wetlands and ponds to provide technical assistance and secure funding to improve and maintain their wetlands and ponds as habitat for Covered Species. The PCA will help landowners apply for existing grants (e.g., North American Wetlands Conservation Act Small Grants Program [USFWS]).

5.4 Mitigation and Conservation Outcomes

This section summarizes the mitigation and conservation outcomes of the Plan's conservation strategy for Covered Species and describes how outcomes are consistent with ESA and NCCP standards. The range-wide and Plan Area status, as well as the effects of Covered Activities, are summarized for each species to provide context for the mitigation and conservation outcomes.

5.4.1 Swainson's Hawk

5.4.1.1 Status and Distribution

Swainson's hawk nests in the Plan Area in the spring and early summer and spends the non-breeding season from Central Mexico to South America. Swainson's hawk North American breeding range extends from California to British Columbia east of the Sierra Nevada and Cascade Range, east

to Saskatchewan, and south to northern Mexico. In California, the breeding range includes extreme northeastern California, isolated valleys in the Sierra Nevada in Mono and Inyo Counties, the Sacramento and San Joaquin Valleys, and at least one known isolated breeding site in the Mojave Desert. California Swainson's hawk populations declined with the loss of grassland foraging habitat and riparian nesting habitat, but in some parts of its California range, the species has adapted to agricultural crops such as alfalfa. Based on nesting records in California, the population appears to have remained relatively stable since the 1980s. In the Plan Area, Swainson's hawk breeding is limited to the Valley, below 400 feet in elevation (Appendix D, *Species Accounts*). Because records of Swainson's hawk are abundant in counties west of Placer, the population within the Plan Area is not of particular significance statewide. There is no recovery plan for Swainson's hawk.

5.4.1.2 Effects Summary

Covered Activities are anticipated to directly affect 149 acres of nesting habitat (riparian natural community modeled as nesting habitat) in the Plan Area (8 percent of a total of 1,968 acres of modeled nesting habitat in the Plan Area) and 16,267 acres of foraging and movement habitat in the Plan Area (30 percent of a total of 54,574 acres of foraging and movement habitat in the Plan Area). The acreage of modeled riparian habitat loss does not include loss of isolated trees. The Plan Area is at the edge of the species' range and Swainson's hawk has always occurred at low densities in this area; therefore, the habitat loss resulting from Covered Activities is not expected to appreciably reduce the Swainson's hawk population, particularly with the conservation measures in place to benefit the species. Increases in the human population related to increased urban and rural development will result in associated indirect effects such as increased harassment from people, increased vehicle-related disturbance (e.g., of breeding habitat near roads), increased risk of wildfire that may affect nesting habitat, and increased noise and light pollution. The assessment of new urban edge in the Valley shows that as much as 6,100 acres of grassland and agricultural foraging habitat may have new urban development within the 250 foot disturbance radius used in that analysis. Implementation of General Condition 2, *Conservation Lands: Development Interface Design Requirements*, will minimize effects of urban development adjacent to the Reserve System.

5.4.1.3 Conservation Summary

The biological goal for Swainson's hawk is habitat to provide for a sustained population of this species in the Plan Area. The Plan will result in protection and restoration of riverine/riparian and valley oak woodland natural communities, for a total of 1,268 acres of nesting habitat protected and 720 acres of riparian habitat restored (Table 5-6). Additionally, the Plan will result in the protection and restoration of grasslands and vernal pool complexes, for a total of 17,003 acres of foraging habitat protected and 3,920 acres of foraging habitat restored (Table 5-6). Swainson's hawk habitat will be provided in a large, interconnected Reserve System that accommodates the large home-range size for this species. The PCA will also protect at least four active nest trees (**Objective SWHA-1.1**, *Protect Swainson's Hawk Nest Trees*), and will protect at least 741 acres of modeled foraging habitat surrounding each active nest tree protected (**Objective SWHA-1.2**, *Protect Swainson's Hawk Foraging Habitat*). The PCA will maintain or increase prey availability for Swainson's hawk by strategically planting shrubs or placing debris piles or other substrate that provides cover and refugia for prey, on at least four sites, each within a mile of one of the protected nest trees (**Objective SWHA-1.3**, *Enhance Foraging Habitat*). The PCA will also protect at least 20 isolated trees with the potential to be used as nesting sites for Swainson's hawk (**Objective SWHA-1.4**, *Protect Isolated Trees*).

Although conservation strategies for nearby counties (e.g., San Joaquin, Yolo) rely on protection of cultivated lands such as alfalfa and row crops for Swainson's hawk foraging, the Plan focuses on grassland habitats in the Plan Area (e.g., vernal pool complex grassland, annual grassland) for Swainson's hawk. In the Plan Area, Swainson's hawk relies more on grassland habitats than agricultural land for foraging, because crops that provide valuable foraging habitat elsewhere in the Sacramento Valley are planted in small amounts in the Plan Area (e.g., approximately 176 acres are planted in alfalfa, less than 0.5 percent of the communities in the Valley).

5.4.1.4 Conclusion

Although the Plan Area is not critical to the long-term survival and recovery of Swainson's hawk, the protection, restoration, management, and enhancement of Swainson's hawk foraging and nesting habitat in the Plan Area will mitigate direct and indirect effects resulting from Covered Activities and will further provide for the conservation of the species in the Plan Area.

5.4.2 California Black Rail

5.4.2.1 Status and Distribution

California black rail populations were previously thought to be restricted to the San Francisco Bay Area, Bolinas Lagoon, Tomales Bay, Morro Bay, Suisun Bay, the Delta region to White Slough in San Joaquin County, the Salton Sea area, and the Lower Colorado River Valley (Grinnell and Miller 1944; Manolis 1978; Garrett and Dunn 1981; Evens et al. 1991; Eddleman et al. 1994). In 1994, new populations were discovered in the western Sierra Nevada Foothills of Yuba County (Aigner et al. 1995), and subsequent surveys revealed previously unknown populations in the Foothills of Butte, Nevada, Placer, and San Joaquin Counties (Richmond et al. 2008). As of 2006, California black rail has been found in 103 marshes in the Foothills of Butte, Nevada, Yuba, Placer, and San Joaquin Counties, almost all below 1,155 feet (Richmond et al. 2008). California black rail occurs in a small proportion of the fresh emergent marshes in the Plan Area. There are 10 or 11 confirmed California black rail occurrences in Placer County (Tecklin and Beedy 2014). Additionally, of 32 wetland sites evaluated in 2014, 20 were rated as likely to contain rails and therefore worthy of formal, protocol-level surveys to assess occupancy (Tecklin and Beedy 2014). Appendix D, *Species Accounts*, provides more detail on the status and distribution of the California black rail throughout its range and in the Plan Area. Range-wide threats to the species include habitat loss and degradation due to water and flood-control projects, land use changes, agriculture, and livestock grazing (Eddleman et al. 1994). There is no recovery plan for California black rail.

5.4.2.2 Effects Summary

Direct effects on California black rail year-round habitat are estimated to affect a total of 105 acres (9 percent of a total of 1,112 acres of year-round habitat in the Plan Area). Covered Activities that eliminate suitable habitat that is unoccupied by California black rails are expected to affect California black rail because the California black rail metapopulation in the Plan Area and surrounding Sierra Nevada Foothills is most likely maintained in part through colonization of unoccupied sites. The assessment of incremental urban edge in the Valley and fragmentation in the Foothills suggests that covered growth may have an indirect effect equivalent to 50 percent of the estimate of direct effect. Additionally, canal lining activities performed by the Placer County Water Agency may indirectly affect California black rail habitat that has been historically supported by

canal seepage. Growth of the human population associated with rural and urban development will increase demands on water, potentially resulting in a decrease in the availability of surface and groundwater, which can reduce the amount of water in fresh emergent marshes that provides habitat for California black rail. Implementation of General Condition 1, *Watershed Hydrology and Water Quality,* will minimize the effects of increased water demand on California black rail and its habitat. Rural and urban development could also cause an increase in predator populations that are associated with development (e.g., house cats, raccoons).

5.4.2.3 Conservation Summary

The Plan's biological goal for California black rail is a sustained population within the Plan Area. Achieving the landscape- and natural community–level biological objectives will result in minimization of and a potential reduction in invasive non-native species that may adversely affect California black rail habitat and the restoration/creation, protection, management, and enhancement of wetlands and ponds that potentially provide habitat for California black rail. Natural community protection and restoration will result in a total of 256 acres of California black rail habitat protected and 175 acres restored (Table 5-6). The species-specific biological objective for California black rail (**Objective BLRA-1.1**, *Protect, Restore/Create, and Manage and Enhance California Black Rail Habitat*) will ensure that the restored/created, protected, managed, and enhanced wetlands and ponds include at least 10 fresh emergent marshes suitable for supporting California black rail. At least 5 of the 10 fresh emergent marshes will be protected and managed and enhanced (up to 5 of the 10 may be created or restored marshes that will be managed). Each wetland will be at least 2 acres in size, and occupancy must be demonstrated in at least five of the wetlands by Year 45 of the proposed permit term. Because the likelihood of colonization of empty patches increases with decreasing distance to occupied sites, new wetlands created for black rail will be located close (e.g., within 0.6 mile) to occupied sites (see Conservation Measure 1, *Establish Reserve System*, for more details), as recommended by Richmond et al. (2010). The PCA will select sites and manage California black rail habitat to ensure that these lands provide suitable habitat for the species. For example, California black rail requires fresh emergent marsh with consistent water depth maintained at less than 1.2 inches year-round (Richmond et al. 2008). These requirements are specified in Conservation Measure 1*, Establish Reserve System,* and Conservation Measure 2, *Manage and Enhance the Reserve System.* Wetlands supported by seepage from canals that are lost because canal repairs eliminate the supply of water to wetlands will be replaced (through in-kind restoration and creation) to ensure no net loss of wetlands.

5.4.2.4 Conclusion

The protection, restoration, management, and enhancement of California black rail habitat in the Plan Area, including at least five occupied sites, will mitigate direct and indirect effects resulting from Covered Activities and further provide for the conservation of the species in the Plan Area.

5.4.3 Western Burrowing Owl

5.4.3.1 Status and Distribution

Western burrowing owl ranges from southern Canada southward into the western half of the United States and into Baja California, Mexico, and central Mexico (Bates 2006). The species is widely distributed in grassland habitat throughout the lowlands of California, but has been extirpated from

approximately 8 percent of its former range. Breeding in Central California has been reduced to the Central Valley, southern San Francisco Bay between Alameda and Redwood City, and areas near Livermore (Bates 2006). There is no information on historic population size and distribution of western burrowing owl in the Plan Area. Western burrowing owls are currently rare in the Plan Area. They occur primarily as overwintering birds in the Plan Area, though a pair \ nested in artificial burrows in 2012 and 2013 at the Swainson's Grassland Preserve (Wages pers. comm.). Appendix D, *Species Accounts*, provides more detail on the status and distribution of the western burrowing owl throughout its range and in the Plan Area.

5.4.3.2 Effects Summary

Direct effects on western burrowing owl year-round habitat are estimated to total 16,444 acres in the Plan Area (30 percent of a total of 55,101 acres of year-round habitat), 16,244 acres in the Valley, and 200 acres in Area B.

Western burrowing owls and their habitat will be indirectly affected by human population growth and increased urbanization within the Plan Area. Indirect effects related to human population growth include increased harassment from people, increased vehicle-related disturbances and potential for collisions, increased risk of wildfire, increased noise and light, habitat fragmentation, rodent abatement programs, and increased populations of predators that thrive in urbanized habitats (e.g., house cats, raccoons). The assessment of new urban edge shows that as much as 6,100 acres of grassland and agricultural land in the Valley may have new urban development within the 250 foot disturbance radius used in that analysis. Implementation of General Condition 2, *Reserve-Development Interface Design Requirements* will minimize effects of urban development adjacent to the Reserve System and RAA. Conservation Summary

The Plan's conservation goal for western burrowing owl provides sufficient habitat for maintaining or increasing the population size of overwintering western burrowing owls within the Reserve System and sufficient habitat for promoting the expansion of a breeding population of burrowing owls within the Reserve System. Achieving the natural community goals and objectives will result in the protection of 17,129 acres and restoration of 4,126 acres of western burrowing owl habitat (Table 5-6). The PCA will prioritize protection in areas that support western burrowing owls or supported this species within the last 5 years (Section 5.3.1.6.3, *Western Burrowing* Owl). It will also result in creating conditions to increase ground squirrel populations on these Reserve System lands, providing prey and burrows for western burrowing owl (CM2 VPCG-2, *Ground Squirrel Population Enhancement*). The species-specific biological objective for this species (**Objective BUOW-1.1**, *Protect and Manage Ground Squirrel Colonies*) will provide at least three protected ground squirrel colonies that will provide nesting opportunities for western burrowing owl, and will provide artificial burrows if ground squirrel colonies are not available to protect.

5.4.3.3 Conclusion

The Plan's conservation strategy will mitigate for the loss of 16,444 acres of habitat and indirect effects resulting from Covered Activities. Although the Plan Area is not critical to the long-term survival and recovery of the western burrowing owl, the strategy will further provide for the conservation of the species by providing nesting opportunities for western burrowing owls in the Plan Area, potentially facilitating expansion of the western burrowing owl's breeding range into the Plan Area.

5.4.4 Tricolored Blackbird

5.4.4.1 Status and Distribution

Tricolored blackbird is largely endemic to California; more than 99 percent of the global population occurs in the state (Appendix D, *Species Accounts*). This species was emergency listed by CDFW in December 2014 after a statewide survey showed a 44 percent decline in tricolored blackbirds since 2011 (Meese 2014). As of 2014, Placer County supported an estimated 12 percent of the statewide tricolored blackbird breeding population (Meese 2014). The Tricolored Blackbird Portal (Information Center for the Environment 2016)[19] documents 21 colony sites and aggregations in Plan Area A, of which 15 are active or recently active. Within a breeding season, surveys have found tricolored blackbirds at two to six colony sites in Plan Area A. Regular monitoring of colony sites has confirmed breeding at four sites in 2014 and five in 2015 (Dan Airola pers. comm.). Of the 15 active or recently active colony sites found in Plan Area A, 6 are in the RAA, 3 or 4 are protected in EXR, and 5 are in the PFG.

5.4.4.2 Effects Summary

Covered Activities will result in direct effects on 55 acres of tricolored blackbird nesting habitat in the Plan Area (9 percent of a total of 633 acres of nesting habitat) and 17,015 acres of foraging habitat in the Plan Area (28 percent of a total of 60,974 acres of foraging habitat). Tricolored blackbirds will also be indirectly affected by adjacent covered land use activities that alter the quantity and quality of standing water within 1,500 feet of nest colony sites, as described in detail in Section 4.7.4, *Tricolored Blackbird*. The assessment of new urban edge in the Valley shows that as much as 6,100 acres of grassland and agricultural land may have new urban development within the 250 foot disturbance radius used in that analysis. Implementation of General Condition 2, *Reserve-Development Interface Design Requirements* will minimize effects of urban development adjacent to the Reserve System and RAA. Covered Activities are expected to directly or indirectly affect the five known colony sites within the PFG.

5.4.4.3 Conservation Summary

The Plan's conservation goal for tricolored blackbird is habitat for a sustained population of this species in the Plan Area. Achieving the biological objectives will result in protection, restoration/creation, and enhancement of suitable complexes of habitat for tricolored blackbird on the Reserve System, including three basic requirements for breeding colony sites: (1) open accessible water within approximately 1,640 feet of a colony site (Hamilton 2004); (2) a protected nesting substrate, including either flooded or thorny or spiny vegetation; and (3) suitable foraging habitat providing adequate insect prey within a few miles of the nesting colony (Hamilton et al. 1995; Beedy and Hamilton 1997, 1999). Achieving the biological objectives will result in protection of 187 acres and restoration of 87 acres of tricolored blackbird nesting habitat (Table 5-6; **Objective TRBL-1.1**, *Protect, Manage, and Enhance Tricolored Blackbird Nesting Habitat;* **Objective TRBL-1.6**, *Restore Tricolored Blackbird Nesting Habitat*). It will also result in the protection of 18,138 and

[19] The Plan relies on data provided by the Tricolored Blackbird Portal to identify potential breeding colony sites for planning purposes. The Portal does not necessarily identify whether a site supported a breeding colony. For example, the Portal may show that birds were seen at a site during the Statewide Tricolored Blackbird Survey, but the colony may have abandoned the site after the survey prior to breeding. The subsequent abandonment may not be noted on the Portal.

restoration of 4,000 acres of tricolored blackbird foraging habitat (**Objective TRBL-1.2**, *Protect, Restore, Manage, and Enhance Tricolored Blackbird Foraging Habitat*). Additionally, achieving the biological goals and objectives will result in the protection of at least five currently unprotected tricolored blackbird colony sites in the Plan Area (**Objective TRBL-1.3**, *Protect Tricolored Blackbird Colony Sites*) and at least 200 acres of foraging habitat adjacent to each of the seven protected colony sites (**TRBL-1.4**, *Protect, Restore, Manage, and Enhance Tricolored Blackbird Foraging Habitat near Colony Site*) as well as the protection or restoration of open water in the vicinity of each protected colony site (**TRBL-1.5**, *Protect and/or Restore/Create Open Water near Tricolored Blackbird Colony Sites*).

5.4.4.4 Conclusion

The protection, restoration, management, and enhancement of tricolored blackbird foraging and nesting habitat in the Plan Area will mitigate the direct and indirect effects resulting from Covered Activities, as described above and will further provide for the conservation of the species in the Plan Area. The protection of maintenance of five colonies with their associated nesting and foraging habitat, with at one large colony of at least 1,500 individuals, ensures protection and maintenance of a sufficient area to support sustainable populations of tricolored blackbird. Additional habitat restoration will provide opportunities for additional colonies to establish, providing for the conservation of this species in the Plan Area.

5.4.5 Giant Garter Snake

5.4.5.1 Status and Distribution

The giant garter snake is endemic to California, found only in the Sacramento and San Joaquin Valleys. Records of giant garter snakes coincide roughly with the historical distribution of the large flood basins, freshwater marshes, and tributary streams of the Central Valley of California (Appendix D, *Species Accounts*). Although the western third of the Plan Area occurs within the Central Valley proper and supports numerous low-elevation tributaries and wetlands that could have provided suitable habitat for giant garter snake, there are no historic or current records for this species in the Plan Area. A population of giant garter snake occurs approximately 1.5 to 5 miles to the west and south of the Placer county line in the Sutter and Natomas Basins of Sutter and Sacramento Counties, with the closest occurrence recorded in the Natomas Basin of Sacramento County, approximately 1.5 miles to the southwest of the Placer county line (Figure 5-3). Appendix D, *Species Accounts*, provides more detail on the status and distribution of the species throughout its range.

5.4.5.2 Effects Summary

Covered Activities will directly affect up to 1,438 acres of giant garter snake breeding and foraging habitat in the Plan Area (7 percent of a total of 19,511 acres of breeding and foraging habitat) and 483 acres of upland refugia habitat in the Plan Area (14 percent of a total of 3,537 acres of upland refugia habitat). If the species is present in the Plan Area, indirect effects could result from construction and maintenance of infrastructure associated with urban and rural development and changes in hydrology resulting from land conversions. Additionally, in-stream activities such as installation and maintenance of utility lines, road improvements, drainage facility improvements,

and flood control projects may indirectly affect giant garter snake. These indirect effects are described in further detail in Section 4.7.5, *Giant Garter Snake.*

5.4.5.3 Conservation Summary

The Plan's conservation goal for giant garter snake provides protected giant garter snake habitat to facilitate the expansion of this species into the Reserve System. Achieving the landscape-level biological goals and objectives will result in the establishment of a large, interconnected Reserve System with upland and aquatic habitat for the giant garter snake, enabling the species to disperse between habitat areas and facilitating genetic exchange if the species occupies the Plan Area in the future. The PCA will maintain and enhance Reserve System permeability, which will facilitate giant garter snake movement through the Reserve System if the species occupies the Plan Area in the future. Implementation of LIDS will protect water quality for giant garter snake in its aquatic habitat, if present. Control of non-native species will minimize predation on young giant garter snakes, if present in the Reserve System, by invasive predators.

Achieving the natural community and species-specific objectives will result in the protection of 2,000 acres of rice land (or fresh emergent wetland as a seasonal equivalent), which will be managed to provide aquatic and adjacent upland habitat for giant garter snake (**Objective GGS-1.1**, *Protect and Manage Giant Garter Snake Habitat*). These rice lands will be managed to provide four basic elements needed by giant garter snake: (1) adequate water during the snake's active season (March 1 to September 30), (2) emergent herbaceous wetland vegetation for escape and foraging habitat, (3) grassy banks and openings in waterside vegetation for basking, and (4) higher elevation upland habitat for cover and refuge from flooding.

Additionally, achieving the natural community objectives will result in the protection of approximately 200 acres of wetland natural communities located below a 100-foot elevation, most of which will provide aquatic habitat for giant garter snake. It will also result in the protection of approximately 12,000 acres of vernal pool complexes and grasslands below a 100-foot elevation, of which roughly 20 percent (2,400 acres) will be located within 200 feet of suitable aquatic habitat, providing adjacent upland habitat for the giant garter snake. A minimum of 2,000 acres of rice land (or functional equivalent of fresh emergent wetland) will be protected and managed for giant garter snake. Protection of the 2,000 acres of rice and additional protection and restoration of aquatic and wetland natural communities to meet the biological objectives will result in the protection of 2,702 acres and restoration of 529 acres of aquatic habitat and the protection of 1,763 acres and restoration of 449 acres of upland habitat for giant garter snake in the Plan Area (Table 5-6).

5.4.5.4 Conclusion

Although the Plan Area is not critical to the long-term survival and recovery of the giant garter snake, and there are no records for this species in the Plan Area, the protection, restoration, management, and enhancement of giant garter snake habitat in the Plan Area will mitigate the direct and indirect effects on habitat resulting from Covered Activities, as described above, and further provide for the conservation of the species by providing opportunities for giant garter snake to occupy the Plan Area.

5.4.6 Western Pond Turtle

5.4.6.1 Status and Distribution

Western pond turtle occurs from Puget Sound in Washington south through Oregon to the American River drainage in central California and generally west of the Cascade-Sierra crest to the American River drainage. Western pond turtle historically inhabited the permanent and seasonal wetlands throughout the Central Valley, with the Tulare Lake basin as a major population center (Hayes et al. 1999). Today, the taxon occurs in 90 percent of its historic range in the Central Valley and west of the Sierra Nevada but in greatly reduced numbers (Jennings and Hayes 1994; Germano and Bury 2001). Western pond turtle historically occurred in suitable habitat throughout the American River drainage, including the Plan Area (U.S. Fish and Wildlife Service 1999a). The taxon is believed to have been abundant in the Plan Area when it supported extensive wetlands (Hayes et al. 1999), but some conversion of former wetlands to agricultural lands has most likely resulted in local declines of these populations (Jennings and Hayes 1994). There are four recorded occurrences of western pond turtles within the Plan Area and vicinity (California Department of Fish and Wildlife 2016).

5.4.6.2 Effects Summary

Covered Activities will directly affect up to 750 acres of aquatic habitat for western pond turtle (7 percent of a total of 10,244 acres of nesting and aquatic habitat in the Plan Area). Covered Activities will also directly affect up to 1,407 acres of upland habitat for western pond turtle in the Plan Area (10 percent of a total of 14,263 acres of movement and secondary nesting habitat in the Plan Area). Additional, indirect effects are expected to result from increased vehicular traffic and the development of new roadways, causing mortalities; in-stream activities and runoff from developed areas that could degrade aquatic habitat; habitat fragmentation as a result of urban and rural development and the construction of new roads and other infrastructure; introduction, establishment, and spread of invasive plant and animal species; and increased predation rates, particularly on eggs and young, from domestic pets and invasive wildlife species. Implementation of General Condition 1, *Watershed Hydrology and Water Quality,* will minimize indirect effects related to water quality and General Condition 2, *Conservation Lands: Development Interface Design Requirements,* will minimize the indirect effects of development adjacent to reserves and the RAA. Additional detail regarding effects of Covered Activities on western pond turtle are provided in Section 4.7.6, *Western Pond Turtle.*

5.4.6.3 Conservation Summary

The Plan's conservation goal for western pond turtle is habitat for a sustained population of this taxon within the Reserve System. Achieving the landscape- and natural community–level biological objectives will result in a large, interconnected Reserve System containing upland and aquatic habitat for the western pond turtle, enabling the species to disperse between primary habitat areas, facilitating genetic exchange. The maintenance and enhancement of Reserve System permeability will facilitate western pond turtle movement through the Reserve System, and implementation of LIDS will protect water quality for western pond turtle in its aquatic habitat. The reduction of invasive non-native plant species could minimize degradation of western pond turtle habitat (e.g., controlling plants that invade open basking sites), and the control of non-native invasive animal species will minimize predation of young western pond turtles by invasive predators. Consistent with **Objectives WPT-1.1**, *Protect and Enhance Western Pond Turtle Habitat*, and **WPT-1.2**, *Restore*

Western Pond Turtle Habitat, the PCA will protect 2,800 acres and restore 1,850 acres of western pond turtle aquatic habitat, and protect 3,859 acres and restore 1,930 acres of western pond turtle upland habitat (Table 5-6). The enhancement of streams will include increasing basking sites and cover for western pond turtle within the Stream System, and habitat enhancement may also include control of red-eared sliders where they are found to be threatening western pond turtle populations in the Reserve System.

5.4.6.4 Conclusion

The protection, restoration, management, and enhancement of western pond turtle habitat in the Plan Area will mitigate the direct and indirect effects resulting from Covered Activities, as described above, and further provide for the conservation of the species by sustaining western pond turtle in the Plan Area.

5.4.7 Foothill Yellow-legged Frog

5.4.7.1 Status and Distribution

The foothill yellow-legged frog historically ranged from west of the crest of the Cascade Mountains in Oregon south to the Transverse Ranches in Los Angeles County and the Sierra Nevada Foothills south to Kern County. Additionally, an isolated population was reported from Sierra San Pedro Martir, Baja California, Mexico. The current range excludes areas south of northern San Luis Obispo County and Foothills south of Fresno County where the species is believed to be extirpated (Appendix D, *Species Accounts*). Although this species is widely scattered in appropriate riverine and riparian habitat throughout the foothill portions of Placer County, there are no records of this species in the Plan Area. The nearest record for this species is a little over 3 miles from the eastern border of the Plan Area. Appendix D, *Species Accounts*, provides more detail on the status and distribution of the yellow-legged frog throughout its range and in Placer County.

5.4.7.2 Effects Summary

Covered Activities will directly affect up to 3 stream miles of foothill yellow-legged frog year-round habitat (1 percent of a total of 290 stream miles of estimated habitat in the Plan Area) and 5 acres of riparian year-round habitat (1 percent of a total of 593 acres of modeled foraging and movement habitat in the Plan Area). Runoff from urban development and other Covered Activities could degrade the aquatic habitats that support these species. Implementation of General Condition 1, *Watershed Hydrology and Water Quality,* will minimize the effects of Covered Activities on water quality in the Plan Area. Short-term construction-related effects on covered amphibians include the generation of dust, which has the potential to interfere with the oxygen diffusion process and can transport toxic compounds that may affect foothill yellow-legged frog, although BMPs will be implemented as described in Chapter 6, *Program Participation and Conditions on Covered Activities*, to minimize dust. Urban development adjacent to habitat could result in increases in predation rates for foothill yellow-legged frog by increasing the abundance of predators that thrive in human-dominated environments (e.g., domestic pets, raccoons, coyotes, skunks, and bullfrogs). Implementation of General Condition 2 will minimize the effects of development adjacent to reserves and the RAA, including the potential spread of non-native species onto reserves.

5.4.7.3 Conservation Summary

The Plan's conservation goal for foothill yellow-legged frog is habitat to facilitate the expansion of this species into the Plan Area. As described in Section 5.4.7, *Foothill Yellow-legged Frog*, achieving the Plan's biological goals and objectives will result in a large interconnected Reserve System that provides riverine and riparian habitat for foothill yellow-legged frog, minimizes edge effects of development, and potentially facilitates movement and genetic exchange between populations if foothill yellow-legged frogs expand into the Plan Area. Achieving the Plan's biological goals and objectives will also minimize degradation of foothill yellow-legged habitat from urban stormwater runoff, and reduce non-native species that may adversely affect foothill yellow-legged frog, such as bullfrogs. Achieving the species-level biological goals and objectives will result in the protection of 83 acres and restoration of 83 acres of foothill yellow-legged frog habitat in the Plan Area (Table 5-6; **Objective FYLF-1.1**, *Protect Foothill Yellow-legged Frog Riverine Habitat;* **Objective FYLF-1.2**, *Protect Riparian Habitat for Foothill Yellow-legged Frog;* **Objective FYLF 1.3**, *Restore Riparian Habitat for Foothill Yellow-legged Frog*). If foothill yellow-legged frogs are found within the Plan Area, the PCA will attempt to acquire occupied sites because foothill yellow-legged frog uses the same sites for breeding year after year.

5.4.7.4 Conclusion

The Plan's conservation strategy for foothill yellow-legged frog, described above, will mitigate for the direct and indirect effects on foothill yellow-legged frog riparian habitat. The strategy will further provide for the conservation of the species by providing opportunities for this species to occupy suitable habitat in the Plan Area.

5.4.8 California Red-legged Frog

5.4.8.1 Status and Distribution

The historical range of the California red-legged frog extended coastally from the vicinity of Point Reyes National Seashore in Marin County and inland from the vicinity of Redding south to northwestern Baja California (Storer 1925; Jennings and Hayes 1985; Hayes and Krempels 1986). The species' current coastal distribution extends from Sonoma to Los Angeles Counties; it also occurs in isolated locations in the Sierra Nevada (including Butte, Yuba, and Nevada Counties) and the northern Transverse, or Los Angeles, Ranges. It is relatively common in the San Francisco Bay area and along the central coast. California red-legged frog is believed to be extirpated from the floor of the Central Valley (U.S. Fish and Wildlife Service 2002). Two populations were discovered in the southern Transverse and Peninsular Ranges where the species was believed to be extirpated (U.S. Fish and Wildlife Service 2001). There is a historical record for California red-legged frog in the Plan Area near Newcastle/Auburn. Currently, there is one known California red-legged frog population in the Plan Area, at the Big Gun Conservation Bank site near Michigan Bluff. Appendix D, *Species Accounts*, provides more detail on the status and distribution of the California red-legged frog throughout its range and in the Plan Area.

5.4.8.2 Effects Summary

Covered Activities will directly affect up to 672 acres of aquatic breeding and foraging habitat (8 percent of a total of 8,532 acres of breeding and foraging habitat in the Plan Area), and up to 8,551 acres of upland movement and refugia habitat (11 percent of a total of 75,306 acres of

modeled upland movement and refugia habitat in the Plan Area) for California red-legged frog. This species may also be indirectly affected through water quality degradation, dust, artificial lighting, and the spread on invasive predators, as described above for foothill yellow-legged frog. Because California red-legged frogs are not expected to occupy Plan Area A, indirect effects on California red-legged frog are expected to be negligible, if any.

5.4.8.3 Conservation Summary

The Plan's conservation goals for California red-legged frog are to protect occupied habitat in the Plan Area (Big Gun Conservation Bank) and provide additional, suitable California red-legged frog habitat in the Plan Area. Achieving the landscape- and natural community–level biological objectives will provide a large, interconnected Reserve System with an estimated 1,168 acres of protected and 1,241 acres of restored aquatic habitat and 12,484 acres of protected and 160 acres of restored upland habitat (Table 5-6) to facilitate the expansion of the California red-legged frog population in the Plan Area; minimize and potentially reduce invasive, non-native species that may adversely affect California red-legged frog, such as bullfrogs or non-native fish species; provide at least 600 acres of wetland and aquatic natural communities in the Reserve System; provide at least 2,200 acres of riparian natural community and 88.6 stream miles in the Reserve System, providing habitat for the California red-legged frog and facilitating dispersal of this species; and provide at least 1,060 acres of restored riparian natural community in the Reserve System as well as an additional restored riparian natural community to meet a 1.5:1 ratio of restored to affected. Achieving species-specific biological goals and objectives (**Objective CRLF-1.1**, *Protect Occupied California Red-legged Frog Habitat;* **Objective CRLF-1.1**, *Protect and Enhance Suitable California Red-legged Frog Habitat;* **Objective CRLF-2.2**, *Restore Suitable California Red-legged Frog Habitat*)will ensure protection, restoration, and creation of habitat suitable for the colonization and expansion of a California red-legged frog in the Plan Area and protection of at least 2 acres of occupied California red-legged frog habitat in the Plan Area at Big Gun Conservation Bank.

5.4.8.4 Conclusion

The protection, restoration, management, and enhancement of suitable California red-legged frog habitat in the Plan Area, and the protection of occupied habitat, will mitigate the direct and indirect effects on suitable habitat resulting from Covered Activities, as described above, and further provide for the conservation of the species in the Plan Area.

5.4.9 Covered Salmonids

5.4.9.1 Status and Distribution

There are most likely more than a thousand spawning populations of Chinook salmon on the North American coast from southeastern Alaska to California (Healey 1991). Chinook salmon is one of the most abundant salmon species in North America. The Central Valley fall-/late fall-run Chinook salmon evolutionarily significant unit (ESU) includes fall-run and late fall-run Chinook salmon in the Sacramento and San Joaquin Rivers and their tributaries. Although, historically, Chinook salmon were widely distributed throughout all major streams of the Central Valley, approximately 72 percent of the historic spawning and holding habitat in the Central Valley is no longer available (Yoshiyama et al. 2001). In addition to habitat loss, population declines have been attributed to poor habitat conditions, and in particular to poor ocean conditions, although freshwater and estuarine

habitat degradation along with hatchery production has created a population that has reduced fitness or resiliency to withstand natural stochastic events (National Marine Fisheries Service 2009). In the Plan Area, this ESU is present in the Raccoon Creek, Auburn Ravine, and Dry Creek watersheds and absent from the Pleasant Grove, Yankee Slough, Markham Ravine and Curry Creek watersheds, most likely because of water quality (e.g., temperature) and the lack of spawning and rearing habitat. Fall-run Chinook from hatcheries on the Feather River have been stocked in the tributaries of Dry Creek (ECORP 2003). The Bear River supports an occasional run of adult fall-run Chinook salmon in years when flows are sufficient to provide passage (Yoshiyama et al. 1996). Appendix D, *Species Accounts*, provides more detail on the status and distribution of the Central Valley fall-/late fall-run Chinook salmon ESU throughout its range and in the Plan Area.

The current distribution of steelhead ranges from Southern California to the Kuskokwim drainages near the Alaska Range and to Asia. The Central Valley steelhead Distinct Population Segment (DPS) occurs in the Sacramento and San Joaquin Rivers, along with all of their tributaries (National Marine Fisheries Service 2009). The Sacramento–San Joaquin steelhead run tends to use primarily tributaries of the Sacramento, Feather, Yuba, and lower American river drainages. A status review for the Central Valley steelhead DPS was completed in June 2005, and the majority opinion of the biological review team (66 percent of the members) was that the Central Valley steelhead DPS is "in danger of extinction" (Good et al. 2005). Overall, the status of Central Valley steelhead appears to have changed little since the 2011 status review when the Technical Recovery Team concluded that the DPS was in danger of extinction (National Marine Fisheries Service 2016). In the Plan Area, Central Valley steelhead is known to be present in the Bear River, Raccoon Creek (including the Doty Ravine tributary), Auburn Ravine, and Dry Creek (including Secret Ravine and Miners Ravine tributaries) (Bailey 2003; Placer County 2009; National Marine Fisheries Service 2009). Raccoon Creek and one of its tributaries, Doty Creek, Dry Creek and two of its tributaries, Secret Ravine and Miners Ravine, are listed as Critical Habitat for Central Valley steelhead (National Marine Fisheries Service 2005). Appendix D, *Species Accounts*, provides more detail on the status and distribution of steelhead throughout its range and in the Plan Area.

5.4.9.2 Effects Summary

Direct effects on covered salmonids are estimated to be 1.24 miles or 1.3 percent of the total length of salmonid habitat, comprising 1.02 miles of spawning habitat (1.5 percent of all spawning habitat) and 0.22 mile of migration habitat (0.9 percent of all migration habitat). The areal representation of the linear habitat is about 16 acres out of the 1,123-acre riverine total. These species may also be indirectly affected through water quality degradation generally throughout all habitat reaches in the Plan Area but primarily in the Valley where effects of up-stream urbanization will be greater. Indirect effects will be avoided and minimized through measures described in Chapter 6, *Program Participation and Conditions on Covered Activities.*

5.4.9.3 Conservation Summary

The Plan's conservation strategy will benefit covered salmonids through the protection and management of 2,200 acres of the riverine and riparian natural community, the enhancement of this natural community through removal and/or modification of barriers to fish passage, improvement of in-channel features, and non-native animal species control. Extensive amounts of high-quality spawning, rearing, and migrating habitat will be protected for these species within the Raccoon Creek, Auburn Ravine, and Dry Creek watersheds, consistent with the Central Valley Chinook and Steelhead Recovery Plan (National Marine Fisheries Service 2014). The application of LIDS will

improve water quality for covered fish species. The restoration of 1,060 acres of riparian natural community will further benefit these species by providing cover and shade for thermoregulation and by providing vegetation that is a source of invertebrates upon which the covered salmonids feed. This conservation will mitigate the effects of Covered Activities and will further provide for the conservation of the covered salmonids.

5.4.9.4 Conclusion

Implementation of the conservation measures to achieve the biological goals and objectives at the landscape, natural community, and species levels will mitigate the direct and indirect effects on the covered salmonids resulting from Covered Activities, as described above, and further provide for the conservation of the species in the Plan Area.

5.4.10 Valley Elderberry Longhorn Beetle

5.4.10.1 Status and Distribution

Valley elderberry longhorn beetle is endemic to the upland riparian areas of the Central Valley of California (Linsley and Chemsak 1972). The range of valley elderberry longhorn beetle extends from Shasta County in the north to Fresno County in the south, mostly concentrated at elevations below 3,000 feet in the watersheds of the American, San Joaquin, and Sacramento Rivers. In the Plan Area, valley elderberry longhorn beetle is known to occur in the American River watershed below Auburn in the vicinity of Folsom Lake, in the Dry Creek watershed along Secret Ravine and Miners Ravine, and at the Silvergate Mitigation Bank. Appendix D, *Species Accounts*, provides more detail on the status and distribution of the valley elderberry longhorn beetle throughout its range and in the Plan Area.

5.4.10.2 Effects Summary

Covered Activities will directly affect up to 476 acres of valley elderberry longhorn beetle habitat in the Plan Area (7 percent of a total of 6,367 acres in the Plan Area). Indirect effects on valley elderberry longhorn beetle habitat include the accumulation of dust on shrubs resulting from up-wind disturbances, flood control practices that could fragment habitat used by valley elderberry longhorn beetle, increased risk of wildfire, and the spread of invasive plants and animals that could affect valley elderberry longhorn beetle.

5.4.10.3 Conservation Summary

The Plan's conservation goal for valley elderberry longhorn beetle is a sustained population of this species in the Reserve System. Achieving the landscape-level biological objectives will provide a large, interconnected Reserve System that minimizes edge effects of development and facilitates movement and genetic exchange between valley elderberry longhorn beetle populations. Achieving the natural community–level biological goals and objectives will result in the protection of 2,313 acres and restoration of 1,553 acres of habitat for this species (Table 5-6). The species-specific biological objective (**Objective VELB-1.1**, *Restore Valley Elderberry Longhorn Beetle Habitat*) will ensure that the restored riparian natural community in the Reserve System will include appropriate habitat components for valley elderberry longhorn beetle (i.e., elderberry shrubs, consistent with USFWS standards).

5.4.10.4 Conclusion

Implementation of the conservation measures to achieve these biological goals and objectives will mitigate the direct and indirect effects on valley elderberry longhorn beetle resulting from Covered Activities, as described above, and further provide for the conservation of the species in the Plan Area.

5.4.11 Vernal Pool Branchiopods

5.4.11.1 Status and Distribution

The vernal pool fairy shrimp is endemic to vernal pools in California and Oregon. The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and Wildlife Service 2005) designates 104 core recovery areas for listed vernal pool branchiopods. Western Placer County includes a portion of one of these core recovery areas, the Southeastern Sacramento Vernal Pool Region, which has the greatest number of known occurrences of vernal pool fairy shrimp throughout the species' range (U.S. Fish and Wildlife Service 2005). The Plan Area is therefore important to the long-term survival and recovery of vernal pool fairy shrimp.

Vernal pool tadpole shrimp is endemic to the Central Valley of California (U.S. Fish and Wildlife Service 1994; Helm 1998; Rogers 2001). The species has patchy distribution from Shasta County in the north to Tulare County in the south, with disjunct populations occurring in Alameda and Contra Costa Counties (U.S. Fish and Wildlife Service 2007c). The largest known concentration of vernal pool tadpole shrimp is in Sacramento County (U.S. Fish and Wildlife Service 2005). The historical distribution of vernal pool tadpole shrimp in the Plan Area is unknown, and there are three known current occurrences of vernal pool tadpole shrimp in the Plan Area.

Conservancy fairy shrimp are endemic to vernal pools in California. This species is restricted to the Central Valley, except for one population in the Central Coast in Ventura County. A single male Conservancy fairy shrimp was detected in Placer County in the spring of 2007, and the species was detected again in one of 37 pools sampled on March 27, 2012 (the number of individuals and sex found in 2012 was not reported in the CNDDB [California Department of Fish and Wildlife 2016]). This occurrence is already protected at the Mariner Conservation Bank. The USFWS indicated in the 5-year review for this species that it did not have sufficient information to determine if this detection represents a population, or an anomaly, and that further surveys are required to determine if the Placer County locality represents a sustainable population of this species (U.S. Fish and Wildlife Service 2007b). This species is typically associated with large cool-water pools, which are not characteristic of the vernal pools found in Placer County. However, further surveys within the two watersheds that straddle the known occurrence may indicate that there are additional occurrences of Conservancy fairy shrimp in the county. Activities covered under the Plan will not take a Conservancy fairy shrimp until additional occurrences are found and protected.

5.4.11.2 Effects Summary

Covered Activities will directly affect 12,550 acres of vernal pool branchiopod habitat (approximately 28 percent of a total of 44,278 acres of vernal pool complex habitat in the Plan Area), 12,400 acres in the Valley, 100 acres in the Foothills, and 50 acres in Plan Area B. Covered Activities will remove no more than 185 acres of actual delineated vernal pool wetland. As described in Chapter 4, *Effect of Covered Activities*, the analysis of incremental urban edge provides a useful

overall indication of covered urban growth's indirect effect on vernal pool habitat. The analysis suggests that roughly 3,350 acres of vernal pool complex lands will be found within the indirect effect radius of new urban development by the end of the proposed 50-year permit term. This estimate of indirect effect on vernal pool complex from incremental urban edge is 27 percent of the estimate of direct effect.

5.4.11.3 Conservation Summary

The Plan's conservation strategy for the vernal pool branchiopods provides protection of 17,000 acres of vernal pool complex, including at least 790 wetted acres of vernal pool constituent habitats (**Objective VPCG-1.1**, *Protect Vernal Pools*). Additionally, it provides restoration or creation of at least 3,000 acres of vernal pool complex in the Reserve System, including at least 900 wetted acres of vernal pools and seasonal wetland habitat for covered vernal pool branchiopods, and additional acres, in-kind, to meet a 1.5:1 ratio of restored to affected habitat (**Objective VPCG-1.2**, *Restore/Create Vernal Pools*). The PCA will manage and enhance vernal pool branchiopod habitat in the Reserve System through actions described in Conservation Measure 2, *Manage and Enhance the Reserve System*, to reduce non-native species, increase native species diversity, and enhance and maintain the natural hydrology of vernal pool complexes in the Reserve System (**Objectives L-3.2**, *Reduce Non-native Species and Increase Native Species,* and **VPCG-2.1**, *Enhance Vernal Pool Vegetation and Hydrology*). The Reserve System will include sufficient occupied vernal pool fairy shrimp and vernal pool tadpole shrimp habitat to ensure an occupancy rate that is equal to or greater than the occupancy rate of vernal pools lost as a result of Covered Activities, for each species (**Objectives VPB-1.1**, *Maintain Vernal Pool Fairy Shrimp Occupancy in the Reserve System*, and **VPB-1.2**, *Maintain Vernal Pool Tadpole Shrimp Occupancy in the Reserve System*). This will be accomplished through vernal pool acquisition and restoration/creation, as described in Conservation Measures 1, *Establish Reserve System*, and 3, *Restore and Create Natural Communities and Covered Species' Habitat.* The PCA will also protect two occurrences of Conservancy fairy shrimp for the first occurrence lost and three occurrences for each additional occurrence lost.

The Plan's conservation strategy provides for the recovery needs of the vernal pool fairy shrimp and vernal pool tadpole shrimp in the Plan Area, consistent with the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and Wildlife Service 2005). The recovery plan has no conservation goals for Conservancy fairy shrimp in Placer County. The core recovery area for vernal pool fairy shrimp and vernal pool tadpole shrimp in western Placer County totals 31,078 acres, of which 25,526 acres are mapped as vernal pool complex. The vernal pool recovery plan sets a goal of 85 percent protection of suitable vernal pool fairy shrimp and vernal pool tadpole shrimp habitat in the western Placer County core recovery area.

Combined with existing protected vernal pool complexes in the core recovery area (5,421 acres or 21 percent), implementation of the Plan will result in the protection of approximately 51 percent of vernal pool complexes in the western Placer County core recovery area. This falls short of the 85 percent protection goal identified for this area in the recovery plan. However, this core area is identified as a Zone 2 area, indicating that the recovery goals have greater flexibility than for Zone 1 core areas and that these goals may be modified on a case-by-case basis based on additional information, particularly for more widespread species such as vernal pool fairy shrimp (U.S. Fish and Wildlife Service 2005, page III-6).

By the end of the permit term, 27,068 acres of vernal pool complexes will be protected and restored in the Plan Area, which is greater than the total core area acreage recommended for protection by

the recovery plan for western Placer County (i.e., 85 percent of the suitable habitat in the core area, or approximately 26,420 acres).

The recovery plan acknowledges that alternative mechanisms, such as HCPs, may be deemed equivalent to implementation of the recovery plan if they contain the six necessary elements specified for meeting equivalency (U.S. Fish and Wildlife Service 2005). Each of the six elements is listed below, followed by a description of applicable components of the conservation strategy that would satisfy each of them.

1. Permanently protected vernal pool preserves within the area covered by the HCP in large contiguous blocks of suitable habitat.

   The Plan will result in a large, interconnected vernal pool Reserve System in the Plan Area. This will be achieved by building off of the existing reserves in the Plan Area. The Plan will protect and restore approximately 20,000 acres of vernal pool complexes (17,000 acquired and protected, and approximately 3,000 restored). In addition, 7,068 acres of vernal pool complexes are already protected on existing reserves (5,421 acres of which [78 percent] are within the western Placer County core area). Before the end of the permit term 27,068 acres of vernal pool complexes will be protected and restored in the area covered by the Plan.

2. Protection of the entire genetic range of each listed species within the area covered by the HCP.

   As described in the recovery plan (U.S. Fish and Wildlife Service 2005, page III-5), genetic composition has not been investigated for most of the vernal pool branchiopod species; therefore, genetic diversity is assumed to be protected by protecting populations throughout each species' range. The core recovery areas identified in the recovery plan are distinct and provide geographic and therefore the genetic diversity necessary for recovery of the species (U.S. Fish and Wildlife Service 2005, page III-18).

   The conservation strategy for vernal pool species is based on the assumption that the genetic range of each species in the Plan Area will be protected by protecting lands within different parts of the species' distribution in the Plan Area. The distribution of recorded occurrences and habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp, in relation to lands that are already protected and are targeted for protection under the Plan, is shown on Figure 5-9. The occurrence records are biased toward sites in or near development, which is where most surveys have occurred. This explains the lack of records in the western portion of the Plan Area. However, the distribution of existing and future reserves along both a north–south and east–west transect in the county demonstrates that reserves protecting the vernal pool branchiopods will be well distributed through western Placer County; therefore, genetic diversity correlated with these geographic patterns will be captured in the Reserve System.

3. Protection of all populations of species with 25 or fewer total occurrences addressed in this Plan within the area covered by the HCP.

   There are more than 25 occurrences of vernal pool fairy shrimp and vernal pool tadpole shrimp throughout the range of each species. Therefore, this element is not relevant for this species.

4. Connectivity with other preserves within the area covered by the HCP.

   Plan reserves will be adjacent to and expand upon existing and future conservation lands (i.e., existing reserves and future Plan reserves) to support recovery of vernal pool branchiopods in the Plan Area (Figure 5-9).

5. Adaptive management of the preserves within the area covered by the HCP to support the species addressed in this recovery plan.

   Adaptive management is a crucial conservation tool in the face of uncertainty. A key uncertainty for the Plan is the distribution of vernal pool fairy shrimp and vernal pool tadpole shrimp in the vernal pool complex landscape and the relative conservation values of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat distributed through the Plan Area. The Plan will include a robust monitoring and adaptive management program to ensure that the conservation value[20] of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat in the Reserve System will be greater than the conservation value of the habitat to be lost. The permanent protection of habitat in large, interconnected blocks will contribute to the value of the Reserve System relative to the lands to be lost. Additionally, the following factors will be considered in assessing vernal pool fairy shrimp and vernal pool tadpole shrimp habitat conservation value for adaptive management purposes, to inform reserve assembly, management, and enhancement:

   a. Size: The Plan will commit to the acquisition of 17,000 acres of vernal pool complex containing at least 502 wetted acres of vernal pool wetlands. Rough proportionality provisions and compliance monitoring will ensure that the acreage will be preserved in step with habitat loss.

   b. Occupancy: The Plan will commit to maintaining a vernal pool fairy shrimp and vernal pool tadpole shrimp occupancy rate in the Reserve System that is equal to or greater than the occupancy rate of vernal pools lost as a result of Covered Activities.

   c. Life History Needs: Habitat features necessary to provide the life history needs for vernal pool fairy shrimp and vernal pool tadpole shrimp are as described in Chapter 4*, Effects of Covered Activities*, for Critical Habitat primary constituent elements. Attributes that may be measured to ensure these features are present include water source, hydroperiod, hydrologic connectivity, and structural patch richness (to measure the fourth primary constituent element related to vernal pool structure). These parameters may be monitored to inform adaptive management during establishment of the Reserve System, to ensure that the Reserve System provides these life history needs at a level equal to or greater than lands lost to Covered Activities.

   d. Threats: In addition to habitat loss and fragmentation, the recovery plan lists the following threats to vernal pools: altered hydrology; invasive species; contaminants; human waste, recreational use, and vandalism; loss of pollinator species; and inappropriate livestock grazing. These threats will be evaluated in the Reserve System for the purpose of effects and effectiveness monitoring and adaptively managed to minimize or eliminate these threats. For example, the Reserve System will be managed to target invasive species and implement grazing practices that enhance vernal pool landscapes. The protection of a large, interconnected Reserve System will minimize the threats of habitat fragmentation and adverse edge effects.

6. Sufficient funding for management, maintenance, and monitoring of the preserves in perpetuity.

   As described in Chapter 9, *Costs and Funding*, the Plan will ensure sufficient funding for management, maintenance, and monitoring of the vernal pool Reserve System in perpetuity.

[20] "Conservation value" is the level of contribution to the recovery of the species, as described in USFWS 2014.

5.4.11.4 Conclusion

The Plan will provide for vernal pool fairy shrimp and vernal pool tadpole shrimp recovery in the Plan Area. The Plan includes all of the six elements listed in the recovery plan for an HCP to be deemed equivalent to implementation of the recovery plan for the covered area. The Plan's conservation strategy is adequate with respect to mitigating the loss of 13,135 acres of habitat within the PFG as well as the roughly 3,350 acres of vernal pool complex lands that may occur within the indirect effect radius of new urban development by the end of the proposed 50-year permit term, and providing for the conservation of vernal pool fairy shrimp and vernal pool tadpole shrimp.

There are no recovery goals for Conservancy fairy shrimp in Placer County (U.S. Fish and Wildlife Service 2005). The protection of two occurrences for the first occurrence lost, and three occurrences for each additional occurrence lost, will ensure that if there is a metapopulation of Conservancy fairy shrimp in the Plan Area, it will be sustained.

Table 5-8. Biological Goals, Objectives, and Conservation Measures

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Landscape-level Goals and Objectives		
Goal L-1. A Reserve System with representative natural communities along a range of environmental gradients large enough to support ecosystem function, sustain populations of Covered Species, maintain or increase biological diversity of native species, and accommodate changing environmental conditions.		
Objective L-1.1. *Establish a Large, Interconnected Reserve System.* Establish a large, interconnected Reserve System of at least 47,300 acres of natural communities, agricultural habitat, and Covered Species' habitat, with all natural communities in the Plan Area represented, primarily within the RAA, irrespective of amount of natural communities and Covered Species lost as a result of Covered Activities, including at least 33,000 acres in the Valley and at least 14,300 acres in the Foothills.	**CM1,** *Establish Reserve System* ● **CM1 L-1,** Reserve Assembly Process ● **CM1 L-2,** *Reserve Acquisition Strategy* ● **CM1 L-3,** *Connectivity and Conservation within the Region* ● **CM1 L-4,** *Connectivity within the Plan Area* ● **CM1 L-5,** *Protection of Uplands Surrounding Wetlands*	● Track acres acquired, land-cover types and habitat constituents (7.3.2) ● Assess connectivity (7.3.3)
Goal L-2. Reserve System connectivity to sustain the effective movement and genetic interchange of organisms between natural communities in a manner that maintains the ecological integrity of the natural communities within the Plan Area.		
Objective L-2.1. *Protect Habitat Linkages.* Protect habitat linkages that allow native and Covered Species to move between protected natural communities within and adjacent to the Plan Area.	**CM1,** *Establish Reserve System* ● **CM1 L-3,** *Connectivity and Conservation within the Region* ● **CM1 L-4,** *Connectivity within the Plan Area*	● Assess corridors (7.3.3) ● Track acquisition of corridor lands (7.3.3)
Objective L-2.2. *Maintain and Enhance Reserve System Permeability.* Maintain and enhance permeability within the Reserve System to provide for wildlife movement, by not adding barriers and by removing or modifying existing barriers in the Reserve System.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 L-3,** *Maintenance and Enhancement of Reserve System Permeability* ● **CM2 RAR-1,** *Removal and/or Modification of Barriers to Fish Passage*	● Track permeability factors (7.3.3) ● Report number of barrier removals or modifications (7.4.3)

[21] These conservation measures are detailed in Section 5.3, *Conservation Measures.*

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective L-2.3. *Establish East–West Corridors.* Establish corridors for east-west movement by Covered Species and other native species along the Stream System[22] by protecting and restoring interconnected riverine and riparian complex natural communities.	**CM1,** *Establish Reserve System* ● **CM1 L-3**, *Connectivity and Conservation within the Region* ● **CM1 L-4,** *Connectivity within the Plan Area*	● Assess corridors (7.3.3) ● Track acquisition of corridor lands (7.3.3)
Objective L-2.4: *Conserve North–South Connectivity.* Protect and restore north-south connectivity in the Valley RAA through an interconnected network of vernal pool complex, grassland, rice land, and, to a lesser extent, agricultural reserves extending from the border of the Plan Area A with Sutter County, east and north to the border of Yuba and Nevada County[23].	**CM1,** *Establish Reserve System* ● **CM1 L-4,** *Connectivity within the Plan Area*	● Assess corridors (7.3.3) ● Track acquisition of corridor lands (7.3.3)
Objective L-2.5. *Conserve Upland Natural Communities Surrounding Aquatic/Wetlands Complex Natural Communities.* Protect upland natural communities surrounding wetlands and ponds to provide the life history requirements for native amphibians and Covered Species with both aquatic and upland habitat requirements.	**CM1,** *Establish Reserve System* ● **CM1 L-4,** *Connectivity within the Plan Area*	● Track acres of upland communities protected (7.3.2) ● Monitor presence of native amphibians and Covered Species (7.4.3)
Goal L-3: Ecological processes and conditions that sustain and reestablish natural communities and native species.		
Objective L-3.1: *Implement Low Impact Development Standards.* Implement LIDS for Covered Activities in the Plan Area.	**CM4,** *Plan Area-wide Actions* ● **CM4 L-1,** *Low-impact Development Standards*	● Track completion of standards for low-impact development (7.2.1.1)

[22] The term *Stream System* is defined for the purposes of this Plan as an area along a stream extending to the greater of (1) the outer boundary of the Federal Emergency Management Agency 100-year floodplain, (2) a variable-width buffer distance from the stream centerline ranging from 50 to 600 feet (specified in Table 3-4), or (3) the limit of riparian vegetation.

[23] Lands will be protected and restored consistent with the "Essential Connectivity Area" identified by the California Essential Habitat Connectivity Project (Spencer et al. 2010).

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective L-3.2: *Reduce Invasive Non-native Species and Increase Native Species.* Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of non-native plants and animals.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 *L-1*,** *Vegetation Management and Invasive Plant Control* ● **CM2 VPCG-1,** *Vernal Pool Complex and Grassland Vegetation Management* ● **CM2 AW-1,** *Aquatic/Wetlands Complex Vegetation Control* ● **CM2 AW-4,** *Non-native Predator Control* ● **CM2 RAR-1,** *Riparian Vegetation Management* ● **CM2 RAR-5,** *Non-native Animal Species Control* ● **CM2 OW-1,** *Oak Woodland Vegetation Enhancement ad Management* ● **CM2 OW-2,** *Control of Invasive Animals that Limit Oak Regeneration*	● Track implementation and effectiveness of non-native species control programs relative to success criteria (7.3.5)
Objective L-3.3. *Manage Fire.* Manage fire as a natural process of the ecosystem to enhance and/or restore natural communities, while protecting natural communities from adverse effects of fire.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 L-3,** *Development and Implementation of Fire Management Plans*	● Track completion of fire management plans (7.3.2) ● Track post-fire response of target natural communities (7.3.2)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Natural Community–level Goals and Objectives		
Vernal Pool Complex and Grassland Natural Community		
Goal VPCG-1: Interconnected vernal pool complex and grassland natural communities with functional ecological processes that sustain native species.		
Objective VPCG-1.1. *Protect Existing Vernal Pool Complexes.* Protect 17,000 acres of existing vernal pool complex, including 790 wetted acres of vernal pool constituent habitat[24] to build a vernal pool Reserve System in large, contiguous blocks based on reserve units (minimum size of 200 acres unless agreed to by the Wildlife Agencies), primarily in the Valley RAA, and provide for the conservation of the covered vernal pool branchiopods in the Plan Area.	**CM1,** *Establish Reserve System* ● **CM1 VPCG-1,** *Vernal Pool Protection*	● Report number of acres protected each year and map locations with a geographic information system (GIS). ● Establish occupancy rate during years 1 through 5. ● Cross check occupancy in subsequent years per guidelines in Chapter 7, *Monitoring and Adaptive Management Program*.

[24] Vernal pool constituent habitat includes delineated vernal pools, seasonal wetlands, and seasonal swales when seasonal wetlands and seasonal swales are a component of vernal pool complex.

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective VPCG-1.2. *Restore/Create Vernal Pool Complexes.* In addition to the protection of 17,000 acres of existing vernal pool complex, restore/ create 3,000 acres of vernal pool complex in the Reserve System by Year 35, independent of effects. Within the 20,000 acres of protected and restored/created vernal pool complex, restore/create vernal pool constituent habitats to provide habitat for covered vernal pool branchiopods. At least 30 wetted acres of vernal pools will be restored/created independent of effects. Assuming all effects occur, an additional 870 acres of vernal pool constituent habitat will be restored as mitigation. If the proposed maximum allowable effect occurs, restoration totals will be 900 acres of vernal pool constituent habitat, of which a minimum of 326 acres would be delineated as vernal pool wetlands. At least 34 percent of all effects on vernal pool constituent habitat will be mitigated as vernal pool wetlands (up to 290 acres). The proportion of vernal pool wetlands to seasonal wetlands that will be restored/created will be equal to or greater than the proportion lost as a result of Covered Activities.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 VPCG-2,** *Reserve Design for Vernal Pool Restoration/Creation* **CM3,** *Restore or Create Natural Communities and Covered Species' Habitat* ● **CM3 VPCG-1,** *Vernal Pool Complex Restoration/creation*	● Report number of acres of vernal pools restored and created annually (7.4.3) ● Measure effectiveness of restoration/creation against success criteria established for the site (7.4.3)
Objective VPCG-1.3. *Protect Grasslands.* Protect 2,740 acres of grassland natural community (i.e., non-vernal pool complex grassland), including 350 acres in the Valley RAA and 2,390 acres in the Foothills RAA.	**CM1,** *Establish Reserve System* ● **CM1 VPCG-3,** *Grassland Protection*	● Report acres and location of grassland natural community acquired (7.4.3)
Objective VPCG-1.4. *Restore Grasslands.* In addition to the protection of 2,740 acres of existing grassland natural community, restore 1,000 acres of grassland in the Reserve System in the Valley, independent of effects.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* **CM3,** *Restore or Create Natural Communities and Covered Species' Habitat* ● **CM3 VPCG-2,** *Grasslands Restoration*	● Report acres and location of grassland restored (7.4.3) ● Measure effectiveness of restoration or creation against success criteria established for the site (7.4.3)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Goal VPCG-2. Vernal pool complex and grassland communities managed and enhanced to promote regeneration and recruitment of Covered Species and support native biodiversity.		
Objective VPCG 2.1. *Enhance Vernal Pool Vegetation and Hydrology.* Enhance the vegetation and hydrology of degraded vernal pools and seasonal wetlands in the Reserve System to a self-sustaining natural hydroperiod (timing, frequency, and duration of inundation), and to sustain the vernal pool complex natural community, including associated covered vernal pool species.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 L-1,** *Vegetation Management and Invasive Plant Control* ● **CM2 VPCG-1,** *Vernal Pool Complex and Grassland Vegetation Management* ● **CM2 VPCG-2,** *Vernal Pool Complex Enhancement of Hydrologic Conditions*	● Report all measures taken to enhance vegetation and hydrology of degraded vernal pools and seasonal wetlands in the Reserve System (7.4.3) ● Measure effectiveness of enhancement activities against success criteria (7.4.3)
Objective VPCG 2.2. *Increase Ground Squirrel Population.* Within protected and restored vernal pool complex and grassland communities, increase the population of ground squirrels to enhance prey populations and habitat value for wildlife species.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 VPCG-3,** *Ground Squirrel Population Enhancement*	● Document efforts to increase ground squirrel populations in the Reserve System (7.4.3) ● Document ground squirrels population trend in the Reserve System (7.4.3)
Aquatic/Wetlands Complex Natural Communities		
Goal AW-1. A Reserve System sustaining functional fresh emergent marshes, seasonal wetlands,[25] and lacustrine habitats (e.g., ponds), and the hydrologic processes that support them to benefit Covered Species and promote native biodiversity.		
Objective AW-1.1. *Protect Aquatic/Wetland Complex Natural Community.* Protect 600 acres of aquatic/wetlands complex natural community (400 acres in the Valley and 200 acres in the Foothills). The 600 acres of aquatic/wetlands complex will include at least 586 acres of wetlands (e.g., fresh emergent marsh, lacustrine, non-vernal pool seasonal wetland), of which at least 256 acres will be fresh emergent marsh.	**CM1,** *Establish Reserve System* ● **CM1 AW-1,** *Aquatic/Wetlands Complex Protection*	● Report acreage, location, and wetland type of acquired aquatic/wetlands complex natural community (7.4.3)

[25] The wetland and pond natural community includes seasonal wetlands that are not components of vernal pool complexes. Seasonal wetlands that are associated with vernal pool complexes are included within the Vernal Pool Complex and Grassland natural community.

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective AW-1.2. *Restore/Create Aquatic/Wetland Complex Natural Community.* In addition to the protection of 600 acres of existing aquatic/wetland complex, restore and create aquatic/wetland natural community by restoring fresh emergent marsh, lacustrine, and non-vernal pool seasonal wetland constituent wetlands. At least 20 acres of fresh emergent marsh will be restored independent of effects. Additional restoration/creation will occur dependent on effect at a 1.5:1 ratio of restored/ created to affected aquatic/wetland types. In the Valley, at least 40 percent of the restoration dependent on effects will be fresh emergent marsh. In the Foothills, at least and 50 percent of the restoration dependent on effects will be fresh emergent marsh. The remaining 10 percent may occur in the Valley or the Foothills. Restoration dependent on effect may result in an additional 390 acres of aquatic/wetland type wetlands restored/ created as mitigation. If the proposed maximum allowable effect on aquatic/wetland complex occurs, independent and dependent restoration will total 410 wetted acres of aquatic/wetland complex community of which a minimum of 196 acres would be delineated as fresh emergent marsh.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* **CM3,** *Restore and Create Natural Communities and Covered Species' Habitat* ● **CM3 AW-1,** *Aquatic/Wetlands Complex Restoration/Creation*	● Report acres, location, and wetland type of fresh emergent marsh, lacustrine, and non-vernal pool seasonal wetland constituent wetlands grassland restored (7.4.3) ● Measure effectiveness of restoration against success criteria established for each wetland type (7.4.3)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective AW-1.3. *Maintain and Enhance Wetlands and Ponds.* Maintain and enhance hydrological functions, native biodiversity, and habitats for populations of Covered Species in all protected aquatic/wetland complexes within the Reserve System.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 AW-1,** *Aquatic/Wetlands Complex Vegetation Control* ● **CM2 AW-2,** *Fencing Wetlands and Ponds* ● ***CM2* AW-3,** *Sediment Removal* ● **CM2 AW-4,** *Non-native Predator Control* ● **CM2 AW-5,** *Basking Habitat Enhancement* ● **CM2 AW-6,** *Provision of Vegetative Cover* ● **CM2 AW-7,** *Maintenance of Water Depths and Hydrological Cycles* ● **CM2 AW-8,** *Maintenance and Enhancement of Water Quality*	● Report all measures taken to enhance hydrological functions, native biodiversity, and habitats for populations of Covered Species in protected fresh emergent marsh aquatic and wetland land-cover types within the Reserve System (7.4.3) ● Measure effectiveness of enhancement activities against success criteria for each wetland type (7.4.3)
Riverine and Riparian Complex Natural Communities		
Goal RAR 1. Functional riverine and riparian communities that benefit Covered Species and promote native biodiversity in the Plan Area.		
Objective RAR-1.1. *Protect Riverine/Riparian Complex.* Protect 2,200 acres of riverine/riparian natural community, which will include at least 1,410 acres of riparian constituent habitat (960 acres in the Valley and 451 acres in the Foothills). This portion of the Reserve System will include 88.6 linear miles of streams (riverine).	**CM1,** *Establish Reserve System* ● **CM1 RAR-1,** *Riverine and Riparian Protection*	● Report acreage and location of riverine/riparian complex acquired (7.4.3)
Objective RAR-1.2. *Protect Riverine Constituent Habitat.* Protect at least 88.6 linear stream miles of riverine within the riverine/riparian complex natural community.	**CM1,** *Establish Reserve System* ● **CM1 RAR-1,** *Riverine and Riparian Protection*	● Report linear stream miles and location of riverine constituent habitat acquired (7.4.3)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective RAR-1.3. *Restore Riverine/Riparian Complex.* A minimum of 32 acres of riparian constituent habitat will be restored, independent of effects. In addition, impacts on riverine/riparian constituent habitat and the Stream System will be mitigated by restoration of riverine and riparian constituent habitat at ratio of 1.52:1. If the proposed maximum allowable effects on riverine/riparian complex and the Stream System occur (490 acres and 426 acres, respectively, for a total estimated effect of 916 acres), up to an additional 1,425 acres of riverine/riparian complex will be restored. Of the 1,425 acres of riverine and riparian constituent habitat restoration, 1,250 acres must be restored as riparian constituent habitat. Also see Table 5-4. Effects on salmonid habitat (i.e., spawning or migrating) will be mitigated in kind. Other natural communities interspersed within riverine/riparian complex may be restored as part of riverine/ riparian upland complex (e.g., valley oak woodland, fresh emergent wetlands).	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 RAR-2,** *Reserve Design for Riparian Vegetation Restoration* **CM3,** *Restore and Create Natural Communities and Covered Species' Habitat* ● **CM3 RAR-1,** *Riparian Natural Community Restoration*	● Report acres and location of riverine/riparian complex acquired and restored (7.4.3) ● Compare number of restored acres to number of affected acres (7.4.3) ● Measure effectiveness of restoration and creation against success criteria established for riparian community (7.4.3)
Objective RAR-1.4. *Enhance Riparian Vegetation***.** Enhance the cover, structural diversity, and native species diversity of the riparian constituent habitat in the Reserve System.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 RAR-1,** *Riparian Vegetation Management*	● Measure effectiveness of enhancement activities against success criteria for riparian vegetation (7.4.3)
Objective RAR-1.5. *Remove or Modify Fish Barriers.* Initiate partnerships with managing agencies and remove or modify two high-priority fish passage barriers, including the barrier at Doty Ravine at Garden Bar Road and one other barrier identified in Table 3-5. When partnerships allow, remove or modify up to three more of the fish passage barriers identified in Table 3-5.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2-RAR-2,** *Removal and/or Modification of Barriers to Fish Passage*	● Track number of fish barriers removed (7.4.3)
Objective RAR-1.6. *Modify Unscreened Water Diversions.* Screen, consolidate, relocate, remove, or otherwise modify all unscreened water diversions on salmonid streams in the Reserve System.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 RAR-3,** *Modify Unscreened Water Diversions*	● Track number of unscreened water diversions that have been modified (7.4.3) ● Check condition of screens (7.4.3)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective RAR-1.7. *Enhance Streams.* Enhance stream reaches within the Plan Area to promote habitat complexity and function (e.g., diversity of instream habitat, shaded riverine habitat, floodplain inundation). The PCA will improve in-channel features of Plan Area streams sufficient to meet a 1.5:1 ratio of enhanced to affected. In-channel enhancement measures will be located in the same watershed and salmonid habitat type (e.g., spawning, migrating, if the effects occur in a salmonid stream) in which the effects occur. The enhancement measures may be implemented in streams on the Reserve System and elsewhere within Plan Area A, Plan Area B3, *Raccoon Creek Floodplain Conservation*, and Plan Area B4, *Fish Passage Channel Improvement* (see Figure 5-4 for Plan Area B locations).	**CM2,** *Manage and Enhance the Reserve System* ● **CM2-RAR-2,** *Removal and/or Modification of Barriers to Fish Passage* ● **CM2 RAR-4,** *Improvement of In-channel Features* ● **CM2 RAR-5,** *Non-native Animal Species Control*	● Track number of fish barriers removed (7.4.3) ● Track response of covered fish to barrier removal (7.5.9) ● Track in-channel enhancements and measure results against success criteria (7.5.9 and 7.4.3) ● Track effectiveness of non-native animal control against success criteria (7.4.3)
Oak Woodland Natural Communities		
Goal OW-1. Functional oak woodland communities, including the oak woodland community and valley oak woodland community[26] that benefit Covered Species and promote native biodiversity.		
Objective OW-1.1. *Protect Oak Woodlands.* Protect 10,110 acres of a diversity of oak woodland land-cover types (e.g., mixed-oak woodland, blue oak woodland, interior live oak woodland).	**CM1,** *Establish Reserve System* ● **CM1 OW-1,** *Oak Woodlands Protection*	● Track acres and types of oak woodland protected (7.4.3)
Objective OW-1.2. *Restore Oak Woodlands*. In addition to the protection of 10,110 acres of oak woodlands, restore 100 acres of foothill oak woodlands, independent of effects.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 OW-2,** *Reserve Design for Oak Woodlands Restoration* **CM3,** *Restore and Create Natural Communities and Covered Species' Habitat* ● **CM3 OW-1,** *Oak Woodland Restoration*	● Report acres of foothill oak woodland restored (7.4.3) ● Measure effectiveness of oak woodland restoration and creation against success criteria (7.4.3)

[26] The oak woodland community includes the diversity of oak woodland land-cover types (i.e., blue oak woodland, interior live oak woodland, mixed oak woodland, oak-foothill pine woodland, and oak savanna) that occur primarily in the Foothills. A small amount of oak woodland extends into the upper elevations of the Valley portion of the Plan Area. Valley oak woodlands are stands dominated by valley oaks with a canopy cover greater than 30 percent.

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective OW-1.3. *Maintain and Enhance Oak Woodlands*. Maintain and enhance all oak woodlands within the Reserve System by promoting regeneration and recruitment of representative species and managing vegetation and invasive plants.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 L-1,** *Vegetation Management and Invasive Plant Control* ● **CM2 OW-1,** *Oak Woodland Vegetation Enhancement and Management* ● **CM2 OW-2,** *Control of Invasive Animals that Limit Oak Regeneration*	● Measure effectiveness of oak woodland enhancement and management against success criteria (7.4.3) ● Document efforts to reduce invasive animals that limit oak regeneration (7.4.3)
Objective OW-1.4. *Protect Valley Oak Woodlands.* Protect 190 acres of valley oak woodland (an estimated 100 acres in the Foothills and 90 acres in the Valley).	**CM1,** *Establish Reserve System* ● **CM1 OW-1,** *Oak Woodlands Protection*	● Track acquisition of valley oak woodlands (7.4.3)
Objective OW-1.5. *Restore Valley Oak Woodlands.* In addition to the protection of 190 acres of valley oak woodland, restore 225 acres of valley oak woodlands independent of effect. Additional restoration will occur dependent on effects in the Valley only at a 1.5:1 ratio of restored to affected valley oak woodland (the mitigation ratio does not apply to loss of valley oak woodland in the Foothills). If the proposed maximum allowable effects on valley oak woodland occur (40 acres), an additional 60 acres of oak woodland would be restored, for a maximum total restoration of 285 acres.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 OW-2,** *Reserve Design for Oak Woodlands Restoration* **CM3,** *Restore and Create Natural Communities and Covered Species' Habitat* ● **CM3 OW-1,** *Oak Woodland Restoration*	● Report acres of valley oak woodland restored (7.4.3) ● Measure effectiveness of oak woodland restoration and creation against success criteria (7.4.3)
Agriculture and Other Open Space		
Goal AO-1. A Reserve System with open space that precludes development, enhances Reserve System connectivity, and provides opportunities for protecting, restoring, and managing habitat for Covered Species and other native species.		
Objective AO-1.1. *Protect Agricultural Lands and Other Open Space.* Protect at least 8,240 acres of agricultural lands or natural communities in the Valley, including patches of natural vegetation such as trees and shrubs that may be used by Covered Species, and provide large, contiguous blocks of open space between protected natural communities, agricultural land, and urban/suburban land uses in the Reserve System.	**CM1,** *Establish Reserve System* ● **CM1 AO-1,** *Agricultural Lands and Other Open Space Protection* **CM2,** *Manage and Enhance the Reserve System* ● **CM2 AO-4,** *Other Management and Enhancement Opportunities*	● Track acquisition of agricultural lands and document presence of patches of natural vegetation (7.4.3)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Species-level Biological Goals and Objectives		
Swainson's Hawk		
Goal SWHA-1. Habitat to provide for a sustained population of Swainson's hawks in the Plan Area.		
Objective SWHA-1.1. *Protect Swainson's Hawk Nest Trees.* Protect at least four active Swainson's hawk nest trees (i.e., nesting within the last 5 years) in the Reserve System. The protected nest trees must be a minimum of 1 mile from each other, or a qualified biologist must otherwise demonstrate that each protected nest tree corresponds to a separate pair of Swainson's hawks rather than multiple nests within a single territory.	**CM1,** *Establish Reserve System* ● **CM1 SWHA-1,** *Protection of Swainson's Hawk Habitat*	● Report acquisition of Swainson's hawk nest trees, including verification of breeding (7.5.1) ● Document occurrences of breeding Swainson's hawk in the Reserve System (7.5.1)
Objective SWHA-1.2. *Protect Swainson's Hawk Foraging Habitat***.** Protect 741 acres of modeled foraging habitat surrounding each protected nest tree for a total of 2,964 acres of suitable Swainson's hawk foraging habitat in the Reserve System.	**CM1,** *Establish Reserve System* ● **CM1 SWHA-1,** *Protection of Swainson's Hawk Habitat*	● Report acquisition of Swainson's hawk habitat (7.5.1)
Objective SWHA-1.3. *Enhance Foraging Habitat***.** Maintain or increase prey availability and improve foraging habitat by strategically planting shrubs or placing debris piles or other substrate that provides cover and refugia for fossorial mammals and other prey species, on at least four sites, each within a mile of one of the four protected nest trees.	**CM2,** *Manage and Enhance the Reserve System* ● **CM2 SWHA-1**, *Swainson's hawk foraging habitat enhancement.*	● Report plantings and placement of shrubs or debris piles in the Reserve System (7.5.1)
Objective SWHA-1.4. *Protect Isolated Trees.* Protect at least 20 isolated trees with the potential to be used as nesting sites for Swainson's hawk, within the protected grasslands.	**CM1,** *Establish Reserve System* ● **CM1 SWHA-1,** *Protection of Swainson's Hawk Habitat*	● Report protection of at least 20 isolated trees within foraging habitat in the Reserve System (7.5.1)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
California Black Rail		
Goal BLRA-1. A sustained population of California black rail within the Plan Area.		
Objective BLRA-1.1. *Protect, Restore/Create, and Manage and Enhance California Black Rail Habitat.* Within the protected and restored/created aquatic/ wetlands complex (AW-1.1 and AW-1.2), include at least 10 fresh emergent marsh sites that provide suitable habitat for supporting California black rail. At least 5 of the 10 fresh emergent marshes must be existing marsh sites. Up to 5 of the 10 sites may be restored/created marshes that will be managed. Each wetland will be at least 2 acres in size, and occupancy must be demonstrated in at least five of the wetlands by Year 45 of the proposed permit term.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 SWHA-1,** *Siting Protection and Restoration of California Black Rail Habitat* **CM2,** *Manage and Enhance the Reserve System* ● **CM2 BLRA-1,** *Maintenance and Enhancement of the Hydrology of California Black Rail Habitat* ● **CM2 BLRA-2,** *Protection of California Black Rail Habitat from Grazing and Other Vegetation Management Activities* **CM3,** *Restore and Create Natural Communities and Covered Species' Habitat* ● **CM3 BLRA-1,** *California Black Rail Habitat Restoration/creation*	● Report (acres and number of sites) acquisition of emergent marshes, including occupancy during the breeding season (7.5.2) ● Document presence of California black rail in the Reserve System (7.5.2) ● Document species response to restoration and creation of habitat (7.5.2) ● Monitor threats to California black rail (7.5.2)
Western Burrowing Owl		
Goal BUOW-1. Sufficient habitat to maintain or increase the population size of overwintering western burrowing owls within the Reserve System, and to promote the expansion of a breeding population of burrowing owls onto the Reserve System.		
Objective BUOW-1.1. *Protect and Manage Ground Squirrel Colonies.* Protect and manage at least three ground squirrel colonies on three separate sites, within protected grasslands providing suitable habitat for western burrowing owl. Protect one ground squirrel colony by Year 15 and at least two more by Year 30. If this cannot be accomplished due to a lack of existing ground squirrel colonies, substitute each ground squirrel colony with at least five artificial burrows in suitable western burrowing owl habitat.	**CM1,** *Establish Reserve System* ● **CM1 BUOW-1,** *Protection of Ground Squirrel Colonies* ● **CM2 BUOW-2,** *Prioritization of Occupied Areas* **CM2,** *Manage and Enhance the Reserve System* ● **CM2 BUOW-1.1,** *Installation and Maintenance of Artificial Burrows on the Reserve System*	● Report installation and placement of artificial burrows in the Reserve System (7.5.3) ● Document species response to creation of burrows (7.5.3) ● Monitor artificial burrows (7.5.3)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Tricolored Blackbird		
Goal TRBL-1. Habitat for a sustained population of tricolored blackbird in the Plan Area.		
Objective TRBL-1.1. *Protect, Manage, and Enhance Tricolored Blackbird Nesting Habitat.* Of the protected wetland and aquatic natural community (Objective AW-1.1), protect, manage, and enhance 187 acres of modeled tricolored blackbird nesting habitat in the Valley Reserve System.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 TRBL-1,** *Reserve Design for Tricolored Blackbird* **CM2,** *Manage and Enhance the Reserve System* ● **CM2 TRBL-1,** *Maintenance and Enhancement of Suitable Nesting Habitat for Tricolored Blackbird* ● **CM2 TRBL-2,** *Protection of Himalayan Blackberry Supporting Tricolored Blackbird Nest Colonies* ● **CM2 TRBL-3,** *Predator Management Plan*	● Report (acres and location) acquisition of fresh emergent wetland, including presence of tricolored blackbirds, nesting individuals, and Himalayan blackberry (7.5.4) ● Document maintenance and enhancement activities for tricolored blackbird nesting habitat over the permit term (7.5.4) ● Document response of tricolored blackbirds to enhancement actions in the Reserve System during the nesting season (7.5.4) ● Monitor threats to tricolored blackbird nesting colonies, such as the presence of black-crowned night herons (7.5.4) ● Submit predator management plan and update on an annual basis, as needed (7.5.4)
Objective TRBL-1.2. *Protect, Restore, Manage, and Enhance Tricolored Blackbird Foraging Habitat.* Within the protected vernal pool grassland natural community (Objective VPCG-1.1), protected grassland natural community (Objective VPCG-1.2), restored vernal pool complex (Objective VPCG-1.2), and restored grassland (Objective VPCG-1.5), protect, restore, manage, and enhance at least 22,138 acres of foraging habitat for tricolored blackbird adjacent to (and no farther than 3 miles from) protected and restored nesting habitat on the Reserve System. Protection to meet this objective will be prioritized where tricolored blackbird are known to forage most.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 TRBL-1,** *Reserve Design* for *Tricolored Blackbird*	● Report (acres and distance from suitable nesting habitat) acquisition of foraging habitat for tricolored blackbirds (7.5.4) ● Document restoration activities for tricolored blackbird foraging habitat over the permit term (7.5.4) ● Document response of tricolored blackbirds to foraging enhancement actions in the Reserve System (7.5.4)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective TRBL-1.3. *Protect Tricolored Blackbird Colony Sites.* Protect at least two tricolored blackbird colony breeding sites by Year 15 and another three tricolored blackbird colony sites by Year 40 (for a total of at least five). All five protected breeding colony sites must support a minimum of 1,500 individuals in at least one season during the permit term. Protection of these sites will contribute to the commitment to protect, manage, and enhance tricolored blackbird habitat, Objective TRBL-1.1. The PCA will prioritize acquisition sites recently used by large colonies (which can vary over time), including wetlands in Yankee Slough, which supports a large tricolored blackbird colony but is only partially protected.	**CM1,** *Establish Reserve System* ● **CM1 TRBL-1,** *Reserve Design for Tricolored Blackbird*	● Report (number and location) acquisition of tricolored blackbird colony sites (7.5.4)
Objective TRBL-1.4. *Protect, Restore, Manage, and Enhance Tricolored Blackbird Foraging Habitat near Colony Sites.* Of the 22,138 acres of foraging habitat protected or restored for Objective TRBL-1.2, at least 200 acres of foraging habitat must be adjacent to (and no farther than 3 miles from) each nest colony site protected on the Reserve System.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 TRBL-2,** *Reserve Design for Tricolored Blackbird*	● Report (acres and distance from nest colony sites) acquisition of foraging habitat for tricolored blackbirds near acquired colony sites (7.5.4) ● Document restoration activities for tricolored blackbird foraging habitat over the permit term (7.5.4) ● Document response of tricolored blackbirds to foraging enhancement actions in the Reserve System (7.5.4)
Objective TRBL-1.5. *Protect and/or Restore/Create Open Water near Tricolored Blackbird Colony Sites.* Protect and/or restore/create open accessible water within 1,640 feet of each nest colony site protected on the Reserve System.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 TRBL-4,** *Reserve Design for Tricolored Blackbird*	● Report (acres and distance from nest colony site) acquisition or creation of open water for tricolored blackbirds (7.5.4)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective TRBL-1.6. *Restore Tricolored Blackbird Nesting Habitat.* Within the fresh emergent wetlands to be restored for Objective AW-1.2, the PCA will restore/create 87 acres of aquatic/wetland complex that provides modeled nesting habitat for tricolored blackbird (i.e., some of the aquatic/ wetlands to be restored for Objective AW-1.2 will occur in the Foothills, outside of the nesting range of tricolored blackbird). Of the 87 acres, restore and/ or create at least five fresh emergent wetlands that provide suitable nesting habitat for tricolored blackbird. These wetlands will be at least 2 acres in size, within 1,640 feet of open water, and will have at least 200 acres of suitable foraging habitat adjacent to nesting habitat that is protected. Expanding an existing fresh emergent wetland may count toward achieving this objective if at least 2 acres are restored/created adjacent to an existing wetland.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM1 TRBL-1,** *Reserve Design for Tricolored Blackbird* **CM3,** *Restore and Create Natural Communities and Covered Species' Habitat* ● **CM3 TRBL-1,** *Tricolored Blackbird Habitat Restoration*	● Report (acres and distance from open water and suitable foraging habitat) restoration of fresh emergent wetland nesting habitat for tricolored blackbirds. (7.5.4) ● Document response of tricolored blackbirds to foraging enhancement actions in the Reserve System (7.5.4)
Giant Garter Snake		
Goal GGS-1. Protected suitable giant garter snake habitat to facilitate the expansion of giant garter snake into the Reserve System.		
Objective GGS-1.1. *Protect and Manage Giant Garter Snake Habitat.* Of the 8,240 acres of protected agricultural lands (Objective AG-1.1), protect and manage at least 2,000 acres of rice annually including securing the necessary perennial water supply to support giant garter snake in the western portion of the Valley RAA to provide habitat for giant garter snake. Where fresh emergent marsh is acquired in lieu of rice, sufficient perennial water supply must be maintained to support giant garter snake.	**CM1,** *Establish Reserve System* ● **CM1 AO-1,** *Agricultural Land and Other Open Space Protection* ● **CM1 GGS-1,** *Giant Garter Snake Habitat Protection* **CM2,** *Manage and Enhance the Reserve System* ● **CM2 AO-1,** *Provision of Patches of Native Vegetation in Rice Lands* ● **CM2 AO-2,** *Development and Implementation of a Water Management Plan* ● **CM2 AO-3,** *Implementation of Integrated Pest Management*	● Document occurrences of giant garter snake in identified suitable habitat (7.5.5) ● Report (acres and location) acquisition of rice or fresh emergent wetland for giant garter snake (7.5.5) ● Report (acres and location) of patches of native vegetation in rice lands in the Reserve System (7.5.5) ● Monitor threats to giant garter snake, such as the presence of domestic cats (7.5.5) ● Submit Water Management Plan and update on an annual basis, as needed (7.5.5)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Western Pond Turtle		
Goal WPT-1. Habitat for a sustained population of western pond turtle within the Reserve System.		
Objective WPT-1.1. *Protect and Enhance Western Pond Turtle Habitat.* Within the natural communities protected, include at least 2,800 acres of aquatic and 3,859 acres of upland habitat for western pond turtle. Enhance the protected habitat to provide specific habitat requirements for western pond turtle.	**CM1,** *Establish Reserve System* ● **CM1 WPT-1,** *Western Pond Turtle Habitat Protection* **CM2,** *Manage and Enhance the Reserve System* ● **CM2 WPT-1,** *Western Pond Turtle Habitat Enhancement*	● Report (acres and location) acquisition of aquatic and upland habitat for western pond turtle (7.5.6) ● Document presence of western pond turtle in the Reserve System (7.5.6) ● Monitor threats to western pond turtle (7.5.6)
Objective WPT-1.2. *Restore Western Pond Turtle Habitat*. Within the natural communities restored, include at least 1,850 acres of aquatic habitat and 1,930 acres of upland habitat for western pond turtle. Sites chosen for restoration of aquatic habitat for western pond turtle will be adjacent to suitable upland nesting habitat.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* ● **CM3 AW-1,** *Aquatic/Wetlands Complex Restoration/creation*	● Report (acres and location) restoration of aquatic and upland habitat for western pond turtle (7.5.6) ● Document presence of western pond turtle in the Reserve System (7.5.6)
Foothill Yellow-legged Frog		
Goal FYLF-1. Habitat to facilitate the expansion of foothill yellow-legged frog into the Plan Area.		
Objective FYLF-1.1. *Protect Foothill Yellow-legged Frog Riverine Habitat.* Within the 88.6 miles of streams to be protected for Objective RAR-1.2, protect 6 miles of streams in the Foothills that provide habitat for foothill yellow-legged frog.	**CM1,** *Establish Reserve System* ● **CM1 FYLF-1,** *Foothill Yellow-legged Frog Habitat Protection*	● Report (miles of stream and location) acquisition of habitat for foothill yellow-legged frogs (7.5.7) ● Document presence of foothill yellow-legged frogs in the Reserve System (7.5.7)
Objective FYLF-1.2. *Protect Foothill Yellow-legged Frog Riparian Habitat*. Within the 450 acres of the riparian vegetation to be protected in the Foothills for Objective RAR-1.1, protect 83 acres of riparian vegetation in the Foothills that provides foraging and movement habitat for foothill yellow-legged frog.	**CM1,** *Establish Reserve System* ● **CM1 FYLF-1,** *Foothill Yellow-legged Frog Habitat Protection*	● Report (acres and location) acquisition of foraging and movement habitat for foothill yellow-legged frogs (7.5.7) ● Document presence of foothill yellow-legged frogs in the Reserve System (7.5.7) ● Monitor threats to foothill yellow-legged frogs (7.5.7)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Objective FYLF-1.3. *Restore Riparian Habitat for Foothill Yellow-legged Frog.* Within the restored riparian natural community (Objective RAR-1.3, *Restore Riverine/Riparian Complex*), restore at least 83 acres adjacent to stream habitat suitable for supporting foothill yellow-legged frog, and include open areas suitable for supporting the species.	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration* **CM3,** *Restore and Create Natural Communities and Covered Species' Habitat* ● **CM3 RAR-1,** *Riparian Natural Community Restoration*	● Report (acres and location) restoration of riparian habitat adjacent to streams for foothill yellow-legged frogs (7.5.7) ● Document response of yellow-legged frogs to riparian restoration and creation in the Reserve System (7.5.7) ● Monitor threats to foothill yellow-legged frogs (7.5.7)
California Red-legged Frog		
Goal CRLF-1. Protected, occupied California red-legged frog habitat in the Plan Area.		
Objective CRLF-1.1. *Protect Occupied California Red-legged Frog Habitat.* Protect at least 2 acres of occupied California red-legged frog habitat in the Plan Area B by Year 2, and an additional 2 acres by Year 5.	**CM1,** *Establish Reserve System* ● **CM1 CRLF-1,** *Purchase of California Red-legged Frog Conservation Credits at the Big Gun Conservation Bank*	● Report (acres and location) acquisition of occupied California red-legged frog habitat (7.5.8) ● Document presence of California red-legged frog in acquired habitat (7.5.8) ● Monitor threats to California red-legged frog (7.5.8)
Goal CRLF-2. Protected and restored, suitable California red-legged frog habitat in the Plan Area.		
Objective CRLF-2.1. *Protect Suitable California Red-legged Frog Habitat.* In addition to Objective CRLF-1.1, and within the natural communities protected in Objective AW-1.1 and Objective RAR-1.1, protect 1,168 acres of aquatic and 12,484 acres of upland habitat for California red-legged frog in the Foothills.	**CM1,** *Establish Reserve System* ● **CM1 CRLF-2,** California *Red-legged Frog Habitat Protection*	● Report (acres and location) acquisition of aquatic and upland habitat for California red-legged frogs (7.5.8) ● Document presence of California red-legged frog in acquired habitat (7.5.8) ● Monitor threats to California red-legged frog (7.5.8)
Objective CRLF-2.2. *Restore Suitable California Red-legged Frog Habitat.* Of the natural communities restored and created in Objective AW-1.2 and Objective RAR-1.3, restore and create 1,241 acres of aquatic and 160 acres of upland California red-legged frog habitat in the Reserve System in the Foothills RAA within a matrix of suitable upland habitat (e.g., oak woodland and grassland).	**CM1,** *Establish Reserve System* ● **CM1 NC-1,** *Siting Restoration*	● Report (acres and location) restoration and creation of aquatic and upland habitat for California red-legged frog (7.5.8) ● Document presence of California red-legged frog in the Reserve System (7.5.8) ● Monitor threats to California red-legged frog (7.5.8)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
FISH (Central Valley Steelhead, Distinct Population Segment and Central Valley Fall-/Late Fall-Run Chinook Salmon)		
Goal FISH-1. Increased spawning, rearing, and migratory success of covered salmonids in the Auburn Ravine, Raccoon Creek, and Dry Creek watersheds.		
Objective FISH-1.1. *Protect Salmonid Spawning and Migrating Habitat.* Of the 88.6 stream miles protected in the Reserve System (Objective RAR-1.2), protect 25 stream miles of salmonid spawning habitat and 10 miles of salmonid migrating habitat primarily on stream reaches along Raccoon Creek, Doty Ravine (a major tributary to Raccoon Creek), and Auburn Ravine.	**CM1,** *Establish Reserve System* ● **CM1 FISH-1,** *Fish Habitat Protection*	● Report (acres and location) acquisition of spawning and migrating habitat for covered fish (7.5.9) ● Document presence of covered fish in the Reserve System (7.5.9) ● Monitor threats to covered fish (7.5.9)
Objective FISH-1.2. *Protect Riparian Habitat for Fish.* Of the riparian natural community protected in the Reserve System (Objective RAR-1.1), protect 558 acres of riparian habitat along salmonid spawning stream reaches and 342 acres of riparian habitat along salmonid migrating reaches, primarily along Raccoon Creek, Doty Ravine, and Auburn Ravine.	**CM1,** *Establish Reserve System* ● **CM1 FISH-1,** *Fish Habitat Protection* ● **CM2 FISH-1,** *Reserve Design for Fish Habitat Restoration*	● Report (acres and location) riparian habitat for covered fish (7.5.9) ● Document presence of covered fish in the Reserve System (7.5.9)
Objective FISH-1.3. *Protect Oak Woodlands for Fish.* Of the 12,490 acres of oak woodland and grassland protected in the Foothills (OW-1.1, VPCG-1.3), protect 9,869 acres in the Raccoon Creek watershed to protect and improve water quality and watershed integrity in the Raccoon Creek watershed, the primary salmonid stream system within the RAA.	**CM1,** *Establish Reserve System* ● **CM1 FISH-1,** *Fish Habitat Protection*	● Report (acres and location) acquisition of oak woodlands for covered fish (7.5.9) ● Document presence of covered fish in the Reserve System (7.5.9)
Valley Elderberry Longhorn Beetle		
Goal VELB-1. Habitat to support a sustained population of valley elderberry longhorn beetle within the Reserve System.		
Objective VELB-1.1. *Restore Valley Elderberry Longhorn Beetle Habitat.* Within the restored riverine/riparian complex natural community (Objective RAR-1.3), plant elderberry shrubs and associated riparian species sufficient to offset loss of valley elderberry longhorn beetle consistent with USFWS' Conservation Guidelines for Valley Elderberry Longhorn Beetle (U.S. Fish and Wildlife Service 1999b) or current USFWS guidelines.	**CM3,** *Restore and Create Natural Communities and Covered Species' Habitat* ● **CM3 VELB-1,** *Valley elderberry Longhorn Beetle Habitat Restoration*	● Report number of Valley Elderberry shrubs planted (7.5.10) ● Document elderberry host plant in reserves. (7.5.10) ● Monitor Argentine ants (7.5.10)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Vernal Pool Branchiopods		
Goal VPB-1. Sustained populations of vernal pool fairy shrimp and vernal pool tadpole shrimp within the Reserve System.		
Objective VPB-1.1. *Maintain Vernal Pool Fairy Shrimp Occupancy in the Reserve System.* Within the 20,000 acres of protected, restored, and created vernal pool complex, maintain a vernal pool fairy shrimp occupancy rate that is equal to or greater than the occupancy rate of vernal pools lost as a result of Covered Activities.	**CM1,** *Establish Reserve System* ● **CM1 VPB-1,** *Protection and Restoration of Occupied Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat* **CM2,** *Manage and Enhance the Reserve System* ● **CM2 VPCG-1,** *Vernal Pool Complex and Grassland Vegetation Management* ● **CM2 VPCG-2,** *Vernal Pool Complex Enhancement of Hydrologic Conditions* **CM3,** *Restore or Create Natural Communities* ● **CM3 VPB-1,** *Translocation of Vernal Pool Branchiopod Cysts*	● Report acres of vernal pool complexes acquired (7.5.11) ● Document occupancy (7.5.11) ● Document species response to enhancement (7.5.11) ● Document species response to vernal pool restoration and creation, including translocation of cysts (7.5.11)
Objective VPB-1.2. *Maintain Vernal Pool Tadpole Shrimp Occupancy in the Reserve System.* Within the 20,000 acres of protected, restored, and created vernal pool complex, maintain a vernal pool tadpole shrimp occupancy rate that is equal to or greater than the occupancy rate of vernal pools lost as a result of Covered Activities.	**CM1,** *Establish Reserve System* ● **CM1 VPB-1,** *Protection and Restoration of Occupied Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat* **CM2,** *Manage and Enhance the Reserve System* ● **CM2 VPCG-1,** *Vernal Pool Complex and Grassland Vegetation Management* ● **CM2 VPCG-2,** *Vernal Pool Complex Enhancement of Hydrologic Conditions* **CM3,** *Restore or Create Natural Communities and Covered Species' Habitat* • **CM3 VPB-1,** *Translocation of Vernal Pool Branchiopod Cysts*	● Report acres of vernal pool complexes acquired (7.5.11) ● Document occupancy (7.5.11) ● Document species response to enhancement (7.5.11) ● Document species response to vernal pool restoration and creation, including translation of cysts (7.5.11)

Biological Goals and Objectives	Conservation Measures[21]	Monitoring
Goal VPB-1. A sustained populations of Conservancy fairy shrimp in Plan Area A.		
Objective VPB-2.1. *Protect Conservancy Fairy Shrimp Occurrences.* Protect two previously unknown (at the time of Plan development) and unprotected Conservancy fairy shrimp occurrences for the first occurrence taken, prior to such take. Protect three additional occurrences for each additional occurrence taken, prior to such take.	**CM1,** *Establish Reserve System* ● **CM1 VPB-2,** *Protection of* Conservancy Fairy *Shrimp Occurrences*	● Report acres of vernal pool complexes acquired (7.5.11) ● Document occupancy (7.5.11) ● Document species response to enhancement (7.5.11) ● Document species response to vernal pool restoration and creation (7.5.11)

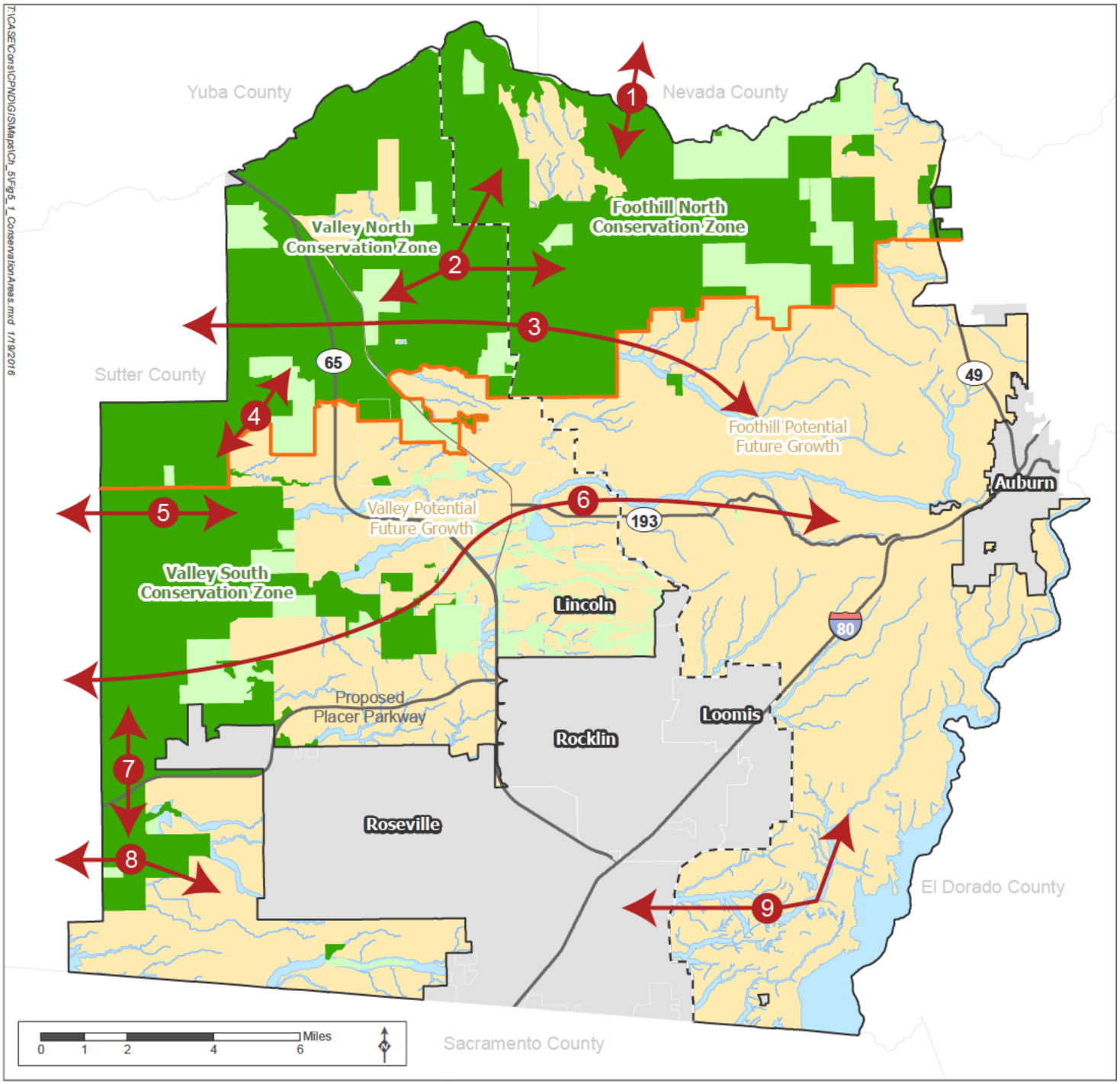
[a] From Section 5.2.4, *Framework for Biological Goals and Objectives and Conservation Measures*

[b] CM2, *Develop an Invasive Species Control Program*, is not shown in this table because it provides for development but not implementation of an invasive species control plan. The plan is implemented under CM9, *Improve Protection and Management on Existing Public and Easement Habitat Lands to Maintain or Enhance Covered Species Occurrences and Habitat*.

[c] Some values may not sum exactly to the total due to rounding.

LIDS = Low Impact Development Standards; PCA = Placer Conservation Authority; RAA = Reserve Acquisition Area; USFWS = U.S. Fish and Wildlife Service

This Page Intentionally Left Blank



Source: Placer County, 2015; CDFW 2010; CalTrans 2010; MIG | TRA 2016

- Existing Protected Area
- Reserve Acquisition Area
- Poten ial Future Growth Area
- Non-Participating City
- Valley/Foothill Divide
- North/South Conservation Zone Divide
- Stream System
- Major Road
- Linkage (Orientation)

1. **Bear River Watershed** (N-S) Connect PCCP oak woodland reserves to oak woodlands in Nevada County throughout the Bear River watershed.
2. **Yankee Slough - Raccoon Creek Watershed** (E-W) Connect Valley reserves to Foothill reserves.
3. **Raccoon Creek - Doty Creek corridor.** (E-W) Connect existing protected areas and reinforce riparian protec ion for salmonids.
4. **Lower Raccoon Creek** Maintain connectivity between PCCP northern and southern conservation areas and linkage along lower Raccoon Creek in the Sutter County
5. **Markham Ravine** (E-W) Connect PCCP reserves with scattered existing protected areas to the east; may play a role in giant garter snake dispersal.
6. **Auburn Ravine.** (E-W) Connect PCCP reserves with scattered existing protected areas to the east; important for salmonids.
7. **Cross Placer Parkway.** (N-S) Remediate barrier created by the proposed Placer Parkway. Connect Pleasant Grove Creek watershed to Curry Creek watershed; may play a role in giant garter snake dispersal.
8. **Curry Creek.** (E-W) Connect PCCP reserve lands to Sutter County on the west and avoided stream systems to the east; may play a role in giant garter snake dispersal.
9. **Miners Ravine.** (E-W) Connect Stream System reserve opportunities in Miners Ravine to tributaries of Dry Creek; important for salmonids.

Figure 5-1 Conservation Zones and Key Linkages

Placer County Conservation Program - Western Placer County HCP/NCCP

MIG | TRA

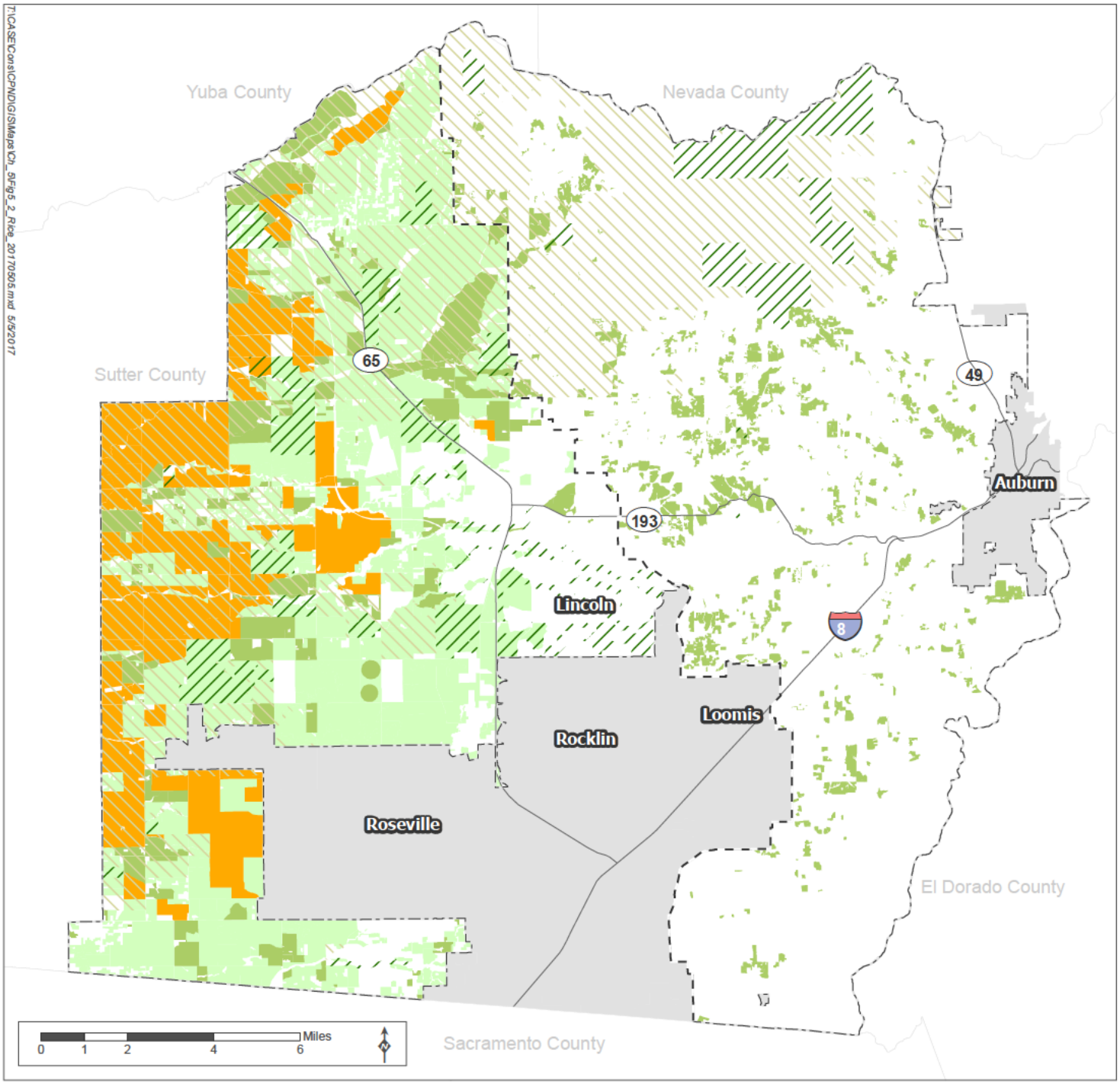
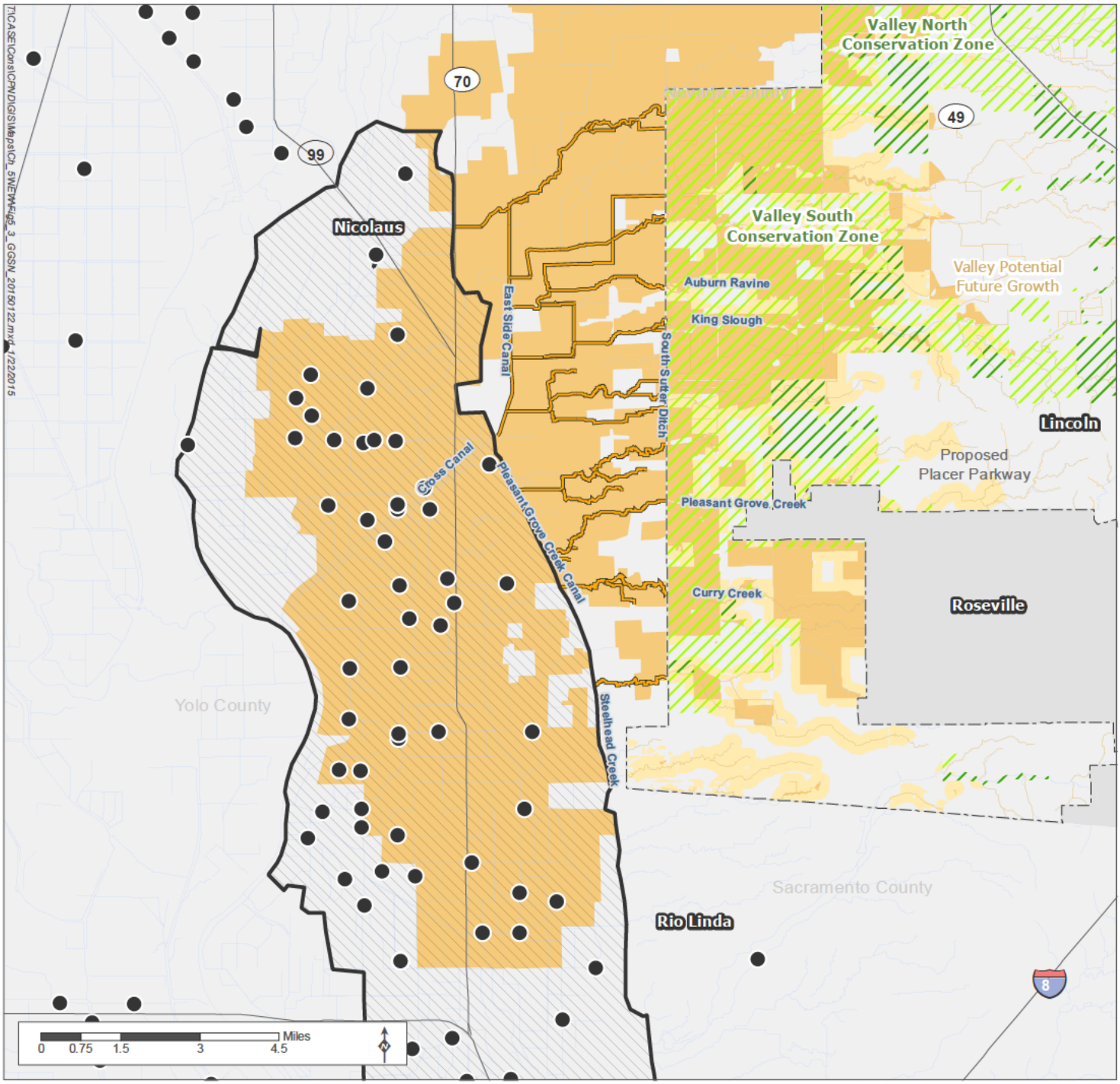


Figure 5-2 Distribution of Rice in Plan Area

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA 2015

- Non-Participating City
- Existing Protected Areas
- Reserve Acquisition Area
- Potential Giant Garter Snake Dispersal Corridor
- Giant Garter Snake Occurrence (Oct 2013
- CNDDB) Giant Garter Snake Population Cluster

Giant Garter Snake Modeled Habitat

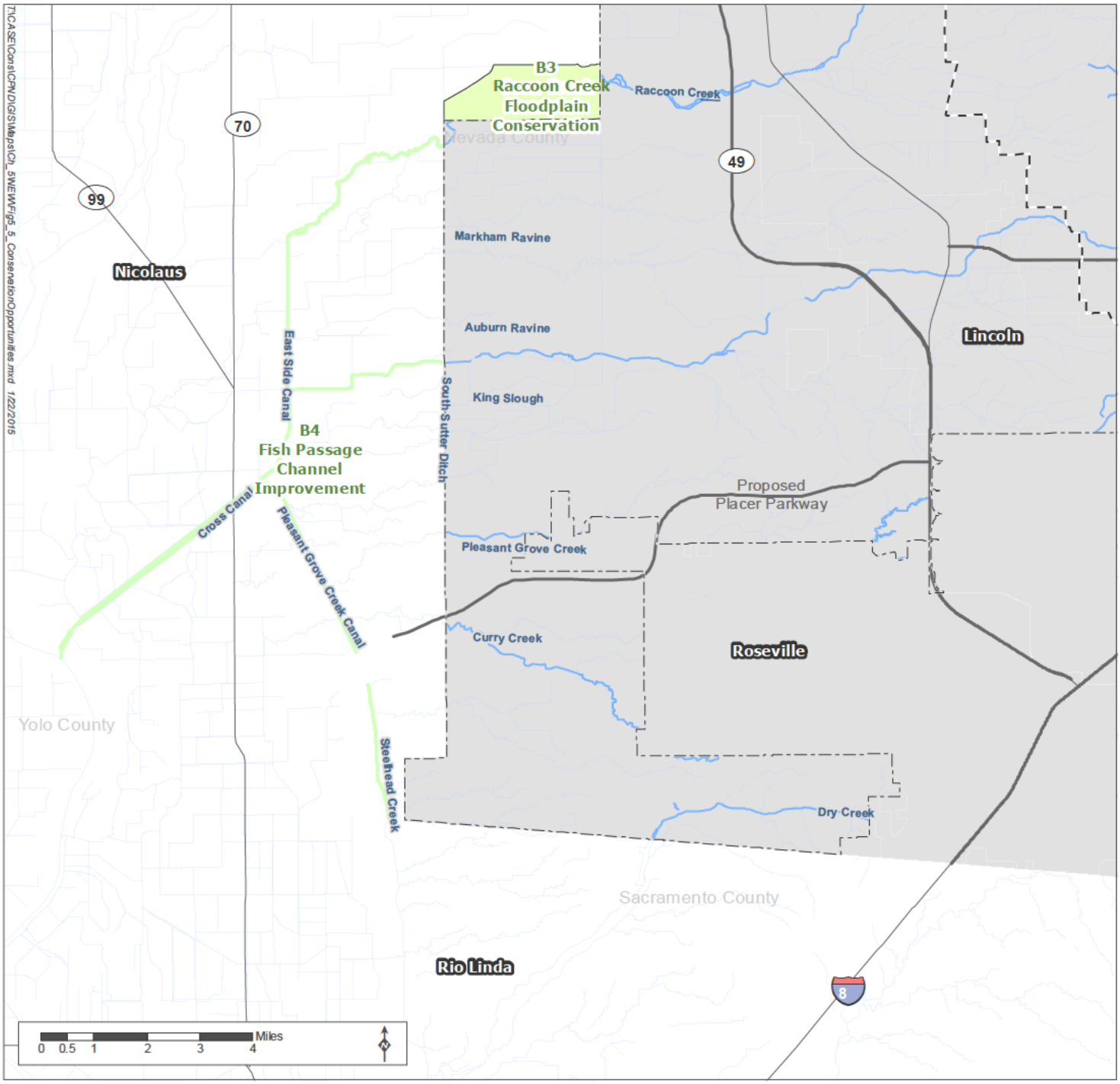
- Breeding and Foraging Habitat*
- Upland Habitat
- Riverine Habitat (Placer County)

- Major Road
- Stream

Figure 5-3 Potential Giant Garter Snake Dispersal Corridors

Placer County Conservation Program - Western Placer County HCP/NCCP

MIG | TRA



Source: Placer County, 2014; MIG | TRA 2015

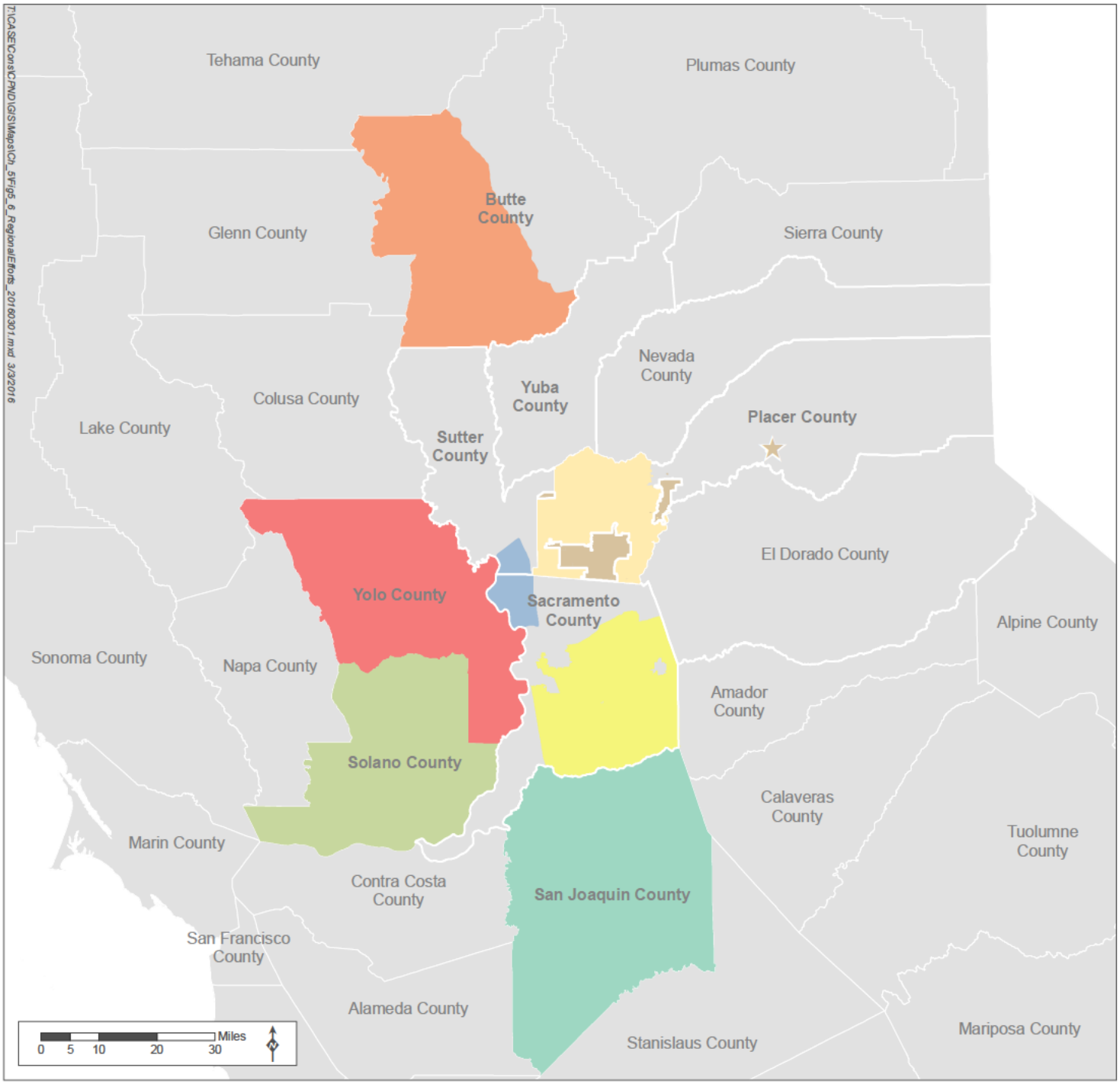
B4. Fish Passage Channel Improvement: Selective in-stream work on a small portion of 30 miles of channels west of Placer County in Sutter County.

B3. Raccoon Creek Floodplain Conservation: Watershed protection and stream restoration activities along Raccoon Creek floodplain in a portion of Sutter County.

- Plan Area A
- Non-Participating City
- Proposed Placer Parkway
- Valley/Foo hill Divide
- Major Road
- Stream

Figure 5-4 Conservation Opportunities in Plan Area B3 and B4

Placer County Conservation Program - Western Placer County HCP/NCCP



Source: Placer County, 2014; MIG | TRA 2015

Placer County Conservation Program

- Plan Area A
- Plan Area B

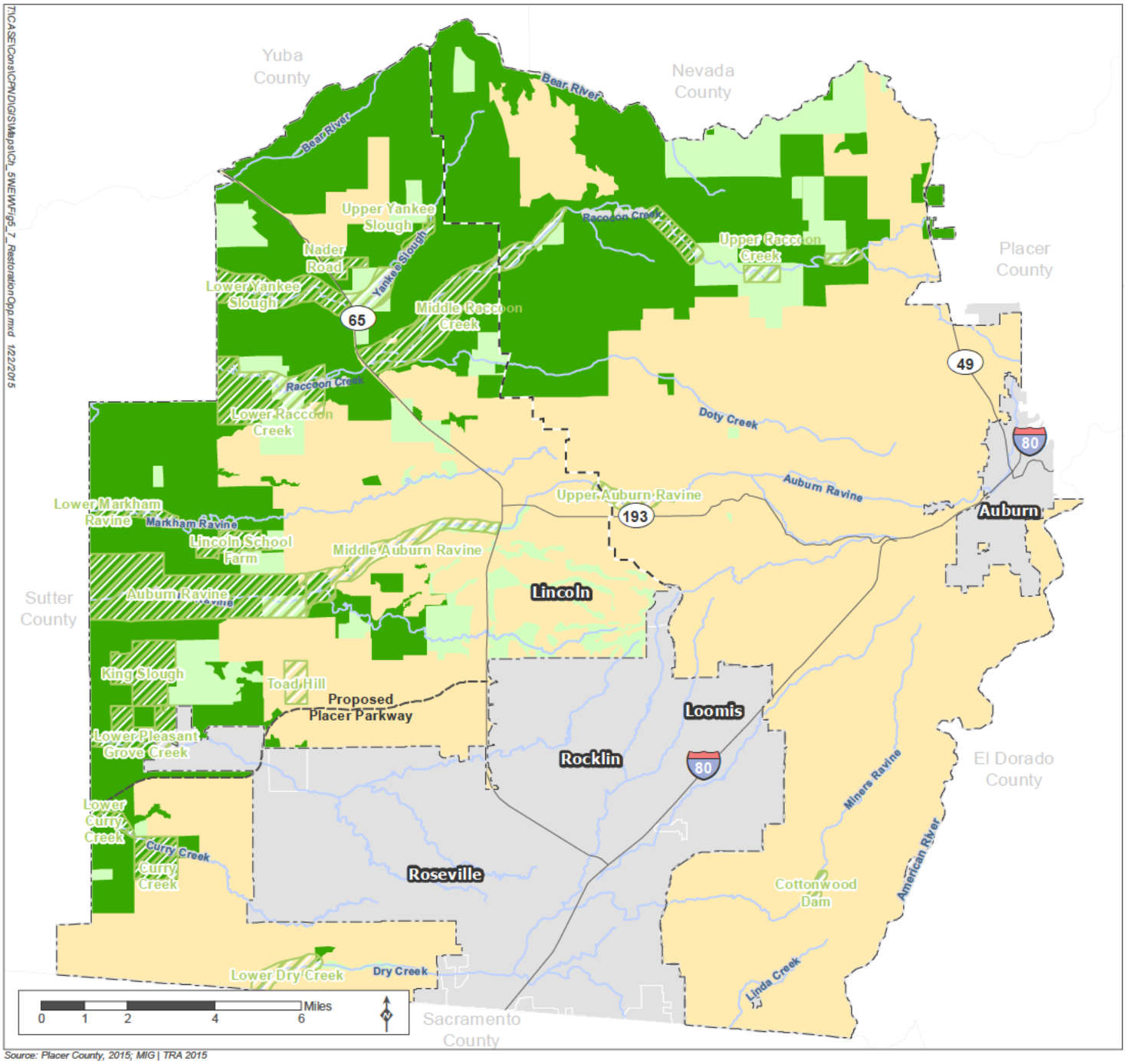
Other Regional Conservation Plans

- Butte Regional Conservation Plan
- Solano Multispecies Conservation Plan
- San Joaquin County Multispecies Habitat Conservation Plan and Open Space Plan
- Natomas Basin Habitat Conservation Plan
- Yolo County Habitat Conservation Plan and Natural Communities Conservation Plan
- South Sacramento Habitat Conservation Plan

MIG | TRA

Figure 5-5 Regional Conservation Plans

Placer County Conservation Program - Western Placer County HCP/NCCP



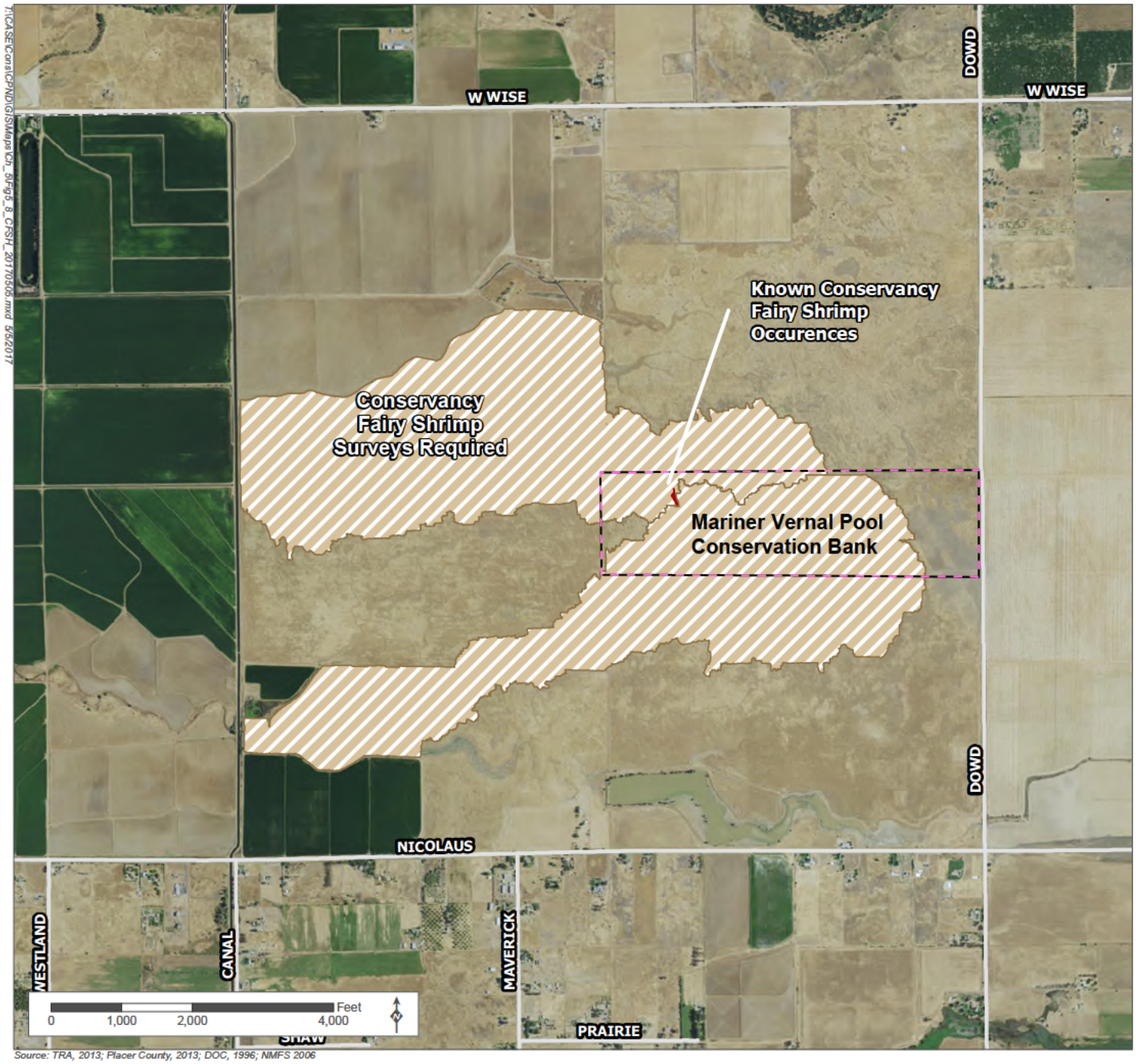
Source: Placer County, 2015; MIG | TRA 2015

- Stream
- Flood Plain
- Non-Participating City Existing
- Existing Protected Areas
- Potential Future Growth Area
- Reserve Acquisition Area
- Potential Restoration Areas

Figure 5-6 Restoration Opportunity Areas

Placer County Conservation Program - Western Placer County HCP/NCCP

MIG | TRA



Source: TRA, 2013; Placer County, 2013; DOC, 1996; NMFS 2006

- Plan Area A
- Valley/Foothill Line
- Roads
- Known Conservancy Fairy Shrimp Occurences
- Conservancy Fairy Shrimp Surveys Required
- Mariner Vernal Pool Conservation Bank

Figure 5-7 Conservancy Fairy Shrimp Survey Area

Placer County Conservation Program - Western Placer County HCP/NCCP

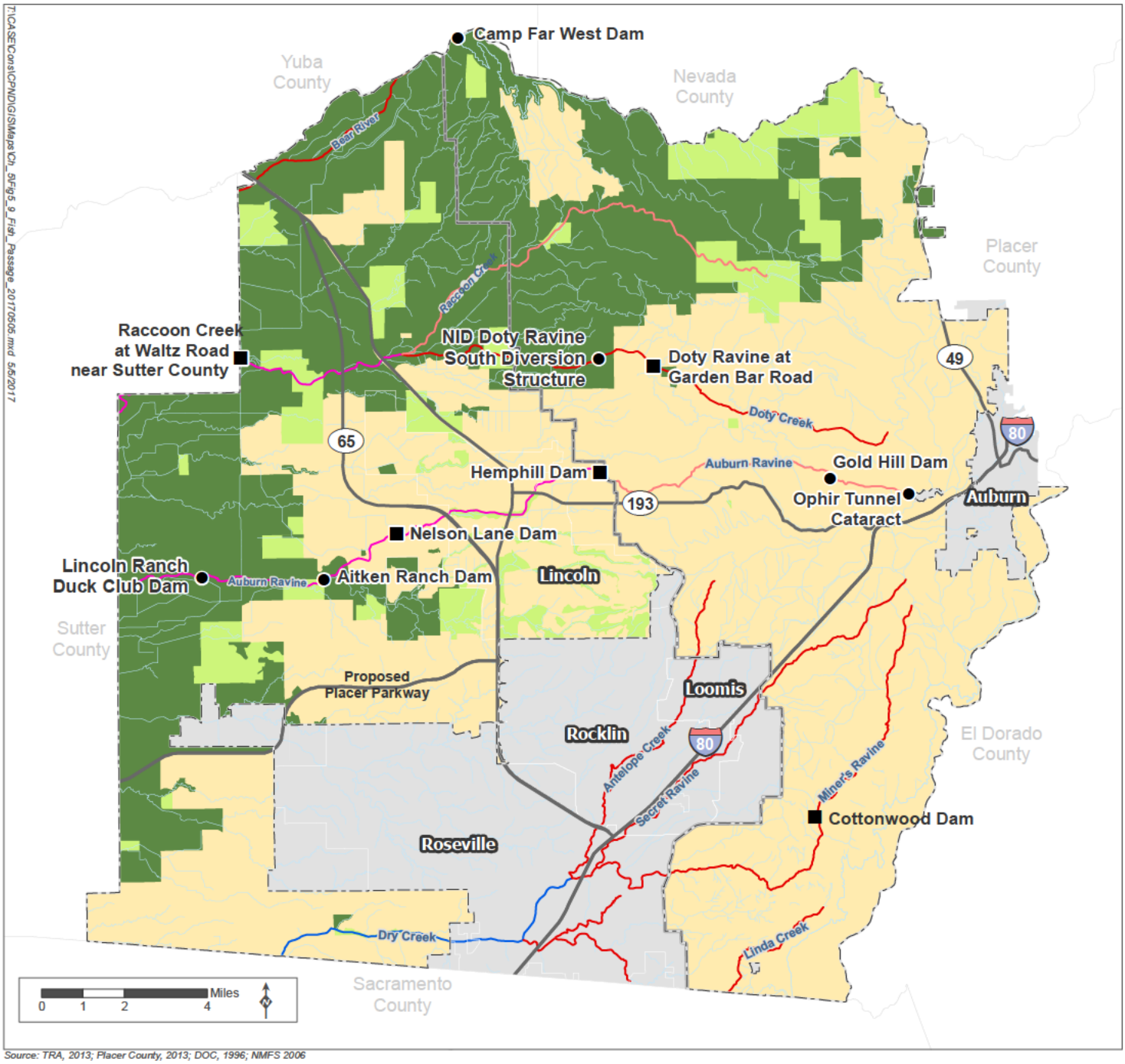
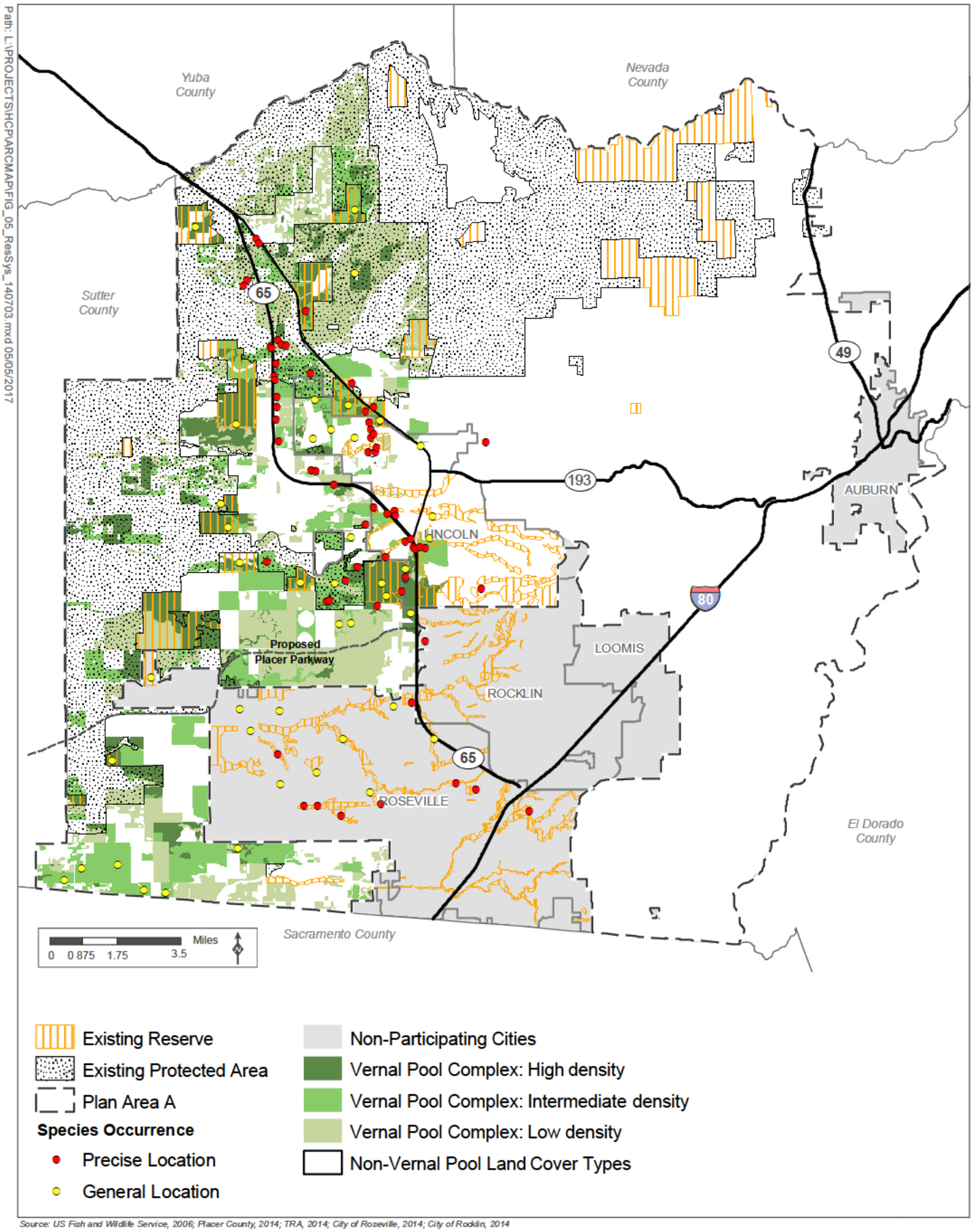


Figure 5-8 Potential Fish Passage Enhancement Projects

Placer County Conservation Program - Western Placer County HCP/NCCP

MIG | TRA



Source: US Fish and Wildlife Service, 2006; Placer County, 2014; TRA, 2014; City of Roseville, 2014; City of Rocklin, 2014

Figure 5-9 Vernal Pool Branchiopods in Western Placer

Chapter 6
Program Participation and Conditions on Covered Activities

6.1 Introduction

This chapter describes the process by which Covered Activities receive the benefits of the permits and the conditions that will apply to Covered Activities. Mandatory conditions on the Covered Activities (Chapter 2, *Covered Activities*) are necessary to meet state and federal permit issuance criteria; to help meet the regional conservation goals described in Chapter 5, *Conservation Strategy*; and to assist Permittees in meeting their funding obligations outlined in Chapter 9, *Costs and Funding*. Collectively, the conditions serve three purposes:

1. Federal Endangered Species Act (ESA) Section 10[a] and California Fish and Game Code Sections 2820(a)(6) and 2820(f) *et seq.* require this plan, in part, to include measures to avoid and minimize take of Covered Species. Enforceable conditions described in this chapter supply the required avoidance and minimization measures. These measures are also designed to be consistent with the Western Placer County Aquatic Resources Program (CARP) and therefore are compatible with requirements under Section 404 of the Clean Water Act (CWA), which requires that projects avoid and minimize effects to the maximum extent practicable.
2. The Western Placer County Conservation Program (PCCP) Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP or Plan) provides compensatory mitigation for incidental take of Covered Species and loss of natural communities resulting from Covered Activities. Several of the conditions described in this chapter pertain to requirements of fees. Conservation beyond mitigation is not addressed in this chapter but is addressed in Chapter 5, *Conservation Strategy*.
3. The Permittees—through the Placer Conservation Authority (PCA)—are required to routinely report on Covered Activities, the extent of take, and corresponding mitigation and conservation. The reporting conditions described in this chapter provide the PCA with the information needed to satisfy their reporting requirements.

6.1.1 Definitions

Avoidance and Minimization Measures. Measures (actions) taken to ensure that adverse effects on Covered Species and natural communities are avoided and minimized.

Baseline. The existing environmental state, which includes past and present impacts as well as the anticipated impacts of all permitted projects in the inventory area.

Baseline Land-cover Map Consistency Finding. The finding made on a project-by-project basis by the Permittee with jurisdiction over a proposed project that the existing condition of resources on a project site are or are not significantly changed over 2011 conditions. This finding is made as part of the participation package review process.

Best Management Practices (BMPs). BMPs are avoidance and minimization measures designed to reduce or avoid an adverse effect on a particular resource. BMPs described in this chapter were based on Permittees' current practices.

Conditions. Collectively refers to all of the conditions on Covered Activities described in this chapter.

Conditions of Approval. Project-specific conditions on Covered Activities that are assigned to a given project by the Permittee with jurisdiction over the project. These conditions will be listed in the documentation of coverage.

County Aquatic Resources Program (CARP). A PCCP program that identifies, classifies and protects Aquatic Resources of Placer County within the Plan area. The program outlines a process to issue authorizations to impact Aquatic Resources of Placer County for Covered Activities requiring a Land Conversion Authorization from a Local Agency.

Delineated Wetland. Any Waters of Placer County subjected to a wetland delineation conducted by a qualified professional following the protocols required by the CARP showing the exact location, wetland extent (also called wetted area or wetland perimeter), wetland type, and other information relevant to that wetland type.

HCP/NCCP Aquatic Features. All Waters of Placer County plus any required buffer as described in Community Condition 1, Community Condition 2, and Stream System Condition 1, the impacts on which result in special habitat fees under the HCP/NCCP.

This may not align with the jurisdiction of USACE, Regional Water Quality Control Boards, or CDFW (under Fish and Game Code 1600 et seq.).

Immediate Watershed. The term immediate watershed applies to the area surrounding and hydrologically connected to an individual delineated vernal pool constituent habitat. Unless demonstrated otherwise, the immediate watershed is considered to extend outward from the wetted perimeter by a default distance of 250 feet. The watershed may be determined to be smaller than the default distance based on a field analysis of terrain and the presence of hydrologic barriers. Where the terrain has a defined gradient and the subject wetland has a defined outlet, the area more than 50 feet downslope from the wetland may be excluded from the immediate watershed. Hydrologic barriers are features that isolate the wetlands from surface or subsurface flow and include the natural boundary of the micro watershed of a group of wetlands, a defined natural channel, or a permanent artificial barrier such as a road, maintained drainage ditch, or canal. A determination that the immediate watershed is smaller than the default must be supported by an analysis conducted by a qualified professional and approved by the reviewing Permittee in consultation with the PCA.

Local Jurisdiction. The Permittees that are also local governments with land use authority. There are two Local Jurisdictions described in the PCCP, the City of Lincoln (City), and the County of Placer (County). The Local Jurisdictions are the only Permittees with the authority to grant Land Conversion Authorizations on Development Projects that are considered Covered Activities under the HCP/NCCP and CARP.

Low Impact Development (LID). A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which collects and conveys storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water

facility, LID takes a different approach by using site design and storm water management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to approximate a site's pre-development hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain storm water runoff close to the source of rainfall.

Native Plants. For the PCCP, "native plants" includes those plants described in the Placer County Landscape Design Guidelines (Placer County 2013).

Participating Special Entity. A participating special entity refers to non-Permittee and public or quasi-public agencies in the Plan Area that request take authorization under the Plan. Quasi-public agencies are those agencies that are privately held, but provide public services (e.g., utilities) and generally operate outside the jurisdiction of the County or City. Participating Special Entities must apply directly to, and be approved by, the PCA to receive take coverage under the permits. In order to grant take authorization to a Participating Special Entity, the PCA will need to establish a legally enforceable contractual relationship.

Permanent Effects. Direct effects that persist for 1 year or more from the start of groundbreaking.

Placer County Wildlife Habitat Relationship dataset. Initially developed in 2004, this dataset provided land-cover mapping of the foothills and valley. This was used as the starting point for vegetation mapping for the PCCP. Valley portions of this dataset were updated in 2012 based on 2011 aerial photography. This dataset will continue to be refined throughout implementation as new data become available; the dataset serves as the PCCP's primary geographic information system (GIS)-based vegetation layer.

Qualified Biologist. Qualified Biologist are those biologists who have the experience, education, and training necessary to perform a given task described in this Plan accurately and in an unbiased fashion. A qualified biologist must have obtained a B.S. or B.A. or equivalent degree in biology, environmental studies, fisheries, or related field, and have at least two years of related work experience.

Qualified Professional. Those professionals who have the appropriate combination of experience, education, and training necessary to perform a given task described in this Plan accurately and in an unbiased fashion. Training must be in the specific field to which the task is related.

Resource Agencies. The agencies that are participating in the PCCP. These include the Wildlife Agencies (U.S. Fish and Wildlife Service [USFWS], National Marine Fisheries Service [NMFS], CDFW) USACE, U.S. Environmental Protection Agency, and the Central Valley Regional Water Quality Control Board.

Stream System The Stream System is the stream channel (wet or dry) and the surrounding area including any area subject to flooding in a 100-year event as determined by the FEMA or project specific information; whichever is more accurate or the outermost limit of a variable-width boundary measured outward from the edge of the Ordinary High Water Mark (OHWM). Further details are provided in Chapter 3, Section 3.2.7, *Stream System*. The Stream System boundary is truncated at the point where the watershed falls below 40 acres in extent. The Stream System boundaries are schematically illustrated in Figure 3-9.

Temporary Effects. Are defined as those effects that persist for less than 1 year. Projects with temporary effects will return habitat to pre-project conditions within 1 year from the time of groundbreaking.

Waters of Placer County. Waters of Placer County encompasses waters of the United States and all other lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, marshes, wetlands, inlets, canals, and other bodies of surface waters, natural or artificial, public or private. Waters of Placer County also includes isolated waters and wetlands not currently regulated by USACE.

Wildlife Agencies. USFWS, NMFS, and CDFW.

6.1.2 Categories of Conditions

The Plan groups conditions according to their purpose as follows.

General Conditions. General Conditions apply to all/most Covered Activities and include the assessment of fees for land conversion and other effects and application of BMPs to reduce potential effects on Covered Species and natural communities.

Natural Community Conditions. Specific avoidance and minimization measures on Covered Activities in certain natural communities may apply.

Stream System Conditions. Conditions to avoid and minimize effects on the Stream System.

Rural Public Project Conditions. Conditions that address public projects undertaken outside the Sacramento Valley portion of the Plan Area (Valley) Potential Future Growth Area (PFG).

Species Conditions. Where activities may affect Covered Species or where potential for take can be avoided or reduced through specific actions such as appropriate species surveys, application of BMPs, seasonal restrictions, or protective buffers.

Reserve Management Conditions. Conditions that apply to management of the reserve lands.

6.1.3 Regional Approach

As an HCP/NCCP, this Plan systematically implements conditions to avoid and minimize effects and, where avoidance is not feasible, requires mitigation for loss of Covered Species habitat, including aquatic resources, on a regional scale. This ensures a comprehensive approach to conservation of Covered Species and natural communities by avoiding and minimizing impacts and concentrating protection where it has the greatest long-term value. By protecting and restoring wetlands, vernal pools, oak woodlands, and riparian and other high-quality habitats, and restricting Covered Activities from areas of higher biological value, such as in Stream Systems, regional avoidance and minimization goals are supported.

Regional-scale avoidance and minimization reduces the need for individual projects to avoid and minimize effects at the project scale and allows streamlining of regulatory requirements. This Plan assumes take will result from individual Covered Activities and mitigates the aggregate effects through implementation of the conservation strategy, described in Chapter 5, *Conservation Strategy*.

On-site avoidance and minimization is given a lower priority within the PFG (with the exception of the Stream System [see Chapter 5, *Conservation Strategy*]), where existing urban areas occur and where future development and infrastructure will be concentrated (see Chapter 4, *Effects of Covered Activities*). However, natural community and species surveys may still be required in these areas to ensure that effects on sensitive resources (e.g., streams and wetland) are avoided and minimized,

and to ensure compliance with other species regulations (e.g., California Fish and Game Code Section 3503).

6.1.4 Use of Standards, Guidelines, and BMPs

Many of the conditions set forth in this chapter refer to standards, guidelines, or BMPs that define how Covered Activities must be carried out. These standards, guidelines, and BMPs were developed for the purpose of avoiding and minimizing effects on various natural resources.

Some standards are set by the Wildlife Agencies. These include species survey protocols and standards for habitat replacement and restoration. Where applicable, Wildlife Agency survey standards are incorporated by reference. Some standards are set through permits issued by other agencies. For example, Placer County has received a National Pollutant Discharge Elimination System (NPDES) permit issued by the Central Valley Regional Water Quality Control Board. That permit may be revised from time to time, but compliance with that permit is intended to serve as compliance with the Plan conditions that reference it.

Other standards, including operations BMPs and LID, are developed by the Permittees themselves. All conditions described in this chapter, including the BMPs and LID that compose the conditions, will be adopted by ordinance and thus become enforceable by the Permittees.

The Plan anticipates that circumstances, regulations, or scientific understanding may change over the 50-year permit term. The Plan anticipates there may be changes in survey protocols, BMPs, and other programs, such as LID. These measures will be refined throughout the life of the Plan, pursuant to the approval of new, revised, or deleted measures by the PCA, the Wildlife Agencies and other local, state or federal agencies and in accordance with the biological goals and objectives of the Plan and the adaptive management program.

6.1.5 Qualified Biologist/Qualified Professional

The conditions and procedures described in this chapter may refer to information provided by "qualified biologists" or "qualified professionals." Qualified biologists are those biologists who have the proper combination of experience, education, and training necessary to perform the tasks described in this Plan accurately and in an unbiased fashion. The term "qualified biologist" is used generically to mean a biologist who is trained to perform the given task; such a person is, more specifically, a fisheries biologist, wildlife biologist, botanist, ecologist, or registered professional forester. Training must be in the specific field to which the task is related. For example, a registered professional forester may not perform a Covered Species survey unless the individual is also competent in implementing the task associated with a particular Covered Species.

For natural community mapping, a biologist or other professional will have demonstrated experience related to conducting vegetation mapping in the field or from air photographs at the scale of the project and in vegetation types similar to those on the project site. Forest natural community types can also be mapped by a registered professional forester or certified arborist. If the project site supports or may support any Waters of Placer County, a biologist must be qualified in performing wetland delineations and must follow the protocols required by the CARP.

If the task does not have the potential to result in take of Covered Species (e.g., natural community mapping), qualified biologists or professionals must be pre-approved by the Plan's Permittee that

will approve the Covered Activity. For private applicants, this is the local jurisdiction with land use authority over the project. For public projects, including a Participating Special Entity (see Section 6.2.3, *Application Process for Participating Special Entity Projects*) projects, this is the PCA. Each Permittee may maintain lists of pre-approved professionals.

If the task has the potential to result in take of Covered Species, the biologist must be approved by the PCA and Wildlife Agencies following a review of qualifications consistent with local procurement procedures.[1] Once approved, the PCA will maintain a list of pre-approved qualified biologists, including the tasks that they are approved to perform, who may conduct work for a 5-year period.

If private sector applicants do not select a pre-qualified biologist or professional from the applicable local jurisdiction's list—or for Covered Species, from the PCA pre-qualified list—applicants must provide the local jurisdiction or PCA with a brief resume of the biologist or professional so that the local jurisdiction or PCA can verify the qualifications of the biologist. New requests for verification of a qualified biologist or professional made by a local jurisdiction for use on public projects will be verified by the PCA. The local jurisdiction, or PCA, as applicable, will review these qualifications together with the application package. If the local jurisdiction or PCA finds the qualifications lacking, it may ask the applicant for additional information on the biologist, require that a new biologist be selected, or require that a biologist be selected from the pre-qualified list. Work that has been performed by a biologist who is later determined to be unqualified for the particular needs of a project could result in the need for repeat surveys.

6.2 Program Participation: Receiving Take Authorization under the Plan

The conditions described in this chapter are designed to ensure Covered Activities are consistent with the Plan's goals and objectives to minimize the impacts of these activities, and to provide standard and predictable requirements for project applicants. The Permittees will evaluate all projects they implement or approve to ensure all applicable conditions described in this chapter have been incorporated into the project prior to extending take coverage under the Plan.

Take authorization will be provided by the Plan for three broad categories of Covered Activities:

1. Public projects undertaken by a Permittee in one of five subcategories:
    a. Projects in the Valley PFG (Section 2.6.1, *Valley Potential Future Growth Area*)
    b. Projects in the Sierra Nevada Foothills portion of the Plan Area (Foothills) PFG (Section 2.6.3, *Foothills Potential Future Growth Area*)
    c. Regional public programs (Section 2.6.5, *Regional Public Programs*)
    d. In-stream activities (Section 2.6.6, *In-stream Activities*)
    e. Conservation strategy actions (Section 2.6.7, *Conservation Programs*)
2. Private projects under the jurisdiction of a Permittee, in one of six subcategories:
    a. Projects in the Valley PFG (Section 2.6.1, *Valley Potential Future Growth Area*)

[1] Placer County has a procurement procedure for establishing qualified consultants.

b. Rural development in the Valley (Section 2.6.2*, Valley Conservation and Rural Development*)

c. Projects in the Foothills PFG (Section 2.6.3, *Foothills Potential Future Growth Area*)

d. Rural development in the Foothills (Section 2.6.4, *Foothills Conservation and Rural Development*)

e. In-stream activities (Section 2.6.6, *In-stream Activities*)

f. Conservation strategy actions (Section 2.6.7, *Conservation Programs*)

3. Projects proposed by Participating Special Entities that are approved for inclusion by the PCA and the Wildlife Agencies

A "public project" is a project that will be carried out by a governmental agency; a "private project" is a project that will be carried out by an entity other than a governmental agency (typically an individual or a business). Although the procedure may vary between public and private projects, all projects must be evaluated to ensure applicable conditions will be met.

The public/private distinction pertains only to the take authorization process. The conditions listed in this chapter will apply equally to public and private projects, including payment of fees or other required mitigation, except where otherwise noted.

6.2.1 Evaluation Process for Permittee Projects

The Plan permits provide the Permittees with take authorization, if the projects are Covered Activities and comply with the terms of the Plan. If a Permittee undertakes a Covered Activity, the Permittee must, in consultation with the PCA, document consistency with the Plan and provide a copy of this documentation to the PCA before the Permittee's take authorization may be exercised. The documentation allows the PCA to track the amount of take coverage granted, to record the fee amount, and schedule of when fees will be paid.

Each Permittee will develop a documentation procedure, including modifications to its California Environmental Quality Act (CEQA) implementation guidelines or a special-purpose standardized template, within the first 18 months of permit issuance. It is expected that the documentation will be similar to the model Plan participation package required of applicants for private projects, as described in Section 6.2.2, *Application Process for Private Projects*, subheading *HCP/NCCP Participation Package*. Permittee project documentation may depart from that model so long as the Permittee is able to make the required determination of the project's consistency with the Plan.

6.2.1.1 CEQA Review for Permittee Projects

When Permittees initiate projects that are subject to CEQA, Permittees are encouraged to consider and incorporate as appropriate the terms of the Plan; however, the HCP/NCCP participation package is not required until the Permittee is ready to seek take coverage for implementation of Covered Activities. To facilitate CEQA coordination, the Permittee may begin the Plan documentation process at the earliest stage of project planning.

6.2.1.2 CEQA-exempt Permittee Projects

Permittee Covered Activities that may not be subject to CEQA include many operations and maintenance (O&M) activities or other actions that may be categorically or statutorily exempt from

CEQA. Many projects that are exempt from CEQA will still be covered under this Plan (e.g., building permits) and still require compliance with the applicable conditions of this Plan, as described in this chapter.

The Permittee documentation process will need to address ongoing programs and CEQA-exempt activities. For example, public works O&M activities will be covered if the Permittee prepares a general description of work to be performed in the upcoming year. Preparation of such a description may be paired with the budget process that will fund the activities. The work description will allow the Permittee to determine if planned ground disturbance or potential work in the Stream System would trigger specific conditions, including the payment of Plan fees. That information and an assessment of work actually done would be provided to the PCA. It is foreseen that such program documentation may involve an annual review of Covered Activities (i.e., O&M) that fall into this category.

6.2.1.3 Receiving Take Authorization for Permittee Projects

Any take of Covered Species associated with Covered Activities proposed by the Permittees is authorized under the permits issued for the Plan. These projects are therefore "pre-approved" for take authorization by the Wildlife Agencies, as long as the Permittee submits the required documentation (described above), meets the conditions of the Plan, and pays applicable fees. Each Permittee is responsible for ensuring its Covered Activities comply with the conditions described in this chapter. Take authorization for a project will be in effect once the Permittee documents consistency with the Plan for that project.

6.2.2 Application Process for Private Projects

Private projects will be reviewed exclusively by one of the two local jurisdictions, either the City of Lincoln or Placer County.[2] Local jurisdictions will have authorization to grant take coverage for Covered Activities proposed by private parties under their jurisdiction that comply with the terms and conditions of the Plan. The process of initiating participation in the Plan will be integrated into the local jurisdictions' normal CEQA procedures for discretionary permits or, for ministerial[3] projects, the normal land development review process.

Private applicants who seek coverage under the Plan will apply to their local jurisdiction (i.e., the County or the City of Lincoln) by submitting a HCP/NCCP participation package, as described in Section 6.2.4, *HCP/NCCP Participation Package*. This process is similar to current project application procedures, but will include information specifically required by the Plan. A checklist for evaluating these private applications will be developed by the Permittees within the first 6 months of permit issuance.

[2] Applications from private applicants not subject to one of the local jurisdictions would be reviewed and approved by the PCA.

[3] "Discretionary" permits are granted following determinations that require the exercise of judgment and deliberation. "Ministerial" permits are granted based on an objective determination as to whether the permit request complies with a set of defined standards.

6.2.2.1 HCP/NCCP Participation Package Review

The HCP/NCCP participation package is described under Section 6.2.4, *HCP/NCCP Participation Package*. In summary, it is a data collection process developed by each Permittee used to determine the type and scope of Covered Activities, the impact on Covered Species, the application of conditions on Covered Activities and any avoidance and minimization measures proposed by the applicant.

The HCP/NCCP participation package Review process is illustrated in Figure 6-1. The private project applicant is responsible for preparing the HCP/NCCP participation package and paying for any necessary field surveys, technical reports, and biological resource mapping. To recover the costs of reviewing and processing these HCP/NCCP participation packages, the Permittees may charge a fee associated with the application (see Chapter 9, *Costs and Funding*, for details).

The first step is local jurisdiction review of the HCP/NCCP participation package to determine whether it is complete. For Covered Activities that are also subject to CEQA review, applications for take authorization will generally be undertaken concurrently with CEQA review. To facilitate a concurrent approach, the local jurisdiction will request that project applicants submit the HCP/NCCP participation package at the same time as the application for the first discretionary action needed for the Covered Activity.

Upon receipt of a participation package, the local jurisdiction will, in consultation with the PCA, review it for completeness in accordance with the checklist. Any project applicant request to contribute land in lieu of fees, pay with mitigation/conservation bank credits, or call for other special project conditions must be reviewed and approved by the PCA. Land in lieu of fees will be evaluated through the process described in Section 8.4.13, *Land Dedication In Lieu of Land Conversion Fee*. Use of bank credits will be evaluated according to the species affected by the project and species credits available at Wildlife Agency-approved mitigation or conservation banks. In order to qualify for credit under the Plan, mitigation/conservation banks must be consistent with the terms and conditions of the PCCP (see Chapter 8, Section 8.4.7, *Private Mitigation and Conservation Banks*) and the applicable state and/or federal agencies signatory to the bank's enabling instrument. The Wildlife Agencies may pre-approve specific banks for Plan use based on the findings that use of these banks is consistent with the HCP/NCCP conservation strategy and that the bank is within the HCP/NCCP permit area—in such cases, bank credits will not require project-by-project approval from the Wildlife Agencies.

If the HCP/NCCP participation package is not complete, it will be returned to the project applicant with an explanation and a request for additional information.

Local jurisdiction review of the HCP/NCCP participation package will be subject to the processing time and other requirements of the California Permit Streamlining Act (Section 65920 et seq.), which requires public agencies to follow standardized time limits and procedures when making specific types of land use decisions.

Once the HCP/NCCP participation package is complete, the local jurisdiction will identify project-specific conditions that will apply and calculate the required fees, mitigation/conservation bank credit payments, and/or in-lieu dedication requirements based on the procedures described in Chapter 9, *Costs and Funding,* and consistent with the local ordinance implementing the Plan.

When a local jurisdiction has completed its review, it will forward the participation package and its determination of applicable conditions and fees to the PCA for review and concurrence. The PCA will enter it into the HCP/NCCP database (described in Chapter 8, *Plan Implementation*). See Chapter 9, Costs and Funding, for required fees, payment schedule, and the use of land dedication in lieu of fee payment. Ministerial issuance of building permits will require only a short checklist for HCP/NCCP compliance. The local jurisdiction will submit documentation to the PCA at least annually (for inclusion in annual reports), describing the number of permits, the conditions applied, and the fees collected.

6.2.2.2 Granting Take Authorization for Private Projects

Projects that are covered by the Plan will be required to comply with all terms and conditions of the federal and state permits, the Plan, and the Implementing Agreement that apply to the project prior to the local jurisdiction issuing take authorization. This is typically achieved by the local jurisdiction imposing terms and conditions on the requested entitlement (authorization granted by the local jurisdiction to an applicant to implement a discretionary or ministerial action) at the time of project approval. Such terms and conditions include, but are not limited to, the following:

a. Compliance with all relevant avoidance, minimization, survey, monitoring, and conservation measures determined by the local jurisdiction to be applicable to the project, as required by the Plan.

b. The right for the local jurisdiction to monitor the applicant's compliance with all applicable conditions of this Plan.

c. The right for the Wildlife Agencies to monitor the applicant's compliance with all applicable conditions of this Plan.

After a local jurisdiction determines, in consultation with the PCA, that a project is consistent with the Plan, it must require the project applicant to comply with all applicable Plan terms and conditions before take authorization is granted. The local jurisdiction may require compliance with the terms and conditions as a condition of project approval or may enter into an agreement in which the project applicant assumes the obligation to comply with the terms and conditions. Once the agreement is entered into, or the conditions of approval are imposed, and applicable fees have been paid, take authorization may be granted. For projects that propose a land dedication in lieu of a fee payment, it is necessary to comply with Section 8.4.13 (Land Dedication In Lieu of Land Conversion Fee) including a land dedication agreement between the proponent and the PCA. The determination to accept a land dedication in lieu of a fee payment is made by the PCA but should be closely coordinated with the local jurisdiction with authority over the project.

Once take authorization is granted by the local jurisdiction, the project applicant will be allowed to proceed with the project consistent with other applicable local, state, and federal laws. Take authorization for effects on Covered Species will be provided by the applicable local jurisdiction consistent with the state and federal permits issued to all Permittees.

Each local jurisdiction working with the PCA will develop a process to document projects that receive take authorization but do not proceed so that the take authorization can be removed from the PCA's records. If a project does not result in any ground disturbance and is abandoned or permission to proceed is revoked or modified, Permittees will notify the PCA that take authorization is also revoked or modified.

6.2.3 Application Process for Participating Special Entity Projects

The list of Covered Activities in Chapter 2, *Covered Activities*, provides for projects that will be proposed by a Participating Special Entity. For example, a special district that is involved in the production, generation, storage, treatment, or transmission of water may propose to build a project in the City or the unincorporated County.

If the effects of a project have been evaluated as part of potential future growth and were included as part of the potential take, then this project can be covered by the Plan, even though the Participating Special Entity is not directly subject to the land use jurisdiction of the Permittees (California Government Code Sections 53091 and 53096).

Participating Special Entities must apply directly to the PCA to receive coverage under the Plan. The Participating Special Entity will provide the same HCP/NCCP participation package as private entities that seek coverage. The PCA will then determine which HCP/NCCP conditions and fees and/or land in lieu will apply. See Section 8.8.4, *Take Authorization for Participating Special Entities*, for details on the process by which Participating Special Entities receive take authorization under the Plan. The PCA may choose not to cover a Participating Special Entity project under the Plan.

The Participating Special Entity is responsible for preparation of the PCCP participation package and may be charged a reasonable fee by the PCA to review it. If legal review is deemed necessary by either the applicant or the PCA, legal fees will be paid by the applicant.

6.2.4 HCP/NCCP Participation Package

This section describes a model HCP/NCCP participation package.

Each Permittee may develop its own HCP/NCCP participation package forms, as long as they are consistent with the requirements described below. The Permittees may adjust the required components of the HCP/NCCP participation package over time, consistent with the requirements of the Plan, other regulatory permits issued for the Plan, and local ordinances and procedures.

The scope and detail of documentation will be tailored to the scope and complexity of the project under consideration. Large subdivisions or specific plans that affect Covered Species habitat may require extensive documentation; a building permit or minor grading permit may require only a few checklist items and verification with an aerial photograph.

The HCP/NCCP participation package must contain the following items. These are subsequently described in detail and diagrammed in Figure 6-1.

Item 1: Initial Project Application Form. This form provides basic contact information for owner and applicant including, but not limited to; zoning, general plan land use designation(s), existing land uses, existing and proposed infrastructure, and project location information; a project description; and other pertinent information for coverage under the Plan.

Item 2: Project Description and Site map. This is a comprehensive project description and site map, with the location of permanent direct, indirect, and temporary effects shown on the map. A vicinity map shall also be provided.

Item 3: Natural Community Types on Site and Baseline Consistency. Provides documentation of natural community types on site and a comparison to the baseline land-cover map or the most recent natural community information provided by the PCA and other applicable biological surveys to allow the Permittee with jurisdiction over the project to make a Baseline Consistency Finding.

Item 4: HCP/NCCP Aquatic Features. Identification of any HCP/NCCP Aquatic Features present on the project site, including any areas within an adjacent vernal pool constituent habitat immediate watershed (as described in Community Condition 1).

Item 5: Mapping the Stream System and Salmonid Streams. Screening and surveying the project site for the presence of a 100-year floodplain, U.S. Geological Survey blueline streams, and salmonid habitat streams and mapping them if present.

Item 6: Results of Applicable Species Surveys. Documentation describing the planning surveys conducted during the planning phase and survey results. Survey requirements are defined in the Species Conditions.

Item 7: Biological Resources Effects Assessment. Determination of project effects on biological resources addressed by the Plan (Covered Species and natural communities), as determined by a qualified biologist (Section 6.1.5, *Qualified Biologist/Qualified Professional*). Biological resources that will be evaluated include the natural community type, Stream System, and Covered Species habitat.

Item 8: Avoidance and Minimization Requirements. Documentation of any applicable avoidance and minimization requirements that will be implemented, including pre-construction surveys and construction monitoring requirements.

Item 9: Proposed Assessment of Land In Lieu of Fees. Required if the project includes land that will be offered for dedication in lieu of Land Conversion fees or as a contribution to the Reserve System, according to the conditions in Section 8.4.13, *Land Dedication In Lieu of Development Fee*.

Each item in the HCP/NCCP participation package builds on the previous item. For example, surveys for certain Covered Species (Item 6) are required only if specific natural community types are documented on the site (Items 3, 4 and 5).

The HCP/NCCP participation package was designed to provide the necessary data to track effects from Covered Activities and allow the PCA to document how it is meeting certain Plan requirements (e.g., land acquisition, stay-ahead provisions, and restoration).

6.2.4.1 Item 1: Initial Project Application Form

The Initial Project Application form will contain basic information about the property owner and the applicant as well as a brief project description. The form may be an extension of an existing project information form that is currently used by the Permittees, but with the addition of specific information relevant to the Plan. The Permittee may also develop forms specific to different types of projects. For example, a ministerial permit form may be a simplified version of a discretionary permit form. Required forms will be available through the Permittee with jurisdiction over the proposed project..

6.2.4.2 Item 2: Project Description and Site Map

The HCP/NCCP participation package will include a comprehensive description of the location, assessor's parcel number(s), and construction activity or maintenance methods. It will also include a complete description of the project, including the nature of the direct effects (permanent or temporary) andpermanent indirect effects. The project description will include information on the totality of all actions requested from the Permittees.

The project description will include a site map (e.g., tentative/parcel map, use permit site plan, design/site review site plan, or building permit plot plan) showing any positive results of pre-project surveys, the entire area on which the activity will be conducted including offsite improvements; and the areas of permanent direct, permanent indirect, and temporary effects. The site map will show any relevant landforms, roads, water bodies, or existing or proposed structures, consistent with current requirements. The scale of the site map shall be consistent with the Permittee's local requirements or the scale necessary to comply with this section. The project description will also include a vicinity map of the parcel(s) on which the activity is proposed, and the approximate 1-mile surrounding area will show where the project is within the Plan Area. The vicinity map will indicate streams or water bodies.

6.2.4.3 Item 3: Community and Constituent Habitat Types on Site and Baseline Land-cover Map Consistency

Almost all effects under the Plan are tracked by community type and the extent of constituent habitats, including wetland area. As described in Chapter 3, *Physical and Biological Setting*, a regional land-cover map was developed for this Plan. This land-cover map, that also includes estimated constituent habitat data, was used to estimate the effects of the Covered Activities (Chapter 4, *Effects of Covered Activities*) and develop the conservation strategy (Chapter 5, *Conservation Strategy*). It is referred to as the "baseline landcover map." In summary, this map incorporates data from mapping conducted prior to 2005, with revisions to vernal pool complexes (based on high-resolution aerial photography taken in April 2011 and desktop mapping conducted in 2012), and some revisions in the Foothills (based on 2009 mapping). See Chapter 3, *Physical and Biological Setting*, for more details.

The baseline land-cover map and future updates will be maintained by the PCA and made available to the Permittees and public for planning purposes. The PCA will maintain its role as the primary clearinghouse of resource data associated with implementation of the Plan, which will include checking with the California Natural Diversity Database (CNDDB), other sources (such as the California Native Plant Society's Inventory of Rare and Endangered Plants and eBird), and the Wildlife Agencies annually to incorporate new additions to the PCA resource data.

6.2.4.3.1 Community Mapping

The HCP/NCCP participation package requires a community map of the parcel at a minimum. In addition, surrounding community types will be mapped as determined on a case-by-case basis, depending on the scale of the project, the potential for indirect effects, the condition of the surrounding landscape (see below), and surveys required (see Section 6.3, *Conditions on Covered Activities*). Each jurisdiction may have site plan and tentative map requirements that will need to be met independently of the Plan mapping requirements. At a minimum, applicants will need to meet local requirements for providing information on surrounding properties.

The community map will show all community types present within the required area (parcel plus surrounding lands, as needed) using the land-cover types defined in Chapter 3, *Physical and Biological Setting*. Mapping the site will determine the land cover extent to an accuracy of 0.1 acre. The amount of each land-cover type on the site will be provided in a table with the participation package.

Land-cover mapping for lands surrounding the project boundary can be less accurate and based on aerial photography interpretation. Field verification may occur if access or visual verification is feasible. In some cases, additional mapping may be required if data mapped for the site and surrounding area are unable to demonstrate the extent of potential indirect effects on connectivity, hydrologic relationships, and surrounding land uses.

For discretionary actions, community types must be mapped by a qualified biologist or other qualified professional (see Section 6.1.5, *Qualified Biologist/Qualified Professional,* for additional details). Biologists and other professionals who are qualified to conduct land-cover mapping will have demonstrated experience from conducting vegetation mapping in the field or from aerial photography at the scale of the proposed project and in vegetation types similar to those on the project site. Forest land-cover types can also be mapped by a registered professional forester or certified arborist. If circumstances warrant (e.g., tenant improvements in existing structures, urban infill projects, and redevelopment projects on existing developed lots), the applicant may request that the field verification requirement be waived.

For ministerial actions (e.g., the issuance of a building permit for a single-family home), community types may be mapped based on Placer County GIS land-cover mapping. If this mapping shows any HCP/NCCP Aquatic Features or valley oak woodland present on the site, then the communities must be mapped by a qualified biologist or other qualified professional. Mapping will be based on available data, including current land-cover data maintained by the PCA in a GIS and current aerial photography. The local jurisdiction may require field verification if uncertainties arise.

For any project, if the local jurisdiction or qualified biologist/professional determines that the project site supports or may support any HCP/NCCP Aquatic Features, a qualified professional with wetlands expertise must be retained to conduct a delineation (see Item 4, below, for additional requirements on delineations). All HCP/NCCP Aquatic Features will be mapped regardless of their being regulated by USACE.

Applicants will include a brief description in the participation package outlining how the land-cover determinations were made. Land-cover determinations, including field reconnaissance, as needed, will be verified by Permittee staff members. Permittees may contract with the PCA to use the services of PCA biological staff members to support verifications. Permittee staff members will use the verified land-cover determination to calculate any required fees (Chapter 9, *Costs and Funding*). Redevelopment of existing developed properties or re-use of existing disturbed sites (i.e., no vegetative land cover is present) will not require site verification if the previous site disturbance was an authorized activity by a Permittee, was a legal non-conforming activity at the time the ground disturbance occurred, or was not subject to regulation by a Permittee.

6.2.4.3.2 Baseline Land-cover Map Consistency Finding

In general, effects of Covered Activities will be quantified and tracked based on existing conditions at the time the effects occur. However, the Permittee reviewing the participation package will compare information regarding existing conditions at the time an applicant requests coverage for a

project with the Baseline Land-cover Map. If current site conditions reflect a substantial degradation of habitat conditions from baseline conditions (e.g., from a change or intensification of land uses), project effects and mitigation requirements will be calculated using the baseline conditions instead of the current, degraded site conditions.

Baseline land cover will be determined using the best information and data available and will reference the following resources:

1. 2004 mapping used for the Notice of Intent for the HCP/NCCP4 (the initial Placer County Wildlife Habitat Relationship dataset)

2. 2009 Placer County Wildlife Habitat Relationship coverage (updated from 2004 based on a revised definition of vernal pool complex, and series of publicly available aerial photos)

3. Placer County spring 2011 aerial photography of the Valley

4. Placer County GIS land-cover mapping

5. Placer County historic aerial photography

6. 2008 Department of Water Resources Light Detection and Ranging (LIDAR) data and analysis, using a "depressional index" that shows topography representative of seasonal depressional wetlands

7. Any other information the landowner provides, including wetland delineations.

For the Valley, the 2011 aerial photography data will serve as the land-cover baseline, and the other resources listed will provide additional support in establishing the baseline condition as of 2011.

Upon receipt of a participation package, the Permittee with jurisdiction over the project will make a Baseline Consistency Finding. This means that the Permittee will compare current site conditions against baseline conditions and make a finding regarding whether or not significant changes have occurred. If an apparent significant change in baseline land-cover is detected, the Permittee will review the changes to determine if baseline land-cover information is inaccurate (based on a review of the data sources used to develop the baseline land-cover map) or if land-cover conditions have in fact been substantially degraded. "Substantial degradation" is defined as lands that meet any of the following criteria:

The micro-topography and hydrology of the property are substantially changed from Baseline conditions, resulting in the following:

1) Creeks, swales, and other drainages are no longer in the same location (within 100 feet).

2) At least 30 percent of ponded water and/or other wetlands are no longer present on the property.

3) The entire tree canopy of riparian vegetation has been diminished by more than 20 percent.

When current on-site land-cover differs significantly (based on the criteria described above) from the Permittee-verified baseline land-cover map, the Permittee will provide the applicant with information regarding the project baseline and qualitatively describe how the current land-cover

[4] While the Notice of Intent was issued in 2005, it utilized land cover data from the 2004 mapping effort.

differs from the baseline. The project applicant must use this data to document (e.g., quantify acreages, qualitatively describe) the extent of change to the baseline land-cover type(s) and the type of activity that caused the change when such a determination can be made. The project applicant must also re-calculate the proposed project effects using the baseline land-cover map.

This information must be submitted to the Permittee with jurisdiction over the Covered Activity and the revised information will be used to determine the effects of the project and fees owed. If impacts and fees are calculated for a project based on baseline land-cover (2011 conditions), the applicant will still use the current site conditions to evaluate the need for and apply any applicable conditions as described in Section 6.3, *Conditions on Covered Activities*.

The PCA may provide data to the Permittees to support staff members in making these determinations. A finding of non-consistency does not establish responsibility for changes to the land-cover type.

6.2.4.4 Item 4: Mapping HCP/NCCP Aquatic Features

Chapter 9, *Costs and Funding*, of the HCP/NCCP identifies required fees that apply when a project affects certain constituent habitats. Item 4 of the HCP/NCCP participation package requires mapping of HCP/NCCP Aquatic Features so that fees may be applied and impacts tracked.

Mapping of HCP/NCCP Aquatic Features has two steps: (1) delineating Waters of Placer County, and (2) mapping complete HCP/NCCP Aquatic Features. Delineations of Waters of Placer County will be based on the current CARP permitting process. If the CARP expires within the HCP/NCCP permit term, the PCA will consult with Wildlife Agencies on the appropriate delineation method to use at that time. Sources considered for guidance will include the then-current USACE delineation manual and applicable regional supplements, as well as any future policy document issued by the State Water Resources Control Board (State Water Board) (the State Water Board recently released for public review the *Procedures for Discharges of Dredged or Fill Materials to Waters of the State*). The delineation must identify the extent and type of the Water of Placer County so that the PCA can track effects.

HCP/NCCP Aquatic Features will be mapped based on delineated Waters of Placer County, but will also include buffers as required by Community Condition 1. If mapping requires access to an adjacent parcel, the project applicant will endeavor to gain permission to access the adjacent parcel to conduct a wetland delineation. If permission is not granted, the application may approximate the extent of the wetland portion of the aquatic feature using aerial photographs. Project proponents are encouraged to contact CDFW to verify survey information, if needed to comply with California Fish and Game Code section 1600 et seq. (see Section 1.5.2.3, *California Fish and Game Code Sections 1600-1616*).

6.2.4.5 Item 5: Mapping the Stream System and Salmonid Streams

Chapter 9, *Costs and Funding*, identifies fees that apply to projects that affect the Stream System or the channels of salmonid habitat streams. Item 5 of the HCP/NCCP participation package requires identifying and mapping certain stream characteristics to determine fees and track impacts. The first step is to determine whether the Stream System and salmonid habitat are present on the project site using readily available maps, and if so, to map the Stream System Boundary and salmonid habitat based on a survey of the project site.

The applicant will provide three maps of the project site from each of the following sources: (1) a U.S. Geological Survey 7.5-minute topographic map showing blueline streams or equivalent mapping downloaded from the National Hydrography Dataset (NHD); (2) a portion of the current Federal Emergency Management Agency (FEMA) floodplain map or project-specific mapping showing the 100-year floodplain; (3) a portion of the current map of salmonid stream habitat maintained by the PCA. The supporting map must identify the name of the stream and stream reach as listed on Table 3-4, and the type of salmonid habitat, if present (i.e., spawning/rearing or migration/rearing). (For a complete definition of the Stream System, see Section 3.2.7 - *Stream System.*)

If one of the above shows that the Stream System is present, then a survey must be conducted to show where Stream System elements are located on a project plan map at a sufficient scale to determine the exact location of the channel or channels and Stream System Boundary.

If streams not shown on the NHD are identified during the site survey or are identified by mapping HCP/NCCP aquatic features as described in Item 4, they must be included on the project plan map. The project plan map must provide information sufficient to determine whether streams not shown on the NHD are part of the Stream System, defined as follows.

a Defining streams not shown on the NHD will be mapped as part of the Stream System:

   1) To provide hydraulic continuity between mapped streams in the upper watershed and mapped streams in the lower watershed. This is necessary because land alteration may have erased original stream traces;

   2) If the watercourse is artificial (such as canals, channels, and flood water conveyances) and the watercourse serves in lieu of a natural stream to maintain hydraulic continuity with the watershed above, and where the channel is in an unlined, earthen condition;

   3) If the stream is determined to be perennial; or

   4) If the stream is determined to provide habitat for salmonids.

b Defining streams will be truncated at the point where the watershed falls below 40 acres in extent in order to avoid defining the Stream System around minor drainages.

c The 50-foot default Stream System Boundary may be adjusted based on site survey.

If it is determined that a drainage feature has a watershed less than 40 acres in area it is considered an upland drainage swale unless an Aquatic Resource of Placer County is mapped within the drainage feature as required by Item 4. The location of upland drainage swales should be identified on the project map but such swales are not subject to Special Habitat Fees. Drainage features with Aquatic Resources of Placer County will not have to map a Stream System Boundary but will be subject to the Aquatic/Wetland Special Habitat Fees (Chapter 9, Cost and Funding, Tables 9-5 and 9-7).

The results of Item 4 may include a determination of the OHWM which is used to determine the innermost edge of the variable-width boundary described in Table 3-4. On the project plan map, the 100-year floodplain can be mapped as determined by FEMA or as determined from project-specific information, whichever is more accurate.

The PCA will provide the current map of salmonid habitat in the Plan Area. If salmonid habitat is present, the maps provided for Item 5 must indicate the reaches of salmonid habitat , as identified

by the PCA, and be drawn at a scale sufficient to determine the exact location of the salmonid stream habitat. The map must also show any tributary or off-channel habitat present based on physical characteristics. A site survey for salmonids is not required for this plan participation item. Project proponents are encouraged to contact CDFW to verify survey information, if needed to comply with California Fish and Game Code section 1600 et seq. (see Section 1.5.2.3, *California Fish and Game Code Sections 1600-1616*).

6.2.4.6 Item 6: Results of Applicable Species Surveys

Using criteria and maps provided by the PCA, the local jurisdiction or the PCA itself will specify what species surveys are required based on the proposed activity, site location, presence of certain land-cover types, and species conditions as described in Section 6.3.5, *Conditions to Minimize Effects on Covered Species*.

The purpose of these surveys is to provide information to complete the Biological Resource Effects Assessment required by Item 8. The Biological Resources Effects Assessment will identify the avoidance and minimization requirements of Section 6.3 (*Conditions on Covered Activities*)and document the effect on, or avoidance of, key resources for tracking purposes. If surveys are implemented far enough in advance (typically 6 to 8 months), it is expected that in most cases, the identification of occupied habitat will allow sufficient time to revise the design or implementation timing of a project such that last-minute changes to the project design or schedule are avoided.

If the results of the species survey document a large or important population of a Covered Species that was not anticipated by the Plan,[5] the local agency reviewing or proposing the project must consult the PCA for advice on species avoidance and minimization measures that may be appropriate. The PCA will also contact the Wildlife Agencies.

In addition to complying with the terms and conditions of the Plan for take of Covered Species, project applicants must comply with all other applicable laws and regulations related to species protection, including, but not limited to, the Bald and Golden Eagle Protection Act; California Fish and Game Code Sections 3503 (eggs and nests of birds), 3503.5 (birds of prey), 3505 (specified birds), and 1900 et seq. (rare plants); and any California Fully Protected species or CESA-listed species not addressed by this Plan.

6.2.4.7 Item 7: Avoidance and Minimization Measures

The Permittee with jurisdiction over the proposed project will specify the conditions that apply to the project, including pre-construction surveys and construction monitoring requirements. The participation package must describe these, state how and when they will be applied, and identify the persons responsible for the additional conditions being carried out. The conditions that may apply to the project depend on the type of effects, location of the project, and natural communities and species that are present (see Section 6.3, *Conditions on Covered Activities*).

[5] Large or important populations not anticipated by the Plan are those that would greatly change our understanding of the distribution of Covered Species in the Plan Area or their habitat requirements from those that are described in this Plan. The distribution and abundance of Covered Species is expected to vary over the permit term. This Plan was developed with this understanding, and the understanding that there are likely unknown occurrences in the Plan Area, due to limitations with occurrence data.

Project applicants will apply the information obtained from Items 2, 3, 4, 5 and 6 to determine applicable avoidance and minimization measures, as follows.

- General conditions required for the project, as described in Section 6.3.1, *General Conditions.* Describe the applicable conditions.
- Natural community conditions required for the project, as described in Section 6.3.2, *Conditions to Avoid and Minimize Effects on Specific Natural Communities.* Describe the applicable conditions.
- Stream System conditions required for the project, as described in Section 6.3.3, *Conditions to Avoid and Minimize Effects on the Stream System.* Describe the applicable conditions.
- Species conditions are required for the project as described in Section 6.3.5, *Conditions to Minimize Effects on Covered Species.* Describe the applicable conditions

6.2.4.8 Item 8: Biological Resources Effects Assessment

The HCP/NCCP participation package will include a project-specific biological resources effects assessment. The effects assessment is intended to evaluate the effects of the proposed project on Covered Species and their habitat. At a minimum, the effects assessment will include the following information:

- Summary of the results from the baseline land-cover consistency review required by Item 3 and Section 6.2.4.3.2, *Baseline Land-cover Map Consistency Finding.*
- Application of the information obtained from Items 2, 3, 4, 5 and 6 to determine the project's permanent direct, indirect, and temporary effects. The effects should be summarized in an effects assessment report. The effects assessment must include all phases of development and all possible on-site and offsite disturbances.
- The acreage of effects on each natural community, Stream System, and the following habitat (those associated with a special habitat fee as described in Chapter 9, *Costs and Funding*).
    - Vernal Pool constituent habitat
    - Vernal Pool immediate watershed(s)
    - Aquatic/Wetland constituent habitat
    - Riverine/Riparian constituent habitat
    - Riverine/Riparian buffer area(s)
    - Salmonid stream channel(s)

The information is to be provided in a table, accurate to 0.01 acre. A table will also indicate the amount of each on-site land-cover type and the linear feet of riverine habitat or other linear water features.

6.2.4.9 Item 9: Proposed Assessment of Land In Lieu of Fees

If the project applicant is offering land in lieu of Plan Land Conversion fees, the PCA must conduct an initial assessment to determine if the proposed land dedication satisfies the Plan's reserve acquisition criteria. Additional information may be required before the PCA can determine

acceptability. See Section 8.4.13, *Land Dedication In Lieu of Land Conversion Fee* and Section 9.4.1.10 *Land Provided in Lieu of Development Fees,* for details regarding land in lieu of fees. Land-in-lieu transactions will require PCA and Wildlife Agency review and approval. Additionally, a Land Dedication Agreement must be executed with the PCA and the lands must be dedicated before Plan fees are due for the proponent's Covered Activity.

The schedule for HCP/NCCP participation package review will be determined by the Permittee, and a final decision on whether the land offered in lieu of fees is acceptable may not be required in order for a Permittee to deem an application complete for entitlement review and processing. However, the PCA must determine an application complete, including making a final decision on acceptability of lands offered in lieu of fees, before coverage under the Plan is extended to the project associated with the land dedication.

6.3 Conditions on Covered Activities

The conditions listed here collectively provide regional and site-specific avoidance, minimization, and mitigation of effects on natural communities and Covered Species. Not all conditions will apply to all activities. The process described in Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*, makes Permittees responsible for reviewing project design, applying appropriate conditions, and ensuring compliance.

For each condition, this section identifies the biological resource to be protected, explains which Covered Activities would need to comply, and lists specific measures in the following order: avoidance, minimization, and mitigation, where applicable. Subsequent discussion provides detail on how the conditions would be applied. BMPs are identified as guidance for some measures.

The conditions are drawn largely from Wildlife Agency guidance documents, conditions applied to other conservation plans or prior Wildlife Agency permits, and the Permittee's own BMPs, plans, ordinances, or policies. Those sources have been adapted to conditions in the Plan Area and reflect the regional scope of the Plan. As explained in Chapter 5, *Conservation Strategy*, biological objectives will be attained mainly by establishing large interconnected reserves away from future growth. For this reason, application of some conditions depends on the geography of the Plan Area, referring to (1) the PCCP map that designates the PFG distinct from the Reserve Acquisition Area (RAA) and Existing Reserves and Other Protected Areas (EXR) and (2) the Stream System map. The PCCP map and Stream System map are described in Chapter 5, *Conservation Strategy*.

Conditions, including survey protocols and storm water management BMPs, may be revised over the course of the permit term based on results of implementation through the adaptive management process. Allowing such revisions will ensure that out-of-date or unsuccessful management techniques do not persist and that best available science is incorporated into the conditions, as appropriate, for the Plan. Conditions on Covered Activities may be modified through the adaptive management process, based on results of implementation. The Wildlife Agencies will review proposed revisions to conditions on Covered Activities and respond within 30 days. The PCA will revise conditions on Covered Activities only if (1) the revisions are at least equally protective to the Covered Species, (2) there is no increase in economic burden to project applicants, and (3) the revisions are approved by the Wildlife Agencies.

Coverage for take of Covered Species under this HCP/NCCP does not remove or otherwise ameliorate requirements for a project applicant to comply with all other applicable federal, state, and/or local ordinances (e.g., CWA, Porter-Cologne Water Quality Control Act, Fish and Game Code 1600 et seq.).

6.3.1 General Conditions

Chapter 2, *Covered Activities*, describes seven categories of Covered Activities: (1) Valley PFG, (2) Valley rural development, (3) Foothills PFG, (4) Foothills rural development, (5) regional public programs, (6) in-stream programs, and (7) conservation programs. General Conditions apply to all categories of Covered Activities.

6.3.1.1 General Condition 1, Watershed Hydrology and Water Quality

All Covered Activities shall comply with the State of California General Construction Permit—including requirements to develop a project-based Storm Water Pollution Prevention Plan (SWPPP)—and applicable NPDES program requirements as implemented by the County and the City of Lincoln.

The site design requirements, source control measures, and BMPs required by this Condition will cumulatively benefit Covered Species by:

a. Minimizing the potential impacts on Covered Species that are most likely to be affected by changes in hydrology and water quality

b. Reducing stream pollution by removing pollutants from surface runoff before it reaches local streams

c. Minimizing degradation of streams and maintaining or improving the hydrograph to maintain populations of Covered Species and enhance recovery

d. Reducing the potential for scour at storm water outlets to streams by controlling the rate of flow into the streams

6.3.1.1.1 State Water Board Construction General Permit

Project applicants whose projects disturb 1 or more acres of soil or whose project disturbs less than 1 acre but the project is part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the *General Permit for Discharges of Storm Water Associated with Construction Activity* (Construction General Permit Order 2009-0009-DWQ). Construction activity subject to this permit includes clearing, grading and disturbances to the ground such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility.

A component of the Construction General Permit requires the development of a SWPPP by a certified Qualified SWPPP Developer. The General Permit also aims to match post-construction runoff to pre-construction runoff for the 85th percentile storm event. However, the runoff reduction requirements only apply to projects that lie outside of jurisdictions covered by a Standard Urban Storm Water Management Plan (or other more protective) post-construction requirements in either a Phase I or Phase II municipal separate storm sewer system (MS4) NPDES permit. The County and City are subject to such a permit. That program is described in the following section.

6.3.1.1.2 West Placer Storm Water Quality Design Manual

In 2013 the State Water Board established the Phase II Small MS4 General Permit (Order 2013-0001-DWQ). This now-current permit modified the previous permit (General Permit, Order 2003-0005-DWQ) by establishing storm water management program requirements in the Order and defining the minimum acceptable elements of the municipal storm water management program. Minimum permit requirements were established at the time of permit issuance and are no longer left to be determined later through Regional Water Board review and approval of Storm Water Management Plans.

Small MS4s are those owned or operated by the United States, a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States. Small MS4s typically support a population less than 100,000 based on the 1990 Decennial Census. The County, the City, Granite Bay Census Designated Place, the Town of Loomis, and North Auburn Census Designated Place are all identified as Permittees to Order 2013-0001-DWQ.

To comply with Order 2013-0001-DWQ, the County, the City of Roseville, the City, the City of Auburn, and the Town of Loomis jointly developed the *West Placer Storm Water Quality Design Manual* (Design Manual). The goal of the Design Manual is to provide standards that both conform to the mandates of the 2013 MS4 General and achieve the objectives of the PCCP

The Design Manual includes requirements for LID strategies that focus on preserving key elements of a project site's pre-development hydrologic function. LID is a design strategy where storm water runoff is treated as a valuable resource that can recharge groundwater supplies, protect and enhance natural habitat and biodiversity, and add value to new development or redevelopment projects. Rather than discharging storm water runoff as a waste product, projects are designed to include a diverse set of post-construction storm water controls, or BMPs that infiltrate, evapotranspire, or biotreat storm water runoff. By retaining storm water runoff on site, downstream receiving waters are provided with protection from increased pollutant loads and alterations of hydrologic functions otherwise affected by increased impervious surfaces and human activities.

6.3.1.1.3 HCP/NCCP Watershed Hydrology and Water Quality BMPs

The following BMPs are related to water quality objectives contained in the NPDES programs, but are more targeted to avoidance and minimization of effects on Covered Species and go beyond the typical requirements of a SWPPP. These BMPs apply to all Covered Activities:

1. When possible, vehicles and equipment will be parked on pavement, existing roads, and previously disturbed areas. When vehicle parking areas are to be established as a temporary facility, the site will be recovered to pre-project or ecologically improved conditions within 1 year of start of groundbreaking to ensure effects are temporary (see Section 6.3.1.4, *General Condition 4, Temporary Effects*, for the process to demonstrate temporary effects).
2. Trash generated by Covered Activities will be promptly and properly removed from the site.

3. Appropriate erosion control measures (e.g., fiber rolls, filter fences, vegetative buffer strips) will be used on site to reduce siltation and runoff of contaminants into avoided wetlands, ponds, streams, or riparian vegetation.

    a. Erosion control measures will be of material that will not entrap wildlife (i.e., no plastic monofilament). Erosion control blankets will be used as a last resort because of their tendency to biodegrade slowly and trap reptiles and amphibians.

    b. Erosion control measures will be placed between the area of disturbance and any avoided aquatic feature, within an area identified with highly visible markers (e.g., construction and erosion-control fencing, flagging, silt barriers) prior to commencement of construction activities. Such identification will be properly maintained until construction is completed and the soils have been stabilized.

    c. Fiber rolls used for erosion control will be certified by the California Department of Food and Agriculture or any agency that is a successor or receives delegated authority during the permit term as weed free.

    d. Seed mixtures applied for erosion control will not contain California Invasive Plant Council–designated invasive species (http://www.cal-ipc.org/paf/) but will be composed of native species appropriate for the site or sterile non-native species. If sterile non-native species are used for temporary erosion control, native seed mixtures must be used in subsequent treatments to provide long-term erosion control and slow colonization by invasive non-natives.

4. If the runoff from the development will flow within 100 feet of a wetland or pond, vegetated storm water filtration features, such as rain gardens, grass swales, tree box filters, infiltration basins, or similar LID features to capture and treat flows, shall be installed consistent with local programs and ordinances.

6.3.1.2 General Condition 2, Conservation Lands: Development Interface Design Requirements

Covered Activities that occur in or adjacent to the Reserve System, or adjacent to existing reserves, mitigation sites, and conservation banks, will incorporate design requirements to minimize the indirect effects of development on these types of conservation lands in the permit area.

This condition applies when new infrastructure projects, and urban and rural development occur in or adjacent to Plan reserves, mitigation and conservation banks, and any other property protected by an in-perpetuity conservation mechanism for natural lands management. The local jurisdiction (i.e., County or City)will determine which development projects are subject to this condition as well as which components may be required for a particular development. The PCA will provide technical assistance when requested by the local jurisdiction. Design requirements will be incorporated in new development at the reserve-development interface, if appropriate, and at the project applicant's expense. The design requirements set by the local jurisdiction may include, but are not limited to, those listed as design guidelines below.

Although the Plan reserves are required to provide internal buffers, when necessary, to protect reserves from adjacent development and other effects (see Section 5.3.1.3.3, *Buffer Zones*), adjacent development could have effects on reserves that extend beyond reserve buffers. The purpose of this

condition is to provide additional measures to minimize effects on Covered Species and natural communities in reserves from neighboring urban and rural development.

6.3.1.2.1 Conservation Lands: Development Interface Design Requirements

Beyond minimizing direct and indirect effects, the design of new development occurring adjacent to conservation lands will consider indirect and long-term effects, such as runoff from developed areas, which can transport harmful substances (e.g., pesticides, fertilizer, automotive fluids, sediment) into conservation lands; changes to hydrological conditions; the establishment of invasive non-native species, which can disperse from landscaped areas; and potential structural and biological damage (e.g., soil compaction, creation of unauthorized trails, disturbance of sensitive species) that can result from unmanaged human access and use. Application of the following design requirements will help minimize the potential for indirect effects of development on conservation lands.

1. Signage will be posted to notify of any usage restrictions and to educate the public on the sensitivity of the area and usage restrictions.
2. Fencing will be installed at the boundary between developed areas and reserves to prevent illegal access by people and pets, unless the conditions on the reserve make trespass unlikely (i.e., surrounded by canals that are difficult to cross). Fences will be suitable to the conditions in the adjacent reserve. The type of fence required will be at the discretion of the County or City, as permitted by County and City codes. Fences will have limited gates and be designed with consideration to not allowing movement of people and their pets. Access will be limited to maintenance and monitoring activities unless a habitat management plan specifies otherwise.
3. Natural or artificial barriers or other access restrictions may be installed around development to protect sensitive land-cover types and Covered Species in the reserves. If used, barriers will be designed so they are appropriate for site conditions and the resources being protected. Some barriers should keep domestic pets outside the reserve, other barriers should keep Covered Species inside the reserve. Before installation of a barrier, consideration shall be given to freedom of movement by Covered Species. If the barrier would prevent movement, or if the barrier would encourage species to use other, less-favorable crossings, alternative solutions shall be considered.
4. Roads constructed adjacent to reserves will be fenced to restrict unauthorized public access. Through the conditional approval process, the Permittee will only approve fencing that is appropriate (e.g., chain link, post and cable, barbwire) to allow movement of wildlife between reserves.
5. Development will be designed to minimize the length of the shared boundary between development and the reserves (i.e., minimize the urban edge, perimeter).
6. Incorporation of high-intensity lighting (e.g., floodlights used for recreational facilities and commercial parking lots) into site improvement standards near reserves will be avoided. Low-glare, no-glare, or shielded lighting will be installed in developed areas adjacent to reserves to minimize artificial lighting of reserve lands at night. The height and intensity of lights shall be kept to a minimum. Resources providing technical support include publications of the Illuminating Engineering Society of North America and its *Lighting Handbook, Reference & Application, Ninth Edition, and Recommended Practices*. The intent of this avoidance and minimization measure is to design a lighting system, where determined necessary, that maintains public safety and security in the project area while curtailing the degradation of the

nighttime visual environment on the reserve property by limiting nighttime light radiation and/or light spill.

7. Public facilities, such as ballparks and fields that require high-intensity night lighting (i.e., floodlights), will be sited at least 0.5 mile from the reserve boundary to minimize light pollution. Facilities may be sited closer to the Reserve System if the PCA determines the lighting system will not be intrusive to wildlife within the Reserve System (e.g., hills block the lighting).
8. For any landscaping adjacent to reserve properties, non-invasive plants will be required, and the use of native plants will be highly encouraged, consistent with County landscape design guidelines (Placer County 2013) or similar standards for the City of Lincoln.

Any of the above design requirements, or similar requirements developed over time, that are incorporated into projects will be located within the development footprint. These project features will be maintained by the property owners. Conditions of approval on projects are monitored by County or City staff during the construction and development phase and are enforced over time through the efforts of professional land development staff familiar with the project or a code enforcement division. If projects are found to be out of compliance, standard remedial actions would be applied and may include: code enforcement, use of securities, revocation or modification of entitlement. Violations will be reported to the PCA, Wildlife Agencies, and applicable local jurisdiction for potential enforcement.

The above avoidance and minimization measures are intended to serve as guidelines that establish, at a minimum, how effects at the development interface with the Reserve System and other conservation lands can be avoided and minimized. Site conditions may introduce additional opportunities that will need to be considered on a case-by-case basis (e.g., topographic conditions, location of passive recreational facilities, native landscaping buffers).

Non-participating local jurisdictions are encouraged to consult with the PCA during the development review process for large projects planned at the boundary of existing reserves.

6.3.1.3 General Condition 3, Land Conversion

Covered Activities that would result in permanent conversion of natural land cover must pay fees or otherwise contribute to establishing the Reserve System and are subject to the maximum extent of take proposed under the Plan.

Land conversion refers broadly to an activity or process that results in the permanent conversion of a natural or semi-natural land cover to an urban, suburban, rural residential, or other artificial, built-up, or otherwise non-natural condition. It is not meant to apply when one natural or semi-natural land-cover type is converted to another natural or semi-natural land-cover type. It is also not meant to apply to changes in agricultural crop types, which is not a Covered Activity addressed by the Plan. Application of this condition is a key provision of the Plan. Land conversion allowable under the permits will be subject to an overall maximum extent of take. The proposed extent of take sets a maximum acreage of cumulative land conversion from all Covered Activities. Proposed maximums are set for several communities and are listed in Table 4-1 for permanent effects. Proposed maximums are also set for geographical Plan subareas, with some provision for flexibility in shifting allowable take between subareas.

The conservation strategy outlined in Chapter 5, *Conservation Strategy*, serves at a regional scale as conservation in perpetuity for Covered Species and mitigation for the effects of Covered Activities.

Fees collected for land conversion will fund land acquisition, restoration, and long-term management and monitoring of similar or higher quality land than those lands affected by Covered Activities.[6]

Covered Activities will be assessed fees based on the parameters described in Chapter 9, *Costs and Funding,* and summarized in Table 9-6. In the Valley the fees will be applied when projects affect natural, semi-natural, and other agricultural communities. These communities include the following land-cover types:

a. Grassland

b. Vernal Pool Complex

c. Aquatic/Wetland Complex

d. Riverine/Riparian Complex

e. Oak Woodland

f. Valley Oak Woodland

g. Rice Agriculture

h. Field Agriculture

i. Orchard and Vineyard Agriculture

j. Rural Residential

In the Valley, the land conversion fee will not apply to ground disturbance in urban (non-natural) communities except if a special habitat fee applies. Special habitat fees for restoration and enhancement will apply to any ground disturbance to a constituent habitat regardless of community type (see Chapter 3, *Physical and Biological Setting*, Table 3-6 for a list of constituent habitats). In urban (non-natural) communities, the land conversion fee would apply to the same area of ground disturbance as the special habitat fee.

In the Foothills, an open space fee will be assessed on ground disturbance of urban (non-natural) communities to reflect the open space and fuels management benefits of the Plan to all Foothills development. As with the Valley, special habitat fees will apply to ground disturbance in any community where a constituent habitat is present.

Chapter 9, *Costs and Funding,* describes how fees will be applied based on the parcel or the development area, depending on the type of covered activity and if the project applicant is a Permittee or not. For projects where fees are based on the entire parcel, the project applicant can demonstrate portions of the parcel will be fully avoided, as described in the following section (Section 6.3.1.3.1, *Permanent Effect Avoidance in the PFG*) and in other conditions on Covered Activities described in this chapter. Fees will not be levied on lands that are completely avoided per the terms of this chapter. The fee calculation is described in further detail in Chapter 9, *Costs and Funding*.

[6] The HCP/NCCP also provides additional conservation beyond mitigation. The fees, however, apply to the mitigation component of the conservation strategy.

6.3.1.3.1 Permanent Effect Avoidance in the PFG

The past trend toward large projects is expected to continue in the Valley and to a lesser extent, in the Foothills in the portion of the Plan Area designated as PFG (Components A1 and A3). These projects typically involve large tracts of undeveloped land converted to fairly dense urban or suburban uses. Open space areas may be left within the project site, but these serve mainly aesthetic, flood control, or recreational purposes rather than biological conservation. Such small, avoided areas are subject to indirect effects so that any original habitat values are difficult to manage and protect. For this reason any open space proposed as part of a Covered Activity will be considered part of the project effects and, therefore, assumed to be permanently affected and not exempted from the Plan fees, unless the open space meets avoidance criteria described below. See Chapter 9, Section 9.4.1.8, *Timing of Development Fee Payment* for application of fees to multi-phase projects.

To qualify as "avoided," land within the PFG must meet all the applicable natural community and Covered Species habitat requirements in Section 6.3.2, *Conditions to Avoid and Minimize Effects on Specific Natural Communities,* and Section 6.3.5, *Conditions to Minimize Effects on Covered Species.* Avoided lands must also meet at least one of the following criteria:

1. It is a minimum of 200 contiguous acres.
2. It is located adjacent to the RAA or adjacent to an existing reserve that together totals at least 200 acres (either a HCP/NCCP reserve or a non-HCP/NCCP reserve protected in perpetuity).
3. It is located in or abuts the Stream System boundary.
4. It contributes to meeting the goals and objectives of the Plan as described in Chapter 5, *Conservation Strategy*, and as determined by the PCA (i.e., the PCA may want to acquire the avoided area for the Reserve System).
5. It is set aside to avoid occurrences of certain Covered Species or sensitive land-cover types per the conditions in this chapter.
6. It is required to be avoided by the PCA .

The avoidance determination, including an evaluation of direct and indirect effects, will be made by the Permittee with jurisdiction over the project in consultation with the PCA and will take into account such factors as the avoidance area's relationship to existing or potential reserves, edge:area ratio, and Stream System boundary. The Permittee may consult with the PCA for guidance in determining the extent of the reduction of effects.

Any part of a project site that is deemed to have avoided take is not subject to the application of fees, and establishment of a conservation easement is not required. Avoidance does not necessarily mean that the excluded land is suitable to be credited as land to be incorporated into the Reserve System in lieu of fees (see below for additional discussion on land in lieu of fees). If the avoided land is to be included as part of the Reserve System, the Wildlife Agencies must review and approve such inclusion.

6.3.1.3.2 Permanent Effect Avoidance for Low Density Rural Development

Low density rural development comprises 1) new rural residential use, 2) appurtenant or accessory activities or structures for existing rural residential uses, and 3) activities or structures for rural non-residential land uses. The following considerations will apply to low density rural development

that is anticipated to include most non-public Covered Activities in the Conservation and Rural Development portion of the Plan Area (components A2 and A4 comprising the RAA and EXR) and in the Foothills portion of the PFG, plus some limited non-public Covered Activities in the Valley portion of the PFG.

Because low density rural development may leave a large portion of a parcel undisturbed and where these Covered Activities occur on existing parcels already subject to fragmentation and indirect effects, fees for new rural residential development are graduated based on whether subdivision of an existing parcels occurs and the number of resulting parcels (see Chapter 9, *Costs and Funding*). The PCA will track the estimated actual impact of rural residential development and the graduated fee may be adjusted if impacts in the aggregate differ from the assumptions used to set the fee. For structures or activities that are appurtenant or accessory to rural residential uses, and activities or structures that support rural nonresidential land uses, land conversion fees will apply to the disturbed area footprint.

6.3.1.3.3 Land Provided In Lieu of Fees

Project applicants wishing to receive full or partial credit toward their fee obligations may offer land in lieu of fees. Details regarding land in lieu of fees are provided in Section 9.4.1.10, *Land Provided in Lieu of Development Fees*.

6.3.1.4 General Condition 4, Temporary Effects

Covered Activities that result in temporary effects on natural land cover must pay fees and are subject to the maximum extent of take proposed under the Plan.

In addition to verifying the land cover on the project site as described in Section 6.2.4.3, *Item 3: Community and Constituent Habitat Types on Site and Baseline Land-cover Map Consistency*, project applicants of Covered Activities that have temporary effects are required to provide documentation related to the nature of the effects. To qualify for the temporary effect fee, applicants must document pre-project conditions and propose performance standards for the affected natural community as part of their participation package. The purpose of these performance standards is to demonstrate to the local jurisdiction that temporary impact sites will be returned to pre-project conditions within 1 year of starting ground disturbance at that location. Performance standards will vary based on natural community type affected, but should include metrics such as percent vegetative cover, vegetation height, restored topography, or restored hydrology. One year after project groundbreaking, the applicant will provide the Permittee with jurisdiction over the project with a written assessment of how the performance standards were met. Based on this information, the Permittee will determine whether the project impacts were actually temporary. If it is determined the effects remain 1 year after groundbreaking activities have commenced, the effects will be considered permanent and fees will be reassessed based on those effects, as described in General Condition 3, *Land Conversion*.

Temporary effects allowable under the permits will be subject to overall maximum effects. If a plot of land is subjected to temporary disturbance more than once, that temporary effect is only counted once in the cumulative tally of maximum effects. Proposed temporary effect limits are set for several communities and are listed in Table 4-3 . Proposed maximum temporary effects under the permits are established for geographical Plan subareas, with some provision for flexibility between subareas.

Within 2 years of permit issuance, the PCA will provide guidelines to all applicants on recommended performance standards for each affected natural community that, if met, would meet the intent of the temporary impacts. At any time, Permittees may confer with the PCA in the review and approval of the performance standards.

6.3.1.5 General Condition 5, Conduct Worker Training

If project-specific conditions for avoidance or minimization apply during construction, all project construction personnel will participate in a worker environmental training program that will educate workers regarding the Covered Species and their habitats, the need to avoid impacts, state and federal protection, and the legal implications of violating environmental laws and regulations.

This condition applies to projects where compliance with the Conditions described in this Chapter would result in one or more avoidance and minimization requirements applied during construction (e.g., maintenance of an avoidance buffer, placement of exclusion fencing). At a minimum, this training may be accomplished through "tailgate" presentations at the project site and the distribution of informational brochures, with descriptions of sensitive biological resources and regulatory protections, to construction personnel prior to initiation of construction work.

6.3.2 Conditions to Avoid and Minimize Effects on Specific Natural Communities

The General Conditions set forth above address conservation issues at a landscape-scale level, which incorporates the major natural communities in the Plan Area. Because of their biological sensitivity and/or regulatory status, several natural communities have specific conditions. Additional avoidance and minimization requirements apply to the following natural communities within the Plan Area:

- Vernal Pool Complex
- Aquatic/Wetland Complex
- Riverine/Riparian Complex (this is in addition to Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*)
- Valley Oak Woodland

The specific conditions define what constitutes avoidance and set mitigation requirements in addition to the general landscape conservation strategy defined above. Mitigation for take of these natural communities involves off-site restoration at an area ratio of 1.5:1. Restoration will be overseen by the PCA. Restoration will be funded through fees paid in addition to land conversion fees. Restoration undertaken on site by the project applicant may serve in lieu of some or all of the special habitat fee if it meets all the applicable requirements described in Section 5.3.1, *Conservation Measure 1, Establish the Reserve System*; Section 5.3.3, *Conservation Measure 3, Restore and Create Natural Communities and Covered Species Habitat*; and Chapter 8, *Plan Implementation*, regarding use of land in lieu of fees and restoration in lieu of special habitat fees. Valley Oak Woodland restoration will be funded by the land conversion fee.

6.3.2.1 Community Condition 1, Wetland Avoidance and Minimization (Vernal Pool and Aquatic/Wetland Complex)

This condition describes how avoidance is determined for constituent habitat within the vernal pool complex and aquatic/wetland complex communities. It also describes how effects on aquatic/wetland complex constituent habitat that cannot be avoided are minimized and, in cases where permanent effects on vernal pool constituent habitat may occur, the process for allowing the PCA to salvage vernal pool inocula.

Vernal pool constituent habitat includes vernal pool wetlands, seasonal wetland in vernal pool complex, and seasonal swales. Aquatic/wetland constituent habitat (also called *other wetlands* in this condition) encompasses fresh emergent marsh, non-vernal pool seasonal wetland, and lacustrine and includes all Waters of Placer County where avoidance buffers are not otherwise applied (Section 6.3.2.1.1, *Community Condition 1.1, Avoidance for Vernal Pool Complex Constituent Habitat*, and Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*). This category includes flowing springs and long-duration seeps not located inside the Stream System. See Chapter 3, *Physical and Biological Setting*, for a description of each constituent habitat type.

Projects that affect vernal pool constituent habitats and other wetlands must also adhere to applicable Species Conditions to minimize effects on certain Covered Species that may occur in these habitat types.

6.3.2.1.1 Community Condition 1.1, Avoidance of Vernal Pool Complex Constituent Habitat

Covered Activities are required to mitigate for impacts, generally through payment of fees if project activities encroach on a vernal pool constituent habitat wetland or its immediate watershed.

As described Section 6.3.1.3, *General Condition 3, Land Conversion*, and Section 6.3.1.4, *General Condition 4, Temporary Effects*, projects resulting in direct permanent or temporary effects on certain communities and/or constituent habitats are required to mitigate for the impacts, generally through payment of fees. This condition describes how impacts on vernal pool constituent habitat is evaluated for the HCP/NCCP participation package.

Impact evaluation will consider whether ground disturbance from a Covered Activity encroaches on (1) the Delineated Wetland or (2) the Immediate Watershed of a vernal pool constituent habitat feature.

Delineated Wetland. Where ground disturbance alters any portion of a vernal pool constituent habitat, the entire wetland area is considered to be subject to permanent direct effect. The wetland perimeter will be based on a wetland delineation for on-site aquatic features (see Section 6.1.1, *Definitions*). If an affected wetland crosses a property boundary where ground access required for wetland delineation is not available, the wetland perimeter of the portion of the wetland which falls outside of the project site will be based on aerial photography, LIDAR, or other approved techniques. The full area of a wetland subject to permanent direct effect will be subject to Special Habitat, Vernal Pool Constituent Habitat, Direct Effect Fee 7a set forth in Chapter 9, *Costs and Funding*, and will count against the proposed maximum extent of take described in Chapter 4*, Effects of Covered Activities*, Table 4-1.

Immediate Watershed. Where ground disturbance encroaches on the Immediate Watershed (see Section 6.1.1, *Definitions*) of vernal pool constituent habitat, that wetland area will be considered to be subject to indirect effect. Any vernal pool constituent habitat that falls within 250 feet from the edge of the project footprint must be evaluated for potential effect. The plan distinguishes whether the indirectly affected wetland is on or off the project site:

- The full area of a wetland on the project parcel with an Immediate Watershed overlapping any portion of the project footprint will be subject to Special Habitat, Vernal Pool Constituent Habitat, and Immediate Watershed Impact Fee 7b (see Chapter 9, *Costs and Funding*) and will be tracked by the PCA.
- The full area of a wetland not on the project parcel with an Immediate Watershed overlapping any portion of the project footprint will not be subject to fees, but the area will be tracked as an offsite indirect effect (i.e., 10% of the direct effects) as described in Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley.* Fees will only be paid for impacts that occur on the project parcel. The project parcel boundary used to evaluate effects calculate fees will be based on the parcel boundaries at the time of Plan adoption.

Vernal pool constituent habitat determined to be subject to indirect effects on the Immediate Watershed will be subject to assessment for direct effects on the Delineated Wetland at any time in the future they are subject to disturbance by Covered Activities. Prior payment of indirect effect Immediate Watershed fees will not affect the status of the wetlands subject to direct effect fees.

Immediate Watershed Avoidance Measures

- Immediate Watersheds that will be avoided will be temporarily staked in the field by a qualified professional to ensure construction equipment and personnel completely avoid these features.

6.3.2.1.2 Community Condition 1.2, Avoidance of Aquatic/Wetland Complex Constituent Habitat

Covered Activities are required to mitigate for impacts, generally through payment of fees if project activities encroach on a non-vernal pool wetland (other wetlands) or its buffer.

This condition describes how impacts on constituent habitat within the aquatic/wetland complex (i.e., "other wetlands") are avoided. Avoidance requirements for other wetlands will be evaluated on a case-by-case basis and will be determined by a qualified biologist hired by the PCA. If the project applicant desires to apply measures to avoid impacts on a resource and, as a result eliminates fee obligations, a buffer will be used to insure that the avoided resource retains pre-project functions and services.

The qualified biologist will determine whether the establishment of an avoidance buffer is appropriate. If applied, the buffer width will vary by project based on the sensitivity and vulnerability of the avoided resources.

The PCA biologist will consider the following when determining the buffer.

- Adjacent land use and nature of potential on-going disturbance to the avoided feature
- Adjacency to existing Reserve System lands or the RAA
- Existing and potential future hydrologic connections (e.g., new storm drain outfalls), which may have a significant effect on the quality, type and function of the feature

- Vertical/topographical separation, particularly in the Foothills
- Species avoidance buffers (per Section 6.3.5, *Conditions to Minimize Effects on Covered Species*)

In cases of disagreement with the qualified biologist's determination regarding the sensitivity and vulnerability of avoided resources or the buffer width, the Wildlife Agencies will be consulted to support resolution of such controversy.

Covered Activities that fully avoid the other wetland and its associated buffer will be deemed to have avoided these resources so long as the project applicant can also demonstrate the water source, including quantity of inflow, has not changed compared with pre-project conditions. This may require that a qualified professional prepare a hydrologic study of the wetland and anticipated effect, or lack thereof, on the wetland as a result of project implementation. The avoidance determination process applies to all other wetlands and buffers that may be affected by a project, even if a portion of the other wetland and buffer is on a different parcel than that on which the project is occurring. As such, the project applicant must evaluate all on-site and nearby aquatic features. If access to determine the extent of aquatic features—and therefore the extent of the buffer and potential for impact—is not allowed, a qualified professional will determine the extent of adjacent aquatic features using available resources, including current aerial photos and baseline data information provided by the PCA, and will apply best efforts to assess the extent of the adjacent aquatic feature visually from areas of allowable site access.

Impacts on other wetlands will be evaluated on a case-by-case basis by the PCA's qualified biologist in instances where the project does not fully avoid the other wetland and buffer. Project impacts on an entire wetland may be assessed under the PCCP if only a portion of the Water of Placer County is affected (permanently or temporarily). The PCA will be make a final determination regarding avoidance or level of impact. At a minimum, project applicants must comply with Community Condition 1.3, *Wetland Impact Minimization Measures*.

The required buffer will not be used to determine the area of indirect effect for other wetlands. The determination that an indirect effect may or will occur will be project-based, and depend on the specific circumstances present at the project site. Indirect effects on buffers or other wetlands will not be deducted as part of the proposed maximum extent of take.

Fees will only be paid for impacts that occur on the project parcel. The project parcel boundary used to evaluate effects will be based on the parcel boundaries at the time of Plan adoption.

Other Wetland Avoidance Measures

- Other wetlands and their associated buffers that will be avoided will be temporarily staked in the field by a qualified professional to ensure construction equipment and personnel completely avoid these features.

6.3.2.1.3 Community Condition 1.3, *Aquatic/Wetland Complex* Impact Minimization Measures

Covered Activities that minimize effects on the Aquatic/Wetland Complex constituent habitat may qualify to count those effects as temporary rather than permanent. If activities associated with Covered Activities are proposed to occur within other wetlands and their associated buffers, the activities must comply with Wetland Impact Minimization Criteria *(below) to have project effects count as temporary instead of permanent.*

Wetland Impact Minimization Criteria

Other wetlands and their buffers will be considered temporarily affected if all of the following criteria are met and if the project also complies with General Condition 1, *Watershed Hydrology and Water Quality*. If a project in other wetlands or their buffers does not comply with the following criteria, the effect will be assessed as permanent across the entire delineated area:

1. Personnel conducting ground-disturbing activities in or around other wetlands must be trained by a qualified biologist in these minimization measures and the permit obligations of project applicants working under the Plan.
2. Construction and maintenance vehicles or equipment cannot be refueled within the wetland or its buffer unless a bermed and lined refueling area is constructed and hazardous material absorbent pads are available in the event of a spill.
3. No equipment will be present in the wetted portion of the aquatic feature. Equipment may only enter the area when the aquatic feature is dry and there is no forecasted rain within 72 hours. Vehicles will be checked for leaks prior to entering or traveling around the aquatic feature.
4. All organic matter must be removed from nets, traps, boots, vehicle tires, and all other surfaces that have come into contact with aquatic features, or potentially contaminated sediments. Items shall be rinsed with clean water before leaving each study site (U.S. Fish and Wildlife Service 2005).
5. Measures to minimize the spread of disease and non-native species shall be implemented based on current Wildlife Agency protocols (e.g., *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog*, Appendix B, *Recommended Equipment Decontamination Procedures* [U.S. Fish and Wildlife Service 2005]) and other best available science.
6. Used cleaning materials (e.g., liquids) must be disposed of safely and, if necessary, taken off site for proper disposal. Used disposable gloves shall be retained for safe disposal in sealed bags (U.S. Fish and Wildlife Service 2005).
7. Native vegetation (shrubs and small trees) must be planted between other wetlands and the development such that the line of sight between other wetlandsand the development is shielded. This measure is only required when the reviewing Permittee deems it necessary to shield other wetlandsfrom adjacent development or to avoid direct or indirect effects from the adjacent development (e.g., trespass).
8. The reviewing Permittee will make a determination if fencing shall be required on a case-by-case basis. If needed, the type of fencing will match the activity and impact types. For example, projects that have the potential to cause erosion will require erosion-control barriers, and projects that may bring more household pets to a site must have permanent fencing to exclude pets. The temporal requirements for fencing also depend on the activity and impact type. For example, fencing to minimize permanent effects will be permanent, and fencing to minimize short-term effects will be removed after the activity is completed. Permanent fencing will be installed after grading or other construction activities in the area have been completed. If installed, a party responsible for maintenance will be identified prior to construction.

6.3.2.1.4 Community Condition 1.4, Salvage of Vernal Pool Constituent Habitat

Covered Activities that result in the conversion of vernal pool constituent habitat must grant adequate and timely access to allow for salvage as directed by the permitting jurisdiction or PCA.

If a project cannot avoid effects, vernal pool constituent habitat wetland soil and other wetland biota may be salvaged through the collection and storage of seeds, cysts, eggs, spores, and similar inocula for other vernal pool constituent habitats that will be created or restored elsewhere in the Plan Area. Work will be undertaken by the PCA, and the decision regarding whether to salvage, the protocol used to salvage, storage arrangements, and the amount to be collected will be at the discretion of the PCA, based on consultation with CDFW and USFWS.

Collection from vernal pool constituent habitat usually occurs when the pool is dry (typically June 15 to October 15), and the collection of other wetland biota may occur at other times, but should occur during the dry season for best possible preservation of seeds and other resources contained in the soil. Prior to collection, the PCA staff conducting the salvage will determine whether the vernal pool constituent habitats is infested with invasive plants. If a vernal pool constituent habitats is found to be infested, the PCA will first consult with CDFW and USFWS regarding the appropriateness of harvesting inoculum from the affected vernal pool constituent habitats.

This condition requires that a project applicant schedule grading and construction in coordination with PCA salvage. Project applicants notify the PCA of their construction schedule to allow the PCA the opportunity to salvage soils, and the PCA must make salvage plans sufficiently far in advance so as to not unreasonably impair construction.

6.3.2.1.5 Community Condition 1.5, Wetlands Restoration

Covered Activities that permanently or temporarily affect vernal pool constituent habitat and other wetlands,must contribute to restoration or creation of these resources as mitigation.

In general, the PCA will be responsible for implementing restoration or creation projects for vernal pool constituent habitat and other wetlands. The project applicant is responsible for paying a fee, as specified in Chapter 9, *Costs and Funding*. The PCA will select restoration or creation sites on the Reserve System based on criteria in Chapter 5, *Conservation Strategy*. Alternately, credits may be purchased at a qualifying mitigation bank (Section 8.4.7, *Private Mitigation and Conservation Banks*), or—with pre-approval by the PCA—restoration or creation may be undertaken on the project site. Restoration and/or creation on the project site itself would be overseen by the PCA, consistent with restoration and creation guidelines described in Chapter 5, *Conservation Strategy*.

6.3.2.2 Community Condition 2, Riverine and Riparian Avoidance and Minimization

This condition, focusing specifically on the riverine and riparian constituent habitat components of the Riverine/Riparian Complex community, is supplemental to Stream System Condition 1, *Stream System Avoidance and Minimization*.

6.3.2.2.1 Community Condition 2.1, Riverine and Riparian Avoidance

Covered Activities that avoid effects on the riparian constituent habitat by excluding construction or other ground disturbance from existing riparian vegetation are not subject to special habitat fees.

Riparian can be credited as avoided and a project will not be assessed special habitat fees if the project does not modify any area within a buffer that extends 50 feet outward from the outermost bounds of the riparian vegetation. The riparian buffer does not include patches of invasive, non-native vegetation that extends beyond the riparian vegetation.

If a project cannot avoid effects on riparian vegetation and surrounding buffer, Community Condition 2.2, *Minimize Riverine and Riparian Effects*, will apply. An avoidance buffer is not required for streams not otherwise addressed through the Stream System conditions (Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*); however, all other Community Condition 2 requirements apply.

6.3.2.2.2 Community Condition 2.2, Minimize Riverine and Riparian Effects

Where riverine and riparian constituent habitat avoidance is not feasible, Covered Activities shall minimize effects on riverine and riparian constituent habitat by following design, construction, and operations minimization measures.

Project applicants are incentivized to avoid riverine and riparian constituent habitat (see Community Conditions 2.1 and 2.3, *Riverine and Riparian Woodland Avoidance* and *Riverine and Riparian Woodland Restoration,* respectively). Nonetheless, some Covered Activities will occur within the riverine and riparian constituent habitat; therefore, projects will adhere to avoidance measures, as applicable. Note that separate conditions to address avoidance and minimization of effects on the Stream System (Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*), and Covered Species (Section 6.3.5, *Conditions to Minimize Effects on Covered Species*) are also required, if applicable, as described in this chapter.

Placer County Water Agency (PCWA) activities are covered separately under Community Condition 2.4, *Placer County Water Agency Operations and Maintenance Best Management Practices*.

The design requirements and construction BMPs identified below reflect current and forthcoming regulations and guidelines for in-stream project design (e.g., the State Water Board's draft *Procedures for Discharges of Dredged or Fill Materials to Waters of the State* and NMFS's *Guidelines for Salmonid Passage at Stream Crossings*). These BMPs will be updated as new information is available. Updated BMPs shall be at least as restrictive for protection of the species as those described here, and Wildlife Agencies will approve proposed changes to the BMPs before the revised BMPs are applied to Covered Activities.

Types of Projects Subject to Condition

Covered Activities in the Stream System are subject to BMPs to reduce effects on streams. BMPs will apply to all Covered Activities in the Stream System in the Plan Area as well as to open canals, except for PCWA canals, which are addressed in Community Condition 2.4, *Placer County Water Agency Operations and Maintenance Best Management Practices.*

BMPs

BMPs are listed in Table 6-1. These BMPs will be applied to Stream System projects and will decrease the potential for degradation of streams in the Plan Area. Additional BMPs are required for projects that are covered under the CARP.

Separate conditions to address avoidance and minimization of effects on Covered Species are also required, if applicable, as described in this chapter.

Table 6-1. In-stream and Stream System BMPs

ID[a]	Avoidance and Minimization Measure	Location[b]
	Project Planning and Design	
	All Covered Activities shall minimize the area of disturbance in Stream System to the maximum extent practicable.	Stream System
	Prior to final project design, site characteristics will be evaluated to determine if non-traditional designs, such as bioengineered bank treatments that incorporate live vegetation, or other engineered habitat improvements, can be successfully utilized while meeting the requirements of the project.	Stream System
	If structural changes to the channel bed are necessary as part of project design, provisions for fish passage will be incorporated into the project design.	Channel
	To minimize impact of new construction, existing access routes and levee roads shall be used.	Stream System
	Removal of riparian vegetation shall be minimized so the amount cleared will only be the amount necessary to accomplish the required activity and comply with public health and safety directives. Where riparian vegetation requires removal, removal will first be targeted in areas dominated by invasive vegetation.	Stream System
	Maintenance of natural stream characteristics, such as riffle-pool sequences, riparian canopy, sinuosity, floodplain, woody debris, and a natural channel bed, will be incorporated into the project design.	Channel
	Stream bank repair design will first consider only use of compacted soil, and will be re-seeded with native grasses or sterile non-native hybrids and stabilized with natural erosion control fabric. If compacted soil is not sufficient to stabilize the slope, bioengineering techniques must be used. No hardscape (e.g., concrete or any sort of bare riprap) or rock gabions may be utilized in streams not managed for flood control (i.e., streams where channel clearing, vegetation and debris removal, and conveyance maintenance activities are conducted) except in cases where infrastructure or human safety is threatened (e.g., undercutting of existing roads).	Stream System
	Rock riprap may only be used to stabilize channels experiencing extreme erosion or posing a threat to public safety. When used, rock riprap must be large enough and installed to withstand a 100-year flow event, and planted with native riparian species suitable for planting in such a manner.	Channel
	Limit removal of instream woody material (IWM) and vegetation in channels, on stream banks, and along levees and maintenance roads to only that necessary to meet the objective of the Covered Activity, or to meet regulatory requirements or guidelines.	Stream System
	In streams not managed for flood control purposes (i.e., streams where channel clearing, vegetation and debris removal, and conveyance maintenance activities are conducted) woody material (including live leaning trees, dead trees, tree trunks, large limbs, and stumps) will be retained unless it is threatening a structure, impedes reasonable access, or is causing bank failure and sediment loading to the stream.	Channel

ID[a]	Avoidance and Minimization Measure	Location[b]
	If debris blockages threaten bank stability and may increase sedimentation of downstream reaches, debris will be removed. When clearing natural debris blockages (e.g., branches, fallen trees, soil from landslides) from the channel, only remove the minimum amount of debris necessary to maintain flow conveyance (i.e., prevent significant backwatering or pooling). Non-natural debris (e.g., trash, shopping carts) will be fully removed from the channel.	Channel
	To minimize the effect of increased local erosion due to in-channel vegetation removal, the top of the bank shall be protected by leaving vegetation in place to the maximum extent possible.	Stream System
	Avoid access routes on slopes of greater than 20 percent used to access upland areas adjacent to streams and riparian areas. Any upland access across sloped areas shall be examined for evidence of instability and either revegetated or filled to prevent future landslide or erosion.	Stream System
	Avoid activities in the active (i.e., flowing) channel to the maximum extent practicable, especially during the migration, spawning, and egg incubation season for listed fish species, or before amphibians have undergone metamorphosis. If activities must be conducted in the active channel, limit the use of equipment for in-water work to hand tools to the extent practicable.	Channel
	Bank stabilization site design shall evaluate hydraulic effects immediately upstream and downstream of the work area to minimize downstream erosion caused by changes in water velocity. Design of bank stabilization projects shall incorporate similar roughness and characteristics of the bank surrounding the project area.	Channel
	Trails will be sited and designed with the smallest footprint necessary to cross through the Stream System. Trail crossings of streams will be aligned perpendicular to the channel and be designed to avoid any potential for future erosion.	Stream System
	Trail crossings of freshwater streams and drainages will adhere to the BMP above regarding the preference of bridges, or other over water structures, to minimize disturbance. Culverts may also be used if that is the least environmentally damaging design.	Channel
	Trail design shall minimize need for drainage structures. At the outfalls of drainage structures, erosion control measures shall be taken to prevent erosion.	Channel
	Whenever possible, the span of bridges will also allow for upland habitat beneath the bridge to provide undercrossing areas for wildlife species that will not enter the creek. Native plantings, natural debris, or scattered rocks will be installed under bridges to provide wildlife cover and encourage the use of crossings.	Stream System
Dewatering		
	While in-stream work is performed, the entire streamflow shall be diverted around the work area by a barrier, except where it has been determined by a qualified biologist that the least environmentally disruptive approach is to work in a flowing stream and fish and amphibian passage is not a concern at that time. Where feasible, water diversion techniques shall allow stream flows to gravity flow around or through the work site.	Channel

ID[a]	Avoidance and Minimization Measure	Location[b]
	Cofferdams for isolating in-channel activities shall be installed both upstream and downstream not more than 100 feet from the extent of the work areas to prevent seepage into or from the work area when dewatering of the entire channel is necessary; otherwise, cofferdams shall affect no more of the stream channel than is necessary to support completion of the work. All water shall be discharged in a non-erosive manner (e.g., through gravel or vegetated bars, on hay bales, on plastic, on concrete, or in storm drains when equipped with filtering devices) provided that it first has been properly treated to eliminate contaminants, including raw concrete. Treated water discharged to the channel shall be consistent with ambient conditions, including temperature and pH. Turbid water or water contaminated with other pollutants pumped out of cofferdams shall be discharged to upland areas (e.g., grassy field) providing overland flow and infiltration and not allowed to re-enter the channel, or pumped to containers (e.g., baker tanks) for disposal.	Channel
	In channels with low flows, small in-channel berms constructed of imported, non-erosive materials (e.g., washed, rounded, spawning-sized gravel between 0.4 and 4.0 inches [10 to 100 millimeters] in diameter) or other temporary structures (gravel-filled sandbags, inflatable rubber cofferdams) that deflect water to one side of the channel during project implementation may be built. Following berm removal, the channel shall be restored to its original condition; gravel in contact with flowing water shall be left in place and allowed to disperse naturally by high winter flows.	Channel
	Sumps or basins may be used to collect water, where appropriate (e.g., in channels with low flows). If pumps are used, a fish screen must be installed to prevent entrapment of small fish.	Channel
	To prevent increases in temperature and decreases in dissolved oxygen (DO), properly sized bypass pipes shall be used (i.e., larger diameter pipes to better pass the flows). Creation of a low-flow channel or other methods to isolate the work area may be used to avoid the use of bypass pipes.	Channel
	Diversions shall not diminish quantity or degrade quality of the discharged water, and shall maintain ambient stream flows below the diversion. When the work is completed, all de-watering materials placed in the channel shall be removed and normal flows shall be restored to the affected stream as soon as is feasible and safe. To the extent feasible, all temporary diversion structures and the supportive material shall be removed no more than 48 hours after work is completed; clean gravel in contact with flowing water shall be left in place and allowed to disperse naturally by high winter flows.	Channel
Construction		
	The applicant shall maintain a copy of project conditions—as determined by the local jurisdiction and/or PCA—at the site. Site supervisors shall be familiar with all permit conditions.	Stream System
	A qualified biologist will train all personnel working within or adjacent to the Stream System (i.e., those people operating ground-disturbing equipment) regarding these avoidance and minimization measures and the permit obligations of project applicants working under this Plan.	Stream System
	Personnel shall utilize equipment that minimizes the area and degree of disturbance, such as appropriately-tired vehicles (either tracked or wheeled, depending on the situation), or avoidance of vehicles if possible.	Channel
	No vehicles other than necessary construction equipment shall be allowed within the Stream System.	Stream System

ID[a]	Avoidance and Minimization Measure	Location[b]
	All wetlands, other waters, and Stream Systems that are adjacent to a Covered Activity project site and that will be avoided shall be marked with bright construction fencing. Temporary fencing shall be removed upon completion of the project.	Stream System
	Deep pools located outside and adjacent to the construction footprint shall be fenced or blocked with barriers to prevent encroachment of equipment and personnel from affecting deep-pool habitats, which are used as refuge for fish and wildlife.	Channel
	When practicable, avoid maintenance and construction activities at night. When night work cannot be avoided: • Minimize use of temporary lighting. • Shield and focus lights on work areas. • Use the lowest intensity lighting necessary to complete the work.	Stream System
	Wildlife entering the construction site shall be allowed to leave the area unharmed, or shall be flushed or herded humanely in a safe direction from the site.	Stream System
	All utility pipe sections shall be capped or inspected for wildlife before being placed in a trench. Pipes within a trench shall be capped at the end of each day to prevent entry by wildlife.	Stream System
	At the end of each workday all open trenches will be provided with a ramp of dirt or wood to allow trapped animals to escape.	Stream System
	Staging and storage areas for equipment, stockpiled materials, fuels, lubricants, and solvents shall be located outside of the Stream System. If site conditions prevent locating staging areas outside the Stream System, at a minimum they shall be located outside the top of the bank, ideally on an existing disturbed area (e.g., access road) or other area that can be readily returned to pre-project conditions at the conclusion of the activity.	Stream System
	Handle and dispose of invasive plant species removed during Covered Activity implementation in such a manner as to prevent further spread of the invasive species.	Stream System
	To minimize the spread of pathogens all staff working in aquatic systems (i.e., streams, ponds, and wetlands), including site monitors, construction crews, and surveyors, will adhere to the most current guidance for equipment decontamination provided by the Wildlife Agencies at the time of activity implementation.	Channel
	Only herbicides registered with the California Department of Pesticide Regulation shall be used in streams, ponds, and lakes, and shall be applied in accordance with label instructions. A list of all pesticides that may be used in the project area shall be submitted to the PCA before use. The USFWS and NMFS do not issue incidental take permits for pesticide and rodenticide use; pesticide and rodenticide use, and resultant "take" of ESA-listed species, are not covered under this Plan for the federal permits.	Stream System
	Avoid or minimize the amount of fertilizer used during hydro seeding to minimize introducing these materials into waterways.	Stream System

ID[a]	Avoidance and Minimization Measure	Location[b]
Post-Construction		
	Temporary fills, such as for access ramps, diversion structures, or cofferdams, shall be completely removed upon finishing the work.	Stream System
	The stream bed will be returned to as close to pre-project condition—considering such characteristics as elevations, profile, and gradient—as appropriate. Ecologically improved conditions shall be incorporated into project design when appropriate.	Channel
	Any disturbed soils will be revegetated with native plants; non-invasive species; or non-reproductive (i.e., sterile hybrids) plants suitable for the altered soil conditions.	Stream System
	Projects that cross beneath streams must provide a post-construction summary of any unanticipated effects (e.g., stream channel disturbance due to a frac-out) resulting from implementation of the project. Additional fees may be owed (as required by General Conditions 3 and 4, *Land Conversion* and *Temporary Effects*, respectively), based on the actual effects of the project.	Stream System
Operations and Maintenance		
	For stream maintenance activities, only in-stream work that is necessary to maintain the channel consistent with designated management purposes (e.g., flood control, groundwater recharge) will be conducted.	Channel
	When conducting vegetation management, retain as much understory brush and as many trees as feasible, emphasizing shade producing and bank stabilizing vegetation.	Stream System
	Vegetation thinning and removal in streams managed for flood control will be phased to ensure that some riparian habitat remains at all times. Projects will be planned so that the least amount of riparian vegetation will be removed while still meeting the desired flood control needs.	Stream System
	If a project alters the stream bed during stream maintenance, the stream low flow channel shall be returned to its approximate prior location with appropriate depth for fish passage without creating a potential future bank erosion problem.	Channel
	Sediment removal in the stream channel shall use the approach with the least impact, such as phasing of removal activities or only removing sediment along one half of the channel bed, allowing the other half to remain relatively undisturbed.	Channel
	Maintenance and operation of pumps and generators placed in stream will minimize impacts to water quality and aquatic species.	Channel
	Temporary crossings shall be installed no earlier than April 15 and shall be removed no later than October 15. This work window could be modified at the discretion of the County, City, and Wildlife Agencies.	Channel
	Work in Stream Systems shall not disturb active bird nests until young birds have fledged. To avoid effects to nesting birds in Stream Systems, trees and shrubs shall be removed outside of the nesting season approximately between August 15 and February 1. Tree and shrub removal at other times is at the PCA's discretion and will require surveys by a qualified biologist to determine the absence of nesting birds.	Stream System

ID[a]	Avoidance and Minimization Measure	Location[b]
	The following will be implemented to minimize noise effects on fish and wildlife during pile driving: • Vibratory pile drivers, or other Wildlife Agency-approved methods, shall be used to drive piles, to the maximum extent practicable. • Where feasible, the use of impact hammers to drive piles will be limited to areas outside of the stream channel or in dry cofferdams. • Bubble curtains will be used to attenuate sound when it is necessary to drive piles with an impact hammer in water. • Where feasible, metal-to-metal contact of the driver hammer and metal piles will be avoided. • The smallest pile driver and the minimum force necessary to complete the work will be used. • All types of pile driving will be limited to daylight hours only to provide fish and wildlife with extended quiet periods. • Prior to initiating pile driving with an impact hammer, an acoustic analysis using the most recent interagency standards and guidelines will be conducted to predict impacts of pile driving noise on listed fish species. A hydroacoustic monitoring plan will be developed and implemented and underwater noise levels will be monitored during all impact pile driving on land, in dry cofferdams and in water (using bubble curtains) to ensure that the peak and cumulative sound exposure levels do not exceed predicted values.	Channel
	Wood treated with oil-type preservatives (e.g., creosote, pentachlorophenol) shall not be used in waterways. Wood treated with waterborne preservative chemicals shall be used instead, provided that the preservative being used has been approved by the Western Wood Preservers Institute (WWPI), and WWPI guidelines and BMPs to minimize effects on aquatic environments during implementation are followed (www.wwpinstitute.org).	Channel

ID[a]	Avoidance and Minimization Measure	Location[b]
Utility Line Installation		
	Utility lines that cross waterways shall be attached to bridges, when feasible.	Stream System

	When it is necessary to bury utility lines beneath stream channels, a frac-out plan will be prepared, and will include a plan for response and containment. In addition, the following factors shall be considered as part of project design :
	• Utility lines shall be buried below the maximum extent of channel bed scour and aligned as perpendicular as possible to the stream channel.
	• Avoid siting crossings at meander bends, braided stream segments, alluvial fans, active floodplains, or other inherently unstable reaches, areas of groundwater upwelling or locations with documented spawning habitat.
	• Trenching through stream banks and channels shall be avoided in favor of trenchless construction methods (e.g., jack and bore, directional drilling), to the maximum extent practicable.
	• If trenching is required:
	  o Trench widths should be as narrow as feasible to accommodate the pipeline/utility line.
	  o Trench excavation shall be conducted in the dry or in areas isolated from flowing water (e.g., cofferdams, stream diversions) and other Avoidance and Minimization Measures associated with cofferdams and water diversions described in this table shall be implemented.
	• The amount of disturbance shall be kept to the minimum necessary to complete the work.
	• Disturbed areas shall be returned to pre-project conditions prior to returning flow to the stream.
	• If directional drilling is required:
	  o Drill paths shall be designed at an appropriate depth below the stream channel to minimize the risk of frac-out where drilling mud is released through fractured bedrock.
	  o Drill entry and exit points shall be located away from channel banks to minimize impact on the Stream System and channel.
		Stream System

	Overland trenches shall be required to be backfilled with the native soils originally excavated from that area (as opposed to imported engineered fills) to the maximum extent feasible. Additionally, where technically feasible, topsoil shall be required to be stripped, stockpiled, and reapplied to original depth in all areas disturbed by construction over and adjacent to overland trenches.	Stream System

[a] To be provided in the Final HCP/NCCP.

[b] *Location* column denotes where the measure applies:

The channel is the area of a stream where normal to high flows occur. It is usually marked by bed-and-bank morphology. The Stream System is as defined in Chapter 3, *Physical and Biological Setting*, and at the beginning of this chapter.

BMP = best management practice

ESA = Endangered Species Act

HCP/NCCP = Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan

NMFS = National Marine Fisheries Service

PCA = Placer Conservation Authority

Plan = Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan

USFWS = U.S. Fish and Wildlife Service

6.3.2.2.3 Community Condition 2.3, Riverine and Riparian Restoration

Covered Activities that affect riverine or riparian constituent habitat must contribute to restoration as mitigation to compensate for loss of riverine or riparian constituent habitat.

Projects that affect riverine and riparian must contribute to replacement of these resources. Riverine restoration measures will be located in the same watershed and salmonid habitat type (e.g., spawning or migrating if the effects occur in a salmonid stream) in which the effects occur.

Generally, restoration and replacement actions will be undertaken by the PCA and funded by additional fees imposed on projects. Riverine and riparian restoration to offset project effects may be implemented on site to replace the functions of the riparian woodland degraded or lost to the Covered Activity. Riparian restoration implemented on site will be credited to Plan restoration targets if the restoration helps to meet the biological goals and objectives of the Plan. When it is deemed infeasible to implement restoration at the project site, in-kind restoration will be required at an off-site location or through the payment of fees to the PCA. Stream enhancement will be implemented in concert with Community Condition 2.2, *Minimize Riverine and Riparian Effects*.

6.3.2.2.4 Community Condition 2.4, Placer County Water Agency Operations and Maintenance Best Management Practices

Placer County Water Agency will apply Operations and Maintenance Best Management Practices in addition to any other applicable community and species conditions.

PCWA operates an extensive raw water distribution system that includes canals, ditches, flumes, and several small reservoirs. The PCWA will implement its Natural Resource Management Plan (NRMP) (Appendix L, *Cost Model and Assumptions*) for O&M of its raw water distribution system to comply with this condition. The NRMP describes natural resource conditions along the PCWA distribution system in the region, regulatory requirements for system O&M, and potential effects of O&M activities on natural resource conditions. It also identifies BMPs for PCWA O&M activities. BMPs described in the NRMP are provided below and will be implemented as applicable.

Pre-implementation BMPs

When the PCWA has need to conduct maintenance activities, it will apply the following pre-implementation BMPs to reduce potential effects of PCWA O&M activities on natural resources in the Plan Area. These BMPs will be applied at facilities as maintenance needs need arise; PCWA will not apply these BMPs unless otherwise conducting ground-disturbing activities.

1. Improve canal bank stability and install sediment traps at canal outlets by:
    a. Installing velocity dissipaters at canal outlets;
    b. Lining banks at canal outlets;
    c. Installing erosion control blankets in areas of soil disturbance;
    d. Installing temporary fiber rolls in areas of soil disturbance; and/or
    e. Applying spray-on soil binders in areas of soil disturbance.

2. Avoid potential wet-weather effects by:
    a. Patrolling canals and removing potential obstructions to prevent erosion;
    b. Minimizing the amount of water purchased from water purveyors during periods of high precipitation;
    c. Distributing flood releases from the canal system by releasing flows at numerous intermediate outlets;
    d. Planning and designing projects to minimize land disturbance;
    e. Installing erosion and sedimentation control measures prior to land-disturbing activities;
    f. Identifying areas that are susceptible to erosion for future canal lining activities; and/or
    g. Choosing canal crossing sites where erosion potential is low.

Ongoing or Post-implementation Best Management Practices

In order to prevent degraded water from entering streams after PCWA O&M activities are performed, the following BMPs will be applied, if applicable:

a. Modifying canal operations to gradually restore reservoir releases to canals at a slower rate
b. Applying sediment traps at storm drains for dewatering before canal lining
c. Treating first-flush flows and other flushing to reduce downstream water quality effects, including minimizing sediment releases during the breeding seasons for covered amphibians and fish

6.3.2.3 Community Condition 3, Valley Oak Woodland Avoidance, Minimization, and Mitigation

This Community Condition addresses issues related to valley oak woodlands.

6.3.2.3.1 Community Condition 3.1, Valley Oak Woodland Avoidance

Covered Activities that avoid effects on valley oak woodland wherever it occurs by excluding construction or other ground disturbance from existing valley oak woodland will not be assessed the land conversion fee.

As valley oak woodland is a scarce land-cover type that can provide ecological value even when isolated (e.g., it can be a pollen source [wind and insect dispersal] and an acorn source, both promoting genetic diversity), it is important to protect, even in small acreages. Any valley oak woodland stand greater than 1 acre can be credited as avoided and will not be assessed impact fees if the project does not:

- Modify any area within the outer edge of a buffer that extends 50 feet outward from the outermost bounds of the valley oak canopy
- Irrigate in and around valley oak woodland or otherwise alter the hydrology of the site, including the location of septic leach fields, such that the valley oak woodland receives more water than under pre-project conditions

If a project can avoid effects on valley oak woodland, no additional conditions related to valley oak woodland are necessary.

6.3.2.3.2 Community Condition 3.2, Valley Oak Woodland and Individual Valley Oak Trees Restoration

Covered Activities must compensate for loss of Valley Oak Woodland natural community, and individual valley oak trees.

Projects that affect individual valley oak trees or stands of valley oak woodland will pay the Plan land conversion fee. All revenue will be provided to the PCA and applied to in-kind mitigation of effects on valley oaks and valley oak woodlands (see Section 9.4.1.3, *Land Conversion Fee*).

6.3.3 Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System

The primary objective of Stream System Conditions is protection of watershed integrity (health and hydrology) by defining the extent of the Stream System and providing an incentive (in the form of a fee) for the project applicant to avoid land conversion within the Stream System boundary. Projects where effects on riparian and riverine constituent habitat are unavoidable must also comply with Community Condition 2, *Riverine and Riparian Avoidance and Minimization*. Effects within the Stream System must be mitigated by stream enhancement. Effects on the riverine and riparian land-cover types must also be mitigated, but this is addressed in Community Condition 2, *Riverine and Riparian Avoidance and Minimization*.

A definition for the Stream System boundary is provided in Section 3.2.7, *Stream System*. The variable boundary widths for streams in western Placer County are listed in Table 3-4. In addition, the FEMA floodplain boundary will dictate how the Stream System is defined. When implementing a project, both the Stream System boundary widths as listed in Table 3-4 and shown in Figure 3-8, and the Stream System floodplains as mapped in Figure 3-10, determine avoidance as described below. For a full description of the Stream System boundary to determine whether a project is in the Stream System, see Section 3.2.7, *Stream System*. The Stream System boundary is different from the watercourse structural setback requirements of local zoning codes.

The Stream System boundary will be determined by a qualified biologist, and approved by the Permittee with jurisdiction over the Covered Activity. Project proponents are encouraged to contact CDFW to verify survey information, if needed to comply with California Fish and Game Code section 1600 et seq. (see Section 1.5.2.3, *California Fish and Game Code Sections 1600-1616*).

6.3.3.1 Stream System Condition 1, Stream System Avoidance and Minimization

Design and implement Covered Activities in such a way as to avoid and minimize adverse effects on the Stream System.

This condition allows applicants to avoid portions of the Stream System and therefore avoid paying fees, as described in Stream System Condition 2, *Stream System Mitigation: Restoration*.

6.3.3.2 Stream System Condition 2, Stream System Mitigation: Restoration

Where Covered Activities result in the permanent or temporary impacts on the Stream System, regardless of the community or constituent habitat type affected, effects shall be mitigated by appropriate restoration or enhancement.

This measure works in concert with Community Condition 2.3, *Riverine and Riparian Restoration*.

6.3.3.2.1 Fee within the Stream System

Projects that occur in the Stream System but do not avoid permanent effects will pay the Stream System fee. Projects in the Stream System with only temporary effects do not pay the Stream System fee. This will apply to all areas of the project that occur in the Stream System boundary that is not otherwise assessed a special habitat fee (see Section 9.4.1.4, *Restoration and Enhancement Fees*), including affected upland communities within the Stream System.

6.3.3.2.2 Stream System Fee Exemptions

Some Covered Activities are required to occur in the Stream System and, as such, cannot meet the avoidance criteria described in Stream System Condition 1, *Stream System Avoidance and Minimization*.

Existing structures, uses, and activities (including legal non-conforming structures, uses, and activities) are exempt from the Stream System fee unless subject to future modification that would require approval by a Permittee. Maintenance activities may also be exempt pending approval of the Permittee.

6.3.4 Regional Public Programs

The conditions listed here set design and construction requirements to minimize the effects of regional public programs (described in Section 2.6.5 *Regional Public Programs*) on wildlife movement, Covered Species, and their habitat. All such projects will also be subject to the General Conditions on land conversion and to such conditions on natural communities and Covered Species as may apply. Projects that affect the Stream System are also subject to Stream System Condition 1*, Stream System Avoidance and Minimization*, and Stream System Condition 2, *Stream System Mitigation: Restoration.*

6.3.4.1 Regional Public Projects Condition 1, Transportation and Other Infrastructure Projects Design Requirements

Implement design requirements for applicable public transportation projects located in the RAA to reduce the effects of barriers in potential conservation lands and minimize effects on Covered Species, natural communities, and wildlife movement.

6.3.4.1.1 Types of Projects Subject to Condition

The following public projects if occurring in the RAA are subject to design requirements or construction practices because they are expected to result in new ground disturbance or they may create new barriers to wildlife movement or augment existing barriers. Each project category is

subject to a specific combination of requirements, listed in Table 6-2 and described in detail in Sections 6.3.4.1.4, *Design Guidance Measures*, and 6.3.4.2.1, *Construction Practices BMPs*. The requirements are described below.

Table 6-2. Conditions on Covered Transportation Projects

Design Requirements and Construction Practices	Highway Projects	Roadway Projects and Interchange Upgrades	Road Safety Improvements
Transportation Project Design Requirements			
Coordination between project applicant, PCA, and Wildlife Agencies to ensure project meets Plan requirements	M	M	-
Enhance existing undercrossings	M	M	-
Implement minimum sizing of culverts	M	M	-
Install grating over tunnels/culverts for penetration of light	P	P	-
Install fencing around undercrossings to maximize use of crossing	P	P	-
Road barrier and passage designs for wildlife (to direct wildlife to safe crossing)	P	P	-
Construction Practices			
Best Management Practices	M	M	M
Post-construction Practices			
Control roadside vegetation adjacent to reserves	M	M	M
Revegetate cut/fill slopes with native vegetation	M	M	M
Vegetation management around undercrossings	M	M	M

Notes:
M = Mandatory
P = Possible (required unless data demonstrate action would not benefit wildlife and California Department of Fish and Wildlife and U.S. fish and Wildlife Service agree to omit).

Highway Projects

Highway projects are those projects identified by the County of Placer, the City of Lincoln, or the Placer County Transportation Planning Agency that call for the expansion of existing highways or the construction of new highway ramps and interchanges within the RAA. This includes limited-access thoroughfares, thoroughfares, freeways, and conventional highways.

Two major transportation projects proposed for construction during the permit term of this Plan are the Placer Parkway project and the Interstate 80/State Route 65 interchange improvements. These are subject in their entirety to this condition.

Roadway Projects and Interchange Upgrades

All new road and interchange projects are considered roadway projects. These include road widening, realignment, extension, connection, or improvement projects that do not qualify as exempt (see *Exempt Transportation Projects,* below, for a list of exempt projects). Also included are road repairs from damage caused by landslides, flooding and other natural disasters. Repair may require the installation of retaining wall or drainage management features such as under-road culverts (this includes arterial, collector, and local roadways).

Road Safety Improvements

Road safety improvements involve minimal ground-disturbing activities, such as traffic control signs, and lengthening existing turning lanes. They are not expected to impede or substantially worsen wildlife movement unless they cumulatively alter a large segment of a rural roadway. Cumulative improvements (i.e., multiple, contiguous improvements implemented in phases) longer than 1,000 feet are subject to this condition.

Other Infrastructure Projects

New infrastructure projects or modifications to existing infrastructure projects involving ground-disturbing activities not otherwise exempt (as described below) are subject to this condition.

Separate conditions to address avoidance and minimization of effects on Covered Species are also required, if applicable, as described in this chapter.

6.3.4.1.2 Exempt Transportation Projects

The following projects are not subject to the design requirements or construction practices specified in this condition because they are not expected to result in new ground disturbance, create new barriers to wildlife movement, or augment existing barriers.

a. Installing traffic signals, signs, pavement markings, flashing beacons (e.g., railroad crossing signals), or other safety warnings within existing improved public rights-of-way

b. Painting new lane striping

c. Installing “rumble” strips, channelizers, or other safety markers

d. Installing guardrails or similar structures within existing improved public rights-of-way that do not impede wildlife movement

e. Installing ramp metering

f. Regrading existing shoulders (this activity is considered maintenance; see Regional Public Projects Condition 3, *Operation and Maintenance BMPs*)

g. Implementing other road safety improvements on less than 1,000 feet of roadway within the existing developed area (including gravel shoulders)

Note that road safety improvements that cross creeks are subject to Stream System Condition 1, *Stream System Avoidance and Minimization*, and Stream System Condition 2, *Stream System Mitigation: Restoration*, above.

The following projects are exempt from this condition because of their small footprint. The exemption would apply only if the project does not include the installation of median barriers or

other impermeable safety barriers; if no stream, riparian, pond, or wetland land-cover types are present; and if the activity is not located in the Stream System. For the area being considered for exemption, the length of the road improvement (as measured along the centerline of the road) must be compared against all new adjacent projects constructed since the time of Plan implementation to determine whether the cumulative thresholds have been exceeded.

a. Widening roads to add lanes where the project is less than or equal to 1,000 feet in length

b. Realigning roads for safety or operational purposes where the project is less than or equal to 1,000 feet in length

c. Constructing new turn lanes less than or equal to 1,000 feet in length

d. Constructing a new road shoulder less than or equal to 1,000 feet in length

6.3.4.1.3 Review Process

Public projects will be evaluated on a case-by-case basis through the review process described in Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*, and appropriate measures from the guidance listed below will be made a binding project requirement by the PCA. A key step is determining what target species will guide design at specific locations and how the design will perform to benefit the target species. Any project design responding to this condition needs to include a proposed list of target species and an explicit program of monitoring and maintenance.

Design guidance measures are based on current techniques for minimizing effects of transportation projects. Because the effectiveness of road crossings designed for wildlife is an active area of research, frequent advances in design are expected throughout the permit term and are expected to be implemented through the adaptive management process. Measures may be updated by the PCA after consultation with the Wildlife Agencies if new information shows more effective ways to encourage safe wildlife movement across transportation corridors.

6.3.4.1.4 Design Guidance Measures

1. **Coordination between project applicant, PCA, and Wildlife Agencies to ensure project meets Plan requirements.** Project applicants will coordinate with the PCA and Wildlife Agencies.

2. **Enhance Existing Undercrossings**. Undercrossing enhancements must incorporate design requirements identified for culverts and stream crossings in Community Condition 2.2, *Minimize Riverine and Riparian Effects*, and Species Condition 7, *Central Valley Steelhead and Central Valley Fall-/Late Fall-Run Chinook Salmon (Salmonids)*. When new roadways are constructed or road expansion projects span an undercrossing, such as a culvert, existing undercrossing structures will be retrofitted within safety and engineering limitations to allow for Covered Species movement. Existing culverts or other potential crossing points will be enhanced based on the best available information and appropriate to the conditions at the project site (e.g., repair of culverts in existing urban settings would not be required to upgrade to be wildlife-friendly). Meeting these objectives will be secondary to the primary engineered objectives of the undercrossing, as determined by Permittee land development engineering requirements. Wildlife crossings that can serve multiple species will be used whenever possible. Examples of enhancements include incorporation of light sources, shortening the overall length of the under-

crossing (while still meeting project objectives), or installing or removing cover throughout (depends on target species' needs).

3. **Implement minimum sizing of culverts.** Culvert sizing is dictated by various conditions that include site-specific and hydrologic conditions, which may not be suitable for adjustment depending upon the drainage objective. On streams that support salmonids, culverts must also be sized according to the requirements for Species Condition 7, *Central Valley Steelhead and Central Valley Fall-/Late Fall-Run Chinook Salmon (Salmonids).* In addition, where space allows, culverts for public works projects should be sized to the minimum length, height, and width necessary to provide safe passage under the road for the Covered Species (as proposed by the project applicant and reviewed and agreed upon by the PCA). Culverts associated with rural public projects will provide a natural substrate on which wildlife can travel (e.g., an open-bottom box culvert) when such designs are compatible with hydrologic design criteria and when appropriate for the conditions at the site.

4. **Install grating over tunnels/culverts for penetration of light**. Grating to allow ambient light to penetrate undercrossings shall be installed for rural public projects when necessary for Covered Species. For major roadways, grating installation will be subject to determination in the field as to the need. When installed, culverts will include grating on the inactive part of the roadbed (e.g., road shoulders or median) to allow filtration of ambient light and moisture but minimize noise intrusion. Artificial lighting inside tunnels or culverts will not be used; these devices have not been shown to be effective and may deter nocturnal wildlife. Such devices may also be vandalized. Other mechanisms for improving visibility may be proposed by the applicant, such as painting the inside of the crossing with a light color. The PCA will review and approve all such proposals in consultation with the Wildlife Agencies.

5. **Install fencing around undercrossings to maximize use of crossing**. Fencing will be required in areas where giant garter snake, California red-legged frog, and western pond turtle that attempt to cross the road may suffer high rates of mortality. Fencing will be used along the perimeter of the roadway to direct these Covered Species to undercrossings and minimize their access to the road. Fencing designs will be tailored to the Covered Species expected to use the undercrossing and will be based on the best available information on species use and best fencing designs available at the time. Fencing will extend out from the undercrossing along the road to an appropriate distance and serve as a barrier to wildlife species that attempt to cross the road. The distance that fencing extends from the undercrossing will be determined on a case-by-case basis and will consider locations of known collisions in the area. Right-of-way fencing could be designed to serve this purpose. Fencing must be attached to the undercrossing to prevent wildlife from passing through a gap between the undercrossing and the beginning of the fence. Fencing must be monitored at least annually and repairs made promptly to ensure effectiveness.

6. **Road barrier and passage designs for wildlife (to direct wildlife to safe crossing)**. New passages will be placed or located only in areas that connect suitable habitats for target species, as determined by a qualified biologist, so that wildlife is not directed into urbanized areas.

   When compatible with vehicle safety, road median barriers or shoulder barriers will allow wildlife to cross under or over the barrier in the event they become trapped in the right-of-way.

6.3.4.2 Regional Public Projects Condition 2, Transportation and Other Infrastructure Projects Construction BMPs

Implement construction BMPs for applicable transportation or other infrastructure projects located in the rural portion of the Plan Area where appropriate and feasible to reduce the effects of construction on natural communities and native species.

6.3.4.2.1 Construction Practices BMPs

Avoidance and minimization measures identified in this condition will be used for all covered road construction and operation and maintenance activities, as applicable.

BMPs for Gravel Road Projects

1. For construction of new gravel roads, prevent rills (small channel or gully) by breaking large or long bare areas up into smaller patches that can be effectively drained before rills can develop.
2. For construction of new gravel roads, disconnect and disperse runoff flow paths, including roadside ditches, which might otherwise deliver fine sediment to stream channels.
3. When constructing gravel roads, install road surface and ditch drainage structures frequently enough so that gullies do not form at drainage points and so that the road and drainage systems are generally dry.
4. For construction of new gravel roads, prevent gullies by dispersing runoff from road surfaces, ditches, and construction sites by correctly designing, installing, and maintaining drainage structures (e.g., road shape, rolling dips, out-sloped roads, culverts) and keeping streams in their natural channels. No single point of discharge from a road or other disturbed area should carry a flow that would be capable of creating gullies. If gullies continue to develop, additional drainage structures will be needed to disperse the runoff.

BMPs for Roadside Drainage

1. When constructing or reconstructing a ditch, utilize designs for the outlet such that runoff is first filtered and/or spread to improve water quality and reduce flow velocity prior to the runoff entering surface waters, when practical. If not practical, implement sediment management BMPs to trap sediment before it reaches a stream. BMPs described in General Condition 1, *Watershed Hydrology and Water Quality*, and Community Condition 2.2, *Minimize Riverine and Riparian Effects*, will be applied as appropriate.
2. When designing or redesigning roads, evaluate—and where appropriate, implement—opportunities to restore natural drainage patterns. Install culverts or rolling dips to retain water in its drainage of origin, which will decrease the potential for erosion downstream. On problem roads, evaluate—and where appropriate, implement—opportunities to reconstruct the road segment in order to improve and maintain natural drainage patterns; for example, add rolling dips, emergency water bars, and additional cross drains.

BMPs for Roadside Construction

1. Equipment storage, fueling, and staging areas will be sited on disturbed areas or on non-sensitive, non-native grassland land-cover types, when these sites are available, to minimize the risk of direct discharge into riparian areas or other sensitive land-cover types. When such sites

are not available, staging will occur on the road used to access the site. BMPs, such as those developed in the West Placer Storm Water Management Plan pertaining to staging, must be utilized.

2. No erodible materials will be deposited into watercourses. Brush, loose soils, or other debris material will not be stockpiled within stream channels, on adjacent banks, or where it may enter into any river, stream or lake.
3. Silt fencing or other sediment trapping methods will be installed below the grade of new road construction or road widening activities to minimize the transport of sediment off the site.
4. Temporary barriers will be constructed to keep wildlife out of construction sites, as appropriate.
5. On-site monitoring will be conducted by a qualified biologist throughout the construction period to ensure that disturbance limits, BMPs, and Plan conditions/restrictions are being implemented properly.
6. Active construction areas will apply standard dust control measures to minimize the effects of dust on adjacent vegetation and wildlife habitats, if warranted.
7. Portions of the project that occur in streams (e.g., bridge or culvert construction) will comply with Community Condition 2.2, *Minimize Riverine and Riparian Effects.*

Post-construction BMPs

8. Following construction, the areas beyond road shoulders and inside the right-of-way will be returned to a natural state or pre-project conditions when a natural state is not achievable within 1 year of project groundbreaking. These actions will most likely be applied differently to each road project and will decrease the potential for the spread of invasive species.
9. Invasive plants within the project area and any construction staging areas will be removed to prevent the spread of these species into nearby or adjacent reserves.
10. Cut-and-fill slopes will be revegetated with native plants, if possible, or with non-invasive plants (see the California Invasive Plant Council website for designated invasive species [http://www.cal-ipc.org/paf/]) suitable for the altered soil conditions.
    - All temporarily disturbed areas, such as staging areas, will be returned to pre-project conditions or improved with native plants within 1 year of project groundbreaking.
    - Vegetation and debris will be managed in and near culverts and under and near bridges to ensure that entryways remain open and visible to wildlife and that the passage through the culvert or under the bridge remains clear.
11. Invasive Species. Permittee shall conduct project activities in a manner that prevents the introduction, transfer, and spread of invasive species, including plants, animals, and microbes (e.g., algae, fungi, parasites, bacteria), from one project site and/or waterbody to another. Prevention BMPs and guidelines for invasive plants can be found on the California Invasive Plant Council's website at: http://www.cal-ipc.org/ip/prevention/index.php and for invasive mussels and aquatic species can be found at the Stop Aquatic Hitchhikers website: http://www.protectyourwaters.net/.
12. Inspection of Project Equipment. Permittee shall inspect all vehicles, watercraft, tools, waders and boots, and other project-related equipment and remove all visible soil/mud, plant materials,

and animal remnants prior to entering and exiting the project site and/or between each use in different waterbodies.

13. Decontamination of Project Equipment. Permittee shall decontaminate all tools, waders and boots, and other equipment that will enter the water prior to entering and exiting the project site and/or between each use in different waterbodies to avoid the introduction and transfer of organisms between waterbodies. Permittee shall decontaminate project gear and equipment utilizing one of three methods: drying, using a hot water soak, or freezing, as appropriate to the type of gear or equipment. For all methods, Permittee shall begin the decontamination process by thoroughly scrubbing equipment, paying close attention to small crevices such as boot laces, seams, net corners, etc., with a stiff-bristled brush to remove all organisms. To decontaminate by drying, Permittee shall allow equipment to dry thoroughly (i.e., until there is a complete absence of water), preferably in the sun, for a minimum of 48 hours. To decontaminate using a hot water soak, Permittee shall immerse equipment in 140 degrees Fahrenheit (°F) or hotter water and soak for a minimum of 5 minutes. To decontaminate by freezing, Permittee shall place equipment in a freezer 32°F or colder for a minimum of 8 hours. Repeat decontamination is required only if the equipment/clothing is removed from the site, used within a different waterbody, and returned to the project site.
14. Decontamination of Vehicles and Watercraft. Permittee shall decontaminate vehicles, watercraft, and other project-related equipment too large to immerse in a hot water bath by pressure washing with hot water a minimum of 140°F at the point of contact or 155°F at the nozzle. Additionally, Permittee shall flush watercraft engines and all areas that could contain standing water (e.g., live wells, bilges) for a minimum of 10 minutes. Following the hot water wash, Permittee shall dry all vehicles, watercraft, and other large equipment as thoroughly as possible.
15. Decontamination Sites. Permittee shall perform decontamination of vehicles, watercraft, and other project gear and equipment in a designated location where runoff can be contained and not allowed to pass into CDFW jurisdictional areas and other sensitive habitat areas.
16. Notification of Invasive Species. Permittee shall notify CDFW and USFWS immediately if an invasive species not previously known to occur within the project site is discovered during project activities by submitting a completed Suspect Invasive Species Report. Upon receiving notification, CDFW will provide Permittee with guidance for further action as appropriate to the species.

6.3.4.3 Regional Public Projects Condition 3, Operation and Maintenance BMPs

O&M BMPs for applicable transportation or other infrastructure projects in the rural portion of the Plan Area will be implemented where appropriate and feasible to reduce the effects of construction on natural communities and native species.

This condition applies to O&M activities: (1) on public lands and (2) on private lands where the activities are authorized pursuant to land use approvals granted by the Permittees and governed by conditions of approval. O&M activities include utility line and facilities maintenance, public or private road maintenance, vegetation management, and mitigation monitoring. Road and utility maintenance activities have the potential to affect Covered Species directly through management

activities such as mowing or resurfacing and may indirectly affect Covered Species by introducing sediment and other pollutants into downstream waterways or by spreading invasive species.

- Most O&M will occur as ongoing activities. The determination regarding which BMPs will be required and how they will be monitored will be made as part of the HCP/NCCP participation package described in Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*.
- Projects occurring in streams or the Stream System will also comply with Stream System Condition 1, *Stream System Avoidance and Minimization*, and Stream System Condition 2, *Stream System Mitigation: Restoration,* as appropriate.

6.3.4.3.1 O&M BMPs

a. Silt fencing or other sediment control devices will be installed down-slope from maintenance activities that disturb soil to minimize the transport of sediment off site.

b. In the course of rural road maintenance, no erodible materials will be deposited into watercourses. Brush, loose soils, or other debris material will not be stockpiled within stream channels (including road side drainage ditches) or on adjacent banks where it could be washed into the channel or drainage ditch.

c. Alternatives, such as mechanical control, shall be considered to substantially lessen any significant effect on the environment before using pesticides. Integrated pest management BMPs shall be used for all vegetation control. Limitations may occur because of fire management requirements and local integrated pest management ordinances.

d. Herbicides and other pesticides will be used only when necessary and applied in strict compliance with label requirements and state and federal regulations. Herbicides and pesticides will be applied only when weather conditions minimize drift and effects on non-target sites. Herbicide and pesticide use is not a Covered Activity under the federal permits.

e. Maintenance activities on rural roads adjacent to natural land-cover types will be seasonally timed, when safety permits and regulatory restrictions allow, avoiding or minimizing adverse effects on active nests of resident and migratory birds, including bird Covered Species. This measure is particularly relevant for right-of-way mowing, brush clearing, and tree trimming. Project applicants will coordinate with the PCA to develop work schedules that optimize logistic, safety, and financial needs while minimizing potential effects on nesting birds.

f. Mowing equipment will be thoroughly cleaned before use so it is free of noxious weeds (as defined by the U.S. Department of Agriculture in cooperation with the California Department of Food and Agriculture) and does not introduce such weeds to new areas.

g. Ground-disturbing road maintenance activities, such as regrading, will be timed so that the moisture content of the soil will support re-compaction of the soil and reduce the need for an imported water source to achieve soil compaction. Similarly, activities will be timed so that the use of heavy equipment will not result in the creation of mud puddles and ruts.

h. Regularly scheduled visual inspection of all roads shall be conducted to identify sites where erosion is contributing sediment to local streams and stabilize eroding areas.

i. Annual clearing of flow lines (e.g., culverts and ditches) shall be conducted such that flow lines are maintained free of debris.

j. Existing roads shall be used for access and disturbed areas for staging as site constraints allow. Off-road travel will avoid sensitive communities.

k. Utility pole or line replacement and maintenance shall follow the suggested practices of the Avian Power Line Interaction Committee's publication *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (Avian Power Line Interaction Committee 2012).

6.3.5 Conditions to Minimize Effects on Covered Species

The following conditions provide measures to avoid or minimize effects on Covered Species.

Most of the survey measures specify when surveys must be conducted and provide seasonal restrictions or spatial buffers to separate certain Covered Species from potential disturbance from Covered Activities. The conditions listed here are based on existing guidelines, regulatory principles, and expert sources available at the time when the Plan was drafted. These measures can be modified based on monitoring data from the PCA, the scientific literature, and new regulations, with review and approval of the Wildlife Agencies consistent with the criteria listed in Section 6.3, *Conditions on Covered Activities*.

6.3.5.1 Surveys for Select Covered Wildlife Species

The timing of species habitat surveys, pre-construction surveys, and construction monitoring relative to impacts are described below. For projects that occur over multiple years, including projects that are phased, the frequency and timing of required surveys will be determined by the Permittee reviewing the application in consultation with the Wildlife Agencies. At a minimum, surveys and monitoring (if required) will be conducted prior to each construction phase if the entire project area is not continuously disturbed between phases.

Surveys will be conducted by qualified biologists, as defined in Section 6.1.5, *Qualified Biologist/Qualified Professional*. If survey results indicate that a Covered Species that is subject to a Species Condition is present, then applicable avoidance and minimization measures and construction monitoring, as specified in the corresponding Species Condition, must be implemented.

Surveys are required when certain land-cover types and other conditions are present on a project site. See Species Conditions and Table 6-3 for a description of the locations and land-cover types that trigger species surveys.

Species Conditions may be revised by the PCA over time without requiring an HCP/NCCP amendment so long as the revisions are reviewed and approved by the Wildlife Agencies. It is expected that the majority of these revisions will be undertaken to integrate new or revised species survey protocols.

Table 6-3. Species Survey Summary

Species	Location, community types, constituent habitat, and habitat features where surveys are required	Survey Period
**Swainson's hawk	In the Valley only in these communities within 0.25 mile (1,320 feet) of the project site: • Grassland (if trees are present) • Valley oak woodland • Riverine/Riparian Complex (if trees are present) • Semi-natural (agricultural; if trees are present) • Other agricultural (if trees are present) • Rural residential (if trees are present) • Urban (if trees are present) *Also see Species Condition 1.*	February 1 to September 15
**California black rail	In these constituent habitats: • Project occurs within 250 feet of fresh emergent marsh > 0.2 acre in size. *Also see Species Condition 2.*	March 15 to Early July
**Western burrowing owl	In these communities and habitat features: • Grassland • Vernal Pool Complex • Semi-natural (agriculture) • Other agricultural • Rural residential and urban if potential burrow sites are available • Man-made structures such as underground pipes, irrigation canal banks, ditches • Banks of intermittent drainages if potential burrow sites are available *Also see Species Condition 3.*	Year-round Breeding season (February 1 to August 31) Non-breeding season (September 1 to January 31)
**Tricolored blackbird	Project sites with the following communities or habitat features if they are within 1,640 feet of open water (e.g., fresh emergent marsh, stock pond, non-vernal pool seasonal wetland, riverine): • Grassland • Aquatic/Wetland Complex • Field Agriculture when planted in wheat or triticale • Blackberry patches (often associated with the riparian constituent habitat) *Also see Species Condition 4.*	March 15 to July 31

Species	Location, community types, constituent habitat, and habitat features where surveys are required	Survey Period
Giant garter snake	Within the mapped range of modeled habitat for giant garter snake (Appendix D, *Species Accounts*) with these communities, constituent habitats, and habitat features: • Rice agriculture • Aquatic/Wetland Complex (including stock ponds) • Non-vernal pool seasonal wetland • Riverine (low-gradient streams) • Canal *Also see Species Condition 5.*	N/A
Valley elderberry longhorn beetle	Below 650 feet elevation in: • Riverine/Riparian Complex • Valley oak woodland • Stream System (excluding frequently disked or flooded agricultural lands such as rice that would not likely support elderberry shrubs) *Also see Species Condition 7.*	Year-round
Conservancy Fairy Shrimp	In vernal pool complex constituent habitat wetlands within the survey boundary depicted in Figure 5-7. *Also see Species Condition 9.*	Wet season and dry season (see current USFWS protocol for details)
Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp	In vernal pool complex constituent habitat wetlands. *Also see Species Condition 10.*	Wet season and dry season (see Species Condition 10 for details)

* Habitat model is a subset of Placer County Wildlife Habitat Relationship land-cover types associated with species and is subject to revision.

** These species are protected under two or more regulations including the federal Migratory Bird Treaty Act, California Fish and Game Code Sections 3503 and 3503.5.

6.3.5.2 Survey Documentation

If applicable community types, constituent habitat, or habitat features are present on site, the applicant must describe in the HCP/NCCP participation package which surveys were conducted, detail the results of those surveys, and provide a map that displays where the surveys were conducted and where Covered Species, if any, were detected.

As described in Section 6.2.4, *HCP/NCCP Participation Package*, the HCP/NCCP participation package will be prepared and approved before project construction. To ensure compliance with pre-construction survey requirements, the Permittee will determine which surveys are required, when they will be performed, and how they will be applied to the project (Item 8 of the HCP/NCCP participation package). This description will follow the requirements in the Species Conditions and will be incorporated into the conditions of project approval.

The survey report submitted to the local jurisdiction and PCA will also document the condition of all occurrences found on the project. Reports will include CNDDB California Native Species Field Survey Form; copies of these forms will also be submitted to the CNDDB and the Wildlife Agencies as part of the Annual Report.

6.3.5.3 Construction Monitoring for Certain Covered Wildlife

Occupied breeding habitat (or for giant garter snake, suitable aquatic habitat) will trigger the species surveys described in Table 6-3 and Species Conditions. Construction monitoring will be carried out by a qualified biologist to ensure that these avoidance and minimization requirements are being implemented properly and that they are adequately protecting the target species. Because the selected wildlife species are rare in the Plan Area, it is expected that few projects will require construction monitoring. If required, the construction monitoring frequency and protocols are described for the appropriate species in the Species Conditions.

Construction monitoring will occur after the local government entitlements (for the County and the City) have been issued authorizing construction and HCP/NCCP participation package is prepared, reviewed, and approved. To ensure compliance with the Plan, the HCP/NCCP participation package must describe which construction monitoring and avoidance and minimization requirements may be required and how they will be applied to the project if pre-construction surveys identify occupied habitat. This description will follow the requirements in the Species Conditions and will be incorporated into the conditions of project approval. The specification will include a description of monitoring frequency and duration (including the time when monitoring will be initiated relative to effects) and specific construction activities to be monitored. It will also establish the authority of the on-site construction monitor to modify or temporarily stop implementation of the activity if necessary to ensure compliance with the Plan.

Construction monitoring is necessary to ensure that avoidance and minimization measures are implemented in accordance with permit requirements and is the responsibility of the project applicant.

The project applicant shall notify the Permittee that processed the HCP/NCCP participation package immediately if Covered Species not expected on the site, and for which applicable Conditions of Covered Activities were not implemented, are discovered during construction activities. The project applicant shall suspend work and notify the Permittee for guidance. The Permittee may contact the PCA or Wildlife Agencies for additional guidance.

6.3.5.4 Exemptions from Species Surveys, Pre-construction Surveys, and Construction Monitoring

The following types of Covered Activities are exempt from species survey and construction monitoring requirements for target Covered Species. Covered Activities exempt from species surveys must still submit a HCP/NCCP participation package as a basis for making the exempt determination and tracking other applicable Plan Conditions. These activities are not precluded from other avoidance and minimization measures, BMPs, etc.

1. **No Ground Disturbance.** Covered O&M activities, including those on the Reserve System, that do not result in any ground disturbance or removal of natural communities.
2. **Continuous Ground Disturbance.** Ongoing O&M activities with ground disturbance that occur monthly or more frequently within the same location are exempt from repeat surveys for Covered Species so long as applicable surveys are conducted once before initiating the activity, surveys are conducted in the appropriate season (i.e., wildlife and plant surveys must be conducted during the appropriate time of year), and the survey results are negative. Such activities are likely to result in repeated disturbance that will preclude establishment or

persistence of the Covered Species targeted by these surveys. If at any time the project applicant becomes aware that Covered Species may be on the site, applicable surveys and avoidance measures, as described in the following conditions, must be implemented.

6.3.5.5 Exemptions from Setbacks from PCA Reserves

When the PCA acquires land adjacent to existing or planned development or agriculture that has no buffer zone or an inadequate buffer zone, one must be created on the reserve (see Section 5.3.1.3, *Reserve System Components*). Therefore, the buffers described below will not extend onto private land when the species occurs on PCA reserves.

6.3.5.6 Species Condition 1, Swainson's Hawk

Conditions for the Swainson's hawk are based on avoidance, minimization, and mitigation guidelines from the *Draft Staff Report: Recommended Mitigation Strategies for the Swainson's Hawk* (Buteo swainsoni) *within the California Breeding Range* (California Department of Fish and Game 1994) and measures developed to avoid and minimize effects on Swainson's hawks by activities covered by the East Contra Costa County HCP/NCCP (2006).

6.3.5.6.1 Survey Requirements

Surveys for Swainson's hawk nests are required on the following communities in the Valley, within 0.25 mile (1,320 feet) of the project site:

- Valley oak woodland
- Grassland (if trees are present)
- Riparian
- Semi-natural (if trees are present)
- Other agricultural (if trees are present)
- Rural residential (if trees are present)
- Urban (if trees are present)

In addition, a CNDDB record search is required to determine whether any active nests are present within 1,320 feet of the project site. A nest is assumed active if it has been used within the previous 5 years.

Swainson's Hawk 1. Swainson's hawk surveys and CNDDB record searches are required well in advance of project construction to determine whether Swainson's hawk is nesting on or within 1,320 feet of the project site. If the project cannot be designed to avoid active Swainson's hawk nest trees and the construction must occur during the nesting season (approximately February 1 to September 15), a preconstruction survey must be conducted no more than 15 days prior to ground disturbance. Surveys will be conducted consistent with current guidelines (Swainson's Hawk Technical Advisory Committee 2000), with the following exceptions:

- Surveys will be required within a 1,320-foot radius around the project site. In instances where an adjacent parcel is not accessible to survey because the qualified biologist was not granted permission to enter, the qualified biologist will scan all potential nest tree(s) from the adjacent property, road sides, or other safe, publicly accessible viewpoints, without

trespassing, using binoculars and/or a spotting scope to look for Swainson's hawk nesting activity;

- Surveys will be required from February 1 to September 15 (or sooner if it is found that birds are nesting earlier in the year); and
- If a Swainson's hawk nest is located and presence confirmed, only one follow-up visit is required (to avoid disturbance of the nest due to repeated visits).

6.3.5.6.2 Applicable Measures

If surveys determine that a Swainson's hawk nest is occupied, the project must adopt the minimization measure listed below:

Swainson's Hawk 2. During the nesting season (approximately February 1 to September 15 or sooner if it is found that birds are nesting earlier in the year), ground-disturbing activities within 1,320 feet of occupied nests or nests under construction will be prohibited to minimize the potential for nest abandonment. While the nest is occupied, activities outside the buffer can take place provided that they do not stress the breeding pair.

If the active nest site is shielded from view and noise from the project site by other development, topography, or other features, the project applicant can apply to the PCA for a reduction in the buffer distance or waiver of this avoidance measure. A qualified biologist would be required to monitor the nest and determine that the reduced buffer does not cause nest abandonment. If a qualified biologist determines nestlings have fledged, Covered Activities can proceed normally.

Swainson's Hawk 3. Active (within the last 5 years) nest trees on a project site will not be removed during the nesting season. If a nest tree must be removed (as determined by the PCA), tree removal shall occur only between September 15 and February 1, after any young have fledged and are no longer dependent on the nest and before breeding activity begins.

6.3.5.6.3 Construction Monitoring

Swainson's Hawk 4. Construction monitoring will be conducted by a qualified biologist and will focus on ensuring that activities do not occur within the buffer zone. The qualified biologist performing the construction monitoring will ensure that effects on Swainson's hawks are minimized. If monitoring indicates that construction outside of the buffer is affecting nesting, the buffer will be increased if space allows (e.g., move staging areas farther away). If space does not allow, construction will cease until the young have fledged from the nest (as confirmed by a qualified biologist).

The frequency of monitoring will be approved by the PCA and based on the frequency and intensity of construction activities and the likelihood of disturbance of the active nest. In most cases, monitoring will occur at least every other day, but in some cases, daily monitoring may be appropriate to ensure that direct effects on Swainson's hawks are minimized. The qualified biologist will train construction personnel on the avoidance procedures and buffer zones.

6.3.5.7 Species Condition 2, California Black Rail

6.3.5.7.1 Survey Requirements

Take of black rail occurrences are limited by the Plan (see Section 5.3.1.6.2, California Black Rail*). Therefore, surveys are critical for determining whether the wetland that may be affected is occupied, and for tracking take of California black rail. As such, surveys are required to determine the presence/absence of California black rails, if a Covered Activity is within 500 feet of the perimeter of a fresh emergent wetland greater than 0.2 acre in size.*

California Black Rail 1. Surveys will be initiated sometime between March 15 and May 31, preferably before May 15. A minimum of four surveys will be conducted. The survey dates will be spaced at least 10 days apart and will cover the time period from the date of the first survey through the end of June to early July. This will allow the surveys to encompass the time period when the highest frequency of calls is likely to occur. Projects must conduct surveys during this time period, regardless of when the project is scheduled to begin, and shall be conducted the year in which ground disturbance activities commence.

This survey requirement also applies to Covered Activities that will alter the supply of water feeding potential breeding habitat for California black rails (e.g., fixing a leak in an irrigation canal). Some wetlands supported by leaks from water conveyance structures such as irrigation canals may also be supported hydrologically by other sources of water. Fixing a leak in an irrigation canal may therefore not substantially alter the extent and/or quality of the wetland habitat for California black rail. In such cases, the project proponent may provide the results of a hydrological study of the affected wetland to the PCA and Wildlife Agencies to determine whether altering the source of water would result in take of a wetland occupied by California black rail.

Surveys must be conducted using survey protocol based on the methods used in Richmond et al. (2008) or guidance agreed upon by the Permittees and Wildlife Agencies**Error! Bookmark not defined.**. Surveys will be conducted if a fresh emergent wetland greater than 0.2 acre in size occurs on an adjacent parcel that is within 500 feet of the project site (as determined by aerial photographs), using survey methods that rely on call playback to elicit response from California black rails (e.g., those used by Richmond et al. 2008). Calls will be played from edge of the adjacent parcel, or where most appropriate to elicit a response, without trespassing.

If a California black rail is determined to be present, no project activities are permitted within 500 feet of the outside perimeter of the occupied wetland. Project proponents may conduct activities within 500 feet of an occupied wetland based on site-specific conditions (e.g., noise barriers) and if approved by the PCA and the Wildlife Agencies and an qualified biologist monitors construction activities within 500 feet to ensure that California black rail nests are not disturbed.

6.3.5.7.2 Applicable Measures

Projects in occupied wetlands will not be permitted unless approval is granted by the PCA. When granting approval, the PCA will consider if take is available under the Plan.

California Black Rail 2. If the PCA does not grant take coverage, a buffer around the avoided wetland will be demarcated 500 feet from the outside perimeter of the occupied wetland with

an exclusion fence to prevent construction activities from encroaching into the buffer zone and to identify the occupied wetland and buffer zone as a no-work area within the covered project. If the work would dewater occupied habitat and the PCA does not grant coverage, the activity could not take place under the Plan.

California Black Rail 3. If the PCA grants take coverage, clearing of the habitat (or dewatering) will occur between September 15 and February 1 (outside the breeding season). For ground disturbing activities, if the project will not convert all of the wetland habitat present, a buffer around the avoided wetland will be demarcated with exclusion fencing to prevent construction activities from encroaching into California black rail habitat and to identify the occupied wetland and buffer zone as a no-work area.

6.3.5.7.3 Construction Monitoring

California Black Rail 4. A qualified biologist will monitor on-site during construction to ensure that no Covered Activities occur within the buffer zone established around the occupied wetland, or if take allowance is granted outside of the breeding season, to ensure that adverse effects are minimized.

The frequency of monitoring will be approved by the PCA based on the frequency and intensity of construction activities and the likelihood of disturbance of the active nest. In most cases, monitoring will occur at least every other day, but in some cases daily monitoring may be appropriate to ensure that direct effects on California black rail are minimized. The qualified biologist may increase the buffer size if s/he determines that activities are particularly disruptive (e.g., use of dynamite, or other explosives).

Prior to the start of construction, the qualified biologist will train construction personnel on the avoidance procedures and buffer zones.

6.3.5.8 Species Condition 3, Western Burrowing Owl

The following measures will be implemented to avoid or minimize effects of Covered Activities on western burrowing owls. This condition is based on the *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 2012) and measures to avoid and minimize effects in the East Contra Costa County HCP/NCCP (2006).

6.3.5.8.1 Survey Requirements

Surveys for burrowing owl must be conducted for projects that occur on the following communities and features in the Valley, or as determined by a qualified biologist, to ensure that occupied burrowing owl nests are not taken:

- Grassland
- Vernal pool complex
- Semi-natural (agriculture)
- Other agricultural
- Rural residential and urban community if potential burrow sites are available
- Man-made structures such as underground pipes, irrigation canal banks, ditches

- Banks of intermittent drainages if potential burrow sites are available

Burrowing Owl 1. Two surveys will be conducted within 15 days prior to ground disturbance to establish the presence or absence of burrowing owls. The surveys will be conducted at least 7 days apart (if burrowing owls are detected on the first survey, a second survey is not needed) for both breeding and non-breeding season surveys. All burrowing owls observed will be counted and mapped.

During the breeding season (February 1 to August 31), surveys will document whether burrowing owls are nesting in or within 250 feet of the project area.

During the non-breeding season (September 1 to January 31), surveys will document whether burrowing owls are using habitat in or directly adjacent to any area to be disturbed. Survey results will be valid only for the season (breeding or non-breeding) during which the survey was conducted.

The Qualified Biologist will survey the proposed footprint of disturbance and a 250-foot radius from the perimeter of the proposed footprint to determine the presence or absence of burrowing owls. The site will be surveyed by walking line transects, spaced 20 to 60 feet apart, adjusting for vegetation height and density. At the start of each transect and, at least, every 300 feet, the surveyor, with use of binoculars, shall scan the entire visible project area for burrowing owls. During walking surveys, the surveyor will record all potential burrows used by burrowing owls, as determined by the presence of one or more burrowing owls, pellets, prey remains, whitewash, or decoration. Some burrowing owls may be detected by their calls; therefore, observers will also listen for burrowing owls while conducting the survey. Adjacent parcels under different land ownership will be surveyed only if access is granted. If portions of the survey area are on adjacent sites for which access has not been granted, the qualified biologist will get as close to the non-accessible are as possible, and use binoculars to look for burrowing owls.

The presence of burrowing owl or their sign anywhere on the site or within the 250-foot accessible radius around the site will be recorded and mapped. Surveys will map all burrows and occurrence of sign of burrowing owl on the project site. Surveys must begin 1 hour before sunrise and continue until 2 hours after sunrise (3 hours total) or begin 2 hours before sunset and continue until 1 hour after sunset. Additional time may be required for large project sites.

6.3.5.8.2 Applicable Measures

If a burrowing owl or evidence of presence at or near a burrow entrance is found to occur within 250 feet of the project site, the following measures must be implemented:

Burrowing Owl 2. If burrowing owls are found during the breeding season (approximately February 1 to August 31), the project applicant will:

- Avoid all nest sites that could be disturbed by project construction during the remainder of the breeding season or while the nest is occupied by adults or young (occupation includes individuals or family groups foraging on or near the site following fledging).
- Establish a 250-foot non-disturbance buffer zone around nests. The buffer zone will be flagged or otherwise clearly marked. Should construction activities cause the nesting bird to vocalize, make defensive flights at intruders, or otherwise display agitated behavior, then

the exclusionary buffer will be increased such that activities are far enough from the nest so that the bird(s) no longer display this agitated behavior. The exclusionary buffer will remain in place until the chicks have fledged or as otherwise determined by a qualified biologist. Construction may only occur within the 250-foot buffer zone during the breeding season only if a qualified raptor biologist monitors the nest and determines that the activities do not disturb nesting behavior, or the birds have not begun egg-laying and incubation, or that the juveniles from the occupied burrows have fledged and moved off site. Measures such as visual screens may be used to further reduce the buffer with Wildlife Agency approval and provided a biological monitor confirms that such measures do not cause agitated behavior.

Burrowing Owl 3. If burrowing owls are found during the non-breeding season (approximately September 1 to January 31), the project applicant will establish a 160-foot buffer zone around active burrows. The buffer zone will be flagged or otherwise clearly marked. Measures such as visual screens may be used to further reduce the buffer with Wildlife Agency approval and provided a biological monitor confirms that such measures do not cause agitated behavior.

Burrowing Owl 4. During the non-breeding season only, if a project cannot avoid occupied burrows after all alternative avoidance and minimization measures are exhausted, as confirmed by the Wildlife Agencies, a qualified biologist may passively exclude birds from those burrows. A burrowing owl exclusion plan must be developed by a qualified biologist consistent with the most recent guidelines from the Wildlife Agencies (e.g., California Department of Fish and Game 2012) and submitted to and approved by the PCA and the Wildlife Agencies. Burrow exclusion will be conducted for burrows located in the project footprint and within a 160-foot buffer zone as necessary.

6.3.5.8.3 Construction Monitoring

Burrowing Owl 5. A biological monitor will be present on site daily to ensure that no Covered Activities occur within the buffer zone. The qualified biologist performing the construction monitoring will ensure that effects on burrowing owls are minimized. If monitoring indicates that construction outside of the buffer is affecting nesting, the buffer will be increased if space allows (e.g., move staging areas farther away). If space does not allow, construction will cease until the young have fledged from all the nests in the colony (as confirmed by a qualified biologist) or until the end of the breeding season, whichever occurs first.

A biological monitor will conduct training of construction personnel on the avoidance procedures, buffer zones, and protocols in the event that a burrowing owl flies into an active construction zone (i.e., outside the buffer zone).

6.3.5.9 Species Condition 4, Tricolored Blackbird

The following measures will be implemented to avoid or minimize effects of Covered Activities on tricolored blackbird nesting colonies and actively used foraging habitat.

6.3.5.9.1 Survey Requirements

The PCA will provide a map of active colony sites to help determine where a survey for tricolored blackbird must occur. A colony site is considered active if it has been used for nesting in the prior 10 years. Surveys for nesting tricolored blackbird must occur if the PCA-provided map indicates an active colony site occurs on the project site or within 1,300 feet of a colony site. Surveys for nesting

tricolored blackbird must also be conducted for project sites below 300 feet elevation, within the following communities.

- Aquatic/Wetland complex
- Field Agriculture when planted in wheat, grain, triticale, or similar crop
- Patches of thorny or spiny vegetation such as blackberry, nettle, or thistle (blackberry is often associated with the riparian constituent habitat)

If an active colony site is within 3 miles of the project site and construction will occur within the nesting season (March 15 to July 31), then a survey of foraging habitat at and immediately surrounding the project site will be conducted within the following communities.

- Grassland
- Rice Agriculture
- Field Agriculture
- Aquatic/Wetland Complex
- Vernal Pool Complex

Tricolored Blackbird 1. *Preconstruction Surveys – Nest Colony Sites*. Prior to initiation of Covered Activities in all project work areas and within 1,300 feet of project work areas, the qualified biologist(s) shall conduct preconstruction surveys to evaluate the presence of tricolored blackbird nesting colonies. In instances where an adjacent parcel is not accessible to survey because the qualified biologist was not granted permission to enter, the qualified biologist will scan all potential nest colony site(s) from the adjacent property, road sides, or other safe, publicly accessible viewpoints, without trespassing, using binoculars and/or a spotting scope to look for tricolored blackbird nesting activity.

Surveys should be conducted at least twice with at least one month between surveys during the nesting season 1 year prior to initial ground disturbing for the Covered Activity if feasible, and the year of ground disturbing for the Covered Activity (required). If Covered Activities will occur in the project work area during the nesting season, three surveys shall be conducted within 15 days prior to the Covered Activity, with one of the surveys occurring within 5 days prior to the start of the Covered Activity. The survey methods will be based on Kelsey (2008) or a similar protocol approved by the PCA and the Wildlife Agencies based on site-specific conditions.

If the first survey indicates that suitable nesting habitat is not present on the project site or within 1,300 feet of the project work area, additional surveys for nest colonies are not required. Preconstruction surveys are still required, however, as described below in Tricolored Blackbird 2.

Tricolored Blackbird 2. *Preconstruction Surveys – Foraging Habitat.* If an active colony is known to occur within 3 miles of the project site, a qualified biologist will conduct two surveys of foraging habitat within the project site and within a 1,300-foot radius around the project site to determine whether foraging habitat is being actively used by foraging tricolored blackbirds. The qualified biologist will map foraging habitat, as defined by the land cover types listed above, within a 1,300-foot radius around the project site to delineate foraging habitat that will be surveyed. The surveys will be conducted approximately one week apart, with the second survey occurring no more than 5 calendar days prior to ground-disturbing activities. Two surveys are

required because tricolored blackbirds may not visit a site during a single survey period, as they may be foraging elsewhere.

Each survey shall last 4 hours, and begin no later than 8:00 a.m. The qualified biologist will survey the entire project site and a 1,300-foot radius around the project site by observing and listening from accessible vantage points that provide views of the entire survey area. If such vantage points are not available, the qualified biologist will survey from multiple vantage points to ensure that the entire survey area is surveyed. In instances where an adjacent parcel is not accessible to survey because the qualified biologist was not granted permission to enter, the qualified biologist will scan all foraging habitat from the adjacent property, road sides, or other safe, publicly accessible viewpoints, without trespassing, using binoculars and/or a spotting scope to look for tricolored blackbird foraging activity. The qualified biologist will map the locations on the site and within a 1,300-foot radius around the project site where tricolored blackbirds are observed and record an estimate of the numbers of tricolored blackbirds observed (estimated by 10s, 100s, or 1,000s), the frequency of visits (e.g., if individuals or a flock makes repeated foraging visits to the site during the survey period), whether tricolored blackbirds are leaving the site with food in their bills, and the direction they fly to/from.

6.3.5.9.2 Applicable Measures

If a tricolored blackbird nesting colony is found, the project applicant will abide by the following measures:

Tricolored Blackbird 3. *Nesting Colony – Avoidance and Minimization.* Construction activity or other covered activities that may disturb an occupied nest colony site, as determined by a qualified biologist, will be prohibited during the nesting season (March 15 through July 31 or until the chicks have fledged or the colony has been abandoned on its own) within a 1,300-foot buffer zone around the nest colony, to the extent practicable. The intent of this condition is to prevent disturbance to occupied nest colony sites on or near project sites so they can complete their nesting cycle. This condition is not intended to preserve suitable breeding habitat on project sites but to ensure impacts to active colony sites only take place once the site is no longer occupied by the nesting colony. The buffer will be applied to extend beyond the nest colony site as follows.

- If the colony is nesting in a wetland, the buffer must be established from the outer edge of all hydric vegetation associated with the colony.
- If the colony is nesting in non-wetland vegetation (e.g., Himalayan blackberry), the buffer must be established from the edge of the colony substrate.

This buffer may be modified to a minimum of 300 feet, with written approval from the Wildlife Agencies, in areas with dense forest, buildings, or other features between the Covered Activities and the occupied active nest colony; where there is sufficient topographic relief to protect the colony from excessive noise or visual disturbance; where sound curtains have been installed; or other methods developed in consultation with the Wildlife Agencies where conditions warrant reduction of the buffer distance. If tricolored blackbirds colonize habitat adjacent to Covered Activities after the activities have been initiated, the project applicant shall reduce disturbance through establishment of buffers or noise reduction techniques or visual screens, as determined in consultation with the Wildlife Agencies and PCA. The buffer must be clearly marked to prevent project-related activities from occurring within the buffer zone.

Tricolored Blackbird 4. *Actively used Foraging Habitat – Avoidance and Minimization*. Construction activity or other covered activities that may disturb foraging tricolored blackbirds, as determined by a qualified biologist, will be prohibited within 1,300-feet of the foraging site to the extent feasible during the nesting season (March 15 through July 31 or until the chicks have fledged or the colony has been abandoned on its own) if the foraging habitat was found to be actively used by foraging tricolored blackbirds during at least one of the two foraging habitat surveys conducted under Tricolored Blackbird 2. If survey results indicate that the area provides marginal foraging habitat (e.g., tricolored blackbirds were observed foraging, but only briefly, and most were not successfully capturing prey), or site specific conditions may warrant a reduced buffer, the PCA technical staff will consult with the Wildlife Agencies to evaluate whether the project needs to avoid the foraging habitat or whether a reduced buffer may be appropriate. In such cases, additional surveys may be needed to assess site conditions and the value of the foraging habitat.

The buffer must be clearly marked to prevent project-related activities from occurring within the buffer zone. This buffer may be modified to a minimum of 300 feet, with written approval from the Wildlife Agencies, in areas with dense forest, buildings, or other features between the Covered Activities and the actively used foraging habitat; where there is sufficient topographic relief to protect foraging birds from excessive noise or visual disturbance; or in consultation with the Wildlife Agencies if other conditions warrant reduction of the buffer distance. If tricolored blackbird begins using foraging habitat adjacent to Covered Activities after the activities have been initiated, the project applicant shall reduce disturbance through establishment of buffers or noise reduction techniques or visual screens, as determined in consultation with the Wildlife Agencies and PCA.

Similar to Tricolored Blackbird 3, the intent of this condition is to allow actively nesting colonies on or near project sites to complete their nesting cycle prior to the loss of the foraging habitat on site. Protecting actively used-foraging habitat during the nesting season will help to enable the tricolored blackbird nesting colony complete its nesting cycle, as loss of valuable foraging habitat could cause the nesting colony to fail. This condition is not intended to preserve suitable foraging habitat on project sites in the long term.)

6.3.5.9.3 Construction Monitoring

Tricolored Blackbird 5. *Nesting Colony – Construction Monitoring*. Active nesting colonies that occur within the no-disturbance buffer shall be monitored by the qualified biologist(s) to verify the Covered Activity is not disrupting the nesting behavior of the colony. The frequency of monitoring will be approved by the PCA and based on the frequency and intensity of construction activities and the likelihood of disturbance of the active nest. In most cases, monitoring will occur at least every other day, but in some cases, daily monitoring may be appropriate to ensure that direct effects on tricolored blackbird are minimized. The biologist will train construction personnel on the avoidance procedures and buffer zones.

If the qualified biologist(s) determines that the Covered Activity is disrupting nesting and/or foraging behavior, the qualified biologist(s) shall notify the project applicant immediately, and the project applicant shall notify the PCA within 24 hours to determine additional protective measures that can be implemented. The qualified biologist(s) shall have the authority to stop Covered Activities until additional protective measures are implemented. Additional protective measures shall remain in place until the qualified biologist(s) determine(s) tricolored blackbird

behavior has normalized. If additional protective measures are ineffective, the qualified biologist(s) shall have the authority to stop Covered Activities as needed until the additional protective measures are modified and nesting behavior of tricolored blackbird returns to normal.

Additional protective measures may include increasing the size of the buffer (within the constraints of the project site), delaying Covered Activities (or the portion of Covered Activities causing the disruption) until the colony is finished breeding and chicks have left the nest site, temporarily relocating staging areas, or temporarily rerouting access to the project work area. The project proponent shall notify the PCA and Wildlife Agencies within 24 hours if nests or nestlings are abandoned. If the nestlings are still alive, the qualified biologist(s) shall work with the Wildlife Agencies to determine appropriate actions for salvaging the eggs or nestlings. Notification to PCA and Wildlife Agencies shall be via telephone or email, followed by a written incident report. Notification shall include the date, time, location, and circumstances of the incident.

Tricolored Blackbird 6. *Actively used Foraging Habitat – Construction Monitoring.* Foraging habitat within the buffer shall be monitored by the qualified biologist(s) to verify that the Covered Activity is not disrupting tricolored blackbird foraging behavior. The frequency of monitoring will be approved by the PCA and based on the frequency and intensity of construction activities and the likelihood of disturbance of foraging tricolored blackbirds. In most cases, monitoring will occur at least every other day, but in some cases, daily monitoring may be appropriate to ensure that effects on tricolored blackbird are minimized. The biologist will train construction personnel on the avoidance procedures and buffer zones.

If the qualified biologist(s) determines that the Covered Activity is disrupting foraging behavior, the qualified biologist(s) shall notify project applicant immediately, and the project applicant shall notify the PCA within 24 hours to determine additional protective measures that can be implemented. The qualified biologist(s) shall have the authority to stop Covered Activities until additional protective measures are implemented. Additional protective measures shall remain in place until the qualified biologist(s) determine(s) tricolored blackbird behavior has normalized. If additional protective measures are ineffective, the qualified biologist(s) shall have the authority to stop Covered Activities as needed until the additional protective measures are modified and foraging behavior of tricolored blackbird returns to normal. Additional protective measures may include increasing the size of the buffer (within the constraints of the project site), temporarily relocating staging areas, or temporarily rerouting access to the project work area.

6.3.5.10 Species Condition 5, Giant Garter Snake

The following measures will be implemented to avoid or minimize effects of Covered Activities on giant garter snakes. This condition is based on the USFWS's *Standard Avoidance and Minimization Measures during Construction Activities in Giant Garter Snake* (Thamnophis gigas) *Habitat* (U.S. Fish and Wildlife Service 1999a).

6.3.5.10.1 Survey Requirements

If the communities listed below are present on or adjacent to a project site and within the geographic range of giant garter snake habitat in the Plan Area (see Appendix D, *Species Accounts*), a

qualified biologist will conduct a survey to assess whether the communities provide suitable habitat for giant garter snake. Giant garter snake surveys will be conducted according to the USFWS's *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake* (Thamnophis gigas) *Habitat*[7] or the current Wildlife Agency–approved protocol. If there is any deviation in the written text below and the formal USFWS guidelines, then the USFWS guidelines or otherwise current Wildlife Agency–approved protocol takes precedence. Project-by-project mitigation requirements do not apply. Mitigation will be addressed through the requirements of the conservation strategy, as described in Section 5.4.5, *Giant Garter Snake*.

a. Aquatic/Wetland Complex (Fresh Emergent Marsh, seasonal wetlands, and ponds)

b. Rice Agriculture

c. Riverine/Riparian in Low-gradient Streams

d. Managed Open Water (sloughs, small lakes, irrigation and drainage canals)

If there is any question about the suitability of the habitat to support giant garter snakes and/or potential for species occurrence, USFWS and CDFW may be consulted. If the surveyor cannot legally access neighboring land within 200 feet of a project site, the qualified biologist may survey the adjacent parcel with binoculars or a spotting scope.

6.3.5.10.2 Applicable Measures

Giant Garter Snake 1. To avoid effects on giant garter snake aquatic habitat, the project proponent will conduct no in-water/in-channel activity and will maintain a permanent 200-foot non-disturbance buffer from the outer edge of suitable habitat. If the project proponent cannot avoid effects of construction activities, the project proponent will implement the following measures to minimize effects of construction projects.

- Conduct preconstruction clearance surveys using USFWS and CDFW-approved methods within 24 hours prior to construction activities within identified giant garter snake aquatic and adjacent upland habitat. If construction activities stop for a period of 2 weeks or more, conduct another preconstruction clearance survey within 24 hours of resuming construction activity.
- Restrict all construction activity involving disturbance of giant garter snake habitat to the snake's active season, May 1 through October 1. During this period, the potential for direct mortality is reduced, because snakes are expected to actively move and avoid danger.
- In areas where construction is to take place, encourage giant garter snakes to leave the site on their own by dewatering all irrigation ditches, canals, or other aquatic habitat (i.e., removing giant garter snake aquatic habitat) between April 15 and September 30. Dewatered habitat must remain dry, with no water puddles remaining, for at least 15 consecutive days prior to excavating or filling of the habitat. If a site cannot be completely dewatered, netting and salvage of giant garter snake prey items may be necessary to discourage use by snakes.
- Provide environmental awareness training for construction personnel. Training may be implemented through the distribution of approved brochures and other materials that describe resources protected under the Plan and methods for avoiding effects. If a live giant garter snake

[7] U.S. Fish and Wildlife Service. 2015. *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake* (Thamnophis gigas) *Habitat*. Appendix C. Available: http://www.fws.gov/sacramento/es/Survey-Protocols- Guidelines/Documents/GGS%20Appendix%20C.pdf.

is encountered during construction activities, immediately notify the project's biological monitor and USFWS and CDFW. The monitor will stop construction in the vicinity of the snake, monitor the snake, and allow the snake to leave on its own. The monitor will remain in the area for the remainder of the work day to ensure the snake is not harmed or, if it leaves the site, does not return. The qualified biologist will work with the PCA, USFWS, and CDFW to redirect the snake away from the disturbance area within 3 days of reporting the snake's presence at the construction site to USFWS and CDFW.

- Employ the following management practices to minimize disturbances to habitat.
    - Install temporary fencing to identify and protect adjacent marshes, wetlands, and ditches from encroachment from construction equipment and personnel.
    - Maintain water quality and limit construction runoff into wetland areas through the use of hay bales, filter fences, vegetative buffer strips, or other accepted practices. No plastic, monofilament, jute, or similar erosion control matting that could entangle snakes or other wildlife will be permitted.

6.3.5.11 Species Condition 6, California Red-legged Frog, Foothill Yellow-legged Frog, and Western Pond Turtle

California red-legged frog, foothill yellow-legged frog, and western pond turtle are all species that rely on aquatic habitats for a portion of their life cycles. Many of the avoidance measures in this chapter focus on the avoidance and minimization of impacts on these aquatic habitats, addressing minimizing converted land as well as degradation of habitat (water quality and other indirect effects). Conditions on Covered Activities that provide avoidance and minimization for California red-legged frog, foothill yellow-legged frog, and western pond turtle include:

- General Condition 1, *Watershed Hydrology and Water Quality*
- Community Condition 1.1, *Avoidance of Vernal Pool Complex Constituent Habitat*
- Community Condition 1.2, *Avoidance of Aquatic/Wetland Complex Constituent Habitat*
- Community Condition 2, *Riverine and Riparian Avoidance and Minimization*
- Community Condition 3, *Valley Oak Woodland Avoidance, Minimization, and Mitigation*
- Stream System Condition 1, *Stream System Avoidance and Minimization*
- Regional Public Projects Condition 1, *Transportation and Other Infrastructure Projects Design Requirements*
- Regional Public Projects Condition 2, *Transportation and Other Infrastructure Projects Construction BMPs*
- Regional Public Projects Condition 3, *Operation and Maintenance BMPs*
- Species Condition 4, *Tricolored Blackbird*
- Species Condition 7, *Central Valley Steelhead and Central Valley Fall-/Late Fall-Run Chinook Salmon (Salmonids)*

In addition to these avoidance and minimization measures, General Condition 3, *Land Conversion*, provides a process for accounting for loss of natural and semi-natural that is more encompassing

than standard practice. This approach better addresses the piecemeal loss of high-quality, contiguous habitat that would occur without a plan such as that HCP/NCCP.

Finally, Chapter 5, *Conservation Strategy*, provides guidance on how impacts that cannot be avoided and minimized are mitigated. Mitigation not only includes addressing loss of aquatic resources, but surrounding uplands and loss of habitat connectivity as well. Because the effects on California red-legged frog, foothill yellow-legged frog, and western pond turtle are addressed through the approach to assessing impact and applying extensive avoidance and minimization measures, no additional avoidance and minimization measures specific to these species are required.

6.3.5.12 Species Condition 7, Central Valley Steelhead and Central Valley Fall-/Late Fall-Run Chinook Salmon (Salmonids)

This condition applies stream avoidance and minimization BMPs specific for salmonid habitat in the Plan Area. The distribution of Central Valley steelhead habitat in Plan Area streams has been modeled by NMFS (2014) (Appendix D, *Species Accounts*). Because no similar modeled habitat exists for fall-/late fall-run Chinook salmon, habitat for fall-/late fall-run Chinook salmon is assumed to be the same as that for Central Valley steelhead because of overlap of life history requirements between species. Effects on steelhead and Chinook salmon by Covered Activities will be minimized by the following General Conditions that apply to the Stream System throughout the Plan Area:

a. General Condition 1, *Watershed Hydrology and Water Quality*

b. Community Condition 2.1, *Riverine and Riparian Avoidance*

c. Community Condition 2.2, *Minimize Riverine and Riparian Effects*

d. Community Condition 2.4, *Placer County Water Agency Operations and Maintenance Best Management Practices*

e. Stream System Condition 1, *Stream System Avoidance and Minimization*

Habitat for steelhead and Chinook salmon will be protected, managed, and restored in the Reserve System (see Chapter 5, *Conservation Strategy*).

6.3.5.12.1 Guidelines for Salmonid Passage at Stream Crossings

All Covered Activities within salmonid habitat will adhere to the NMFS *Guidelines for Salmonid Passage at Stream Crossings* (National Marine Fisheries Service 2001) (or most current guidance provided by NMFS), where feasible, unless otherwise noted in this chapter. In addition, the *California Salmonid Stream Habitat Restoration Manual* (California Department of Fish and Game 2011) will be consulted for specific in-stream design features and protocols to enhance habitat for salmonids. Key guidelines described in *Guidelines for Salmonid Passage at Stream Crossings* (National Marine Fisheries Service 2001) are described below.

1. For stream crossings, the following structure types (listed in descending order of preference) will be considered:

    a. Free-span bridges that fully span (from top-of-bank to top-of bank) the stream and allow for long-term dynamic channel stability.

    b. Streambed simulation approaches, including a bottomless arch, embedded culvert design, or ford that maintains the natural streambed. The structure shall be sufficiently large and

embedded deep enough into the channel to allow the natural movement of bedload and formation of a stable bed inside the culvert or structure. There should not be an excessive drop at the outlet or too high water velocity through the passage structure.

c. Non-embedded culvert (often referred to as a hydraulic design), for use in low-gradient areas, that allows fish passage.

d. Baffled culvert (creases in the culvert create a series of short high-velocity runs and low-velocity backwater areas that allow the fish to swim in short bursts and then rest), for use in high-gradient areas, that allows fish passage.

2. If the project's site is in an active salmonid spawning area, only free-span bridges or streambed simulations (i.e., culverts with a bed that simulates the natural streambed) are acceptable (National Marine Fisheries Service 2001).

3. Most stream crossings, regardless of the design (i.e., bridge or culvert) or material used, will be designed to accommodate the 100-year peak floodflow with appropriate clearance to prevent structural damage to the crossing, where feasible. In the Valley, the 100-year floodplain can be thousands of feet wide on some Stream Systems, so it may not be feasible to build stream crossings to accommodate the 100-year peak floodflow). Unless culverts are intentionally designed to be undersized for storm water detention or retention, culverts must at a minimum accommodate the 100-year flood without causing any adjacent flooding around the crossing that could result in mass erosion of the bank or the structural support of the crossing. (Note: State or local requirements may require that the 200-year floodplain be considered for stream crossings. The standards contained in this section do not supersede those more stringent requirements). This requirement will reduce the risk of channel degradation, stream diversion, and failure that may lead to adverse effects on salmonids over the lifespan of the crossing (National Marine Fisheries Service 2001).

4. For in-stream culvert installation or replacement projects that may affect stream hydraulics, the project must be designed so that the elevations of surface waters in the stream reach exhibit gradual flow transitions, both upstream and downstream. Abrupt changes in water surface and velocities must be avoided, with no hydraulic jumps, turbulence, or drawdown at the entrance. Hydraulic controls may be necessary to provide resting pools, concentrate low flows, prevent erosion of streambed or banks, and allow passage of bedload material (National Marine Fisheries Service 2001).

5. If a free-span bridge is not feasible, bridge piers and footings will be designed to have minimum impact on the stream. This applies in all Stream Systems, not just active salmonid spawning areas. A hydraulic analysis must be prepared that shows piers or footings will not cause significant scour or channel erosion. Whenever possible, the span of bridges will also allow for upland habitat beneath the bridge to provide undercrossing areas for wildlife species that will not enter the creek. Native plantings, natural debris, or large rocks (not riprap) will be installed under bridges to provide wildlife cover and encourage the use of crossings.

6. All in-stream structures will be aligned with the stream, with no abrupt changes in flow direction upstream or downstream of the crossing. This requirement can often be accommodated by changes in road alignment or slight elongation of the culvert. Where elongation would be excessive, such a solution must be weighed against a better crossing alignment and/or modified transition sections upstream and downstream of the crossing. Project components that may result in disruption of stream hydraulics and alterations to the

natural streambed will be anticipated and mitigated in the project design (National Marine Fisheries Service 2001).

7. If structural changes to the channel bed are necessary as part of project design, provisions for fish passage will be incorporated into the project design. If the project applicant has the opportunity to incorporate new fish passage into the project design in an area where fish passage is currently lacking, the project applicant will work with the PCA to determine if new fish passage would support Covered Species recovery.

6.3.5.12.2 Applicable Measures

Salmonid 1. Fish Passage Design. Streamflow through new and replacement culverts, bridges, and over stream gradient control structures must meet the velocity, depth, and other passage criteria for salmonid streams as described by NMFS and CDFW guidelines or as developed in cooperation with NMFS and CDFW to accommodate site-specific conditions (*Guidelines for Salmonid Passage at Stream Crossings* [National Marine Fisheries Service 2001]).

Salmonid 2. Fish Passage During Construction. Fish passage through dewatered channel sections shall be maintained at all times during the adult and juvenile migration season on streams with Covered Species to allow for unimpeded passage of migrating adults and juveniles (smolts). In addition, fish passage shall be maintained during summer on streams supporting summer rearing of Covered Species to allow for seasonal movement of resident (over-summering) fish when the natural channel segment within the vicinity of work areas also supports the movement of resident fish.

To allow for fish passage, the diversion shall:

- Maintain continuous flows through a low flow channel in the channel bed or an adjacent artificial open channel
- Present no vertical drops exceeding six inches and follow the natural grade of the site
- Maintain water velocities that shall not exceed 1.5 feet per second and provide velocity refugia, as necessary
- Maintain adequate water depths consistent with normal conditions in the project reach
- Be lined with cobble/gravel to simulate stream bottom conditions
- Be checked daily to prevent accumulation of debris at diversion inlet and outlet

A closed conduit pipe shall not be used for fish passage. Pipes may be used to divert flow through dewatered channel segments on streams that do not support migratory species, or during low flow conditions when the channel segment within the vicinity of work areas at the time of construction does not support movement of fish.

Salmonid 3. Pre-construction Relocation. Prior to the start of work or during the installation of water diversion structures, if fish Covered Species are present and it is determined that they could be injured or killed by construction activities, a qualified biologist will first attempt to gently herd fish Covered Species away from work areas and exclude them from work areas with nets, if practicable. If herding is not practicable or ineffective, a qualified biologist shall capture fish Covered Species and transfer them to another appropriate reach. In considering the relocation, the qualified biologist will determine whether relocation is ecologically appropriate

using a number of factors, including site conditions, system carrying capacity for potential relocated fish, and flow regimes (e.g., if flows are managed). If fish Covered Species are to be relocated, the following factors will be considered when selecting release site(s):

- Similar (within 3.6°F [2 degrees Celsius (°C)]) water temperature as capture location. In addition, fish must be held in water that is at the same temperature as release sites at time of release. If raising or lowering of water temperature in holding apparatus is required, water temperatures in holding apparatus containing fish should not be changed at a rate that exceeds 1.8°F (1°C) every 2 minutes, and should not exceed 41°F (5°C) per hour.
- Ample habitat availability prior to release of captured individuals.
- Presence of others of the same species so that relocation of new individuals will not upset the existing prey/predation function.
- Carrying capacity of the relocation location.
- Potential for relocated individual to transport disease.
- Low likelihood of fish reentering work site or becoming impinged on exclusion net or screen.

Capture and relocation of fish Covered Species is not required at individual project sites when site conditions preclude reasonably effective operation of capture gear and equipment, or when the safety of the biologist conducting the capture may be compromised.

Salmonid 4. Spawning Gravel Cleaning. Spawning gravel cleaning and replacement activities should be timed to occur during the dry season and after fry have emerged from the gravel (generally July 1 through October 1). Applicants may submit requests for extension of this work window to the PCA for review by CDFW and NMFS. In streams that receive summer irrigation flows, spawning gravel cleaning and replacement activities should be timed to occur after the irrigation season has ended and stream flows are at a minimum to minimize the need for site dewatering (if needed) and to minimize the potential for downstream turbidity and sedimentation effects. If dewatering is needed, other applicable Avoidance and Minimization Measures shall be implemented prior to commencing spawning gravel cleaning and replacement activities. Gravel to be placed in streams shall be washed (to remove fines), rounded (i.e., non-angular) and spawning-sized (between 0.4 and 4.0 inches [10 to 100 millimeters] in diameter). For gravel augmentation projects, gravels should be placed such that high flows naturally sort and distribute the material.

Salmonid 5. Use of Riprap When Necessary. When riprap is required to be placed below the OHWM, it shall have a cleanliness value of no less than 85 percent and shall be covered with clean, uncrushed rock consistent with NMFS spawning gravel size requirements (currently 98 to 100 percent of the clean, uncrushed rock must pass through a 4-inch sieve, and 60 to 80 percent must pass through a 2-inch sieve). Of the total volume of rock placed, 50 percent shall consist of clean, uncrushed rock. This measure may be updated with more current standards.

6.3.5.12.3 Salmonid Stream Fees

Projects affecting riverine constituent habitat in a salmonid stream will be assessed a special habitat fee based on linear feet of impact. This will apply to both permanent and temporary impacts.

6.3.5.13 Species Condition 8, Valley Elderberry Longhorn Beetle

The following measures will be implemented to avoid or minimize effects of Covered Activities on valley elderberry longhorn beetle.

Surveys for valley elderberry longhorn beetle are required for Covered Activities within the following habitat features when below 650 feet elevation (above mean sea level):

a. Riparian constituent habitat

b. Valley oak woodland community

c. Stream System (excluding frequently disked or flooded agricultural lands such as rice that would not likely support elderberry shrubs)

The project applicant will apply avoidance and minimization measures as specified in the USFWS's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (U.S. Fish and Wildlife Service 1999b) or the current Wildlife Agency–approved avoidance and minimization protocol. When take is authorized the project applicant must coordinate with the PCA to provide transplants and seedlings/cuttings for planting in suitable habitat on the Reserve System consistent with the USFWS Guidelines/Framework. Project-by-project mitigation requirements for valley elderberry longhorn beetle cannot be applied to the restoration requirements of 6.3.2.2.3 (*Community Condition 2.3, Riverine and Riparian Restoration*) for a project's associated riparian native trees/shrubs impacts to be planted as replacement habitat (i.e., mitigation for impacts to valley elderberry longhorn beetle [transplants and plantings of seedlings/cuttings] does not count as mitigation for impacts to riverine and riparian [restoration of riverine and riparian]). The distinction between valley elderberry longhorn beetle impacts and riverine/riparian impacts will be addressed through project-specific mitigation requirements that provide for restoration of natural communities, including riverine/riparian complex (i.e., restoration dependent on effects; see Table 5-4).

6.3.5.14 Species Condition 9, Conservancy Fairy Shrimp

6.3.5.14.1 Survey Requirements

Surveys for Conservancy fairy shrimp are required if vernal pools and seasonal wetland occur on the project site and if the project site falls within the survey boundary depicted in Figure 5-7.

Conservancy Fairy Shrimp 1. Surveys will be conducted for Conservancy fairy shrimp in vernal pools, vernal swales, and other seasonal wetlands. The qualified biologist will conduct protocol-level surveys using the *Survey Guidelines for the Listed Large Branchiopods* (Guidelines) (U.S. Fish and Wildlife Service 2015). Among other requirements, this protocol states that a complete survey consists of one wet season survey and one dry season survey within a 3-year period. As such, applicants must plan ahead to allow sufficient time to complete these surveys. The results of the protocol-level survey will be valid for 5 years after completion, which means no more than 5 years may lapse between the survey and PCA approval of the Covered Activity.

If another occurrence is found in the Plan Area but outside of the survey requirement area, a similar requirement will be established in consultation with the Wildlife Agencies.

6.3.5.14.2 Applicable Measures

Covered Activities must avoid taking Conservancy fairy shrimp, except as stated in Section 5.4.11, *Vernal Pool Branchiopods* (CM1 VPC-2, Protection of Conservancy Fairy Shrimp Occurrences). If Conservancy fairy shrimp is found to occur on a project site, the following measures will be required for full avoidance:

Conservancy Fairy Shrimp 2. Maintain a 250-foot upland buffer from the outer edge of all hydric vegetation associated with occupied wetlands.

At the request of the project applicant, representatives of the PCA and the Wildlife Agencies may conduct site visits to inspect the particular characteristics of specific project sites and may approve reductions of the buffer. Buffer reductions may be approved for all or portions of the site whenever reduced buffers will maintain the hydrology of the seasonal wetland and achieve the same or greater habitat values as would be achieved by the original buffer. Avoidance and minimization measures will be incorporated into the project design and other portions of the application package prior to submission for coverage under the Plan.

An avoided occurrence can count toward the project's mitigation requirements if it is incorporated into the Reserve System and managed according to the Plan's conservation strategy.

In the event that complying with this condition to avoid an occurrence of Conservancy fairy shrimp would severely affect a property owner's use or economic interest in private property, the PCA and the Wildlife Agencies shall promptly consult with the property owner to consider whether any modifications to this condition are appropriate to reduce the impact on the property owner or whether the PCA may instead purchase the property as part of the Reserve System.

Conservancy Fairy Shrimp 3. Activities inconsistent with the maintenance of seasonal wetlands within the buffers and disturbance of the on-site watershed will be prohibited, including:

- Altering existing topography
- Placing new structures within the buffers
- Dumping, burning, and/or burying garbage or any other wastes or fill materials
- Building new roads or trails
- Removing or disturbing existing native vegetation
- Installing storm drains
- Using pesticides or other toxic chemicals

Conservancy Fairy Shrimp 4. To avoid or minimize effects on Conservancy fairy shrimp being retained on site, the 250-foot upland buffer will be marked by brightly colored fencing throughout the construction process. Activities will be prohibited within this buffer.

6.3.5.14.3 Construction Monitoring

Conservancy Fairy Shrimp 5. If occupied habitat is retained on site, a qualified biological monitor will be present to ensure compliance with the buffer zone restrictions. A qualified biologist will inform all construction personnel about the life history of Conservancy fairy shrimp, the importance of avoiding its habitat, and the terms and conditions of the Plan related to avoiding and minimizing effects on Conservancy fairy shrimp.

The frequency of monitoring will be approved by the PCA and based on the frequency and intensity of construction activities and the likelihood of disturbance of the occupied pool(s). In most cases, monitoring will occur at least every third day.

6.3.5.15 Species Condition 10, Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Surveys are required in vernal pools that will be lost to Covered Activities to determine the occupancy rate of vernal pool fairy shrimp and vernal pool tadpole shrimp in these wetlands. These occupancy rates will be used to calculate the Occupancy Rate Standards8 for these species. The Occupancy Rate Standards will help to ensure that the PCA protects, restores, and creates vernal pools that are occupied by vernal pool fairy shrimp and vernal pool tadpole shrimp at a rate and quality equal to or greater than vernal pools lost to Covered Activities. The Occupancy Rate Standards will be determined after at least 37 wetted acres of vernal pools have been surveyed. Existing data (i.e., data collected prior to issuance of the state and federal permits) collected within the PFG will count toward the requirement to survey a minimum of 37 wetted acres of vernal pools if the surveys were conducted using USFWS-established or –approved protocols, and data are sufficient to quantify occupancy rates, as defined below (see Occupancy Phase). Once the Occupancy Rate Standards are established and approved by the Wildlife Agencies, no further vernal pool occupancy surveys will be required for sites to be affected under the Plan. See Section 5.3.1.6.10, *Vernal Pool Branchiopods*, for more details on the Occupancy Rate Standards and the Plan's requirements to protect, enhance, restore, and create habitat on the Reserve System occupied by vernal pool fairy shrimp and vernal pool tadpole.

6.3.5.15.1 Survey Requirements

Wet season surveys to determine occupancy of vernal pools by vernal pool fairy shrimp and vernal pool tadpole shrimp will be required during the Initial Survey Phase. . The PCA will inform the applicant if the Plan is in the Initial Survey Phase and surveys are required.

Vernal Pool Fairy Shrimp and Tadpole Shrimp 1. Wet season surveys will be conducted for vernal pool fairy shrimp and vernal pool tadpole shrimp in vernal pools, as determined by wetland delineation (See Section 6.2.4.4, *Item 4: Mapping HCP/NCCP Aquatic Features* for details). The qualified biologist will conduct protocol-level wet season surveys, using modified Guidelines, as approved by USFWS (see below). Modifications include requiring that all vernal pools at a site be surveyed, rather than allowing for the survey to be terminated when presence on a project site is confirmed. This modification is necessary to obtain data on presence and

[8] The Occupancy Rate Standard is the proportion of occupied vernal pools relative to all vernal pools sampled, expressed as a percentage. The Occupancy Rate Standard will be represented in two ways: as an Area-Based Occupancy Rate Standard and a Pool-Based Occupancy Rate Standard. See the following footnotes for more details.

absence in all of the available vernal pools, to facilitate the determination of the Occupancy Rate Standards. This, and other exceptions and additions to the Guidelines, as follows.

- If presence is confirmed for vernal pool fairy shrimp and vernal pool tadpole shrimp in an individual vernal pool, surveys may be stopped for that vernal pool.
- All vernal pools on the project site must be surveyed. Surveys cannot be suspended prior to completion, as allowed by the Guidelines, if one or more of the six listed large branchiopods, identified in the Guidelines is determined to be present.
- The Guidelines define a complete survey as consisting of one wet-season and one dry-season survey conducted and completed in accordance with the Guidelines within a 3-year period. For the purposes of the Plan, only one wet-season survey is required; dry-season surveys are not required. Applicants must plan ahead to allow sufficient time to complete these surveys.
- Data that will be collected at each vernal pool surveyed during the wet season survey will include the presence or absence of vernal pool fairy shrimp and vernal pool tadpole shrimp, species identity and the estimated abundance (10s, 100s, 1,000s) of immature and mature vernal pool fairy shrimp and vernal pool tadpole shrimp present, and estimated maximum surface area of the vernal pool. Other information on the USFWS data sheet are not required to be collected (i.e., air and water temperature, average and estimated maximum depth of the vernal pool, presence of non-target crustaceans, insects, and platyhelminths, and habitat condition). This will allow surveys to be conducted more efficiently, while providing the essential information necessary to calculate the Pool-based Occupancy Rate Standard[9] and the Area-based Occupancy Rate Standard[10]. Because these vernal pools will be affected by Covered Activities, collection of additional information is not necessary.
- Information will be recorded on the PCA-provided data sheet, which will be the USFWS data sheet (included as Appendix A to the Guidelines), modified to include the above information.
- Voucher specimens will not be collected during wet season surveys unless the identity of the mature shrimp is uncertain and cannot be identified in the field. The Guidelines allow for a limited number of voucher specimens to be collected for each vernal pool. For the purpose of the Plan, the modified survey protocol further limits the collection of voucher specimens to instances where identity is uncertain.

The biologist conducting a survey for vernal pool fairy shrimp and vernal pool tadpole shrimp should participate in the wetland delineation to map the area of each vernal pool. If the biologist cannot participate in the wetland delineation, and the wetland delineation does not provide area for each vernal pool, the biologist will conduct follow-up surveys to map the perimeter of each vernal pool with a global positioning system (GPS). Each vernal pool will be given a unique

[9] The Pool-based Occupancy Rate Standard is defined as the total number of vernal pools occupied by a covered branchiopod species divided by the total number of vernal pools surveyed and expressed as the percentage of occupied pools and seasonal swales. A pool-based Occupancy Rate Standard will be set for vernal pool fairy shrimp and for vernal pool tadpole shrimp individually.

[10] The Area-based Occupancy Rate Standard is defined as the total wetted area of vernal pools occupied by a covered branchiopod species divided by the total wetted area of vernal pools surveyed, and is expressed as the percentage of the wetted area occupied. An Area-based Occupancy Rate Standard will be set for vernal pool fairy shrimp and for vernal pool tadpole shrimp individually.

identification number that will be used to track survey data collected during wet- season surveys.

6.3.5.15.2 Applicable Measures

The applicant must submit completed data sheets to the PCA prior to ground disturbance activities.

6.3.6 Reserve Management Conditions

The conditions listed here establish requirements for public access and recreation on the Reserve System and describe incorporation of these requirements into reserve unit management plans.

6.3.6.1 Reserve Management Condition 1, Public Access and Recreation on Future Reserve Lands

Land acquisition is a primary component of the conservation strategy. Lands acquired during Plan implementation will be enrolled into the Reserve System and managed for the benefit of Covered Species and natural communities. The primary purpose of all Reserve System lands is the conservation of the Covered Species and natural communities in the HCP/NCCP. However, limited recreation may be allowed on some reserves as long as that recreation does not inhibit the ability of the PCA to achieve the biological goals and objectives of the Plan. There will be some areas of the Reserve System in which recreation will be prohibited either at all times or certain times of the year. This condition describes the limited allowable recreational uses on future lands acquired for the Reserve System during Plan implementation, and the limited situations in which that is allowed (also see Section 6.3.6.2, *Reserve Management Condition 2, Recreation Component of Reserve Unit Management Plans*).

Jump Start lands are eligible to be included in the Reserve System at the time the Plan is permitted and will be enrolled in the Reserve System upon recording of a conservation easement. Some of these existing lands have established trails and existing recreational uses and will, therefore, be assessed separately. Limitations on recreation in Jump Start lands are described in Section 6.3.6.3, *Reserve Management Condition 3, Jump Start Lands.*

The level of recreation allowed on future reserves will be minimal (e.g., docent-led tours, hiking). Hunting and fishing will be allowed under limited circumstances, applying the conditions described below. No off-road vehicles will be allowed in new reserves except for management purposes. New trails may be constructed but designed to be minimally invasive. Within the future Reserve System up to 70 miles of new trails with an average width of 6 feet may be developed (approximately 50 acres of ground disturbance) upon approval of the PCA and Wildlife Agencies. An 18-foot buffer that encompasses the trail will be deducted from enrolled acres of any future reserve (up to 153 acres over the course of the permit term). Trail location and density in any given reserve unit will not impact the biological goals and objectives that the acquisition is designed to meet or for which acquisition credit is given. Recreation facilities, such as parking lots, will be located offsite to the extent practicable and will not be enrolled in the Reserve System (see item 14 below). Section 2.6.7.1.4, *Recreation*, describes facilities construction and trail construction as Covered Activities, the footprint of these effects will be counted against the proposed direct effect limits provided in Table 4.1.

6.3.6.1.1 Restrictions on Recreational Uses in Future Reserves Acquired during Plan Implementation

Any recreational use on future reserves will be limited to outdoor education, docent lead tours, and hiking, biking, and horseback riding on peripheral trails and trails along creek corridors. Many future reserves may have no recreational access. Any allowed recreational uses on Reserve System lands will be outlined in the reserve unit management plan and approved by PCA and the Wildlife Agencies. Recreational use on reserve lands will be designed to minimize effects on biological resources and must adhere to the requirements and guidelines listed below (limitations on trail construction and use are described in Section 6.3.6.1.2, *New Trail Design and Use Standards for Future Reserves.*

1. Recreation will be allowed only where it is compatible with the biological goals and objectives of the Plan and where it is explicitly approved by the Wildlife Agencies.
2. Where allowed, recreational use and its effects will be monitored by the PCA to ensure that uses do not adversely affect Covered Species or natural communities. If any use is found to be adversely affecting Covered Species or natural communities, then that use will be discontinued until adjustments can be made to reduce or eliminate effects (see Chapter 7, *Monitoring and Adaptive Management Program*, for details on monitoring). The PCA and the Wildlife Agencies will make decisions about discontinuing or modifying recreational uses.
3. Hunting on reserve lands owned in fee title or easement will be prohibited unless the hunting occurs for management purposes (e.g., control of feral pigs) or where the hunting contributes to achieving the goals and objectives of the Plan, with the following exceptions.
    a Landowners who have hunted game (e.g., pheasant, ducks, deer, feral pigs) on their property that becomes part of the Reserve System through a conservation easement will be allowed to continue this use as long as it is consistent with the biological goals and objectives of the Plan.
    b Hunting on "any agricultural land" incorporated into the Reserve System (6,240 acres through CM1 AO-1) through agricultural conservation easements may continue in conformance with the pertinent regulations and by invitation of the landowner.
4. The PCA will develop hunting protocols for all reserves (e.g., natural communities and agriculture) in coordination with other agencies that utilize hunting for management purposes (e.g., CDFW, California Department of Parks and Recreation) and require approval by the Wildlife Agencies.
5. Fishing is allowed on land acquired for the Reserve System when the activity does not conflict with the biological goals and objectives of the Plan and is consistent with an approved reserve unit management plan.
6. Any active recreation (e.g., outdoor sports) not listed above are prohibited in the reserves.
7. No overnight camping or backpacking are allowed in the reserves.
8. Formal picnic areas are prohibited in the reserves.
9. Public collecting of native species or disturbance of Covered Species' habitat is prohibited within reserves.

10. Allowable recreational uses will be controlled and restricted by area, time of year, and weather events to minimize effects on natural communities and Covered Species and to ensure that the biological goals and objectives of the Plan are met. For example, trails will be closed during and immediately following heavy rains and annually winterized to minimize erosion and sedimentation.
11. Recreational uses will be allowed only during daylight hours.
12. Dogs associated with recreational use of the reserves are prohibited except for therapy or guide dogs. Dogs used for herding purposes by grazing lessees must be under verbal control and have proof of vaccination. For reserves under conservation easements, pet or working dogs may be allowed by the landowner or lessee.
13. Introduction of domestic or feral animals, including cats, ducks, fish, reptiles, and any exotic non-naturalized species, is prohibited within the reserves to prevent interference with, and mortality of, native species, except as required by the reserve manager for management purposes.
14. Recreational uses will be controlled using a variety of techniques including fences, gates, online registration for day-use permits, clearly signed trails, educational kiosks, trail maps and brochures, interpretive programs, and patrol by land management staff and/or other enforcement staff (i.e., sheriff, park rangers, wildlife officers).
15. Construction of recreational facilities other than trails and trail staging areas will be located outside of the reserve to the extent practicable.
16. Signs and informational kiosks will be installed at trailheads to inform recreational users of the sensitivity of the resources in the reserve, the need to stay on designated trails, and the danger to biological resources of introducing wildlife and plants into the reserve, as well as the goals of the PCCP.
17. Reserves adjacent to public lands not enrolled in the Reserve will provide clear signage to explain different use restrictions across boundary lines. The PCA will be responsible for securing and providing signage for reserve boundaries.
18. Exceptions may be approved by the PCA and Wildlife Agencies only if they are consistent with the biological goals and objectives of the Plan. Any exceptions will be clearly identified in the Reserve Management Plan.

6.3.6.1.2 New Trail Design and Use Standards for Future Reserves

For properties to be enrolled in the Reserve System that wish to develop new trails, the following general standards will be applied to ensure that there are minimal short-term effects associated with trail construction and no long-term effects from trail use. Specific design standards will be described in the reserve unit management plan before trails are constructed. Any trails found to be adversely affecting Covered Species will be evaluated to determine whether management actions, restoration, or other measures will reduce the effect.

1. New trails should be a maximum of 6 feet in width unless specific design needs are required for a larger width to ensure that effects are minimal (e.g., incorporation of drainage features, structural retaining features, water bars, culverts, and small bridge structures). An 18 foot buffer that encompasses the trail shall be the default deduction from the creditable acreage of future reserves.

2. Construction staging areas for new trails will be located off the Reserve System or developed in areas that are already disturbed and not suitable for habitat restoration and that do not contribute to the biological goals and objectives, otherwise they would be required to be restored after construction is complete.
3. After being reviewed and if approved by the PCA and Wildlife Agencies, trails will be established on existing roads or trails wherever possible to minimize the need for new ground-disturbing activities and to reduce new and ongoing maintenance costs. However, this will be balanced with the need to reroute some poorly designed, existing ranch roads and trails that are difficult and expensive to maintain. In some cases, rerouting access roads and trails may have net benefits on biological resources.
4. After review and if approved by the PCA and Wildlife Agencies, new trails will be designed and operated to be compatible with protection of natural resources. New trails will be sited to minimize effects on Covered Species and natural communities and to minimize disturbance to adjacent landowners and land uses. Trails through woodland and riparian habitat will be designed to avoid the removal or substantial pruning of trees, to the extent possible. If tree removal is required, unhealthy, exotic tree species, or trees unlikely to reach maturity due to site conditions (e.g., being shaded out by larger trees) will be targeted for removal. Trails will be constructed at the periphery of the Reserve to the maximum extent practicable.
5. Where necessary, trails will include barriers to limit access to sensitive areas including streams, wetlands, and habitat for Covered Species. Where possible, natural barriers will be used that are composed of native vegetation.
6. Lighting along trails will be prohibited.
7. The alignment of new trails should be designed to serve as fuel breaks but to avoid the removal of mature native woody vegetation (e.g., oak trees greater than 6 inches diameter at breast height).
8. Stream access from trails shall be near bridge crossings (150 feet upstream and downstream of any bridge measured from the point of trail/bridge intersection of the creek). Fencing, natural barriers (e.g. brush, trees, shrubs, boulders), or similar impediments will be applied to restrict or reduce off-trail access to the stream beyond the 150 feet where needed.
9. New trails will be suitably dispersed to ensure habitat connectivity remains intact and to reduce the impacts of recreational use on the conserved area.
10. New trails will be prohibited within 100 feet of wetlands, seeps, springs, ponds, rock outcrops, meadows, riparian woodlands and streams that provide suitable habitat for Covered Species unless topography or other landscape characteristics shield these trails from the Covered Species' habitat or a lack of effect of the trail on the species can be otherwise demonstrated. The exception to this prohibition is when it is necessary for trails to cross a stream or wetland (see below for conditions on such crossings). Reductions in these setbacks may be considered following the review and approval by the PCA and Wildlife Agencies when it is demonstrated that a reduction in the setback will provide a biological benefit to the stream/wetland resource (e.g., avoiding unapproved cross country trail development by users).
11. New trails will be prohibited within 250 feet of vernal pools.
12. New trails built across streams or through riparian corridors will be sited and designed with the smallest footprint necessary to cross the Stream System. Stream crossings will be perpendicular

to the channel and be designed to minimize potential for future erosion. Trails that follow a stream course will be sited outside the riparian corridor to the maximum extent feasible. However, trail design and placement will also consider the best alignment to avoid unapproved, cross-country trail development by users who are seeking access to creeks, vista points, and improved facilities (e.g., restrooms, potable water).

13. New trails will not be paved, except as required by the Americans with Disabilities Act and will be sited and designed so that they do not contribute to erosion and bank failure. To provide trail access for a range of user capabilities and needs (including persons with physical limitations) in a manner consistent with local, state and federal regulations, the landowner will site and design new, paved trails in areas within reserves that are already disturbed and do not have the potential to affect sensitive habitat. As common practice, these types of whole-access trails will be sited near public roads and access points.
14. New trails will be designed to avoid disturbance of active nests of any covered bird species. Active nests are defined as nests occupied during the breeding season (dates vary for each species, but generally from February 1 to August 31). Trail construction that occurs within 1,000 feet of an active nest of a covered bird species, or a lesser distance if agreed upon by the PCA and Wildlife Agencies, will be stopped to avoid the nest until young have fledged or are no longer dependent on the nest. The PCA will consult with the Wildlife Agencies to determine the appropriate action to take.
15. If trail use affects the biological goals and objectives the Reserve is intended to meet, the PCA will take appropriate corrective measures to remedy the effect, which might include closing or limiting the use of the trail/facility/property or other management action requirement to avoid or minimize those adverse effects on the Covered Species and/or natural communities.

6.3.6.2 Reserve Management Condition 2, Recreation Component of Reserve Unit Management Plans

The requirements below will apply if the Permittees determine, subject to PCA and Wildlife Agencies review and approval, that limited recreational activities and/or associated infrastructure will be allowed in one or more newly protected reserves during the permit term.

At a minimum, the recreation component of a reserve unit management plan will contain the information listed below.

- A written project description that includes all benefits and impacts of proposed recreation.
- Identification of sites within reserves where recreational use is compatible with the goals and objectives of the Plan.
- Identification of sites within reserves that contain sensitive land-cover types, constituent habitats, and suitable or occupied habitat for Covered Species.
- Identification of species-specific objectives associated with reserve protection and description of any potential threats to species potentially associated with recreational use.
- Maps of existing and proposed roads, recreational trails, staging areas, and facilities and the habitats and biological resources affected by the recreation.
- Description of educational opportunities within the proposed reserve.

- Site-specific methods to control recreational use.
- Trail use monitoring methods, schedules, and responsibilities.
- Trail O&M guidelines and responsibilities. This includes control (i.e., prevention) of any off-trail recreational activities determined inappropriate by the PCA and Wildlife Agencies.
- A framework for enforcement of recreational restrictions and permitting process for restricting recreational uses.
- An assessment determining if planned recreation is compatible with the biological goals and objectives of the Plan.
- An adaptive management plan that addresses the effects of recreation.
- A description of monitoring actions and associated triggers for use restrictions or closure (e.g., seasonal closures of some trails during activity periods of Covered Species) based on biological indicators.
- Financial analysis that describes the costs of recreation al infrastructure, maintenance, monitoring, and enforcement.

6.3.6.3 Reserve Management Condition 3, Jump Start Lands

Upon adoption of the HCP/NCCP, recreational uses on Jump Start lands to be enrolled in the Reserve System may continue at the same level and intensity until the recreation component of the Reserve Unit Management Plan is completed and approved by the PCA and Wildlife Agencies. After the reserve unit management plan and associated recreation plan are completed and approved by the Wildlife Agencies, recreation will occur in accordance with the recreation plan.

Below we describe in more detail recreational use on specific, identified Jump Start lands.

6.3.6.3.1 Existing Protected Areas and other Jump Start Lands to be Enrolled in the Reserve System

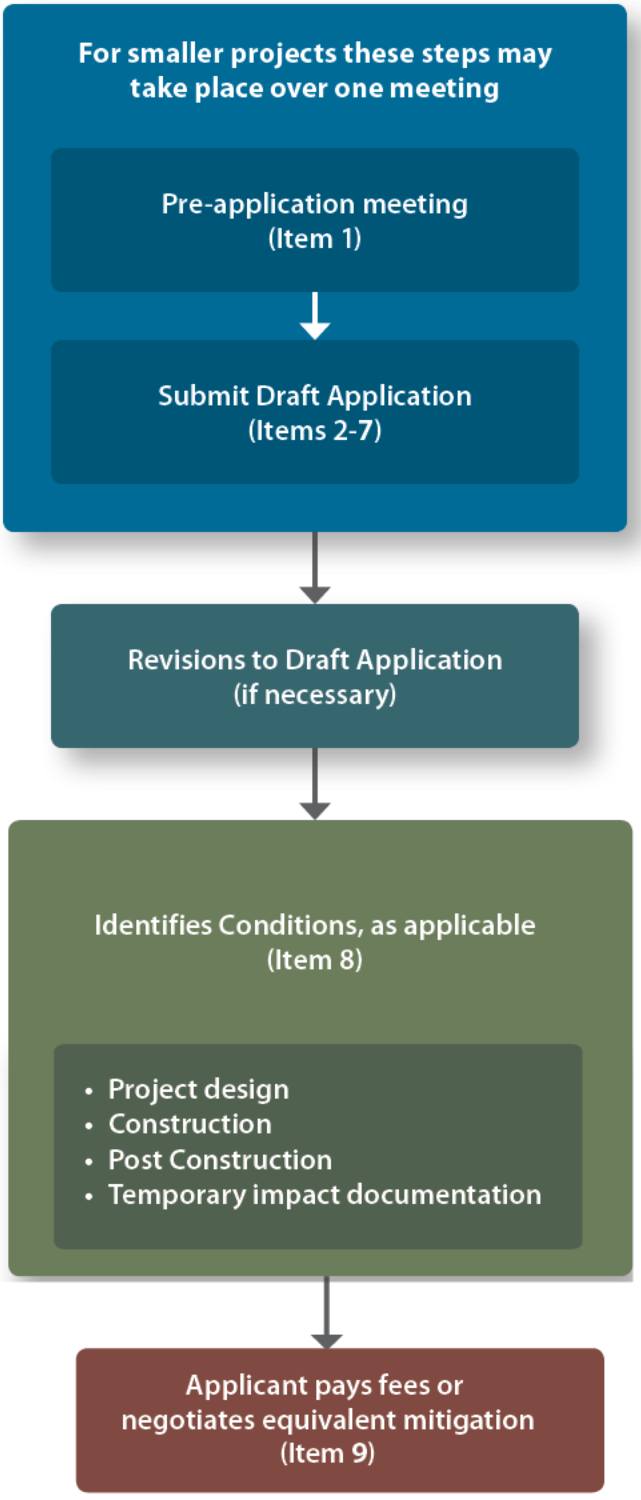
Recreational uses on existing protected areas to be enrolled in the Reserve System (i.e., Jump Start lands) are described below. Some of these areas, particularly Hidden Falls Regional Park (Hidden Falls) and the Harvego Bear River Preserve portion of the Big Hill Area, include an existing network of trails and associated passive recreational use. Section 5.3.1.3.5, *The Role of Existing Protected Areas in the Conservation Strategy,* describes how these lands will be enrolled in the HCP/NCCP Reserve System and provide credit toward land acquisition commitments. As described in Section 5.3.1.3.5, portions of the enrolled acreage will be deducted to account for relatively high levels of recreational use and trail use in some areas. Other specifics of enrollment for target properties are described in Section 8.4.4, *Jump Start*.

- Hidden Falls Regional Park: Hidden Falls is currently used for passive recreational uses including hiking, biking and equestrian activities. Day time picnicking is allowed, but no overnight use is permitted. Fishing is allowed on Raccoon Creek consistent with state regulations, but recreational hunting is prohibited. Hidden Falls has an existing parking lot, and may have a future 10-acre outdoor nature education center. These and other associated recreational infrastructure will be included in the Reserve System but deducted from the Jump Start credit under the Plan. Existing Hidden Falls trails will be evaluated for effects on Covered Species through the preparation of a reserve management plan. Any trails found to be adversely

affecting Covered Species will be evaluated to determine whether management actions, restoration, or other measures will reduce the effect. Trails may be deducted from the Reserve System credit if these measures are infeasible or ineffective. Construction of any new trails would be subject to the 18-foot buffer and deducted from Jump Start credit.

- Big Hill Area: The Big Hill Area includes the Harvego Bear River Preserve comprising acres that will be credited toward Jump Start requirements. Other properties in this area could be proposed for future enrollment into the Reserve System subject to Section 8.2.6.5 (*Review of Reserve Land Acquisition Proposals*). The Harvego Bear River Preserve primarily includes target communities of blue oak woodland habitat. Although a reserve unit management plan has not yet been developed, preliminary planning shows that it will include trails, a potential future parking lot, and related facilities. As mentioned above, an 18-foot buffer overlaid on top of all trails will be deducted from the Jump Start credit. Recreational hunting may be requested via CDFW's Shared Habitat Alliance for Recreation Enhancement program in the future subject to the terms and conditions of Section 6.3.2.1, *Community Condition 1, Wetland Avoidance and Minimization (Vernal Pool and Aquatic/Wetland Complex)*.
- Doty Ravine Preserve: This preserve will contribute to the conservation of valuable vernal pool grassland and riparian habitat to the Reserve System. The only recreational activities that will be allowed will be docent-led tours of the site by Placer Land Trust and other education and research.
- Swainson's Grassland Preserve: This preserve will contribute to the conservation of valuable vernal grassland and riparian habitat to the Reserve System. The only recreational activities that will be allowed are docent-led tours of the site by Placer Land Trust and other education and research.

This Page Intentionally Left Blank



* does not include other possible permits needed for a project

Graphics ... 00506.10 (2/11/15) AB

Figure 6-1 Participation Package Process

Placer County Conservation Program - Western Placer County HCP/NCCP

Chapter 7
Monitoring and Adaptive Management Program

7.1 Introduction

This chapter describes the monitoring and adaptive management framework for the Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan (referred to as the HCP/NCCP or Plan), including guidelines, and specific recommendations that will help the Placer Conservation Authority (PCA) develop a detailed program during the initial years of implementation. The purposes of this framework and the final monitoring program are to ensure compliance with the Placer County Conservation Program (PCCP), to assess the status of Covered Species and natural communities within the Reserve System, and to evaluate the effects of management actions such that the conservation strategy described in Chapter 5, *Conservation Strategy*, including the biological goals and objectives, is achieved. Adaptive management and monitoring are integrated processes in this Plan, and monitoring will inform and change management actions to continually improve outcomes for Covered Species and natural communities. An overview of the program, monitoring and management actions, and data and reporting requirements are found below.

It is beyond the scope of this Plan to develop a comprehensive program at this time. Rather, the goal of this chapter is to provide sufficient guidance to ensure that the program designed during implementation will meet Endangered Species Act (ESA) and NCCP regulatory standards discussed below in Section 7.1.1, *Regulatory Context*.

7.1.1 Regulatory Context

An HCP must provide for the establishment of a monitoring program that generates information necessary to assess compliance and verify progress toward achieving the biological goals and objectives of the plan (50 Code of Federal Regulations [CFR] 17.22(b)(2)(A-F), 50 CFR 17.32(b)(2)(i-iii), and 50 CFR 222.307(b)(5)). Adaptive management programs are generally recommended for large, programmatic plans and those with data gaps and scientific uncertainty that could affect how species are managed and monitored in the future. The *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016) describes adaptive management as a method for addressing uncertainty in natural resource management and states that management must be linked to measurable biological goals and monitoring. Table 5-2 crosswalks biological goals and objectives to conservation and monitoring actions to ensure evaluation of conservation measures and implementation of the biological goals and objectives. Conservation measures proposed in Table 5-2 can be modified in response to new information within an adaptive management framework.

An NCCP must include both a monitoring program and an adaptive management program (California Fish and Game Code Section 2820(7) and (8)) and must integrate adaptive management strategies that are periodically reviewed and modified on the basis of the results of monitoring efforts and other sources of new information (California Fish and Game Code Section 2820(a)(2)).

The monitoring and adaptive management framework described in this chapter will fulfill HCP and NCCP requirements. This program incorporates recommendations for monitoring and adaptive management based on guidelines provided by the U.S. Geological Survey, Biological Resources Division; California Department of Fish and Wildlife (CDFW); and U.S. Fish and Wildlife Service (USFWS) for regional HCPs and NCCPs (Atkinson et al. 2004).

7.1.2 Adaptive Management

For the purposes of this Plan, adaptive management is a decision-making process used to examine alternative strategies (e.g., conservation measures) to meet the biological goals and objectives, and, if necessary, adjust future management actions based on new information (U.S. Fish and Wildlife Service 2000). Adaptive management is based on a flexible approach whereby actions can be adjusted as uncertainties become better understood or as conditions change (Figure 7-1). Monitoring the outcomes of management actions is the foundation of an adaptive approach, and thoughtful monitoring can guide how management actions are modified iteratively (Williams et al. 2007).

The PCCP, similar to other regional HCP/NCCPs, has been developed despite uncertainties within the Plan Area, including ecosystem processes, the distribution and abundance of many Covered Species, the response of species and ecosystems to management actions, and future changes to ecological systems (e.g., changes that may occur due to climate change) (Christensen et al. 1996; Noss et al. 1997; Atkinson et al. 2004). Because the PCCP is based on the best scientific information currently available, it is expected that the Plan's conservation measures will effectively achieve the biological goals and objectives. However, there are varying degrees of uncertainty associated with the management techniques and conditions within and outside the Plan Area. In addition, the status of Covered Species and natural communities may change in unexpected ways during Plan implementation. It is possible that additional and different management measures not identified in the Plan will be identified in the future and proven to be more effective in achieving the biological goals and objectives than those currently implemented. Results of effectiveness monitoring may also indicate that some management measures are less effective than anticipated. To address these uncertainties, the monitoring program will be designed to track progress toward achieving the Plan's biological goals and objectives and to maximize the ability of the PCA to meet the PCCP's goals and objectives in a scientifically defensible and cost-effective way (Atkinson et al. 2004). The monitoring and adaptive management program will inform reserve managers and other decision makers of the status of covered and other native species, natural communities, and essential ecological processes, such that management actions can be revised when necessary to meet the biological goals of the Plan.

The adaptive management process will be administered by the PCA. The PCA will also coordinate and share the results of monitoring and targeted studies, as appropriate, with other HCP/NCCPs, Wildlife Agencies, and regional conservation and restoration programs. A well-coordinated and scalable monitoring program will enable the PCA and others to measure and evaluate changes in resources and threats in individual reserves, across the entire Plan Area, and within the ecoregion. Such coordination requires standardization of protocols, sampling design, and training of personnel, as well as integrative data analysis.

Another important component of the adaptive management process is outside review by scientists. An independent group of Science Advisors will evaluate the effectiveness of existing or proposed management actions (see Section 8.2.7, *Science Advisors and Land Managers*). The Science Advisors

will periodically evaluate data from the various monitoring programs and formulate recommendations for the PCA to improve or update management actions. The PCA will incorporate such recommendations, where appropriate, into Plan implementation. It is also intended that the adaptive management program will provide the basis for budget and funding decisions throughout the term of the Plan and in accordance with active adaptive management principles (see Figure 7-2).

Integrating adaptive management and monitoring is critical to the successful implementation of the conservation strategy. Monitoring is the foundation of an adaptive approach, and adaptive management actions are developed, in part, from the results of monitoring. In this Plan, the two components are integrated into a single program.

The effectiveness of conservation efforts will be evaluated using the process outlined in Figure 7-2, where monitoring informs the success of management actions, and changes are made based on monitoring results. The use of conceptual ecological models can also guide monitoring and adaptive management (see Figure 7-3). Conceptual models will be developed and refined during Plan implementation.

Monitoring is used to establish compliance with the Plan, to gauge effectiveness of actions and to guide future implementation. Using monitoring to inform management actions will require a framework for measuring responses. This is best done by approaching management actions experimentally (Figure 7-4). Management actions must be developed in concert with monitoring objectives to increase certainty regarding the significance of the results. Projects will be carried out (see Section 7.2.1, *Types of Monitoring*), whereby management actions will be treated as experiments, and monitoring will be used to evaluate different actions. An adaptive approach will allow management to proceed without complete knowledge of the needs of the species or ecological processes. These components are described more fully in the following sections.

7.1.3 Program Objectives

The overarching objective of the monitoring and adaptive management program is to ensure that the biological goals and objectives are being achieved. This chapter presents a foundation and guidelines for developing the monitoring and adaptive management program. It is anticipated that the monitoring and adaptive management program will be established during the first 5 years of Plan implementation and as individual parcels are acquired as part of the Reserve System (see Section 7.2.2, *Program Phases*, below). Additional objectives of the monitoring and adaptive management program are as follows:

- Provide an organizational framework and decision-making process for evaluating monitoring, targeted studies, and other data to adjust management actions.
- Provide a process for incorporating monitoring, including targeted studies and new information, into management actions.
- Document the baseline condition of biological resources in the Reserve System and other key habitat (e.g., salmonid streams) outside of the Reserve System using existing data, modeling, and the results of field surveys.
- Improve understanding of biological resources in the Reserve System by incorporating results of field studies and pre- and post-acquisition surveys into existing data and modeling.
- Develop management-oriented conceptual models (Atkinson et al. 2004) that summarize our understanding of and hypotheses about the structure and function of natural communities and

factors that limit populations of Covered Species. Management-oriented conceptual models will be used to identify critical uncertainties, hypotheses, and assumptions; clarify likely responses to management actions (e.g., grazing, controlled burns) and environmental stressors (e.g., invasive competitors); identify variables to monitor and hypotheses to test; and design and change management practices.

- Incorporate hypothesis testing and experimental management into monitoring to address key uncertainties and to improve management and monitoring efforts.
- Develop and implement scientifically valid monitoring protocols at multiple levels to ensure that data collected will inform management and integrate with other monitoring efforts.
- Develop and implement accurate, reliable, feasible, and cost-effective monitoring protocols that produce data that can inform management efforts at multiple scales and that integrate with other monitoring efforts, and using accepted protocols when available.
- Ensure that monitoring data are collected, analyzed, stored, and organized so they are accessible to the PCA, the Permittees, regulatory agencies, scientists, and, as appropriate, the public.

7.1.4 Program Scope

Designing a biological monitoring and adaptive management program that is logistically feasible and scientifically sound is a complicated task that will take many years. This chapter provides a framework, guidelines, and specific recommendations that will help the PCA develop a detailed monitoring program during the first 5 years of Plan implementation and as individual parcels are acquired as part of the Reserve System.

It is beyond the scope of this Plan to develop a comprehensive monitoring program at this time. Rather, the goal of this chapter is to provide sufficient guidance to ensure that the monitoring program designed during implementation will meet regulatory standards. Because the location and condition of the Reserve System, as well as target areas for monitoring outside the Reserve System, are not known at this time, it is difficult or impossible to develop detailed monitoring requirements, including protocols, thresholds, triggers, and other key variables. Furthermore, some of the components of this monitoring program will be new and will therefore require extensive field testing (see Section 7.2.1, *Types of Monitoring*, below) before they can be implemented on a large scale.

Before each reserve unit management plan monitoring component is developed, basic monitoring will be initiated within the Reserve System. Upon permit approval, the PCA will compile information from ongoing monitoring efforts conducted by the Permittees throughout the Plan Area, as well as other available information.

Monitoring priorities will be guided by species present or assumed to be present in the first reserves acquired under the Plan.

Envirograms, which are conceptual models included in the species account (Appendix D, *Species Accounts*) will be updated for species, as applicable, and baseline surveys will be initiated for newly acquired parcels. If restoration actions are proposed before the reserve unit management plan is in place, a design plan, including experimental design, monitoring actions and adaptive management will be developed, specific to that action. Table 7-1 provides examples of success criteria for monitoring effectiveness and Table 7-2 provides a summary of monitoring tasks throughout the Plan permit term

and beyond. Detailed information of monitoring tasks by program phase is found in Section 7.2.2, *Program Phases*.

This approach of providing a framework, guidelines, and specific recommendations in the PCCP is consistent with the monitoring and adaptive management plans for recent, approved regional HCPs and NCCPs, including the Western Riverside County Multi-Species Conservation Plan (an HCP/NCCP), Coachella Valley HCP/NCCP, East Contra Costa County HCP/NCCP, and the Santa Clara Valley HCP/NCCP.

The scope of the monitoring and adaptive management program is limited by the assurances provided by the Wildlife Agencies to the Permittees and described in Chapter 10, *Assurances*. These assurances include the commitment by the Wildlife Agencies that if unforeseen circumstances arise (as defined in Chapter 10, *Assurances*), the Permittees will not be required to provide additional land, water, or financial compensation beyond the obligations of the HCP/NCCP.

The monitoring program is designed to be flexible. Because the Plan seeks to balance the requirements of management with the need to learn more about the ecological system through monitoring, the amount of funding allocated to monitoring can vary during the permit term. Funding can be shifted within the Plan at the discretion of the PCA to respond to the changing needs of the monitoring and adaptive management program. The scope of the monitoring and adaptive management program is further defined below.

Table 7-1. Example Success Criteria for Monitoring Effectiveness of Selected Management Actions[a]

Management Action	Performance Period[a]	Example Success Criteria	
		Example Minimum Value[c]	**Example Target Value[d]**
Restore Vernal Pool Complex	__ years following initial restoration	*Extent restored:* __ acres[e]	*Area restored:* __ acres[e]
		Ponding depth: Demonstrate that the maximum and minimum depths of inundation are no less than 10% less and no more than 10% more than the minimum and maximum depths of inundation in the reference pools.	*Ponding depth:* Demonstrate that the maximum and minimum depths of inundation are no less than 5% less and no more than 5% more than the minimum and maximum depths of inundation in the reference pools.
		Ponding duration Demonstrate that the ponding duration is no less than 10% of the shortest reference site ponding duration and no more than 10% longer than the longest reference pool ponding duration.	*Ponding duration* Demonstrate that the ponding duration is no less than 5% of the shortest reference pool ponding duration and no more than 5% longer than the longest reference site ponding duration.
		Vegetation Cover The absolute cover of native wetland plants will be ≥ 75% of the average absolute cover of wetland plants in the reference wetlands.	*Vegetation Cover* The absolute cover of native wetland plants will be ≥ 90% of the average absolute cover of wetland plants in the reference wetlands.
		Vernal Pool Plant Relative Cover 1 The number and relative cover of vernal pool endemic species[1] for each vernal pool will be ≥ 75% of the number and relative cover of endemic species in the reference wetlands.	*Vernal Pool Plant Relative Cover 1* The number and relative cover of vernal pool endemic species[1] for each vernal pool will be ≥ 90% of the number and relative cover of endemic species in the reference wetlands.

[1] Vernal pool endemic species as defined in Appendix 1 of the California Rapid Assessment Method (CRAM) for Wetlands, Version 6.1. Individual Vernal Pools Field Book (California Wetlands Monitoring Workgroup 2013) or future updated publication.

Management Action	Performance Period[a]	Example Success Criteria	
		Example Minimum Value[c]	**Example Target Value[d]**
		Vernal Pool Plant Relative Cover 2 The average number and relative cover of vernal pool endemic species of the pools will be ≥ 75% of the number and relative cover of vernal pool endemic species for the reference pools. Vernal pools that fail to meet success criteria for Vernal Pool Plant Relative Cover 1 will be excluded from the average.	*Vernal Pool Plant Relative Cover 2* The average number and relative cover of vernal pool endemic species of the pools will be ≥ 90% of the number and relative cover of vernal pool endemic species for the reference pools. Vernal pools that fail to meet success criteria for Vernal Pool Plant Relative Cover 1 will be excluded from the average.
Enhance Grassland	__ years following implementation of preserve-wide management of grasslands	*% native forb cover:* Demonstrate an upward trend in __% native forb cover relative to existing conditions	*% native forb cover:* Increase native forb cover by __% relative to condition at time of acquisition and/or relative to a reference site.
		% native grass cover: Demonstrate an upward trend in __% native grass cover (annual or perennial) relative to condition at time of acquisition	*% native grass cover:* Increase native grass cover by __% relative to condition at time of acquisition
		Native plant diversity: Demonstrate an upward trend in native plant diversity	*Native plant diversity:* Demonstrate an upward trend in native plant diversity
Enhance Wetlands and Ponds: ponds and perennial wetlands	__ years following acquisition of ponds and perennial wetlands	*Non-native predators:* Maintain __% of all ponds and permanent wetlands free of non native fish (except mosquitofish)	*Non-native predators:* Maintain all ponds and permanent wetlands free of non-native fish (except mosquitofish) and bullfrogs annually
		Emergent vegetation cover-margins: Maintain native emergent vegetation along at least __% of pond and perennial wetland edges	*Emergent vegetation cover-margins:* Maintain native emergent vegetation along at least __% of pond and perennial wetland edges
		Emergent vegetation cover-pond surface: For ponds designed to support tricolored blackbird breeding: Maintain native emergent vegetation over at least __% of pond surface area	*Emergent vegetation cover-pond surface:* For ponds designed to support tricolored blackbird breeding: Maintain native emergent vegetation over at least __% of pond surface area

Management Action	Performance Period[a]	Example Success Criteria	
		Example Minimum Value[c]	**Example Target Value[d]**
		Hydrology: Maintain wetlands year-round in normal rainfall years[f] Maintain ponded surface water until October 1 in normal rainfall years[f]	*Hydrology:* Maintain wetlands year-round in dry rainfall years[f] Maintain ponded surface water until October 1 in normal rainfall years[f]
Pond creation	__ years following pond creation	*Extent created:* __ acres[e]	*Extent created:* __ acres[e]
		Emergent vegetation cover: __% of ponds will support native emergent vegetation > 5 feet tall (e.g., cattail or tules) over at least __% of surface area (for tricolored blackbird) __% of ponds will support emergent vegetation over at least __% but no more than __% of the surface area (for California red-legged frog)	*Emergent vegetation cover:* __% of ponds will support native emergent vegetation > 5 feet tall (e.g., cattail or tules) over at least __% of surface area (for tricolored blackbird) __% of ponds will support emergent vegetation over at least __% but no more than __% of the surface area (for California red-legged frog)
		% emergent vegetation cover-margins: Maintain native emergent vegetation along at least __% of each pond margin	*% emergent vegetation cover-margins:* Maintain native emergent vegetation along at least __% of each pond margin
		Non-native predators: Maintain __% of all ponds of free of non-native fish (except mosquitofish) and bullfrogs in any given year	*Non-native predators:* Maintain all ponds free of non-native fish (except mosquitofish) and bullfrogs annually for the length of the permit term
Enhance Riparian Woodland/ Complex	__ years following initial treatments	*Relative native tree canopy cover:* Demonstrate an upward trend in native plant diversity	*Relative native tree canopy cover:* Increase the existing relative native tree canopy cover by at least __%
		Relative native shrub canopy cover: Demonstrate an upward trend in native plant diversity	*Relative native shrub canopy cover:* Increase the existing relative native shrub canopy cover by at least __% using an existing reference cite as a guide.

Management Action	Performance Period[a]	Example Success Criteria	
		Example Minimum Value[c]	**Example Target Value[d]**
Restore Streams and Riparian Woodland to Compensate for Habitat Loss and Increase Biodiversity	__ years following restoration planting	*Extent restored:* __ acres[e]	*Extent restored:* __ acres[e]
		Relative native tree canopy cover: Establish a relative native tree canopy cover of at least __%	*Relative native tree canopy cover:* Establish a relative native tree canopy cover of at least __%
		Relative native shrub canopy cover: Establish a relative native shrub canopy cover of at least __%	*Relative native shrub canopy cover:* Establish a relative native shrub canopy cover of at least __ acres
Enhance Oak Woodland	__ years of detecting a decline in canopy cover	*Absolute oak tree canopy cover:* Maintain the existing __% absolute oak tree canopy cover in oak woodlands on Reserve lands	*Absolute oak tree canopy cover:* Maintain the existing __% absolute oak tree canopy cover in oak savanna and woodlands on Reserve lands
Restore Oak Woodland	__ years following initial plantings of oak trees	*Extent restored:* __ acres[e]	*Extent restored:* __ acres[e]
		% oak-tree canopy cover: __% tree canopy cover equal to or up to __% greater than the percent canopy cover in valley oak stands removed by Covered Activities	*% oak-tree canopy cover:* __% tree canopy cover equal to or up to __% greater than the percent canopy cover in valley oak woodlands removed by Covered Activities
	__ years following initial plantings of oak trees	*Understory native plant cover:* Develop an understory with native plant cover within __% of existing conditions	*Understory native plant cover:* Develop an understory with native plant cover equal to or greater than that of existing conditions
		Understory native plant diversity: Develop an understory with native plant diversity at least __% of existing conditions	*Understory native plant diversity:* Develop an understory with native plant diversity equal to or greater than existing conditions

Management Action	Performance Period[a]	Example Success Criteria	
		Example Minimum Value[c]	Example Target Value[d]

Notes:

[a] This table provides a framework for evaluating the success of certain conservation measures. The Placer Conservation Authority will develop values for assessing success during the Inventory and Targeted Studies phases of implementation.

[a] The estimated period following enhancement/creation/restoration of a natural community at a site during which performance standards should be achieved.

[c] The example minimum value is the minimum measured value for each success criterion that must be achieved during the performance period.

[d] The example target value represents the optimal desired value for each performance indicator and the design and management objectives for enhanced/created/restored natural communities. If performance objectives are not achieved, adaptive management actions may be triggered.

[e] Acres restored are estimates based on the impact analysis. Actual restoration performance standard/target may vary depending on actual field-verified impacts.

[f] Normal rainfall years are defined as within 1 standard deviation of the annual average rainfall as measured at the California Irrigation Management Information System __ rain gauge over the hydrologic record of the gauge (October–September). Dry years are defined as less than 1 standard deviation from the annual mean.

Table 7-2. Schedule of Monitoring Tasks over the Permit Term

Monitoring Type/Phase	Summary Tasks
Years 0–5	
Compliance	Set up tracking databases for impacts, acquisition, creation, and restoration to land cover, and covered plant populations.
Inventory	Initiate inventories in the Reserve System.
	Assess landscape linkages using aerial photos and ground surveys and collect additional baseline data needed to refine conceptual models.
	Submit reserve unit management plans for Wildlife Agencies review and approval within 5 years of the first acquisition for each reserve unit. Each plan will contain a detailed monitoring and adaptive management plan; including the development of indicators, monitoring protocols, and success criteria for management actions.
	Prioritize conservation actions within the Plan area.
Targeted Studies	Develop conceptual models for key natural communities and Covered Species that identify critical management uncertainties.
	Prioritize and initiate pilot projects.
	Prioritize and initiate directed studies.
Long-term Monitoring	Develop experimental design for long-term management activities such as restoration and include as part of reserve unit management plans.
Years 6–15	
Compliance	Continue tracking impacts, acquisition, creation, and restoration. Ensure that mitigation stays ahead of impacts.
Inventory	Continue baseline inventories as sites are added to the Reserve System.
Targeted Studies	Complete pilot projects.
	Continue directed studies.
Long-term Monitoring	Update GIS layer (every 5 years) and assess trends.
	Monitor Covered Species response to management actions.
	Monitor Covered Species using methodologies developed in targeted studies phase.
	Monitor success of restoration sites against success criteria.
	Review existing literature and scientific knowledge and make changes to monitoring and management based on new information.
Years 16–25	
Compliance	Continue tracking impacts, acquisition, creation, and restoration. Ensure that mitigation stays ahead of impacts.
Inventory	Continue baseline inventories as sites are added to the Reserve System.
Targeted Studies	Complete targeted studies.
Long-term Monitoring	Continue to assess status and trends of natural communities and Covered Species.
	Adapt management actions based on monitoring results of species response and success criteria for restoration and other management efforts.

Monitoring Type/Phase	Summary Tasks
	Continue to monitor Covered Species and adaptively manage species in response to monitoring results.
	Evaluate efficacy of monitoring protocols using results of pilot projects.
Years 25+	
Compliance	Finalize impact tracking. Maintain database of any active ongoing mitigation.
Inventory	Finalize baseline inventories of parcels acquired after Year 25.
Long-term Monitoring	Continue to assess status and trends of natural communities and Covered Species.
	Based on 25 years of implementation, develop reduced monitoring protocols for target species and/or communities.
	Promote directed studies in the Reserve System that benefit Covered Species and natural communities.

GIS = geographic information system

7.1.4.1 Geography

The geographic scope of the monitoring and adaptive management program will be determined by the lands acquired and/or managed for the Reserve System and the streams managed for the conservation benefit of Covered Species, as described in Chapter 5, *Conservation Strategy*. The exact configuration of the Reserve System is unknown, because lands for the Reserve System will be assembled over the course of the permit term and within the constraints of a willing seller program; however, most of the Reserve System will occur in the Reserve Acquisition Area (RAA) (see Figure 1-5). As the Reserve System grows, the monitoring program will also grow. The regional and global context of Covered Species and natural communities will be considered when designing and implementing monitoring and adaptive management.

7.1.4.2 Levels

Scale is an important component of management for conservation. The conservation strategy functions at multiple scales or levels, and the monitoring and adaptive management program must collect information at these multiple levels. The program described in this chapter details the framework for a three-tiered approach that consists of landscape-, natural community-, and species-level monitoring.

Landscape-level monitoring is designed to collect large-scale information, such as changes in ecosystem processes and shifts in natural community distribution. Community-level monitoring is designed to detect changes in the composition and function of natural communities, invasive species, and other important habitat factors for Covered Species. Species-level monitoring measures the effects of management actions on Covered Species and tracks the distribution, status, and other aspects of Covered Species in the Reserve System and the Plan Area.

7.1.4.3 Coordination with Other Programs

Monitoring already occurs in western Placer County to varying degrees on public and private lands. The Plan will coordinate with other entities' ongoing monitoring efforts within the Plan Area by

sharing information (e.g., data, monitoring methods). For example, the Dry Creek Conservancy monitors and assesses aquatic insect populations, aquatic habitat, water quality and flow, geomorphology, and salmonid populations in the watersheds of Dry Creek, Pleasant Grove Creek, Auburn Ravine, Raccoon Creek, and surrounding areas in Placer, Sutter, and Sacramento Counties. These monitoring efforts inform conservation and restoration of aquatic systems through associated adaptive management and monitoring plans (e.g., Dry Creek Coordinated Resource Management Plan, Raccoon Creek Watershed Assessment). Other programs administered in part by USFWS and CDFW and other organizations and institutions include periodic surveys within the Plan Area and surrounding region (e.g., the statewide Swainson's hawk survey and the statewide tricolored blackbird survey).

Specific to Waters of Placer County, Placer County (County) and the City of Lincoln (City) developed the Draft Western Placer County Aquatic Resource Program (CARP) (Western Placer County 2016). The PCWA natural resources management plan (Placer County Water Agency 2009) also addresses aquatic species and habitat. The HCP/NCCP conservation strategy and the CARP have been developed to be compatible with each other, but they are separate plans meeting different regulatory needs. Although the PCCP meets requirements under the ESA and the Natural Community Conservation Planning Act (NCCP Act), the CARP meets requirements under Section 404 of the Clean Water Act. CARP monitoring requirements are derived from the PCCP. However, the CARP focuses on aquatic resources (including both waters of the United States and waters of the state) specifically and, in some areas, addresses them in greater detail than the PCCP. The PCA will implement monitoring for both the PCCP and the CARP.

During the inventory phase, the PCA will consult with the proponents of the monitoring programs mentioned above, and any additional relevant proponents, to learn the latest protocols and determine what aspects of their monitoring overlap with the Plan's requirements. Where appropriate, the PCA will coordinate monitoring efforts with other existing programs and share data. There may also be opportunities to conduct joint monitoring efforts to meet the needs of multiple projects.

The PCA will also coordinate and share monitoring and other experimental results, as appropriate, with other regional restoration and management programs (e.g., South Sacramento HCP, Yuba-Sutter HCP). A well-coordinated and scalable monitoring program will enable the PCA and others to measure and evaluate change in resources and threats in individual reserves, across the entire Plan Area, and within the ecoregion. Such coordination could focus on standardization of protocols, sampling design, and training of personnel, as well as integrative data analyses. Programs and organizations with which the PCA should coordinate include those listed below.

- Sierra Foothills Audubon Society and/or the local chapter
- Placer Land Trust
- Dry Creek Conservancy
- City of Roseville Open Space Program
- Central Valley Joint Venture - American Basin Working Group
- CDFW regarding the Spenceville Conceptual Area Protection Plan
- Cosumnes, American, Bear, and Yuba Integrated Regional Watershed Management Plan Group
- American River Basin Integrated Regional Watershed Management Plan Group

- American Basin Council of Watershed Groups
- Sierra Nevada Conservancy
- Save Auburn Ravine Salmon and Steelhead
- Friends of Auburn Ravine
- Regional Water Authority
- Tricolored Blackbird Working Group
- Wildlife Heritage Foundation

Data dissemination to facilitate coordination among programs is described in Section 8.11, *Reporting*.

7.1.5 Take Authorization during Monitoring

Some monitoring activities may require handling or disturbing state- or federally listed species; such activities constitute take. The monitoring method is optimal when both the quality of information and the impact on the species is assessed. The monitoring program will consider the impact on the species, particularly in cases of very low population numbers. Take of Covered Species during monitoring activities is authorized providing that all of the following conditions are met:

- The take occurs in association with activities described in the conservation strategy, monitoring chapter, or reserve unit management plan approved by the Wildlife Agencies.
- The take occurs in the Plan Area, during the permit term, for activities conducted by the Permittees, the PCA, or any person acting under the direct guidance or authority of these entities.
- The person(s) undertaking such activities is qualified to do so and can carry out their duties in conformance with the protocols and procedures specified in the monitoring chapter and the reserve unit management plan (see Section 6.1.5, *Qualified Biologist/Professional*).
- The activity is consistent with the Plan's monitoring and adaptive management program.

In order to meet federal and state requirements, the amount and extent of take must be reported in accordance with the permits. The occurrence of all special-status species within the Reserve System will be reported to the California Natural Diversity Database (CNDDB).

Simple surveys, such as habitat assessments, that would not result in take will likely be conducted by the biologists within the PCA. However, more complex biological field work, (e.g., burrowing owl exclusions) may result in take and therefore must be carried out by a "qualified" biologist as defined in Section 6.1.5, *Qualified Biologist Professional*.

7.2 Overview

7.2.1 Types of Monitoring

Recent guidance for regional conservation planning defines monitoring as the "systematic and usually repetitive collection of information typically used to track the status of a variable or system"

(Atkinson et al. 2004). The monitoring program will provide the information necessary to assess Plan compliance and project effects, verify progress toward achieving the biological goals and objectives, and provide the scientific data necessary to evaluate the success of the PCCP's conservation program. The PCA will monitor resources at the landscape, community, and species levels. In addition to these levels, the PCA will conduct three main types of monitoring: compliance monitoring, effectiveness monitoring, and targeted studies. A description of each of these types is provided below.

7.2.1.1 Compliance Monitoring

Compliance monitoring (also known as implementation monitoring) tracks the status of Plan implementation and documents that the requirements of the Plan are being met. Compliance monitoring verifies that the Permittees are carrying out the terms of the HCP/NCCP, permits, and Implementation Agreement. The PCA will track compliance monitoring internally to ensure the PCCP is working as planned and will provide the monitoring results to the Wildlife Agencies who will verify the Plan remains in compliance. As defined by the PCCP, compliance monitoring will track the following components:

- Location, extent, and timing of loss of natural communities and constituent habitats (as defined in Table 3-5) to ensure the proposed maximum extent of take is not exceeded and to ensure compliance with the Stay-ahead requirements. This includes the time commitments for restoration/creation not tied to impacts and time commitments for other conservation measures (see Chapter 5, *Conservation Strategy*).
- Tracking impacts to Critical Habitat for vernal pool fairy shrimp.
- Habitat enhancement, restoration, and creation actions and affected acres.
- Location, extent, and timing of land acquisition, acquisition requirements, and PCCP reserve establishment.
- Implementation of avoidance and minimization requirements (see Chapter 6, *Program Participation and Conditions on Covered Activities*).
- Reporting of management actions (e.g., proportion of reserves fenced) and monitoring activities (e.g., what monitoring activities were implemented and resulting reports produced) (Atkinson et al. 2004).
- Location, extent, and timing of implementation of other conservation actions (e.g., preparation of reserve specific management plans) on and off the Reserve System.

7.2.1.2 Effectiveness Monitoring

Effectiveness monitoring assesses the biological success of the Plan. Effectiveness monitoring evaluates whether the effects of implementing the conservation strategy described in Chapter 5, *Conservation Strategy*, is consistent with the assumptions and predictions made during development of the conservation strategy (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016). Effectiveness monitoring is used to assessed whether implementation of the conservation strategy is achieving the Plan's biological goals and objectives. Effectiveness monitoring typically measures the effects of management actions on targeted communities (e.g., cover of invasive plants in vernal pools before and after grazing treatment) and Covered Species (e.g., status of overwintering and breeding western burrowing owl on the Reserve System), status and trends in

resources (e.g., percent cover of land-cover types), and status and trends of stressors to the biological resources (e.g., distribution of invasive species) (Atkinson et al. 2004). To conduct effectiveness monitoring, it is necessary to first develop thresholds of success for management actions. These may include quantitative measures such as occupancy rates for vernal pool branchiopods, area of habitat suitable for Covered Species, etc. Quantifying these conditions before and after management is the basis for judging success. In most cases, success will not be immediately apparent and monitoring must be conducted over a sufficiently long period for results to manifest.

Effectiveness monitoring is focused on the status of Covered Species within the Reserve System and the results of conservation measures, almost all of which will be implemented within the Reserve System.

Understanding the effects of management actions is a critical component of the monitoring and adaptive management program. The purpose of this monitoring is to ascertain the success of management in achieving desired outcomes, to provide information and mechanisms for altering management if necessary, and to evaluate whether the conservation strategy described in Chapter 5, *Conservation Strategy,* was successful.

The preliminary or initial component of this monitoring will include the development and assessment of success criteria for management actions, such as stream restoration and vernal pool creation. Where they exist, the biological goals and objectives will determine the form that success criteria take. Once success criteria are developed, monitoring will include monitoring these criteria, as well as assessing the effects of management on Covered Species. Finally, the effects of threat-abatement activities (e.g., density of non-native invasive plants) will be evaluated (Atkinson et al. 2004).

To determine the effects of management, management actions will be conducted using an experimental approach when feasible (Figure 7-4).

The PCA will design, conduct, and report on the results of effectiveness monitoring (including effects monitoring). Wildlife Agencies and independent group of Science Advisors will have an opportunity to provide input on and evaluate the proposed effectiveness monitoring and its results. Effectiveness monitoring is tied closely to the biological goals and objectives. Table 5-2 crosswalks each goal to its objectives, conservation measures, and monitoring actions.

7.2.1.3 Targeted Studies

Targeted studies may be needed to achieve the biological goals and objectives. Most targeted studies will be implemented to resolve critical uncertainties the resolution of which is required to achieve the biological goals and objectives. Pilot studies may also be needed if a proposed conservation measure is untested or if there is uncertainty about its effectiveness. Targeted studies may be funded by outside sources or in part by the PCA and may utilize graduate students, university researchers, or other scientists whose project goals inform critical uncertainties and further the biological goals and objectives of the Plan.

In general targeted studies fulfill three major objectives (Atkinson et al. 2004):

1. Identify the best methodologies for monitoring.
2. Provide information about the efficacy of management techniques.

3. Resolve critical uncertainties allowing for improved management of systems and species.

These uncertainties are generally related to the factors listed below.

- Understanding the ecological requirements of Covered Species
- Identifying and understanding the threats to Covered Species and factors that have caused their decline
- Understanding the likely response of Covered Species and natural communities to implementation of conservation measures within the Reserve System

Targeted studies can be costly and resource intensive; therefore, the PCCP proposes few specific targeted studies. Targeted studies will be implemented on an as-needed basis, when resources (e.g., financial) permit, and when uncertainties limit the ability of the PCA to achieve the biological goals and objectives of the Plan. Targeted studies may be carried out to gain insights into key questions identified in the conservation strategy and during Plan implementation. Potential targeted studies will be identified and prioritized during implementation and will be carried out based on their priority ranking as funding allows.

For the purposes of this Plan, targeted studies that provide information regarding the effects of management actions are called *pilot projects*. For example, testing the management benefits of prescribed burn is a pilot project. .Targeted studies that address critical uncertainties are called *directed studies*. Pilot projects will be conducted by the PCA or its contractors. Directed Studies could be carried out or funded by the PCA. However, the PCA may also utilize graduate students, University researchers, or other scientists whose project goals inform critical uncertainties and further the biological goals and objectives of the Plan. In addition, directed studies may be funded by outside sources if the work carried out on Reserve System furthers the PCA's understanding of Covered Species and natural communities.

7.2.1.3.1 Pilot Projects

Pilot projects will be used during implementation to ascertain, on a small scale, which management actions may ultimately yield the desired conservation gains prior to initiating a long-term project. Pilot projects are used to address uncertainties, where they exist, in proposed management actions. Pilot projects are also a cost-effective way to test management actions. Pilot projects may be used during the early phases of Plan implementation to field test different management actions (see Figure 7-4 for a continuum of experimental management).

7.2.1.3.2 Directed Studies

The term *critical uncertainties* refers to key questions that shape how the ecological system is actively managed. Because natural systems are extremely complex and dynamic, varying degrees of uncertainty are associated with conserving and managing these systems. Typically, management proceeds absent a full understanding of the components that affect a natural community or a species. The outcome of these management actions are carefully monitored and refined in acknowledgement of the high level of uncertainty. Directed studies are used to reduce the levels of

uncertainty related to achieving biological goals and objectives. These uncertainties are generally related to the factors listed below.

- The ecological requirements of Covered Species
- The likely response of Covered Species and natural communities to implementation of conservation measures within the Reserve System

Directed studies will be carried out to gain insights into key questions identified in the conservation strategy and during Plan implementation. All proposed directed studies will be prioritized during implementation and will be carried out based on their priority ranking. A directed study may involve, for example, analyzing the relationships between different biotic (e.g., presence of competitors and predators, vegetation structure and composition in vernal pools) and abiotic factors (e.g., ponding duration and depth) and the occupancy of vernal pool fairy shrimp and tadpole shrimp in vernal pools.

Results of targeted studies (both pilot projects and directed studies) conducted under the Plan will inform management and ensure attainment of the biological goals and objectives. Targeted studies may be conducted by the PCA and/or consulting scientists. Additional long-term directed studies, identified during Plan implementation, may be conducted by or in partnership with outside scientists from academic institutions, consulting firms, and non-profit organizations. It is anticipated that funding provided by the PCA for targeted studies could be matched or supplemented by other entities to increase the level of investigation and to achieve results that integrate with broader issues in the scientific community. The amount of targeted studies will be limited by funding available to the PCA (see Chapter 9, *Costs and Funding*).

In addition to the targeted studies undertaken to answer critical uncertainties, it is expected that the PCA will develop partnerships with academic institutions (e.g., undergraduate student projects, master's theses, Ph.D. dissertations) to help address broader scientific interests within the Reserve System that will nonetheless inform and improve management and monitoring techniques. Funding for this and other programs is described in more detail in Chapter 9, *Costs and Funding*.

7.2.2 Program Phases

The essential elements of the monitoring and adaptive management program have been organized into two phases: inventory and long-term monitoring and adaptive management. Key tasks in each phase are described below. In general, activities in the inventory phase (see Section 7.2.2.1, *Inventory Phase*, below) will occur during the first 5 years of Plan implementation and thereafter on new parcels as parcels are added to the Reserve System. For individual sites, the inventory phase will begin immediately after land acquisition. Activities in the long-term monitoring and adaptive management phase will begin on each site after the inventory phase is either complete or well under way. Because the Reserve System is being created over several decades, there will most likely be extensive overlap between activities in each phase during the first 10 to 20 years of Plan implementation (Figure 7-5). Table 7-2 provides a summary of monitoring tasks throughout the permit term.

7.2.2.1 Inventory Phase

The inventory phase of monitoring occurs following permit approval and continues on new parcels as they are acquired and added to the Reserve System or new conservation measures are initiated outside the Reserve System (for example, in-stream enhancement measures may occur within the Reserve System or outside the Reserve System [see Section 5.3.2.3.3, *Riverine/Riparian Complex Natural Communities*]). If a parcel is acquired in a drought, it may take several years for certain plants to appear, for example. This information will build largely on the data collected during pre-acquisition assessments and will be supplemented by post-acquisition monitoring.

The inventory phase has three key components: documentation of baseline conditions, initiation of management and monitoring planning and activities, and initial development of management-oriented conceptual models. Each of these three components is discussed below.

7.2.2.1.1 Document Baseline Conditions

Baseline information collected during the inventory phase will be used to assess changes in biological resources in the Plan Area and will lay the foundation of the overarching monitoring and adaptive management program. Note that the term baseline within a monitoring context refers to conditions when the parcel is acquired for the Reserve System and/or when initial surveys begin. Elsewhere in the document, the term baseline refers to the regulatory baseline. While the conservation strategy was developed based on the best available science and knowledge, for many Covered Species, there is little available information on their distribution, abundance, habitats, and the threats to their populations in the Plan Area. As such, during the inventory phase the PCA will focus monitoring efforts to document baseline conditions on the presence, distribution, and in some cases, abundance (or relative abundance) of Covered Species, their habitats, and the threats to their populations. Inventories may need to occur over multiple seasons to ensure that all species present are identified. The initial inventory will take place within 3 years of acquisition for each site.

Baseline conditions within the Reserve System need to be documented to enable management planning and to serve as a comparison point for all future monitoring. Accordingly, resources of interest that occur on a site need to be documented and mapped. The PCA will inventory and assess landscapes, natural communities, and populations or status (e.g., presence/absence) of species, as appropriate, within the Reserve System. Baseline information may come from surveys conducted by the PCA and other entities (e.g., CDFW, USFWS, Dry Creek Conservancy), from past surveys that have been conducted in the Plan Area (e.g., tricolored blackbird survey), and from pre-acquisition surveys and assessments. In particular, the PCA expects to use 2012 mapping of wetlands/vernal pool complexes recently completed by Glazner as the baseline for wetlands/vernal pool complexes. The baseline inventory will consist of the following tasks:

- Document resources and improve mapping as the Reserve System is assembled. The results of the assessments for land acquisition (i.e., pre-acquisition assessment; see Chapters 5 and 8, *Conservation Strategy* and *Plan Implementation*, respectively) will be the first source of baseline data. Data-collection methodologies and nomenclature will be standardized to facilitate sharing of information. Incorporate results of pre-acquisition surveys into Reserve Area maps.
- Collect and synthesize existing monitoring data that is applicable to the Reserve Area and identify data gaps.
- As needed to fill identified data gaps, conduct landscape assessments (based on geographic information system [GIS] and remote sensing data to obtain information about watershed

conditions and the distribution and abundance of wetland types in the watershed) and site-specific rapid assessments.

- Research and document historical data and trends for Covered Species and natural communities, as appropriate. Historical trends and known occurrence data in the Plan Area for Covered Species are included in the species accounts (Appendix D, *Species Accounts*).
- Conduct post-acquisition biological inventories. Additional surveys may be needed to supplement data gathered in pre-acquisition assessments.
- Use aerial photos and ground surveys, as needed, to assess quality and location of local and regional landscape linkages between unprotected natural areas and adjacent protected lands.

7.2.2.1.2 Initiate Management and Monitoring Planning

Upon implementation of the Plan, the PCA will develop survey methods and monitoring schedules based on the guidelines for monitoring described below in order to document baseline conditions, establish effectiveness monitoring, and/or set up targeted studies. Population sizes of some species can vary widely between years, often in relation to weather or other variables (e.g., vernal pool species). Long-term monitoring, survey protocols, and success criteria will be developed to account for this. These protocols and schedules will provide the overarching monitoring framework that will be implemented in each management unit. Where feasible and appropriate, the PCA will draw from relevant and established protocols (e.g., Wildlife Agency survey protocols) and will adapt them as more information becomes available.

A monitoring plan will be developed for each reserve unit management plan that identifies protocols, indicators, monitoring schedule, and success criteria. Monitoring protocols will be conducted in a repeatable manner and will provide both quantitative and qualitative data to inform management design within the Reserve System.

This monitoring plan will be periodically revised to include results of monitoring, proposed adaptive management actions, and information from targeted studies as results become available. Management and monitoring planning may consist of the following tasks:

- Prioritize implementation of conservation measures to best achieve biological objectives.
- Develop reserve unit management plans (described in Chapter 5, *Conservation Strategy*, Section 5.3.2.2, *Landscape-level Management and Enhancement*).
- Develop a monitoring plan, or plans, that provides a process for evaluating the success of management activities and their progress toward meeting the biological goals and objectives described in Chapter 5, *Conservation Strategy*. Monitoring protocols will be developed for landscapes, natural communities, and, if necessary, for individual Covered Species. As part of the monitoring planning process, the following tasks will be undertaken.
    - Refine the monitoring schedule.
    - Identify biotic and abiotic indicators (see Section 7.2.3, *Guidelines for Monitoring*).
    - Select monitoring protocols and develop sampling design for monitoring, including status, trends, and effects, as needed. Test experimental designs using targeted studies, if necessary.
    - Develop criteria for measuring success of enhancement, restoration, and creation efforts.

- Develop criteria to assess effectiveness of targeted conditions on Covered Activities (described in Chapter 6, *Program Participation and Conditions on Covered Activities*).
- Establish a framework for adaptive management actions, if monitoring reveals that initial management actions are not having the desired effect. Adaptive management actions may include targeted studies.

7.2.2.1.3 Refine Management-oriented Conceptual Ecological Models

During the inventory phase, the PCA will refine hypotheses about key relationships between species, habitats, and management; identify and assess threats and stressors to communities and species; and select biotic and abiotic indicators for evaluating monitoring

Management-oriented conceptual ecological models have been developed for Covered Species (see Appendix D, *Species Accounts*). These models will be a cornerstone of the monitoring program and will be refined during the initial years of implementation. These models will help guide the development of the monitoring program by identifying relationships between threats and the management and monitoring action necessary to evaluate if threats are being alleviated such that the biological goals and objectives may be achieved. The envirograms, drafted as part of the Species Accounts, will be revised as needed once the long-term monitoring program is drafted and monitoring protocols and success criteria are defined. These models will also be refined over time based on data collected through implementation of the monitoring and adaptive management program. Over time, these models will serve as a framework for management decisions and will function as reference points for the PCA's understanding of the relationship between management and natural communities and/or Covered Species within the Reserve System. Baseline data will be used to validate and refine species' habitat models as lands are surveyed and acquired (species models will be updated periodically, but no less frequent than every 5 years, consistent with new survey data collected from the PCA, from land-cover mapping provided by project applicants, and from other relevant sources).

7.2.2.1.4 Targeted Studies Implementation

As described above in Section 7.2.1, *Types of Monitoring*, targeted studies will be implemented to resolve critical uncertainties the resolution of which is required to achieve the biological goals and objectives. While it is anticipated that most targeted studies will be developed relatively early in implementation, targeted studies will be used throughout implementation to address new or revised management techniques that will be implemented and evaluated experimentally through adaptive management.

The PCA will work with other individuals and organizations (e.g., local universities) to facilitate targeted studies on the Reserve System and streams that will improve the effectiveness of management actions for Covered Species under the Plan.

Testing the use of indicators for natural communities or Covered Species; refining monitoring protocols; establishing control plots for long-term management; and reviewing the literature for guidance on sampling, experimental design, and management will all be a part of targeted studies.

7.2.2.2 Long-term Monitoring and Adaptive Management Phase

The long-term monitoring and adaptive management phase generally begins after the inventory phase, but need not wait until the inventory phase is fully concluded before initiation. Monitoring that does not depend on the results of targeted studies will occur as soon as the reserve unit management plans have been reviewed and approved by the Wildlife Agencies and baseline studies are complete (inventory phase) or sooner, if appropriate. Long-term monitoring will be conducted to identify and evaluate the status of landscapes, natural communities, and Covered Species and the effectiveness of the management actions in achieving the biological goals and objectives of the Plan (Figure 7-5).

Long-term monitoring includes the following tasks:

- Update land-cover layer with aerial photographs or satellite imagery at intervals that will detect substantive changes in land use (e.g., every 5 years) and use this information to assess status and trends at the landscape and natural community levels.
- Monitor the response of species (Covered Species or indicator species) to habitat enhancement, restoration, and creation.
- Monitor restoration sites and assess effectiveness of restoration with respect to project-specific success criteria; remediate sites if initial success criteria are not being met. The reserve unit management plan will identify triggers for remediation, if necessary.
- Monitor Covered Species using methodologies developed in the inventory phase, and once available, through targeted studies.
- Conduct wetland assessments at proposed restoration sites within the Reserve System.
- When restoration projects are complete and meet success criteria, scale back monitoring efforts at these sites to be consistent with the rest of the Reserve System but continue to adaptively manage these sites.
- Work with other individuals and organizations (e.g., CDFW, local conservation-based non-governmental organizations, regional universities) to facilitate targeted studies on the Reserve System and streams that will improve management.

In addition to long-term monitoring, this phase will include steps to adaptively manage the Reserve System to achieve the biological goals and objectives of the conservation strategy. Adaptive management tasks are listed below.

- If management actions are not resulting in the desired effect, identify alternative management actions (such as through a targeted study or other additional research).
- If monitoring protocols are not providing definitive results, evaluate efficacy of monitoring protocols using appropriate targeted studies methods, such as conducting pilot projects before making large-scale or long-term changes.
- Incorporate best available scientific information from recent literature into management. Periodic reviews of literature, as well as interaction with the Science Advisors, will ensure that new understanding of the species or monitoring approaches is incorporated into the monitoring and adaptive management program.

- Evaluate and refine conceptual models.
    - Conceptual models will be refined as new information becomes available.
    - The existing species-habitat models developed for this Plan will be refined.
    - Models will reflect changes and continue to provide guidance for future monitoring efforts.
- Adjust success criteria and conservation measures, if necessary.

The success criteria and conservation measures described in this Plan will be adjusted if they are determined to be inappropriate indicators of success (too high or too low, based on biological information), if more cost-efficient actions are developed and agreed upon, or if they are inadequately conserving species or communities. Success criteria will not be changed frequently (it is expected that they will rarely need to be changed), and will be changed only in collaboration with the Wildlife Agencies.

Example success criteria are provided in Table 7-1 to illustrate a range of successful outcomes that will be developed for restoration, creation, and enhancement objectives. These examples are based on success criteria used in other management plans and restoration plans. Actual success criteria will be developed for all conservation measures in the reserve unit management plans based on the communities and Covered Species (and their habitats) present on the reserve unit, and the existing conditions of those communities and habitats (see Section 5.3.2.1.1, *Development of Reserve Unit Management Plans*). Final success criteria will not necessarily be the same as the examples provided. The biological goals and objectives and the best available scientific information will determine the content of the success criteria. The success criteria developed for reserve unit management plans and site-level restoration plans (Section 5.3.3.2.1, *Site-level Restoration Plans*) will be subject to review and approval by the wildlife agencies. See Section 7.2.3.1, *Indicators*, for guidelines when setting success criteria.

The success criteria in Table 7-1 include minimum values and target values. A minimum value for a success criterion represents the minimum value that must be met. If a minimum success criterion is not met, a remedial action would be triggered (e.g., supplemental restoration, repeating the applied enhancement measure, such as re-applying prescribed burn to control an invasive plant). The PCA may not receive full credit for restoration of a site until the site exceeds minimum success criteria.

A target success criterion is by definition higher than the minimum, and it is deemed the best-case goal of the restoration, creation, or enhancement measure for that site. If the measured success criteria are above the minimum criteria but below the target criteria, the PCA might implement an appropriate adaptive management response to improve the site to meet the target(s). The PCA would still receive credit for restoration or creation that does not meet the target success criteria, but exceeds the minimum criteria. Once a site meets or exceeds the target, management is only needed to maintain the existing condition.

In many instances, a success criterion may identify a range of values, rather than a minimum and target. In such cases, the range is often based on conditions at a reference site.

7.2.3 Guidelines for Monitoring

Because the biological outcome of some management actions is uncertain, the monitoring and adaptive management program utilizes scientific principles for adaptive management to guide continual refinement of conservation efforts to achieve the Plan's biological goals and objectives.

The adaptive management program will be designed to test the effectiveness of management actions in the Reserve System and develop alternative management strategies. To that end, there is a continuum of management actions that incorporate scientific principles of adaptive management to varying degrees (Figure 7-4).

The most basic monitoring involves simply assessing effects once a management action has been implemented, without any replication, controls, or comparison of management treatments. In contrast, directed studies test hypotheses using controlled and replicated experiments or systematically collected observational data and statistical inference. Even simple experimental methods can yield valuable results that can be used to help guide and improve management. The scientific principles listed below will guide adaptive management and will influence how monitoring is conducted.

- Management actions, especially early in Plan implementation, will incorporate scientific principles and be implemented with replicated treatments and controls, and will be monitored before and after treatment to best assess the effects of management actions, where feasible. Pilot projects will be implemented as needed to refine monitoring protocols and directed studies to resolve key management uncertainties.
- Management and monitoring actions, especially early in Plan implementation when uncertainty about management actions tend to be greatest, will be designed to test hypotheses about the ecological relationships between species and their environment, and responses to management actions.
- When feasible, adaptive management or directed studies will be designed and replicated to provide sufficient power to detect effects.

Adaptive management, and the design of targeted studies, will be driven by hypotheses about the landscape, natural community, and/or species for which the management is applied. For example, if the goal of management is to expand the distribution and increase the sizes of populations of vernal pool branchiopods, land managers must develop hypotheses about factors that limit their distribution and abundance. Management and monitoring actions will be directed toward testing the validity of those hypotheses. For key management questions, where feasible, directed studies will be conducted on a small scale using an experimental design that will yield statistically valid results to address critical uncertainties.

If proven guidelines for monitoring exist then they will be implemented. If however, species or community monitoring has not been established the following steps can provide useful guidance for monitoring. .

1. **Define the question.** Develop and state the assumptions in the hypotheses and models before collecting monitoring data or conducting manipulations. Monitoring strategies will be designed to address specific hypotheses. Conceptual, statistical, or spatially explicit models will be used to formulate hypotheses. Conceptual models are described below.
2. **Determine what to measure.** Establish the attributes or variables that will be measured to answer the question defined above. Variables should be measured in a repeatable, cost-effective manner. This step includes the development of clear, measurable success criteria for evaluating creation, restoration, and enhancement actions.
3. **Develop monitoring protocols.** Questions to be answered by the monitoring program will be at the species, natural community, and landscape levels. Monitoring protocols will vary with

scale and with the target of the monitoring. Monitoring protocols will be developed in accordance with the guidelines provided below in the *Protocols* section.

4. **Use indicator species, if appropriate.** In some cases, groups of species or indicator species will streamline monitoring. Indicators are selected because they are easy to survey and provide usable information on the species or system in question. Guidelines for selecting and using indicators are described in detail below.
5. **Consider sampling design.** Experimental and sampling design will be established prior to initiating the experiment or observational study. The experimental management approach of the HCP/NCCP requires that questions of site selection, statistical power, and significance be incorporated, as much as possible, into the monitoring and adaptive management program. Aspects of experimental and sampling design include site selection, replication, and sampling protocol.

7.2.3.1 Indicators

Indicators can be used in many ways: to predict species richness (Fleishman et al. 2005), to estimate biodiversity (Kati et al. 2004; Chase et al. 2000), to assess levels of disturbance, to provide targeted information on a system or species (Caro and O'Doherty 1999; Carignan and Villard 2004), and to determine the availability of habitat for a species (e.g., the surface area of vernal pools may be used as an indicator of habitat available for vernal pool branchiopods). In this Plan, abiotic and biotic indicators will be used, when appropriate, to provide information on Covered Species and other components that are difficult to survey, and to provide information on natural community or ecosystem function.

In cases where an indicator is used to monitor an ecosystem or natural community, conceptual models will be used to help identify an appropriate indicator species or variable. Example performance indicators for natural community enhancement, restoration, and creation measures are presented in Table 7-1. Indicators, in general, are easy to monitor and demonstrate changes or trends that are quantifiable. Indicator species can be used as an index of attributes too difficult, inconvenient, or expensive to measure for other species or environmental conditions of interest (Landres et al. 1988). Indicators need not be species, but may be ecological variables or structure-based characteristics, such as diameter and age class of trees, size and distribution of vernal pools, duration that pools remain wet, or key structural features of certain habitat types (e.g., snags or downed logs in forests, woody debris in rivers) (Noss 1999; Lindenmayer et al. 2000). Effective indicators (or variables) have some or all of the following characteristics (Carignan and Villard 2002; Atkinson et al. 2004):

- They are relevant to program goals and objectives and can be used to assess the program performance at the appropriate spatial and temporal scales.
- They are sensitive to changes in the ecosystem, providing early warning of response to environmental or management effects.
- They indicate the cause of change, not just the existence of change.
- They provide a continuum of responses to a range of stressors such that the indicator will not quickly reach a minimum or maximum threshold.

- They have known statistical properties, with baseline data, references, or benchmarks available.
- They are technically feasible, easily understood, and cost effective to measure by all personnel involved in the monitoring.

If possible, the selection of indicators or variables will also be coordinated with existing programs and data sets that are complementary to, and consistent with, the conservation strategy of this Plan. Prior to adopting an indicator, field verification and fine tuning in the system of interest may be necessary (Atkinson et al. 2004). Once monitoring variables have been selected, the following information will be included in monitoring plans (Atkinson et al. 2004, as adapted from Gibbs et al. 1999 and National Research Council 2000):

- "What" will be monitored
- "Why" the monitoring is useful (i.e., the specific question the variable is designed to address)
- "When" will the variable be monitored and at what frequency
- The conceptual ecological model underlying the selection of the monitoring variable
- The geographical area where it will be monitored (e.g., transect locations, stream miles)
- The specific variable that will be measured and the protocol that will be used
- The range of values the monitoring can produce and what these would mean
- The expected response (as in response to management or outside pressures) and the magnitude of change expected
- The time frame and spatial scale over which change is expected to be demonstrated

Monitoring plans will clearly present the rationale for using indicators. Indicators must be applicable and appropriate measures of the biological goals and objectives. For example, the monitoring plan will specify why monitoring the presence of egg sacks for covered amphibians is an appropriate indicator of population-based goals and objectives. In this example, the monitoring plans will justify that counting individual adults, larvae, and/or metamorphs is not the only or preferred way of monitoring for population status. Finally, it is important to consider how the results will be interpreted and how they can be used to create change, if necessary.

7.2.3.2 Protocols

When available, scientifically accepted monitoring protocols that are compatible with measuring the success of the conservation strategy of this Plan will be adopted to facilitate comparison of data with other studies. Monitoring protocols will be appropriate to the task, accurate, and as cost-effective as possible. Monitoring protocols will be standardized across the entire Reserve System and will be incorporated into all reserve unit management plans. To be successful, the monitoring protocols must be applied consistently by different observers and across monitoring cycles. Ongoing training by PCA staff or their contractors will be necessary to ensure consistency.

Local monitoring programs, when available, will be evaluated for compatibility with and relevance to PCCP management needs. These local programs can be replicated or augmented, where appropriate, by the Plan's monitoring program.

Monitoring protocols will vary by Covered Species and will be tied to biological goals and objectives. The following principles apply to monitoring and will guide targeted studies in the Reserve System:

- Develop and state the assumptions in the hypotheses and models *before* collecting monitoring data or conducting manipulations such as experiments and adaptive management.
- When designing an experiment or using adaptive management, select the number and location of sampling units so as to apply sufficient scientific rigor for evaluating the hypothesis being advanced.
- Replicate in space and time the number of the sites surveyed for population estimates and/or those receiving a management action. Use controls when appropriate.
- Measure the sensitivity of variables to reflect true changes in the resource being sampled. When appropriate, adjust counts, measures of species richness, and determinations of patch occupancy (i.e., presence/absence) with an estimate of detection probability, as described by Lancia et al. (1994), Yoccoz et al. (2001), and Pollock et al. (2002).

7.2.3.3 Sampling Design

Sampling design will be driven by the Plan's biological goals and objectives, the reserve management, and monitoring plans; it will vary during the phases of monitoring. During the inventory phase, baseline inventories may require a less rigorous sampling design, relying, for example, on visual surveys for detecting presence or absence. As on-the-ground monitoring progresses, site selection and replication merit increased attention based on the goals of the monitoring at that time and rapid assessment techniques may no longer be appropriate.

An important goal in sampling and experimental design is to minimize extraneous variance in the measured values of indicators or variables. Selection of variables will be guided by a thorough knowledge of the ecological relationships that structure natural communities. Sampling intensity and probability of detection will be considered to ensure that all Covered Species are adequately inventoried and monitored. Recent studies have indicated that monitoring programs that fail to address issues of detectability and spatial variation have drastically overestimated population trends over time (Martin et al. 2007). Prior to implementing simple count-based surveys to detect trends of populations of Covered Species, for example, researchers must have confidence that detectability will remain constant over time. Methods of data analysis will be established prior to study design and a statistician or biologist with sufficient statistical expertise will be consulted. Issues to consider (Scheiner and Gurevitch 1993) are listed below.

- Availability of sites on which treatments can be applied
- Availability of reference sites
- The site-selection process (is it random? stratified random? non-random?)
- Systematic versus opportunistic sampling
- Detection probability of the protocol
- Replication versus pseudo-replication (Hurlbert 1984)
- The clarity of hypotheses
- Sufficient statistical power ($1-\beta$) or significance level (α)

7.2.3.4 Species Models

Habitat Distribution Models. Parameters for the species' habitat distribution models (see Section 3.3.2, *Covered Species*, for a description of the habitat distribution models and the methods used to develop the models for the Covered Species; each species' habitat distribution model can be found within the corresponding species account in Appendix D, *Species Accounts*) will be refined and revised throughout Plan implementation as more information becomes available. These species-habitat models document the best current understanding of the biological and physical parameters that influence the habitat associations of each species in the Plan Area and, in this way, are species-specific conceptual models. Species-habitat models were developed for all Covered Species to hypothesize a relationship between land-cover type and the distribution of Covered Species. These models were used to quantify potential effects and to inform the conservation strategy. Information from the pre-acquisition surveys and post-acquisition inventories will be used to further refine these models to more accurately help predict distribution and occupancy.

Conceptual Models. As described above in Section 7.2.2, *Program Phases*, conceptual models are an important component of the monitoring and adaptive management program. These were developed as part of the species accounts (Appendix D, *Species Accounts*) and termed envirograms. Envirograms are one example of management-based conceptual models. These models will be refined using data from species surveys and other monitoring efforts. The envirograms provide a framework for the further development and refinement of conceptual models. The envirograms can be modified or used to develop different types of conceptual models.

An envirogram is a tool to identify important ecological factors that affect a population or group of populations of a particular species. The concept was developed originally by Andrewartha and Birch (1984), and envirograms were first applied to conservation planning by James et al. (1997) who used them to identify factors limiting the abundance of endangered red-cockaded woodpeckers in the southeastern United States.

An envirogram consists of a "centrum," components of the environment that directly affect a species' likelihood to survive and reproduce, and several "webs," distal factors that act in sequence to affect the proximate components of the centrum. The centrum consists of four major categories: resources, reproduction, threats, and dispersal. Each of these can be subdivided as necessary. For example, resources could be subdivided into foraging habitats, breeding habitats, and food. The web identifies the underlying ecological processes or human actions that influence each centrum component. The idea is that distal factors in the web activate proximate components of the centrum. Each chain of activating factors forms a pathway. Pathways in the web are constructed from right to left, with Web-1 factors directly affecting centrum components, Web-2 factors affecting Web-1 factors, and so on.

Envirograms are intended to be used in conjunction with the species accounts and habitat distribution models to help inform conservation measures and management actions. They are considered to be "works in progress" and always can be modified by new and better information.

7.3 Landscape-level Monitoring Actions

Landscape-level monitoring will be directed at tracking geographically large areas (e.g., the entire Reserve System or large portions of the Reserve System), landscape-scale processes, and regional issues that affect the Plan Area. Functioning landscapes encompass multiple ecosystems and natural

communities and the movement of nutrients, materials, and organisms between those units. The section below summarizes the specific monitoring actions that the PCA will carry out to track environmental issues at the landscape level and ensure that landscape-level goals and objectives are being met. Compliance monitoring is described above in Section 7.2.1, *Types of Monitoring,* and will take place at all levels of monitoring, including the landscape level.

- The amount of land-cover types in the Reserve System and Plan Area and their relationship to each other (e.g., succession or conversion from one community type to another, transitions zones between communities, degree of habitat fragmentation)
- Linkages, permeability, connectivity, and corridors
- The amount and quality of land-cover types, natural communities, and other landscape features
- Occurrences of invasive plant infestation, non-native wildlife species, and serious wildlife diseases in the Plan Area
- The frequency, intensity, and geographic scope of disturbance events such as fires and floods

This section summarizes specific monitoring actions that the PCA will carry out to track environmental issues at the landscape scale and ensure that landscape-level goals and objectives are being met. Compliance monitoring is described above in Section 7.2.1, *Types of Monitoring,* and will take place at all scales of monitoring, including landscape level.

Because most effectiveness monitoring takes place at the natural community and species levels, monitoring at the landscape level focuses on detecting changes in natural process that cannot be detected on smaller scales. This type of monitoring will ensure that effects to biological resources, as specified by the Plan, are not exceeded; that restoration and enhancement requirements are being met; that threats are being targeted and reduced; and that any large-scale issues affecting resources regionally are identified early and addressed. Following is a description of the types of landscape-level monitoring that will occur on the Reserve System and throughout the Plan Area.

7.3.1 Assimilate Results of Pre-acquisition Assessments and Other Surveys

Information on landscape features will be collected through pre-acquisition assessments, including biological surveys, updated land-cover mapping, assessments of habitat suitability for Covered Species, air photo interpretation, and the biological resources present or expected on site, that provide information on the extent, quality, and distribution of land-cover types in the Reserve System. These data will be used to refine existing species' habitat models and management-oriented conceptual models (see Figure 7-3). Additionally, this information will be combined with landscape-level information being collected by others in the region to provide resource managers, including the PCA, with an understanding of how critical biological resources are generally trending under the influence of Plan implementation as well as under the influence of other human activities and other environmental factors (e.g., fire, drought, disease).

7.3.2 Monitor Land Cover in the Plan Area

The PCA will track all acres acquired within the Reserve System and by land-cover type and habitat constituent and acres of enhancement/restoration in the Stream System (see Chapter 8, *Plan Implementation*, Section 8.11, *Reporting*).

The PCA will monitor land-cover types and habitat constituents in the Reserve System and throughout the Plan Area annually to track the amount of land-cover types, changes in land-cover types (and hence, natural communities), and changes in habitat constituents over the permit term, and the degree of fragmentation and connectivity in the landscape. This will be done using the results of land acquisition surveys (see Section 5.3.1.4, *Landscape-level Reserve Design*), post-acquisition monitoring (see Section 7.2.2, *Program Phases*), and pre-construction surveys (see Section 6.2.4.3, *Item 3: Community and Constituent Habitat Types on Site and Baseline Land-cover Map Consistency*). Land cover will be tracked using information from surveys and using aerial photos or satellite imagery to update land-cover maps. These data will be used to refine existing species-habitat models (see Appendix D, *Species Accounts*), conceptual models, and the land-cover GIS database. It will also be used to assess the Plan's effectiveness in achieving the biological goals and objectives.

At the landscape level, the PCA will use aerial photos and/or satellite imagery to monitor the extent and distribution of land-cover types within the Plan Area every 10 years. Land-cover mapping will be verified in the field at sites where air- or satellite-photo interpretation is difficult. Current species models reflect landscape-level data available at the time plan development (2014 to 2015). Species models, including maps, will be improved as new data become available.

In addition, the PCA will track completion of fire management plans, as well as track post-fire response of target natural communities. If feasible, this monitoring could occur at a more refined level following significant natural events that affect the Reserve System (e.g., flood and wildfire). This effort will begin during the Inventory Phase but will continue throughout all phases of Plan implementation.

The purpose of monitoring changes in the extent of land-cover types and habitat constituents within the Plan Area is to track long-term, landscape-level changes and, by inference, changes to the habitats and natural communities contained therein. Long-term changes can indicate local, regional, or global problems such as unanticipated effects of Covered Activities, influence of invasive species and disease, and effects of climate change. Monitoring long-term changes will also track the contribution of the PCCP toward maintaining or improving the extent, distribution, and continuity of natural land-cover types and habitat constituents. Changes in land-cover type will result from conversion by Covered Activities (e.g., urban and suburban development) and management actions (e.g., restoration and creation of vernal pool complexes and other land-cover types). If landscape-level changes differ from the expected outcomes due to management actions, the PCA will attempt to identify reasons for the differences and address them through the adaptive management program as appropriate.

Tracking land cover will also inform an understanding of habitat fragmentation. Monitoring and tracking changes in land cover will inform land acquisition by helping the PCA identify parcels that can be acquired to re-connect fragmented habitat (e.g., between reserves that are acquired in the future) and expand unfragmented habitat through preservation and restoration.

7.3.3 Assess and Monitor Landscape Linkages

The PCA will track acquisition of corridor lands. Prioritizing, acquiring, assessing, managing, and monitoring landscape linkages are important tasks at the landscape level (Table 5-2). One of the primary goals of the conservation strategy is to sustain and enhance the effective movement and genetic exchange of native organisms within and between natural communities inside and outside

the Plan Area. To monitor landscape linkages the PCA will use a combination of compliance monitoring (to ensure that land acquisition requirements are met) and effectiveness monitoring (to ensure that species utilize linkages effectively and that management actions to increase permeability or improve connectivity are successful). Effectiveness monitoring will include studies of wildlife and plants. The PCA will track permeability factors and report the number of barrier removals or modifications to the Wildlife Agencies.

The inventory phase of monitoring will prioritize acquisition of linkages, develop management protocols to enhance linkages, and develop success criteria for the effectiveness of linkages at sustaining movement and genetic exchange. Targeted studies may address whether linkages are successful at the small scale (e.g., testing use of culverts by target species using camera traps, track plates, or other techniques) and the large scale (e.g., testing connectivity by monitoring indicator species or through genetic testing of target species). The long-term monitoring phase will implement methodologies identified to assess and monitor landscape linkages.

In addition, structures specifically constructed for wildlife movement (tunnels, culverts, underpasses,) will be monitored by the Permittee facility owner and repairs made promptly to ensure that the structure is in proper condition. For facilities owned by entities not participating in the Plan (e.g., California Department of Transportation) and where feasible, the PCA will secure access and data collection agreements with these entities to allow the PCA to conduct this monitoring.

7.3.4 Track Climate Change

As indicated in Chapter 10, *Assurances*, climate change-related remedial measures will be triggered if there is an increase in temperature categories as measured against the 10-year running average (see Section 10.3, *Changed and Unforeseen Circumstances Addressed by this Plan*). The annual report will document changes in temperature in the Plan Area throughout the permit term.

7.3.5 Track Invasive Species and Disease

7.3.5.1 Invasive Plants

The PCA will track implementation and effectiveness of non-native species control programs relative to success criteria. Control of invasive plants and animals is a serious regional issue, as is disease. Efforts to control invasive species and disease will directly benefit the natural communities and species addressed by this Plan. These threats will be evaluated and prioritized regionally. For example, non-native plants that are identified during pre- and post-acquisition surveys will be prioritized regionally for eradication or control.

For all reserve units, an invasive plant control program will be developed that will include early detection and eradication and success criteria to assess the effectiveness of control efforts. In addition, best management practices will be incorporated into Reserve System management activities to prevent weed establishment. Long-term monitoring will assess the effectiveness of threat-prevention and threat-reduction efforts. The introduction, occurrence, and spread of new invasive plant species will be tracked through periodic, systematic plant surveys within the Reserve System. These surveys will focus on the invasive plants that are the greatest threat to meeting the biological goals and objectives. Invasive plant surveys will also focus on areas of restoration, creation, and intensive management actions to ensure that efforts made to enhance a natural

community or Covered Species' habitat are not lost a year or two after completion. The recently developed assessment tool, the Weed Heuristics: Invasive Population Prioritization for Eradication Tool (WHIPPET) (Skurka Darin et al. 2011), provides a useful protocol for screening and prioritizing specific invasive species and invaded sites for control efforts.

During the inventory phase of monitoring, the PCA will identify and prioritize problems; map occurrences of invasive plants, if possible; develop an invasive species control program as a component of reserve management plants; and develop success criteria for the effectiveness of eradication or reduction efforts. Targeted studies may be implemented to develop protocols for invasive species monitoring and test methodologies for monitoring eradication efforts. The long-term monitoring phase will entail implementation of methodologies identified in the targeted studies phase.

7.3.5.2 Invasive Animals

Occurrences of invasive animals will be documented in GIS and management actions will be developed to prioritize and control threats to natural communities and Covered Species. For example, bullfrogs compete with and depredate native amphibians, fish, and invertebrates, including the California red-legged frog, Chinook salmon, and vernal pool fairy shrimp. Also, the feral pig is an invasive species. Rooting disturbance by feral pigs allows non-native invasive plants to establish in grassland and aquatic communities, and fall acorn foraging likely has a detrimental effect on oak regeneration (Sweitzer and Van Vuren 2002). Once acquired as a new reserve, a baseline inventory of aquatic and perennial wetlands will be conducted to prioritize threats and target reduction or elimination. For example, during the inventory phase, areas frequented by bullfrogs and feral pigs will be identified for eradication (through trapping and hunting) and exclusion (using fencing exclosures and cages for feral pigs). As part of management and monitoring planning, protocols will be developed to monitor the presence/absence of bull frogs and feral pigs over time. Monitoring will track the effectiveness of bullfrog and feral pig reduction and ensure that feral pig exclosures from grassland, oak woodland, and aquatic habitat types are effective and maintained. Also, monitoring will assess the response of targeted Covered Species (and other native species) to eradication efforts (e.g., do populations of Covered Species increase in response to eradication of invasive species). Ideally, sites that do not receive treatments (i.e., control sites) will be compared to sites that received treatment to improve understanding of the effectiveness of eradication efforts. In addition, protocols will assess the extent and types of damage to vegetation and soils caused by pigs, including detection of invasive plant species in areas of pig rooting. Monitoring will also be designed to detect new invasions and the spread of invasive species to unaffected parts of the Reserve System. These protocols will then be used as part of long-term monitoring for bullfrog and feral pig eradication and other invasive animal species as appropriate.

7.3.5.3 Disease

Disease, as defined by this Plan, is a condition leading to decreased or impaired function or increased rate of mortality in plants and wildlife; it can be caused by a variety of pathogens. Disease is a serious threat to plant and wildlife populations throughout California, including the Plan Area, and can be detrimental to the health and function of entire ecosystems. Instances of disease will be monitored in the Reserve System, and reported, as they are discovered. The PCA will maintain a watch-list of dangerous diseases for the Plan Area and will monitor animals, including fish, and vegetation, as part of species and natural community monitoring, to identify outbreaks of diseases.

One example of potential diseases to monitor in the Plan Area includes sudden oak death and other species of *Phytophthora*. Sudden oak death is a disease of oak trees caused by an invasive plant pathogen, *Phytophthora ramorum*. It currently occurs in coastal California counties from Monterey to Humboldt and in a small portion of southwest Oregon. It is estimated to have killed more than 1 million oak and tanoak trees during the last decade. In addition, more than 100 other plant species are susceptible to the pathogen, but most suffer only minor damage limited to leaf spots or twig dieback. Possible ecological threats of sudden oak death include a change in species composition in infested forests and, therefore, in ecosystem functioning; loss of food sources for wildlife; a change in fire frequency or intensity; and decreased water quality due to an increase in exposed soil surfaces. Although sudden oak death has not been recorded in oak trees in in the Central Valley or Sierra Nevada foothills, including Placer County, it had been recorded recently in nursery container stock in adjacent Sacramento County.

The PCA will track, on an annual basis, the status of high-priority diseases and non-native invasive species in order to expeditiously initiate remedial actions described in Section 10.3, *Changed and Unforeseen Circumstances Addressed by this Plan*.

7.3.6 Track Recreation in the Reserve System

Some areas of the Reserve System will support passive recreational use, such as hiking, biking, and equestrian activities, in accordance with approved Reserve Unit Management Plans (the recreation section of those plans). The effects of recreational use on biological resources will be monitored and managed adaptively to reduce or eliminate adverse effects. During the inventory phase, potential effects on species and communities will be identified, recreational plans developed, and protocols created to evaluate effects of public access and use within lands acquired for the Reserve System. If targeted studies are deemed critical to resolving management questions, signs of disturbance from recreational use will be documented and assessed, and long-term monitoring may track trends in recreation impacts to adjust management practices to reduce or eliminate impacts.

7.3.7 Monitor Disturbance Events

Within the context of this Plan, a disturbance is a temporary or intermittent change in environmental conditions that causes a pronounced change in an ecosystem. Ecological disturbances include natural events such as fire, drought, and flooding. The effects of disturbance events, such as fire and flood, will be monitored after they occur, if they do, and will be addressed through natural community-level monitoring. Should fire or flooding occur in an area that has been previously monitored, the PCA will conduct post-disturbance monitoring to assess the effects of the disturbance and to inform future management. The effects of disturbance can also be assessed by comparing post-disturbance conditions to similar, unaffected areas in or adjacent to the Reserve System using aerial photographs or on-the-ground monitoring for areas on the Reserve System. The PCA will monitor the effects of these natural disturbances and implement remedial actions as described in Section 10.3, *Changed and Unforeseen Circumstances Addressed by this Plan*.

7.4 Natural Community–level Monitoring Actions

Although monitoring occurs at three spatial scales, the natural communities provide the organizational framework for monitoring—species are associated with and occur within natural communities. Landscapes are made up of collections of natural communities. In this way, understanding natural communities and evaluating the effects of management on natural communities is one of the most important tasks of the monitoring program.

This section begins by describing approaches that may be used to monitor natural communities. The individual natural community subsections that follow detail the specific monitoring actions that the PCA will carry out to track environmental issues at the natural-community level and ensure that natural community–level goals and objectives are being met. Table 5-2 relates community-level monitoring actions with biological goals, objectives, and conservation measures for natural communities.

7.4.1 Develop Conceptual Ecological Models

Development of management-oriented conceptual ecological models is described under Section 7.2.2, *Program Phases*. In addition, the PCA may find that in some cases, it will be helpful to develop other types of conceptual models. For example, conceptual ecological models can also be developed to describe how an ecosystem functions. They provide a framework for learning about a system and help formulate hypotheses about the relationships between components of the modeled ecosystem. Conceptual models are useful for management because they can represent and document uncertainty (Williams et al. 2007). They also help summarize information about a system, identify which factors may be influenced by management, and help identify critical uncertainties for targeted studies (Atkinson et al. 2004).

Conceptual models can inform the monitoring program in several important ways:

- Developing hypotheses about the relative importance of certain ecological and ecosystem relationships and processes
- Helping to identify threats or stressors that require monitoring
- Identifying species or other attributes that function as indicators
- Serving as a repository of the changing understanding of the system as more data become available

Conceptual models can also be used to explain ecosystem processes and relationships to other scientists and the public and to facilitate review by outside experts.

Models can be either narrative or diagrammatic. In most cases, diagrams show the hypothesized relationships that characterize the ecosystem and are supplemented by written materials.

7.4.2 Enhance Natural Community Mapping

Once parcels for the Reserve System have been acquired, the PCA will ground truth the location and extent of land cover and habitat constituents. This approach will draw from accepted protocols for defining and identifying vegetation types and wildlife habitats. These typing protocols include the California Native Plant Society/CDFW Protocol for Combined Vegetation Rapid Assessment and

Relevé Sampling Field Form (April 28, 2016). Protocols are updated frequently and the most recent or most appropriate protocols at the time of assessment will be used, unless previous assessment were made using an older, established protocol. In these cases the older protocol may be used in order to preserve consistency and allow comparison of monitoring results over time. Streams will be mapped and included as one of the land-cover types addressed.

Similarly, acquired parcels will be surveyed during the inventory phase for wildlife (including Covered Species), invasive species, and potential threats and stressors. Also, survey protocols will be developed by the PCA during the inventory phase of implementation.

Along with the existing species models, the California Wildlife Habitat Relationships (CWHR) classification and land-cover classification system used in this Plan (see Chapter 3, *Physical and Biological Setting*) is recommended to understand the relationship between natural communities, their habitat, and wildlife species (Mayer and Laudenslayer 1988). Information from CWHR or other wildlife-habitat systems, the results of protocol-level surveys, and any other relevant, new information will be incorporated into species and community models throughout the lifetime of the PCCP. When feasible, the PCA will seek to develop protocols that use a multi-species or habitat-based approach.

7.4.2.1 Monitor Ecosystem Function

Conserving, restoring, and managing ecosystem function is a requirement of the NCCP Act.[2] Ecosystem functions are the biological and physical processes and components that occur within an ecosystem. Ecosystem functions relate to the structural components of an ecosystem (e.g., vegetation, water, soil, atmosphere, and biota) and how they interact with each other, within ecosystems, and across ecosystems. Ecosystem functions can also be referred to as ecological processes..

The general ecological concept of ecosystem function as it applies to conservation has evolved in the last two decades to focus on the subset called ecosystem services,[3] and a shift in management strategy from protection of reserves to sustainability and stewardship of the human-occupied landscape (Daily and Matson 2008; Cowling et al. 2008). Ecosystem services include maintenance of habitat for endangered species as well as production of clean water and air, aesthetics for tourism, forage for livestock, and climate stabilization. They have human economic value that can generate payments as incentives to maintain those services. This newer concept recognizes the vital roles of people, including planners, managers, and consumers, in a vision of conservation for California rangelands.

During plan implementation and in conjunction with land acquisition, the PCA will identify the ecosystem functions that require monitoring. Once these are established, biotic or abiotic indicators of ecosystem function will be selected and monitored and monitored at an appropriate frequency, as determined during implementation.

[2] California Fish and Game Code Section 2820(a)(4)(A).

[3] Jack et al. (2008) defines ecosystem services as the benefits that people derive from ecosystems, including commodities and regulating, supporting, and cultural services.

7.4.2.2 Evaluate Community Enhancement, Restoration and Creation

A primary component of natural community monitoring will be the assessment of natural community enhancement, restoration, and creation actions. Monitoring at this scale will focus on the response of natural communities. Because natural communities are likely to occur in different stable states, determining the desired restoration/creation success criteria is a complex but necessary first step (Hobbs and Norton 1996). This effort will ensure that the restored/created natural communities are functioning as habitat for particular Covered Species or suites of species associated with the subject communities.

Key steps to evaluate restoration and creation projects (Hobbs and Norton 1996) are listed below.

1. Identify processes leading to decline.
2. Develop methods to ameliorate degradation or decline.
3. Determine realistic goals for functional ecosystems.
4. Develop easily observable success criteria.
5. Develop practical techniques for implementing these goals and ensure that they are commensurate with the problem.
6. Document and communicate these techniques.
7. Adaptively manage the system.

Success criteria for the enhancement, restoration, and creation of each natural community type will generally be consistent across natural communities and type of conservation measure (i.e., enhancement, restoration, creation), with minor variations a result of on-the-ground conditions and will be established during the early phases of Plan implementation. Site-specific success criteria will be developed for each specific restoration, enhancement, or creation effort after reserves are acquired and once target areas are identified.

7.4.3 Monitor Natural Communities

7.4.3.1 Vernal Pool Complex and Grasslands

In the Plan Area, vernal pools are embedded within a landscape of annual grasslands and are closely linked through various ecological and ecosystem processes—nutrients, water, and, organisms move between vernal pools and grasslands. Therefore, vernal pools and grasslands will be managed together as a system. Adaptive management in vernal pool grassland complexes will be focused on enhancing and restoring hydrological processes of vernal pool complexes to benefit the covered animals that use vernal pool complexes and to promote populations of Covered Species and native biodiversity in grasslands. Management actions will be monitored to evaluate the effectiveness of management actions to enhance and restore vernal pool topography, hydroperiod, and water quality; to reduce or eliminate invasive non-native vegetation; and to enhance and restore biodiversity and populations of Covered Species (e.g., vernal pool branchiopods, and grassland-dependent birds such as Swainson's hawk, western burrowing owl, tricolored blackbird).

Primary management actions will be monitored and refined within an adaptive management framework to meet the biological goals and objectives for vernal pool complex and grassland communities (see Table 5-2). These management techniques include livestock grazing, prescribed

burning, mowing, and seeding to increase the cover of native plants and reduce the cover and biomass of non-native, invasive plants; inoculating created and restored vernal pools with cysts of covered invertebrates; physical manipulation of the topography of vernal pools and vernal pool wetland complexes to restore and enhance the hydrologic conditions of vernal pools; diverting polluted runoff from vernal pools; eliminating ground squirrel control efforts to allow populations of ground squirrels to increase; and restricting recreation and other damaging activities from sensitive vernal pool ecosystems.

7.4.3.1.1 Assess Condition of Natural Community

The PCA will monitor the condition of vernal pool complexes and annual grasslands within the Reserve System, with a focus on identifying and monitoring vernal pool complexes that support or have the potential to support Covered Species. Monitoring actions to assess condition may include the following:

- Document the distribution of vernal pools, seasonal wetlands, and grassland land cover within the Reserve System using recent aerial photographs or other methods of remote sensing (e.g., Light Detection and Ranging [LIDAR]), pre-acquisition surveys, and post-acquisition surveys.
- Map wetland area and assess the condition of hydrologic functions during the wet season when pools are inundated.
- Identify sites suitable for enhancement, restoration, and potentially, creation.
- Identify factors that may be limiting ecological and hydrologic functions, assess vernal pool complexes and grasslands (e.g., extent of covered species, inundation period, water quality, extent of non-native species, and extent of damage from past land uses). If ecological and hydrological functions are of low quality, or if quality is declining, adaptive management actions will be implemented. These actions will be site-specific and may include restoring vernal pool topography through mechanical means; restoring hydrological function; diverting sources of pollution; managing vegetation through prescribed burning, prescribed grazing, and introducing inoculae; and fencing vernal pools and creating recreational boardwalks.
- Assess and monitor invasive, non-native species. The distribution and relative cover of particularly invasive, problematic non-native species will be mapped. The known or potential effects on ecosystem function, native biodiversity, and Covered Species will be documented to inform the management plan to control invasive plant cover within the Reserve System. Should fire be considered as a management tool in vernal pool complexes and grasslands, the effects of prescribed burning on cover of native and invasive species, vernal pool hydroperiod, and other ecosystem functions will be assessed in a pilot study before being implemented as a management tool. If prescribed burns are feasible, and expected to benefit Covered Species and native biodiversity, prepare burn plans that include the monitoring of habitat before and after burns to assess the efficacy of prescribed burning in enhancing native species diversity in grasslands and vernal pool complexes and populations of Covered Species.
- Develop criteria for measuring success with review and approval from the Wildlife Agencies.
- Begin pre-treatment monitoring of sites considered for restoration/creation and enhancement.

Occupancy of acquired pools in the Reserve System is an important component of the conservation strategy and is described in Section 7.5, *Species-level Monitoring Actions*, below.

7.4.3.1.2 Monitor the Success of Vernal Pool Complex Restoration/Creation Measures

The PCA will restore or create at least 30 acres of vernal pools, independent of effect, that provide habitat for covered vernal pool branchiopods. Additional restoration/creation will occur dependent on effects at a 1.5:1 ratio of restored/created to affected vernal pool constituent habitats (see Section 5.2.6.1, *Vernal Pool Complex and Grassland Natural Communities*, Objective VPCG 1.2). This would result in up to an additional 870 wetted acres of vernal pool constituent habitats restored and created as mitigation. If the proposed maximum allowable effect occurs, independent and dependent restoration will total 900 wetted acres of all vernal pool constituent habitats of which a minimum of 326 acres would be delineated as vernal pools (Table 5-5). The proportion of vernal pools to seasonal wetlands that will be restored/created will be equal to or greater than this proportion within vernal pool complexes lost as a result of Covered Activities.

The PCA will monitor restored and created vernal pools (e.g., hydroperiod, depth and size of pools, water quality, vegetation) to assess the success of vernal pool restoration and creation. As discussed in Chapter 5, *Conservation Strategy*, although restoration/creation actions will be determined on a case-by-case basis, they will generally include restoring or creating vernal pool topography; removing permanent or longer-term water sources; re-introducing vernal pool cysts; restoring water quality; and removing non-native, invasive, and non-vernal pool native species. Restored/created vernal pools will be monitored to determine whether they meet the success criteria provided in Section 5.3.3.3.1, *Vernal Pool and Grassland Natural Communities,* under CM3 VPCG-1, *Vernal Pool Complex Restoration/Creation.* The purpose of the monitoring is to assess the relative success of the restoration/creation as compared to performance standards and to determine whether remedial actions are necessary to assure the performance standards are met. The PCA will implement the following monitoring and reporting protocol:

- The PCA will monitor the hydrology and vegetation of the restored and created vernal pools for a period of 10 years, with monitoring and reporting occurring in years 1, 3, 5, 7, and 10 after the submission of as-built mapping after construction in the dry season of year 0. As-built mapping will be produced by the contractor using survey equipment. Monitoring during these years will include low altitude, global positioning system (GPS)-defined course imagery from an unmanned aerial vehicle, and field assessment by a biologist for both hydrology and vegetation. In monitoring years, the unmanned aerial vehicle–based monitoring will be conducted twice to qualitatively assess hydrology and vegetation: once during the month of January and the second time in April. The wetland boundary will be mapped by submeter GPS after the third wet season.
- The results of each year's monitoring of vernal pool restoration and creation will be compiled into a monitoring report, which will be included with annual reports described in Section 8.11, *Reporting*. The monitoring reports will present all monitoring data, assess the implications of those data, and make recommendations for remedial actions, where warranted.

7.4.3.1.3 Evaluate Effects of Water Quality Management Actions

The PCA may monitor water quality in vernal pools to assess the effectiveness of management actions implemented to protect and improve water quality and habitat in vernal pools. The tasks listed below may be implemented to determine the effectiveness of these actions on water quality.

- Survey watersheds to identify potential sources of polluted runoff. Develop a plan to treat (e.g., create vegetated buffer strips) or divert polluted runoff away from vernal pools, if feasible, without damaging the integrity of pools.
- Determine water quality indicators and develop target measures for each indicator. Target measures may be based on reference sites and/or habitat requirements for Covered Species.
- Collect baseline measures associated with each water quality indicator.
- Compare results of efforts to improve water quality (e.g., diverting point-source pollution, managing livestock) against baseline and target measures.
- Develop pilot projects that test the effects of different grazing practices (e.g., grazing intensity, duration, and season) on vernal pool water quality.

7.4.3.1.4 Monitor the Success of Grassland Restoration Measures

The PCA will restore or create at least 1,000 acres of grassland in the Valley. Monitoring restored grassland habitat will ensure that the natural community is functioning as habitat while providing for ecological processes in the larger landscape. The monitoring activities listed below will be conducted to assess the effectiveness of grassland restoration.

- Develop success criteria in conjunction with the Wildlife Agencies.
- Develop monitoring protocols and define target measures for each success criteria. Target measures may be based on reference sites, previous restoration/creation projects, and/or habitat requirements for Covered Species.
- Collect baseline information associated with each success criteria.
- Compare results of restoration/creation efforts against baseline conditions and target measures.

7.4.3.1.5 Evaluate Effects of Management on Vernal Pool Hydrology

The PCA will monitor the vegetation and hydrology in restored vernal pools to assess the effectiveness of management actions implemented to make vernal pools self-sustaining. The tasks listed below may be used to determine the effectiveness of management actions on vegetation and hydroperiod.

- Collect baseline measures of vegetation type and the timing, frequency, and duration of inundation.
- Compare results of efforts to improve retention against baseline and target measures.

7.4.3.1.6 Evaluate Effects of Vegetation Management Actions, Tools, and Techniques in Vernal Pools and Grasslands

As discussed in Chapter 5, *Conservation Strategy*, measures that relate to vegetation management include reducing thatch, non-native plants, and invasive plants in vernal pool complexes; increasing

forb diversity in vernal pool uplands and non-vernal pool grasslands; enhancing remnant populations of native grasslands; and reducing the risk of wildfire. Some of the tools and techniques for implementing these actions include prescribed grazing, manual vegetation removal, and prescribed burning (where feasible and when it can benefit the natural community and Covered Species). Monitoring to evaluate the effects of these activities will take place at target sites, using the following tools, as necessary.

- Determine the appropriate monitoring indicators for each measure to be monitored. Indicators may include the relative cover, abundance, or distribution of invasive plant species, and the relative frequency of native forb species.
- Determine success criteria in conjunction with the Wildlife Agencies for selected indicators to evaluate the success of conservation measures in reducing the cover of non-native, invasive vegetation and promoting the extent and diversity of native plants. Success criteria will be based on reference sites with approval from the Wildlife Agencies.
- Determine the appropriate protocol for measuring selected indicators. Collect baseline information associated with each indicator. Compare results of vegetation management against baseline and target measures.
- Develop a grazing plan in conjunction with the Wildlife Agencies for the Reserve System that integrates an experimental approach to achieving the biological goals and objectives of the Plan.

If monitoring results indicate that management actions have not improved indicators beyond baseline measures or achieved target measures, develop pilot projects that compare tools and techniques or that compare the effects of various regimes associated with each technique (e.g., intensity, duration, season).

7.4.3.1.7 Evaluate Efforts to Increase Ground Squirrel Population

As discussed in Chapter 5, *Conservation Strategy*, ground squirrels provide critical habitat elements for Covered Species such as burrowing owls, which rely on these excavated areas for nests and shelter. In addition, ground squirrels are an important prey species for many native predators. Overall, ground squirrels are an important component of the grassland community. Within protected and restored vernal pool complex and grassland communities, the conservation strategy aims to increase the population of ground squirrels to enhance prey populations and habitat value for wildlife species (Objective VPCG 2.2).

Monitoring to evaluate the effects of ground squirrel population enhancement will take place at target sites, using the following tools, as necessary:

- Determine success criteria in conjunction with the Wildlife Agencies for ground squirrel enhancement.
- Collect baseline information associated with ground squirrel populations, such as presence, distribution, and density of burrows.
- Compare results of management against baseline and target measures.

7.4.3.2 Aquatic/Wetlands

Adaptive management of aquatic/wetland on the Reserve System will be implemented to protect, enhance, restore, and create aquatic/wetland habitats for the benefit of Covered Species and native

biodiversity. To achieve this goal, management actions will be focused on reducing cover of invasive plants, enhancing structural complexity of wetlands, controlling or eliminating invasive animals, protecting wetlands from overgrazing, and enhancing hydrologic function for Covered Species. The PCA will monitor the effectiveness of these management actions designed to increase covered and native species found in these aquatic/wetland communities.

7.4.3.2.1 Assess Condition of Natural Community

The PCA will monitor status of key characteristics of the aquatic/wetlands natural community within the Reserve System. The tasks listed below may be used to assist determining the baseline condition of aquatic/wetland communities on the Reserve System.

- Use pre-acquisition assessments, site inventories, and other surveys to establish the distribution and abundance of aquatic/wetland within the Reserve System.
- Report acreage, location, and wetland type of acquired aquatic/wetlands complex natural community.
- Map the distribution and assess connectivity of aquatic/wetland and associated upland areas.
- Develop a conceptual ecological model for wetlands and identify indicators for community function as well as any critical uncertainties that may require additional directed studies.
- Evaluate the hydrological conditions of existing aquatic/wetland to determine whether hydrological conditions (e.g., hydroperiod, water quality) are suitable to support target Covered Species.
- Prioritize aquatic/wetland for enhancement and restoration and identify site for aquatic/wetland creation. Sites will be selected based on their physical features and hydrologic, geomorphic, and soil conditions to ensure that successful restoration can occur and be self-sustaining.
- Assess the condition of adjacent upland habitats to identify restoration and enhancement areas (see Chapter 5, *Conservation Strategy*, and Appendix D, *Species Accounts*, for a description of the upland conservation measures and habitat requirements for wetland-dependent species).
- Develop criteria for measuring success with review and approval from the Wildlife Agencies
- Begin pre-treatment monitoring of sites considered for enhancement and restoration. These criteria will be suitable to evaluate management of hydrogeomorphic and ecologic functions, habitat value, and landscape connectivity.

7.4.3.2.2 Monitor Success of Habitat Enhancement, Restoration, and Creation Actions

Aquatic/wetlands enhancement, restoration, and creation will be monitored to assess the efficacy of these actions and improve success through adaptive management. Monitoring will evaluate creation/restoration of fresh emergent marsh, lacustrine, and non-vernal pool seasonal wetland constituent wetlands (AW 1.2) and enhancement of wetlands and ponds (AW-1.3). The tasks listed below may be conducted to determine the effectiveness of restoring community function to aquatic/wetland:

- Monitor restored and created aquatic/wetland constituent habitats for 5 years after the submission of as-built mapping, with monitoring reports provided to the Wildlife Agencies in

years 1, 3, and 5. Hydrological conditions will be monitored and reported in years 1, 3, and 5, with the wetland boundary mapped in year 3. If hydrologic modifications are made after the initial grading, then the wetland boundary will be mapped again in years 1 and 3 after hydrologic modifications are made. Vegetation will be monitored and reported in years 3 and 5.

- Report acres, location, and wetland type of fresh emergent marsh, lacustrine, and non-vernal pool seasonal wetland constituent wetlands restored and created.
- Determine indicator species for monitoring enhancement, restoration, and creation and develop success criteria within the management plans (in conjunction with the Wildlife Agencies) to assess the effectiveness of these actions.
- Determine enhancement, restoration, and creation measures for individual sites on the basis of hydrologic conditions; extent and quality of existing habitats (e.g., percent native vegetation and presence/absence of non-native wildlife, such as bullfrogs); existing wildlife using the site; and the potential for adverse effects to Covered Species (e.g., removal of invasive vegetation that is being used for substrate by Covered Species). These measures will include descriptions of plant material requirements (e.g., collected and propagated from local sources); planting and construction methods; and adaptive management and monitoring requirements.
- Report all measures taken to enhance hydrological functions, native biodiversity, and habitats for populations of Covered Species in protected fresh emergent marsh aquatic and wetland land-cover types within the Reserve System.
- Determine and quantify changes in habitat that result from aquatic/wetland enhancement, restoration and creation.
- Monitor the survivorship of plantings; quantify the extent of emergent wetland vegetation in ponds; and describe habitat quality, connectivity, and response of Covered Species to enhancement, restoration, and creation projects.
- Monitor hydrological conditions of aquatic/wetland to ensure that indicators of target hydrological function have been achieved and are being maintained (e.g., do wetlands restored to provide nesting and year-round habitat for California black rail have adequate levels of water throughout the year?). Determine use of artificially created ponds by native plants and animals.
- Evaluate the use of wetland-upland complexes by native plants and animals.

7.4.3.3 Riverine and Riparian

Adaptive management of riverine and riparian habitat on the Reserve System will be implemented to improve habitat quality and increase native biodiversity along streams and riparian corridors. To achieve this goal, management actions will be focused on enhancing and restoring riparian habitat, controlling invasive species, improving channel habitat, reducing sedimentation, and lowering temperature in target reaches.

7.4.3.3.1 Assess Condition of Natural Community

The PCA will monitor riverine and riparian characteristics within the Reserve System (fish-specific monitoring is addressed in Section 7.5, *Species-level Monitoring Actions*). The tasks listed below may help determine the baseline condition of riverine and riparian communities within or targeted for the Reserve System.

- Conduct pre-acquisition assessments and site inventories to document and map the distribution and condition of riparian and riverine communities to verify and revise, if necessary, existing maps of land cover.
- Identify and prioritize sections of riparian and riverine habitat suitable for restoration and enhancement.
- Document and assess the connectivity of stream and riparian corridors throughout the Plan Area and prioritize key riverine and riparian sections for acquisition, restoration, and enhancement.
- Report acreage and location of riparian woodland acquired and restored or enhanced.
- Report linear stream miles and location of riverine natural community acquired and restored or enhanced.
- Synthesize known water quality data, including sediment data; identify key uncertainties; and prioritize issues/topics for directed study.
- Develop a Quality Assurance/Quality Control water quality monitoring plan for target Reserve System streams.
- Develop a management-oriented conceptual model for the riverine and riparian natural community and identify ecological indicators for community function and uncertainties that may require directed studies.
- Prioritize invasive species for eradication or reduction.
- Compare number of restored acres to number of affected acres in the riverine and riparian natural community.
- Develop criteria for measuring success with review and approval from the Wildlife Agencies.

7.4.3.3.2 Monitor Riparian Restoration Projects

Monitoring restored riparian habitat will ensure that the natural community is functioning as habitat while providing for ecological processes in the larger landscape. Covered Activities that affect riverine and riparian habitat, particularly activities that remove riparian vegetation, can indirectly affect water temperature. Water temperature is an important habitat characteristic for covered salmonids and amphibians. Conditions to avoid, minimize, and mitigate effects on the Stream System (Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*), and the protection, and restoration of riverine and riparian communities (Chapter 5, *Conservation Strategy*) will minimize and mitigate the aggregate effect.

The monitoring activities listed below provide examples of what the PCA will monitor with respect to riparian restoration.

- Assess recent riparian restoration projects within western Placer County watersheds and assess effectiveness of use of monitoring protocols and indicators.
- Monitor the survivorship of plantings (e.g., riparian species such as willow, cottonwood, oaks, and elderberry) in restored and enhanced sites.
- Monitor the effectiveness of measures to control invasive species and the effects of control on Covered Species. Monitoring efforts should provide data to evaluate potential effects of invasive species control on Covered Species.

- Identify key locations for riparian restoration and in-stream enhancement measures to moderate water temperature.
- Evaluate the efficacy of riparian and in-stream enhancement measures in moderating water temperature.
- Measure effects of in-stream enhancement activities on riparian woodland and vice versa.
- Develop site-specific, long-term monitoring to assess the effects of riparian restoration and enhancement projects on native diversity, ecological processes, and Covered Species.

7.4.3.3.3 Monitor Stream Enhancement Projects

Stream restoration and enhancement projects in the Plan Area will focus on reducing channelization, stabilizing banks, removing or modifying passage barriers (e.g., barriers that prevent frog, turtle, and other species dispersal), recreating natural stream features, such as meanders, pools, runs, and riffles, and reconnecting the floodplain to the active channel. These projects will reduce sediment deposition, improving passage for native aquatic species, and restore ecological processes. Although sediment deposition is natural, development enhances sedimentation rates and results in significant habitat degradation for most native aquatic species. Best Management Practices and other conditions on Covered Activities will be implemented in watersheds throughout the Plan Area that will reduce the effect of development on Plan Area streams by minimizing the creation of sediment at the source and reducing the rate at which it is deposited into stream systems (see Chapter 6, *Program Participation and Conditions on Covered Activities*). Sediment load will be monitored in targeted stream systems in the Plan Area. The sediment load in a stream system can serve as a good indicator of habitat quality, particularly for covered salmonids and foothill yellow-legged frog.

Areas slated for stream restoration will be monitored before restoration commences and after restoration is completed to assess the effectiveness of the restoration project. Success criteria by which each project will be evaluated will be site-specific and will be established in project and reserve unit management plans. In addition, the following monitoring tasks will be conducted to evaluate the efficacy of stream restoration projects:

- Develop specific, measurable success criteria for assessing natural hydrogeomorphic and ecological processes and improving habitat for Covered Species.
- Use data from previous monitoring efforts (e.g., by CDFW, Friends of Auburn Ravine,Dry Creek Conservancy, and implementation of the Auburn Ravine/Raccoon Creek Ecosystem Restoration Plan) and new PCCP monitoring activities to assess whether populations of targeted covered and other native species are increasing in relation to stream enhancement and restoration efforts.
- Track number of fish barriers removed.
- Track number of unscreened water diversion that have been screened and assess condition of screens.
- Assess change in physical parameters, such as channelization, pools and riffles, floodplain connectivity, and passage barriers.

- Monitor the turbidity of flows in strategic locations throughout target stream systems in the Plan Area to identify areas for sediment control projects, monitor the effects of activities in the watershed on sediment load, and monitor the effectiveness of sediment control efforts.
- Evaluate the effectiveness of in-stream, streambank, and riparian habitat improvements at minimizing and immobilizing sediment in Plan Area streams.

7.4.3.4 Oak Woodland

Adaptive management of oak woodland on the Reserve System will be implemented to protect and enhance a diversity of functional oak woodland types to benefit Covered Species and promote native biodiversity. To achieve this goal, management actions will be focused on promoting regeneration and recruitment of native oak species by planting seeds and seedlings and protecting seedlings from browsing; restoring valley oak woodland; managing invasive, non-native plants, particularly in the understory using techniques, such as grazing and prescribed burns; controlling feral, non-native animals; and managing fuel loads to reduce the likelihood of catastrophic wildfire. To ensure the long-term persistence of oak woodlands in the Reserve System, the PCA will monitor the effectiveness of these management actions designed to restore the natural processes and native species found in these oak woodlands.

7.4.3.4.1 Assess Condition of Natural Community

The PCA will monitor oak woodland characteristics within the Reserve System, with a focus on oak regeneration and disease. Baseline conditions will be documented on the Reserve System to identify areas where recruitment appears to be limiting oak regeneration; to identify areas in need of fuels treatments; and to identify the most suitable techniques to manage wildfire fuels. Documenting the baseline conditions against which change can be effectively evaluated may entail the tasks listed below.

- Track and report acres and types of oak woodland acquired, protected, and restored.
- Assess oak stands (e.g., canopy coverage, tree condition, seedling and sapling abundance and survival, population age structure) to identify factors that may be limiting ecological functions. If canopy coverage is declining and/or tree recruitment is insufficient, adaptive management actions will be implemented to improve recruitment. These actions will be site-specific and may include modifying livestock practices, plantings, fencing saplings, reducing competing herbaceous vegetation, and controlling wild pigs.
- Determine the threat from sudden oak death and other potential disease threats.
- Develop a management-oriented conceptual model for oak woodland communities and identify indicators for community function as well as any critical uncertainties that may require additional directed studies.
- Prepare burn plans that describe pre- and post-burn monitoring to determine effects (if prescribed burns are feasible and desirable).
- Document the extent of wildfire in oak woodland on the Reserve System, and monitor the effects of wildfire on oak woodlands regeneration.
- Develop criteria for measuring success with review and approval from the Wildlife Agencies.
- Begin pre-treatment monitoring of sites considered for enhancement.

7.4.3.4.2 Monitor Success of Oak Woodland Restoration and Enhancement Actions

Seedling recruitment and regeneration within oak woodlands can be limited by invasive weeds and non-native plants in the understory (e.g., Gordon and Rice 2000), mammal herbivory (Borchert et al. 1989; Bartolome et al. 2002; Tyler et al. 2002), and seed predation by feral pigs (Sweitzer and Van Vuren 2002). Depending on timing, frequency, and intensity, fire may have a negative or no effect on recruitment and regeneration in oak woodland (Griffin 1977; Bartolome et al. 2002). However, fire decreases the density of understory weeds and plants, indirectly creating favorable conditions for recruitment and regeneration. Because of the complex interactions of herbivory, grazing, competition from invasive plants, and native species composition, monitoring in the community will focus on assessing potentially limiting factors. Oak woodlands on the Reserve System that have been identified by baseline surveys as being limited in their ability to recruit and regenerate native species will be targeted for enhancement and restoration efforts aimed at improving oak regeneration and recruitment into the canopy.

The monitoring program will evaluate the effects of Foothill oak woodland restoration (OW-1.2), oak woodland enhancement (OW-1.3), and Valley oak woodland restoration (OW-1.5). Monitoring will track and document the effectiveness of these measures to promote regeneration and recruitment of representative species, manage vegetation and invasive plants in the understory, manage invasive animals, and manage fuel loads to reduce the chance of catastrophic fire at enhanced and restored sites in the Reserve System. The tasks listed below may be conducted to determine the response of enhancement and restoration actions on promoting regeneration and recruitment in oak woodlands.

- Compare post-restoration vegetation to reference stands within the Plan Area to determine effectiveness of restoration efforts. Remediate sites if initial success criteria are not being met.
- Determine indicator species for enhancement efforts and develop success criteria.
- Monitor success of enhancement efforts (seeding and planting, altered livestock practices, fencing saplings, reducing competing herbaceous vegetation and invasive plant species, and controlling wild pigs).
- Monitor the survivorship of plantings (e.g., oaks species and understory vegetation) in restored and enhanced sites.

7.4.3.5 Agriculture and Other Open Space

The HCP/NCCP seeks to preserve sustainable agriculture in the landscape in balance with the conservation goals for natural communities. To achieve this, the Reserve System will include agricultural land managed for a variety of wildlife-compatible agricultural uses (see Section 5.2.6.5, *Agriculture and Other Open Space*). Agricultural land acquisition will be tracked and presence of natural vegetation patches will be documented. Most of the agricultural lands incorporated into the Reserve System will not be maintained specifically as Covered Species' habitat, and will not count toward Covered Species' habitat protection and management commitments under the PCCP. As such, these lands provide open space value, but will not be monitored for biological conditions, except for the monitoring of easements. The only agricultural lands that the PCA will monitor will be the 2,000 acres of rice lands set aside for giant garter snake. Monitoring actions will evaluate the effectiveness of rice land uses and management to provide habitat for giant garter snake and other wildlife (e.g., migratory waterfowl and shorebirds). Monitoring will focus primarily on habitat

values for giant garter snake and is discussed in greater detail in Section 7.5, *Species-level Monitoring Actions.*

7.5 Species-level Monitoring Actions

The PCA will monitor Covered Species to determine the extent to which the biological goals and objectives are being met. The section below summarizes the specific monitoring actions that the PCA will carry out to track environmental issues at the species level and ensure that species-level goals and objectives are being met.

Monitoring frequency for each species will be determined during implementation or as described below.

7.5.1 Swainson's Hawk

7.5.1.1 Document Presence of Breeding Swainson's Hawks

Surveys will be conducted to document Swainson's hawks breeding in the Reserve System. Surveys will be conducted within portions of the Reserve System annually (from April 30 through June 30) where suitable habitat occurs, with a goal of surveying all suitable habitat in the Reserve System over each 5-year period to locate nests and document status of nesting (e.g., nesting suspected, incubating female, chicks). All active nest sites known to occur on the Reserve System (a Swainson's hawk nest is assumed active if it has been used within the previous 5 years) will be surveyed annually to determine status of nesting activity at each nest site. The survey protocol will be developed during early Plan implementation based on standardized methods.

To gain an understanding of the population size and location of nest sites throughout the Plan Area, the PCA will coordinate with the local birding community (e.g., Sierra Foothills Audubon) to utilize volunteer, citizen science to help survey accessible areas throughout the Valley. The PCA will provide a means through its website for citizens to submit data on the location of nest sites and territories of breeding pairs of Swainson's hawks.

Swainson's hawks have relatively conspicuous nests and can be readily identified and monitored. The location of nest sites will be documented in GIS and used to inform management measures that may benefit the species. For example, areas with suitable foraging habitat, but no nesting activity, may be planted with potentially suitable nest trees.

In order to fulfill objective SWHA 1-1, the active nest trees to be acquired for the Reserve System will be monitored to verify breeding. If breeding is recorded in at least three different years at each nest (or within the same territory) within 10 years, this objective will be fulfilled. Nests will continue to be monitored annually. If breeding is not recorded in at least three different years at each nest tree (or within the same territory) within 10 years, the PCA will meet with the Wildlife Agencies to discuss potential adaptive management measures that may be implemented to improve habitat quality for Swainson's hawk, and subsequent site fidelity.

7.5.1.2 Summary of Survey Requirements

- Report protection of Swainson's hawk foraging habitat, as part of compliance under the Plan.
- Report acquisition of Swainson's hawk nest trees as part of compliance under the Plan.
- Track compliance with occupancy requirement of four active nest trees.
- Document breeding at nest trees annually with surveys from April 30 through June 30 in a subset of areas where suitable habitat occurs.
- Monitor known nests throughout the Plan Area annually during the breeding season and record number of nestlings and fledglings and other observed breeding behavior. Document failed nests, and potential causes for failure, if determinable. Also document presence of potential predators such as red-tailed hawks and great horned owls in the vicinity of nest sites.

7.5.2 California Black Rail

7.5.2.1 Document Presence of California Black Rail

The PCA will document the acquisition (acres and number of sites) of emergent marshes, including the occupancy of wetlands during the breeding season within the Reserve System by California black rail. Potentially suitable habitat will be surveyed during pre- and post-acquisition surveys and annually at potential sites within acquired parcels. California black rail is difficult to observe, because of its secretive behavior and the dense vegetation of its habitat. To increase detectability, California black rail may be surveyed using call-playback response surveys (Evens et al. 1991; Richmond et al. 2008). With this method, recordings of calls are broadcast and the numbers of responding black rails are documented. Surveys will be conducted in spring through summer at a subset (20 percent, or greater, if necessary to demonstrate compliance with the occupancy requirement [Section 5.3.1.6.2, *California Black Rail*]) of wetlands with suitable habitat in the Reserve System to assess occupancy (although surveys can be conducted any time of year, if necessary, as California black rail are year-round residents in the Sierra Nevada foothills and respond to calls year-round). Survey protocol will be developed by the PCA, in conjunction with the Wildlife Agencies, based on standardized methods such as those used by Evens et al. (1991) and Richmond et al. (2008).

7.5.2.2 Evaluate Species Response to Habitat Restoration and Creation

Conservation Measure 3 BLRA-1 seeks to create or restore California black rail habitat. Success criteria for restored habitat will be developed for each site with review and approval from the Wildlife Agencies. Success criteria will be based on the best available science on the habitat requirements of Sierra Nevada foothill populations of California black rail (e.g., those described in Richmond et al. 2010). Restored fresh emergent wetlands in the Foothills will be surveyed to assess occupancy and record habitat features. The PCA will document California black rails' response to restoration and creation of habitat. Surveys may include the following to help meet success criteria:

- Document the location and perimeter of the wetland in GIS.
- Characterize the vegetation, including percent cover of vegetation and open water, and general species composition.

- Measure water depth, the duration throughout the year a site remains flooded, and determine the source of water for each wetland (e.g., spring-fed, leak from canal). Because water levels likely fluctuate seasonally, the water levels in potentially suitable habitat should be measured regularly to assess habitat quality and identify remedial enhancement actions, if necessary.
- Identify any apparent threats to the habitat (e.g., unreliable source of water, presence of non-native predators, excessive grazing).

Locations will be documented using GIS to update the habitat model for California black rail (see Appendix D, *Species Accounts*).

It is expected that it will be relatively feasible to successfully restore and create habitat for California black rail in the Sierra Nevada foothills (Tecklin pers. comm.). However, habitat restoration is experimental in nature, and wetlands restored to provide habitat for California black rail may not be colonized by rails. Restored sites will be monitored to assess the status and condition of restoration efforts, to determine whether they are being colonized by California black rail, and to identify and remedy factors that may limit successful colonization.

7.5.2.3 Monitor Potential Threats

The source for water for the majority of the wetlands inhabited by California black rails in the Sierra Nevada foothills is from intentional and unintentional inputs of irrigation water. As demands for water continue to grow in California, there will be increasing pressure to increase efficiency and thereby reduce water loss from agricultural delivery systems. California black rail habitat will be lost when a consistent source of water is eliminated due to water conservation measures. As discussed above, the PCA will monitor water levels in target wetlands within the Reserve System to inform management of California black rail habitat. Surveys will be conducted twice each year at the target wetlands, from spring through summer, to coincide with the occupancy surveys described above (Section 7.5.2.1, *Document Presence of Black Rail*). When suitable habitat is threatened by loss of water, the PCA will work to purchase water to protect habitat.

Wetlands may also be threatened by overgrazing. Livestock may trample nests or individuals, destroy vegetation, and degrade water quality. Habitat assessments will evaluate threats to potential habitat to inform remedial actions. Such management actions may include fencing the wetland to restrict access by livestock, providing alternate water sources, or reducing stocking rates in adjacent grasslands and pastures.

7.5.2.4 Summary of Monitoring Requirements

- Document the acquisition (acres and number of sites) of emergent marshes as part of compliance under the Plan.
- Track compliance of three to five sites, progressively demonstrated from Year 20 to Year 45.
- Survey a subset (20 percent) of potential habitat (wetlands) during the breeding season annually to determine occupancy. Call-playback responses may be used.
- Evaluate species response to habitat restoration and creation.
- Monitor potential threats.

7.5.3 Western Burrowing Owl

7.5.3.1 Document Presence of Western Burrowing Owl

The western burrowing owl is rare in the Plan Area. Recent records of western burrowing owls in Placer County are predominantly of overwintering individuals. Therefore, the western burrowing owl conservation strategy focuses primarily on protecting and enhancing overwintering habitat, with a secondary objective of facilitating the expansion of a breeding population into the Plan Area (see Section 5.4.3, *Western Burrowing Owl*). The availability of suitable burrows potentially limits the distribution and abundance of western burrowing owls in the Plan Area. Natural community–level monitoring in grasslands and suitable agricultural lands will include presence/absence surveys for burrows and burrowing mammals to assess potential habitat for western burrowing owls and to inform enhancement actions..

Winter and breeding season surveys will be conducted to document occurrences of western burrowing owls overwintering and breeding in the Reserve System. After acquisitions, areas of highly suitable habitat for western burrowing owl will be identified and prioritized for surveys based on suitability for the species. During the winter, surveys will be conducted between December and February.

7.5.3.2 Monitor Use of Artificial Burrows

As part of Objective BUOW-1.1, the PCA may create and manage artificial burrows in suitable breeding habitat on the Reserve System, if it cannot protect existing ground squirrel colonies, to facilitate the expansion of a breeding population. The PCA will report installation and placement of artificial burrows in the Reserve System. Installed burrows will be monitored to determine whether they are being occupied. The PCA will document the species' response to the created burrows.

7.5.3.3 Monitor Potential Threats

Within the Plan Area, the western burrowing owl is primarily threatened by factors that affect the amount, distribution (e.g., fragmentation), and quality of its habitat, such as natural or prescribed burns, burrow availability, or prey availability. Other factors that threaten overwintering populations of this species are more difficult to identify, as the numbers of these species overwintering in the Plan Area may be limited by factors occurring during the breeding season or migration.

7.5.3.4 Summary of Monitoring Requirements

- Report protection of ground squirrel colonies as part of compliance under the Plan.
- Survey for burrows and burrowing mammals as part of natural community monitoring.
- Prioritize areas of highly suitable habitat after land acquisition for the Reserve System.
- Survey highly suitable habitat during the winter (December and February) and breeding season.
- Report installation and placement of artificial burrows.
- Document species response to artificial burrows.
- Monitor potential threats.

7.5.4 Tricolored Blackbird

7.5.4.1 Document Occurrences of Tricolored Blackbird

The primary purpose of monitoring tricolored blackbirds is to document the presence of nesting colonies on the Reserve System, and the use of foraging habitat, to inform enhancement and restoration measures. Within the Plan Area, tricolored blackbirds occur in the lower elevations from 100 to 300 feet (Jones & Stokes Associates 2004). The Tricolored Blackbird Portal (Information Center for the Environment 2016) (see survey methods below) documents 21 colony locations in western Placer County, 15 of which are listed as active or recently active. Most of the remaining historically occupied sites have not been active in recent years (see species account) (Dudek 2014; University of California, Davis n.d.)

Once acquired, parcels within the Reserve System will be surveyed during the nesting season to identify nest colonies and foraging habitat. Surveys for nesting tricolored blackbird will occur during the peak nesting season (approximately April through June) when nest colony sites are occupied. Potentially suitable nest sites include large stands of Himalayan blackberry, generally located in pasture and grassland (as opposed to stands within riparian woodlands) and fresh emergent wetlands, such as those dominated by cattails and bulrushes. All sites within the Reserve System known to previously support a nest colony will be surveyed annually, at a minimum. The PCA will report (number of sites, location, and provide an estimate of the individuals in the colony) the acquisition of tricolored blackbird colony sites. Baseline information for the species may comprise the components listed below.

- Location of occupied colony sites as part of compliance under the Plan.
- Estimate of number of birds in colony.
- Assessment of nesting habitat quantity and quality (e.g., condition of fresh emergent wetlands).
- Assessment of the amount and quality of foraging habitat, particularly foraging habitat within three miles of an active nest colony site. Quality may be assessed by monitoring the relative frequency of use of a site, the type of prey being captured, and the frequency of tricolored blackbirds departing the foraging habitat with prey during the nesting season.
- Assessment of any additional nearby threats (e.g., heron rookeries, sources of noise or other disturbance).

This information will be documented in GIS layers and used to prioritize areas for protection and enhancement or restoration/creation.

Once baseline data are collected, the population size of established colonies will be documented. Where feasible, the PCA will coordinate with other efforts to monitor tricolored blackbird to standardize survey protocol to facilitate interpretation across monitoring efforts (e.g., Statewide Tricolored Blackbird Survey conducted every 3 years, last in 2017.[4]

[4] See Information Center for the Environment (2016) *Tricolored Blackbird Portal*, *Tricolored Blackbird Statewide Survey Protocol*. Information Center for the Environment. Available: http://tricolor.ice.ucdavis.edu/content/tricolored-blackbird-statewide-survey-protocol.

Information on nest colony sites will be used to inform management of fresh emergent wetlands (e.g., those that may be managed to provide nest colony habitat for tricolored blackbird) and of foraging habitat surrounding nest colony sites. Information on foraging habitat will be used to inform management of foraging habitat for this species.

7.5.4.2 Evaluate Species Response to Enhancement and Restoration of Nesting Habitat

Enhanced or restored wetland areas and suitable created ponds will be monitored to determine if a tricolored blackbird nesting colony is present or, if one is already established, to document its current size. Following those management actions, the tricolored blackbird colony will be monitored to determine the population response to the management actions. In target areas where tricolored blackbirds were not observed prior to management actions, subsequent surveys will document whether new colonies establish in the area.

The PCA will assess the use of enhanced and restored wetlands to provide nest colony habitat for tricolored blackbird. Potentially suitable wetland habitat will be surveyed to assess the use of enhanced and restored habitat by tricolored blackbirds and to inform future enhancement and restoration projects. Enhancement actions in or adjacent to nesting colonies will occur outside the breeding season.

7.5.4.3 Monitor Potential Threats

In instances where tricolored blackbirds are nesting in non-native plants (e.g., Himalayan blackberry), there is the risk that non-native species control could result in the loss of nesting habitat. Accordingly, the removal of non-native plant species will be weighed against the loss of important nesting habitat for this species. There should be attempts to transition non-native habitat to native habitat that will also support nesting tricolored blackbirds. The colony response to those actions will be monitored and the result will inform future management prescriptions for colony sites with non-native plants.

CDFW believes that predation is a threat to the success of some tricolored blackbird nesting colonies (California Department of Fish and Wildlife 2015). Colony sites located in small patches of native vegetation are recognized to be especially vulnerable to predation, especially if they are near sites at which predator populations are at artificially high levels due to the availability of augmented food sources from human activities. Predation has been documented as a cause of complete nesting failure at some tricolored blackbird colonies in the Central Valley (e.g., Beedy and Hamilton 1999). Historical accounts documented the reproductive failure of nesting colonies to predation of nest contents by a diversity of avian, mammalian, and reptilian predators. Entire colonies (more than 50,000 nests) have been lost to black-crowned night herons, common ravens, coyotes, and other predators (Beedy and Hamilton 1999).

Initial monitoring will not focus on monitoring reproductive success of tricolored blackbird, because this species is easily disturbed while nesting (but see Meese 2010 for methods to estimate reproductive success). Furthermore, monitoring nest success may be too time-consuming within the framework of this multi-species/natural-community monitoring program. The PCA will assess threats from potential nest predators by noting the presence of potential predators (e.g., heron species, common ravens, raccoons) during nest colony surveys. Should colonies be potentially threatened by predators, the PCA will consult the Wildlife Agencies to develop remedial measures

(e.g., flush black-crowned night herons from nearby roosts). In general, control programs will not address native species. However, targeted programs could be initiated in response to observations of individuals taking nests, eggs, or nestlings. The PCA will submit a predator management plan and update on an annual basis, as needed.

During the non-breeding season, tricolored blackbirds roost in large, mixed-species flocks that can include red-winged blackbirds (*Agelaius phoeniceus*), Brewer's blackbirds (*Euphagus cyanocephalus*), brown-headed cowbirds (*Molothrus ater*), and European starling (*Sturnus vulgaris*). Preferred roosting sites include large, vegetated freshwater marshes near suitable foraging areas in pasturelands, recently cultivated croplands, and livestock feed stores (Meese et al. 2014). There is the potential that important roost sites in the Plan Area, both within and outside the Reserve System, could be disturbed by various human activities such as development. The PCA will monitor roost sites within the Reserve System and outside the Reserve System (where accessible) where roost sites are near areas and activities that may disturb roosting tricolored blackbirds (e.g., when a roost site is adjacent to a busy road; activities on an adjacent, non-Reserve System parcel may disturb tricolored blackbird roosting on the Reserve System; and when a roost site outside the Reserve System is adjacent to a Covered Activity), to assess the response of roosting tricolored blackbirds to nearby disturbance. The PCA, in consultation with the Wildlife Agencies, may use the results of monitoring roost sites to consider adding a roost site avoidance and minimization measure to Section 6.3.5.9, *Species Condition 4, Tricolored Blackbird*.

7.5.4.4 Summary of Monitoring Requirements

- Report (acres and location) acquisition of suitable nesting habitat, including presence of tricolored blackbirds and nest colony sites as part of compliance under the Plan.
- Report protection of tricolored blackbird foraging habitat as part of compliance under the Plan.
- Report protection of tricolored blackbird colony sites as part of compliance under the Plan.
- Report protection of open water habitat near tricolored blackbird colony sites as part of compliance under the Plan.
- Document maintenance, enhancement and restoration activities for tricolored blackbird.
- Perform annual nesting surveys at all sites within the Reserve System known to previously support a nest colony for tricolored blackbirds. Report (number of sites, location, and provide an estimate of the individuals in the colony).
- Monitor known populations of tricolored blackbirds within the Reserve System annually (see guidance above).
- Assess the use of enhanced and restored habitat for tricolored blackbirds.
- Monitor potential threats.
- Submit predator management plan and update on an annual basis, as needed.

7.5.5 Giant Garter Snake

7.5.5.1 Document Presence of Giant Garter Snake

The giant garter snake is restricted to wetlands and surrounding uplands of the Central Valley of California. Its habitat includes sloughs, marshes, low-gradient streams, ponds, small lakes, irrigation

and drainage canals, rice fields, and adjacent uplands (U.S. Fish and Wildlife Service 1999). Because privately held agricultural land within the Plan Area is rarely surveyed, little is known about the distribution of giant garter snake in the Plan Area (Paquin pers. comm.). The Plan Area occurs within the giant garter snake's historic range (U.S. Fish and Wildlife Service 1999) and is within a few miles of the "BKS tract," a preserve established under the Natomas Basin HCP with an abundant population of giant garter snakes. The BKS tract is less than 3 miles from the nearest habitat within the Plan Area. The results of a thorough review (Dudek 2014) showed that suitable habitat for giant garter snake occur in the Plan Area along the western edge of Placer County, from approximately Sheridan south to the area of Baseline Road and South Brewer Road. Several locations within this area are used for growing rice, and the associated agricultural ditches and wetlands/sloughs containing emergent vegetation in conjunction with suitable adjacent upland habitat could be used by this species during both the active and inactive seasons (Dudek 2014). Connectivity via ditches and low-gradient streams within these areas and nearby Sutter County (where there are documented occurrences of giant garter snake) could allow for the possibility of occurrences within this portion of the Plan Area.

Suitable habitat for giant garter snake will be identified as part of acquisition surveys in western Placer County (see Figure 5-3 and Section 5.3.1.6.5, *Giant Garter Snake*). The acres and location of this habitat (rice or fresh emergent wetland) will be reported. The PCA will monitor for giant garter snake in potentially suitable habitat on reserves within the identified range (Figure 5-3). Trapping or other surveys may be conducted to establish giant garter snake presence or occupancy. Floating funnel traps can be used to determine occupancy, and potentially to identify correlates of occupancy and assess the size/age distribution of the population. The presence of burrows and basking sites may also be assessed to establish habitat quality.

Location data will be documented using GIS and will be used to prioritize sites for enhancement and restoration (if snakes are found) and to prioritize adjacent or hydrologically connected non-Reserve System sites for acquisition. This information will also be used to update the habitat model for giant garter snake (see Appendix D, *Species Accounts*). The PCA will provide occurrence data to the Wildlife Agencies through the CNDDB or other protocol approved by the Wildlife Agencies.

7.5.5.2 Evaluate Species Response to Enhancement and Restoration of Aquatic and Upland Habitat

The PCA will identify patches of emergent vegetation in canals, irrigation ditches, sloughs, ponds, and borders of rice fields that could provide habitat for giant garter snake. The PCA will assess whether any giant garter snakes are present after allowing emerging marsh vegetation (e.g., cattails) to become established. The acres and location of sites enhanced or preserved for garter snake (native vegetation in rice lands) will be reported.

The PCA will also document any occurrences of basking giant garter snake in patches of grassland along the borders of waterways (e.g., canals, irrigation ditches) and rice fields, including any specific areas planted with native grasses to provide basking areas for the species.

Because giant garter snake are difficult to detect, the PCA will note factors such as percent cover of emergent vegetation, basking sites, and small mammal burrows in adjacent uplands.

The PCA will use information obtained from existing giant garter snake monitoring and research efforts to understand how management actions might affect garter snake. For example, the U.S. Geological Survey Western Ecological Research Center, along with state and federal agency partners,

is assessing the effects of rice idling and drought on the demography and behavior of giant garter snakes.[5] The PCA will coordinate its activities with existing giant garter snake monitoring programs to ensure that efforts are not duplicated and are complementary.

7.5.5.3 Monitor Potential Threats

The PCA will document the presence of non-native predators and competitors in giant garter snake habitat. Non-native species, including invasive aquatic species such as non-native snakes, and domestic cats, may prey on giant garter snake. Domestic cats have been observed hunting and killing giant garter snakes (U.S. Fish and Wildlife Service 1993, as cited in U.S. Fish and Wildlife Service 2006), even as far away as 2 miles from the closest urban development. Non-native species may also compete with giant garter snake for limited resources (e.g., food, basking sites), thereby potentially excluding giant garter snake from suitable habitat (Stitt et al. 2005, as cited by U.S. Fish and Wildlife Service 2006). If it is determined that non-native species pose a threat to giant garter snake, an animal control program will be implemented.

7.5.5.4 Summary of Monitoring Requirements

- Document occurrences of giant garter snake.
- Report (acres and location) acquisition of rice or fresh emergent wetland for giant garter snake as part of compliance under the Plan.
- Report (acres and location) of patches of native vegetation in rice lands in the Reserve System.
- Report on connectivity of suitable habitat.
- Monitor threats to giant garter snake, such as the presence of invasive snakes and domestic cats.
- Submit Water Management Plans and update on an annual basis, as needed.

7.5.6 Western Pond Turtle

7.5.6.1 Document Presence of Western Pond Turtle

Surveys of potential western pond turtle habitat will be conducted on the Reserve System to document occupancy, prioritize sites for management, and identify sites for long-term monitoring. Baseline surveys may entail an assessment of stream reaches, ponds, wetlands, or reservoirs occupied by western pond turtle adults.

Surveys will include the following, as needed, to help meet success criteria:

- Assess the quality of occupied and unoccupied (typically adjacent to occupied habitat) western pond turtle habitat in stream reaches, and aquatic/wetland.
- Document the presence of basking sites that could be monitored repeatedly.
- Assess the relative quality of adjacent upland nesting and overwintering habitat, particularly in areas where nesting has been documented in the past.
- Evaluate the presence of factors that could affect breeding success (e.g., adjacent land use).

[5] See U.S. Geological Survey. n.d. *Giant Garter Snake Studies*. Western Ecological Research Center. Available: http://www.werc.usgs.gov/ProjectSubWebPage.aspx?SubWebPageID=10&ProjectID=89.

- Document whether young turtles are present (as an indication of whether successful reproduction is occurring).

Western pond turtle is generally monitored by visual and/or trapping surveys. Despite its visibility when basking, western pond turtle can be a difficult species to survey and monitor (Rosenberg et al. 2009). This species can be very wary of human observers, and often retreats from basking sites when approached, taking refuge below the water surface (Rosenberg et al. 2009). Visual surveys, such as those developed by Barkhurst et al. (1997), and updated by Bury et al. (2001), have been deemed reliable in estimating occurrence and, even, relative abundance (Horn 2001, as cited in Rosenberg et al. 2009). Visual surveys, therefore, are proposed for documenting presence of western pond turtle. However, trapping will be considered if it proves cost effective and more efficient than visual surveys. Protocols for monitoring western pond turtle will be developed by the PCA, in coordination with the Wildlife Agencies, using the best available scientific methods (e.g., Barkhurst et al. 1997; Bury et al. 2001).

Adult western pond turtles can be observed year-round in perennial streams, aquatic/wetland, and on the fringes of reservoirs. Fixed basking sites can be surveyed repeatedly, and the relative abundance of western pond turtles observed can serve as an index of abundance. In some cases, artificial basking sites could be installed in aquatic/wetland to facilitate standardized monitoring. Although monitoring may be initiated in March, in order to coincide with monitoring for stream populations of California red-legged frogs, the ideal time for detecting turtles is during the summer months when individuals can be counted while basking during the middle of the day. This method will likely be more effective in ponds and wetlands, where aquatic habitat is well defined, than in streams or lakes where individuals are able to move greater distances through the water.

Location data will be documented using GIS and will be used to prioritize sites for enhancement and restoration and to prioritize adjacent non-Reserve System sites for acquisition. This information will also be used to update the habitat model for western pond turtle (see Appendix D, *Species Accounts*). It will also help predict how proposed restoration or enhancement of aquatic habitat and adjacent uplands might affect western pond turtle nest sites.

If necessary, at unoccupied potential habitat, the PCA will document the presence of factors that may be impeding use of the site. The habitat assessment data will be used to identify site-specific management actions to enhance and restore habitat and to determine the potential for unoccupied breeding habitat to be enhanced or restored to support breeding adults in the future.

To achieve Biological Goal of NWPT-1.1, the PCA will report to the Wildlife Agencies (acres and location) of acquisition of aquatic and upland habitat for western pond turtle. Documented occurrences of western pond turtle in the Reserve System will also be reported to the Wildlife Agencies.

7.5.6.2 Evaluate Species Response to Restoration of Aquatic and Nesting Habitat

The PCA will report (acres and location) restoration of aquatic and upland habitat for western pond turtle and monitor the response of pond turtles to restoration actions designed to improve and provide habitat for western pond turtles.

If western pond turtles are found within the Reserve System, stream reaches, ponds, and wetlands that are targeted for restoration or enhancement will be monitored to determine the response of the

species to those activities. The relative success of different techniques for maintaining or increasing western pond turtle populations will be assessed to guide future management efforts. Enhancement or restoration of occupied habitat may be monitored by determining changes in the average number of individuals observed during basking site surveys. This method will only be useful at monitoring long-term trends, but it will give some sense of the population response to the change in habitat.

The PCA will determine the best approach for monitoring western pond turtle once reserves are acquired and reserve unit management plans are being developed. Trapping or observations can provide information on the relative abundance of young (small) turtles as an index to reproductive success.

7.5.6.3 Monitor Potential Threats

Threats to nesting sites limit western pond turtles in some areas. Identifying known or potential nest sites in the Reserve System and along target streams will provide valuable information that informs efforts to conserve the species. Studies have shown that while western pond turtle populations can seem relatively stable due to the presence of adults, there may be minimal recruitment of juveniles into the population (Reese 1996). Focusing on aquatic habitats is important, but extending that focus to include adjacent uplands, where nesting could occur, is critical to guaranteeing the long-term stability of the populations.

The PCA will monitor the presence of threats seemingly affecting breeding success at a given location (e.g., adjacent land use, non-native species).

7.5.6.4 Summary of Monitoring Requirements

- Document presence of western pond turtle in the Reserve System.
- Report (acres and location) western pond turtle habitat protected as part of compliance under the Plan.
- Report (acres and location) of aquatic and upland habitat restored for western pond turtle.
- Monitor threats to western pond turtle.

7.5.7 Foothill Yellow-legged Frog

7.5.7.1 Document Presence of Foothill Yellow-legged Frog

There are numerous known occurrences of foothill yellow-legged frog in the Foothills of central Placer County; however, there are no known occurrences of foothill yellow-legged frog in the Plan Area. The nearest known populations occur about 3 miles east of the Plan Area. Potentially suitable habitat occurs primarily in the stream systems in the eastern portion of the Plan Area (see Species Account for Foothill Yellow-legged Frog, Appendix D, *Species Accounts*). Potentially suitable aquatic habitat on the Reserve System will be surveyed to assess the presence of foothill yellow-legged frog on Reserve System lands. The PCA will report (acres and location) acquisition of foraging and movement habitat for foothill yellow-legged frogs.

Visual encounter surveys may be used to determine the presence and, distribution of egg masses, tadpoles, juveniles/subadults, and/or adults (Seltenrich and Pool 2002). The relative number of egg masses can serve as a proxy for the relative number of breeding females and as an estimate of

overall population health. Targeted stream reaches should be initially surveyed for presence of adults. If presence is confirmed, subsequent surveys throughout the season may be conducted to monitor other life stages (i.e., egg masses, tadpoles, and juveniles/subadults) once every 3 years. Adults and egg masses can be surveyed during the spring breeding period (though adults can be surveyed from spring through early autumn), however, surveys for adults will only be used to determine population levels if multiple surveys are conducted at a given site and all life stages have been counted. Otherwise, these visual detection surveys will only serve to determine presence/absence of the species along a given stream reach. Egg-laying occurs primarily from April through June, as the spring hydrograph recedes and when water temperatures reach 54 degrees Fahrenheit (°F) (12 degrees Celsius [°C] to 59°F (15°C), so surveys for egg masses should be conducted during this period, with surveys for tadpoles occurring approximately 4 to 8 weeks after completing breeding surveys (Seltenrich and Pool 2002). Late summer through early autumn is the best period to survey for juveniles and subadults, because they are often readily observed along stream margins during this period (Seltenrich and Pool 2002).

The actual timing of surveys for foothill yellow-legged frog will depend on the life stage being monitored, and the timing of breeding in the Plan Area, which will depend on local characteristics such as the timing and rate of spring runoff and precipitation, average ambient air and water temperatures, and local weather conditions. In general, egg-laying will begin earlier at lower elevations (as air and water conditions are generally warmer). Consequently, spring surveys should be initiated first at the low elevation sites, moving up in elevation as the season progresses (Seltenrich and Pool 2002).

Protocols for documenting occurrences of all life-stages of foothill yellow-legged frog (including monitoring intervals) and assessing their habitat will be developed by the PCA, in conjunction with the Wildlife Agencies, based on the best available protocol for this species (e.g., Seltenrich and Pool 2002). This information will be used to document baseline levels for population monitoring during the permit term and beyond.

Surveys will include the following, as needed, to help demonstrate compliance with the biological goals and objectives:

- Stream reaches occupied by adult foothill yellow-legged frog and stream reaches used for breeding (e.g., based on presence of egg masses or tadpoles)
- Unoccupied breeding habitat with the potential to support breeding populations (typically upstream or downstream of occupied habitat)
- An assessment of riparian vegetation and stream substrate along occupied and unoccupied stream reaches
- Presence of non-native bullfrogs, crayfish, and non-native, predatory fish species
- Presence of other factors that could potentially affect breeding success

Location data, occupied, and potentially suitable habitat will be documented in GIS layers and used to prioritize sites for enhancement and restoration and to prioritize adjacent non-Reserve System sites for acquisition. This information will also be used to update the habitat model for foothill yellow-legged frog (see Appendix D, *Species Accounts*). At locations where potential habitat for foothill yellow-legged frog occurs, but where foothill yellow-legged frogs are not found, the PCA will assess the condition of riparian vegetation and stream substrate and document the presence of factors that may be impeding use of the site. The assessment data will be used to determine the

potential for unoccupied breeding habitat to be enhanced or restored to support breeding adults in the future. It will also inform future restoration and enhancement actions to benefit foothill yellow-legged frog. However, it should be emphasized that there are no known occurrences in the Plan Area. Based on the results of a thorough review of existing maps, current and historical aerial photography, and extensive ground-truthing, moderate to moderately high-quality breeding, larval development, and juvenile and adult habitat for foothill yellow-legged frog is limited; high-quality habitat does not appear to be present within the Plan Area (Dudek 2014).

7.5.7.2 Evaluate Species Response to Restoration of Riparian Habitat

The PCA will report (acres and location) restoration of riparian habitat adjacent to streams for foothill yellow-legged frogs and monitor the response of foothill yellow-legged frogs to restoration and creation of riparian habitat (CM1 FYLF-1 and CM3 RAR-1) using visual surveys to assess the presence of individuals, as described above. Should foothill yellow-legged frog occupy or colonize habitats on the Reserve System, more intensive monitoring will be conducted to assess the relative success of different management actions in maintaining or increasing populations of foothill yellow-legged frog.

In general, changes in the presence of foothill yellow-legged frogs will be assessed in relation to restoration and creation actions that the PCA implements in riparian habitats to determine how those actions (and associated management techniques) are affecting the populations. Response to restoration and creation actions by foothill yellow-legged frogs may be slow, as individuals may be unable to successfully disperse from source populations to newly restored/enhanced habitat. Under such conditions, the PCA, in consultation with the Wildlife Agencies, may consider translocation individuals to restored/enhanced habitat on the Reserve System.

7.5.7.3 Monitor Potential Threats

Monitoring of any known populations within the Reserve System will include monitoring for non-native predators that threatens foothill yellow-legged frog, such as bullfrogs.

Many stream conservation measures involve removing or enhancing barriers to increase connectivity for fishes and other species within riverine corridors. Although barriers often restrict native species from moving within a riverine corridor, they can also restrict non-native species from invading otherwise pristine reaches. When barriers are removed within stream corridors that support foothill yellow-legged frogs, both the foothill yellow-legged frog population and the non-native species populations will be monitored to determine how the barrier removal affects community dynamics and ultimately the native population.

7.5.7.4 Summary of Monitoring Requirements

- Document presence of foothill yellow-legged frog in the Reserve System.
- Report (stream miles and location or acres and location) foothill yellow-legged frog riverine and foraging habitat protected as part of compliance under the Plan.
- Report (acres and location) restoration of riparian habitat adjacent to streams for foothill yellow-legged frogs.

- Document response of foothill yellow-legged frogs to riparian restoration and creation in the Reserve System.
- Monitor threats to foothill yellow-legged frog.

7.5.8 California Red-legged Frog

7.5.8.1 Document Presence of California Red-legged Frog

There are no known occurrences of California red-legged frog in Plan Area A; however Plan Area B does have a population (i.e., Big Gun Conservation Bank). The PCA will report (acres and location) acquisition of occupied California red-legged frog habitat. Potentially suitable aquatic habitat occurs in the eastern, Foothills portion of the Plan Area and is comprised of ponds, fresh emergent marsh, seasonal wetlands, riverine/riparian, and wetland land-cover types and constituent habitats. Reserve system parcels with the potential to support California red-legged frog will be assessed upon acquisition and, if applicable, surveys will be conducted to determine occupancy.

These surveys will take place from November to March, when adult California red-legged frogs typically move into breeding habitat. Surveys during the breeding season will be conducted using the most recent protocols adopted by USFWS and CDFW (e.g., U.S. Fish and Wildlife Service 2005) and in coordination with monitoring of regional Sierra Nevada foothill populations (where applicable).

Surveys may record the following information to document presence of California red-legged frog in the Reserve System:

- Occupancy of stream reaches and aquatic/wetland habitat by California red-legged frog. Where possible, an estimate of numbers (or an index of abundance) of adults, tadpoles, and egg masses
- Unoccupied breeding habitat with the potential to support breeding individuals
- An assessment of habitat conditions and characteristics of occupied and unoccupied sites (e.g., the extent and species composition of aquatic vegetation; the extent of open water) and the possible factors that may hinder use of the habitat (e.g., lack of suitable emergent vegetation, habitat too far for from known populations to colonize)
- An assessment of upland habitat for potential refugia around occupied and unoccupied potential habitat
- Presence of non-native bullfrogs, crayfish, and non-native, predatory fish species
- Presence of other factors that could potentially affect breeding success
- An estimate of the distance between known or potential breeding sites to help inform understanding of potential dispersal between habitats and populations and to help guide restoration and enhancement actions

Occupied sites will be documented using GIS and will be used to prioritize enhancement and restoration. This information will also be used to update the habitat model for California red-legged frog (see Appendix D, *Species Accounts*). The assessment data will be used to determine the potential for unoccupied breeding habitat to be enhanced or restored to support breeding adults in the future. It may also inform how proposed restoration or enhancement of riparian corridors and streams might affect California red-legged frog breeding and non-breeding sites.

Survey frequency for California red-legged frog will be determined during development of site-specific monitoring plans and will build off of Big Gun Conservation Bank survey protocols.

7.5.8.2 Evaluate Species Response Habitat Restoration

One of the objectives of the conservation strategy is to restore suitable habitat for California red-legged (CRLF-2-2). The PCA will monitor the response of California red-legged frog populations to restoration actions designed to improve and provide habitat for California red-legged frog.

Aquatic habitats restored for California red-legged frog will be surveyed for the presence of non-native predators (e.g., bullfrog, predatory fish) to prioritize control efforts in sites managed to provide habitat for California red-legged frog. Subsequent surveys for bullfrogs and predatory fish will be conducted to determine the effectiveness of control efforts. Post-treatment surveys will also be conducted to assess the response of native amphibian populations to invasive species control efforts.

7.5.8.3 Monitor Potential Threats

Monitoring of any known populations within the Reserve System will include monitoring for non-native predators that threaten California red-legged frog, such as bullfrogs.

7.5.8.4 Summary of Monitoring Requirements

- Report protection of California red-legged frog habitat, as part of compliance under the Plan.
- Document presence of California red-legged frog in the Reserve System.
- Report purchase of conservation credits for red-legged frogs as part of compliance under the Plan.
- Document response of California re-legged frogs to riparian restoration and creation in the Reserve System.
- Monitor threats to California red-legged frog.

7.5.9 Salmonids: Central Valley Steelhead and Central Valley Fall-/Late Fall-run Chinook Salmon

The Plan covers Central Valley Steelhead (Distinct Population Segment) and Central Valley Fall-/Late Fall-Run Chinook Salmon (Evolutionary Significant Unit).

7.5.9.1 Document Status of Covered Fish

Plan Area streams within the Reserve System in the Bear River, Raccoon Creek, Auburn Ravine, and Dry Creek watersheds supporting covered fish species will be surveyed to document status of these fish. Ongoing efforts and existing plans in Plan Area watersheds (e.g., monitoring by Dry Creek Conservancy; Auburn Ravine/Raccoon Creek Ecosystem Restoration Plan) can provide a framework for elements of the Plan's survey approach. Status will be documented by quantifying the number of spawners returning to streams (i.e., adult escapement). Some Plan Area streams are currently surveyed periodically for Central Valley steelhead and fall-/late fall-run Chinook salmon by CDFW, Dry Creek Conservancy, and other partners. The PCA will report (stream miles, acres, and location)

acquisition of spawning and migrating habitat and riparian and oak woodland habitat for covered fish.

The PCA will collaborate with the Wildlife Agencies, the Dry Creek Conservancy, and other partners to continue monitoring and documenting covered fish in these stream systems and expand monitoring efforts to key stream reaches within acquired PCCP reserves. The PCA will coordinate its activities with existing salmonid monitoring programs to ensure that efforts are not duplicated and are complementary.

Visual surveys may be used along key or targeted stream reaches to count live adults, carcasses, and/or redds, if appropriate. Visual surveys can be problematic for steelhead and other late spawners, due to turbidity and high flows. Surveys will be conducted before, during, and after the spawning season for each species (generally fall and winter months). Monitoring protocols will be adopted as feasible to ensure consistency with these local and regional monitoring efforts.

Surveys in acquired parcels will assess habitat condition if necessary to better understand the status of species. This habitat assessment may consist of the following components:

- Assess the habitat quality of streams that support covered fish. Habitat features that may be used to characterize habitat quality include, but are not limited to:
    - Water conditions (e.g., temperature, flow, depth)
    - Presence, quantity, and condition of gravel substrate suitable for spawning and egg/alevin incubation for each species
    - Percent of fine sediment in spawning gravel
    - Percent of stream length with riffles, runs, and pools
    - Quantity of instream cover (e.g., large woody debris and cut-banks)
    - Percent overhanging vegetation
    - Miles of available off-channel and floodplain habitat
    - Pool attributes, such as frequency (riffle:pool ratio), area, and depth
    - Channel width, configuration, and channelization features, including quantity of hardened (e.g., rip-rapped) banks
    - Barriers to movement (e.g., beaver dams, waterfalls, and manmade dams)
- Assess condition of riparian habitat. Habitat features that may be used to characterize riparian habitat related to fish include, but are not limited to:
    - Off-channel/side channel habitat availability
    - Connectivity of stream to floodplain (e.g., degree to which stream channel is incised)
    - Condition of streambanks
    - Percent canopy cover
    - Structural diversity

7.5.9.2 Track Compliance of Fish-specific Management Actions

A number of biological goals and objectives were developed for fish, including several at the landscape and community level. The PCA will track compliance with these biological goals and objectives, including restoration of riverine/riparian habitat (especially migration and spawning habitat), removal or modification of fish barriers, and screening of water diversions.

7.5.9.3 Evaluate Species Response to Riparian Habitat Restoration

The PCA will monitor the response of covered fish species to riparian restoration actions in target areas, including specific fish barrier removal sites and other selected in-channel enhancements, some of which are landscape or natural community goals and objectives. To do so, relative abundance of each species can be monitored before and after the action in or near the target reach and, as appropriate, compared to a nearby reference (control) site. The results of fish surveys before and after restoration will be compared. Responses by spawners can be measured as total number of individual live fish, carcasses, and/or spawning redds using visual counts. Responses by juveniles can be measured as total number of individuals or catch per unit effort using snorkel surveys, nets, or other standard juvenile fish sampling techniques, depending on site-specific conditions. Restoration efforts will be focused on Raccoon Creek, Doty Ravine, and Auburn Ravine.

7.5.9.4 Monitor Potential Threats

Many of the stream conservation measures involve removing or modifying barriers to increase connectivity for fishes and other species within riverine corridors. While barriers often restrict native species from moving within a riverine corridor, they can also restrict non-native species from invading otherwise pristine reaches. When barriers are removed within stream corridors that support native fish populations, the non-native competitor and predator fish populations will be monitored to determine how the barrier removal affects community dynamics and ultimately the relative abundances of covered fish species.

7.5.9.5 Summary of Monitoring Requirements

- Document presence of covered fish in the Reserve System and at restoration and enhancement sites outside the Reserve System.
- Report (acres and location) acquisition of spawning and migrating habitat for covered fish.
- Report (acres and location) acquisition of oak woodlands for covered fish as part of compliance under the Plan.
- Report (acres and location) actions to enhance habitat for covered fish that occur within and outside the Reserve System
- Track compliance with fish-specific management actions.
- Evaluate salmonid response to riparian enhancement.
- Monitor threats to covered fish.

7.5.10 Valley Elderberry Longhorn Beetle

7.5.10.1 Document Presence of Valley Elderberry Longhorn Beetle

As new reserves are acquired into the Reserve System, the PCA will document the occurrence and plantings of host elderberry plants and to prioritize sites for long-term adaptive management and monitoring.

Protocols for establishing presence of the beetle (including timing of surveys and monitoring intervals) will be developed by the PCA in coordination with USFWS, CDFW, and species experts. (USFWS has developed guidelines for monitoring valley elderberry longhorn beetle populations [U.S. Fish and Wildlife Service 1999].) One potential method for detecting occurrences is to search for the exit holes that are created by the larvae when the larvae begin to mature into adults (U.S. Fish and Wildlife Service 1999).

At each Reserve where potential habitat for valley elderberry longhorn beetle occurs, the PCA will document the distribution and relative abundance of valley elderberry longhorn beetle (e.g., as indicated by presence of exit holes and/or their age) in areas of highly suitable habitat within the Reserve System. In addition the PCA will record the following information, as needed, to understand valley elderberry longhorn beetle occupancy in the Reserve System:

- The distribution and relative abundance of host plants (i.e., elderberry species)
- The proximity to other habitats

Occurrences will be documented in GIS and will be used to prioritize sites for management. This information will also be used to update the habitat model for valley elderberry longhorn beetle (see Appendix D, *Species Accounts*). At locations where potential habitat for valley elderberry longhorn beetle occurs, but where valley elderberry longhorn beetles are not found, the PCA will document the presence of factors that may be impeding use of the site. Based on the assessment data, if conditions are suitable, the PCA will develop a plan to transplant occupied elderberry shrubs into appropriate sites.

7.5.10.2 Evaluate Species Response to Enhancement and Restoration of Riparian Habitat

The PCA will document the number of elderberry shrubs planted and monitor the response of valley elderberry longhorn beetle populations to restoration actions designed to restore habitat for valley elderberry longhorn beetle. One way to evaluate the success of restoration is to compare the relative abundance of valley elderberry longhorn beetle individuals or exit holes before (or at the beginning of) and at regular intervals after restoration. Valley elderberry longhorn beetle populations are likely to fluctuate regardless of restoration. Therefore, it may be necessary to compare the fluctuations that occur in the relative abundance of valley elderberry longhorn beetle at restoration sites to the fluctuations that occur at reference sites.

In addition, host plants will be monitored to determine if they are supporting valley elderberry longhorn beetle populations. Where elderberry re-vegetation is implemented, it will be necessary to monitor long-term survival of transplants to guide propagation and outplanting procedures.

7.5.10.3 Monitor Potential Threats

Invasion by the exotic Argentine ant into riparian habitat may potentially threaten the survival of valley elderberry longhorn beetle (Huxel 2000). However, the severity, extent of effects, and ecological relationships between Argentine ants and valley elderberry longhorn beetle are not well understood, and some studies have not found significant relationships between the presence of Argentine ants and valley elderberry longhorn beetle (Huxel 2000; Holyoak and Koch-Munz 2008). Argentine ants may colonize restored and native sites occupied by valley elderberry longhorn beetle on their own, or by being transported to restored sites in the soil of potted plants (Talley et al. 2006). Furthermore, irrigation may promote ideal conditions for the growth and survival of Argentine ants (Talley et al. 2006). The PCA will consider conducting directed studies to evaluate the effects of Argentine ants on populations of valley elderberry longhorn beetles on the Reserve System if monitoring data indicate that valley elderberry longhorn beetles are declining or not successfully colonizing or establishing populations in restored or enhanced sites or if data in the scientific literature indicate that Argentine ants may be limiting the distribution and abundance of valley elderberry longhorn beetle. The PCA will review the scientific literature and regularly consult with scientific experts to remain current on new findings that further clarify the relationship between Argentine ants and valley elderberry longhorn beetle. The PCA will adapt future management (including conducting targeted studies) when necessary, based on new knowledge of threats to valley elderberry longhorn beetle.

7.5.10.4 Summary of Monitoring Requirements

- Document presence of valley elderberry longhorn beetle in the Reserve System.
- Report number of elderberry shrubs planted as part of compliance under the Plan.
- Monitor threats to valley elderberry longhorn beetle.

7.5.11 Vernal Pool Branchiopods

- Vernal Pool Fairy Shrimp
- Conservancy Fairy Shrimp
- Vernal Pool Tadpole Shrimp

Because the covered vernal pool branchiopods inhabit the same or similar habitats, frequently co-occur, and are subjected to the same or similar threats and management actions, they are grouped together for monitoring priority and to increase monitoring efficiency. Many of the actions related to monitoring and adaptive management of habitat for the covered vernal pool species are described in Section 7.4.3.1, *Vernal Pool Complex and Grasslands*. The PCA will conduct species-specific monitoring actions to ensure that the management, enhancement, and restoration/creation actions are achieving the biological goals and objectives for the covered vernal pool species (Table 5.2). In many cases, species-specific monitoring is a component of vernal pool community–level monitoring actions. For example, species diversity, occurrence, and/or relative abundance will be used to

evaluate the success of community-level restoration/creation and enhancement actions. Species-specific actions may include the following:

- Documenting occupancy of vernal pools by covered vernal pool species
- Conducting targeted studies, if needed, to resolve critical uncertainties about threats and management issues (e.g., evaluating the effects of global climate change on amounts and temporal patterns of precipitation on vernal pool hydroperiod) and to improve management techniques (i.e., pilot projects)
- Evaluating the response of target species to restoration/creation and enhancement

7.5.11.1 Document and Monitor Status of Vernal Pool Covered Species

All of the Covered Species in this group occur in vernal pool complexes. Although the distribution of vernal pools and vernal pool grassland complexes in the Plan Area is generally known, less is known about the distribution of the individual vernal pool Covered Species in the Plan Area. The PCA will report acres of vernal pool complexes acquired.

7.5.11.1.1 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Table 5-2 identifies the species-specific biological objectives for vernal pool fairy shrimp and vernal pool tadpole shrimp. Within the 20,000 acres of protected, restored, and created vernal pool complex, the objective is to maintain an occupancy rate of both species that is equal to or greater than the occupancy rate of naturally occurring vernal pools that will be lost to Covered Activities. To determine whether these objectives are being achieved, data must first be collected to estimate the occupancy rate for each species. The approach has two phases: an Initial Survey Phase and an Occupancy Phase.

- The *Initial Survey Phase* is the period of time during which data will be collected to establish the Occupancy Rate Standards for vernal pool fairy shrimp and vernal pool tadpole shrimp.
- The *Occupancy Phase* is the period of time from the end of the Initial Survey Phase to the end of the permit term.

See Section 5.3.1.6.10, Vernal Pool Branchiopods, for more details on the Occupancy Rate Standards, the Initial Survey Phase, and the Occupancy Phase.

Initial Survey Phase

Occupancy Rate Standards will be established at the end of the Initial Survey Phase. The *Occupancy Rate Standards* are the target occupancy rates for vernal pool fairy shrimp and vernal pool tadpole shrimp on the Reserve System. The Occupancy Rate Standards will be based on the following:

- Surveys of vernal pools to be affected by Covered Activities during the Initial Survey Phase, and
- Other survey data from the PFG (this may include existing data from within the PFG and data collected on parcels in the PFG that may be enrolled in the Reserve System).

After the Occupancy Rate Standards are set for both species, monitoring will be conducted within the Reserve System to determine whether vernal pools in the Reserve System meet this occupancy requirement on a long-term basis.

The Initial Survey Phase will last until a minimum of 37 wetted acres of existing vernal pools (i.e., 20 percent of the maximum estimated effects on vernal pools) have been surveyed for vernal pool fairy shrimp and vernal pool tadpole shrimp.

Existing data (i.e., data collected prior to issuance of the state and federal permits) collected from vernal pools surveyed within the PFG will count toward the requirement to survey a minimum of 37 wetted acres of vernal pools if the surveys were conducted using USFWS-established or –approved protocols, and data are sufficient to quantify occupancy rates (e.g., the number of occupied pools and their area relative to the number and area surveyed can be estimated for the two species). The Occupancy Rate Standards will not be established using data from the Reserve System, except for parcels in the PFG that may be enrolled into the Reserve System.

During the Initial Survey Phase, project proponents will survey vernal pools during the wet season on project sites before vernal pools are affected by Covered Activities (see Chapter 6, *Conditions on Covered Activities*, Section 6.3.5.15, *Species Condition 10*, *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp* for more details on the survey requirements). Occurrence data collected by project proponents will be combined with existing data to determine Occupancy Rate Standards. The PCA will also survey vernal pools protected on the Reserve System during (and after; see below) the Initial Survey Phase, to document the distribution of covered vernal pool branchiopods on the Reserve System.

Occupancy Phase

Once the Occupancy Rate Standards are set, surveys for vernal pool fairy shrimp and vernal pool tadpole shrimp will no longer be required for covered projects. A Wildlife Agency-approved monitoring program will be developed by the end of Year 3, or at least 6 months before the beginning of the Occupancy Phase, whichever comes first, for determining whether the Occupancy Rate Standards are being met on the Reserve System. The monitoring program will include, but will not be limited, to the following:

- A sampling design to efficiently and effectively collect data that can be analyzed to determine compliance with the Occupancy Rate Standards.
- An approach that will be used to analyze occupancy data to determine whether the occupancy rates on the Reserve System are greater than or equal to the Occupancy Rate Standards.
- A protocol to survey vernal pools during the wet season. Dry season surveys are not required. The surveys on the Reserve System will distinguish between natural, protected pools and restored and created pools. These surveys are not required to be full USFWS protocol-level surveys.
- A database for vernal pools that will be used to organize data for analysis and tracking. The database will include a unique identifier for each vernal pool, the occupancy status of those vernal pools, and other information such as the size of the vernal pool.

The monitoring program may be periodically revised to improve data collection methods and include alternative survey methods (e.g., environmental DNA). Revisions to the monitoring program would require Wildlife Agency approval. During the Occupancy Phase, the occupancy rates on the Reserve System will be calculated for both the percentage of the number of vernal pools occupied and the percentage of the area of vernal pools occupied (the Pool-based Occupancy Rate and the Area-based Occupancy Rate, respectively) for vernal pool fairy shrimp and vernal pool tadpole

shrimp. These rates will apply to the vernal pool complexes in the Reserve System as a whole. See Section 5.3.1.6.10, *Vernal Pool Branchiopods,* for details.

The PCA will be responsible for demonstrating that the Occupancy Rate Standards are met at each milestone during the Occupancy Phase. The milestones for preserved vernal pools will be every 3 years for the first 10 years of the Occupancy Phase. If Occupancy Rate Standards are met during the first 10 years of the Occupancy Phase, the milestones for preserved vernal pools will be every 10 years thereafter (occupancy standards for restored or created pools will be monitored more closely; see Section 7.5.11.3, *Evaluate Species' Response to Vernal Pool Restoration/Creation*). If the occupancy rates on the Reserve System fall below the Occupancy Rate Standards, the PCA and Wildlife Agencies will meet to evaluate potential causes for falling below the Occupancy Rate Standards and to determine appropriate remedial actions, which may include additional Occupancy Rate milestones until Occupancy Rate Standards have been met.

To identify factors that may be affecting populations of Covered Species at vernal pools being sampled to assess the occupancy rate, the PCA will carry out the following measures:

- Assess the vegetation management regime (e.g., grazing/mowing regime) that has been implemented within the sampled vernal pool complex and associated upland habitat.
- Assess water conditions such as quality, hydroperiod, and depth and size of pools.
- Assess substrate geochemistry parameters (percent $CaSO_4*H_2O$ [gypsum], percent $CaCO_3$ [calcium carbonate], salinity, and dominate salt cations [Ca, Na, K]), and substrate type.
- Survey the distribution and relative abundance of invasive plants and animals.
- Assess the presence of other potential factors seemingly affecting habitat at a given location.

Occurrences of species will be documented using GIS and will be used to prioritize sites for enhancement actions, to identify factors that limit the distribution of each species in the Plan Area, and to inform future acquisition. Covered Species' occurrences will be reported to the Wildlife Agencies, as well as to CNDDB.

Physical and biological data identified above will be measured at vernal pools and, along with species occurrence data, will be used to refine species-specific habitat models, management-oriented conceptual models, future acquisition, and restoration/creation and enhancement. Monitoring data may inform future acquisition, restoration/creation, and enhancement if the data help to identify key habitat features that should be targeted for future acquisition and management efforts. For example, if the data show that vernal pool tadpole shrimp tend to occur in larger pools on the Reserve System, the PCA should prioritizes the acquisition and restoration of larger vernal pools to protect and restore more occurrences of vernal pool tadpole shrimp.

At locations where potential habitat for vernal pool branchiopods occurs, but where they are not found, the PCA will document factors that may be impeding use of the site (e.g., presence of non-native predators, inability to colonize site). These assessment data will be used to identify unoccupied vernal pools to be enhanced or restored to support populations of vernal pool branchiopods in the future, and to identify pools to be inoculated with cysts of covered vernal pool branchiopods.

7.5.11.1.2 Conservancy Fairy Shrimp

As described in Chapter 5, *Conservation Strategy*, and Chapter 6, *Program Participation and Conditions on Covered Activities*, pre-project surveys will be required for conservancy fairy shrimp for any projects occurring within the two watersheds where the species could potentially occur (Figure 5-7). These surveys will follow USFWS protocol. Surveys will also be required on reserve lands to the ensure that at least three occurrences of Conservancy fairy shrimp are protected for each occurrence taken as a result of Covered Activities.

7.5.11.2 Evaluate Species' Response to Vernal Pool Management and Enhancement

Vernal pool management and enhancement is an important component of the vernal pool conservation strategy. To achieve the biological objective of maintaining covered vernal pool fairy and tadpole shrimp in the Reserve System (VPB 1-1 and VPB 1-2), enhancement of vernal pool complexes, upland grasslands, and hydrologic conditions are proposed. Conservation measures will be tailored to site-specific conditions, because threats and environmental conditions vary geographically and for each species.

The PCA will monitor occupancy of these species before and after enhancement actions at vernal pools to adaptively improve management. For example, controlling invasive plant species in vernal pools is a high management priority. However, some management techniques may benefit some species, while being detrimental to others. Studies of various measures to control invasive species may be conducted to assess the response of populations of Covered Species to these methods to ensure the conservation of all vernal pool Covered Species within the Reserve System. Furthermore, populations of vernal pool species are likely to fluctuate regardless of management actions. Therefore, it may be necessary to also compare the fluctuations in the relative abundance of species at management and enhancement sites to the fluctuations that occur at reference sites. Studies may also evaluate the success of management and enhancement actions by comparing the relative abundance of adult invertebrates before and after treatments, as indicated by the number of adults found in pre-specified numbers of water samples.

Because condition and function of vernal pools are intimately tied to the surrounding uplands, species response to grassland enhancement, restoration or creation sites near vernal pool complexes will be monitored. Therefore, vernal pool grassland complexes will be adaptively managed as a system. In general, changes in the relative abundance of covered vernal pool species will be monitored and correlated with upland management and enhancement actions to determine how those actions are affecting their populations. For example, if actions such as prescribed grazing or re-vegetation are implemented in an upland area surrounding a vernal pool, and the relative abundance of Covered Species increases in that pool over time, then some of that success could be attributed to the upland management techniques. This would be especially true if the relative abundances within reference pools did not increase (or did not increase at the same rate).

Vernal pools must support a hydroperiod suitable for the targeted Covered Species. Hydrological monitoring can be used to identify degraded pools in need of modification/enhancement to improve hydrological function. Monitoring of the depth and inundation period of vernal pools can be used to determine whether degraded vernal pools remain inundated long enough to allow covered vernal pool branchiopod species to complete their life cycles—but are also short enough to restrict predation by dragonflies and other predatory invertebrate species that emerge late in the spring.

One way to monitor the depth and inundation period of relatively large vernal pools is to install staff gauges in the deep and shallow portions of a pool. For relatively small pools, it may be possible to use temporary gauges in combination with hydrographs and photo-monitoring.

Vernal pools must support a hydroperiod suitable for the targeted Covered Species. As part of Natural Community–level Goal CM2 VPCG-2, hydrologic conditions will be enhanced with the objective of improving habitat for vernal pool species, including vernal pool fairy and tadpole shrimp. Species' response to this enhancement action will be tracked.

7.5.11.3 Evaluate Species' Response to Vernal Pool Restoration/Creation

As part of CM3 (Restore or Create Natural Communities), the PCA will translocate vernal pool branchiopod cysts with review and approval from the Wildlife Agencies. The PCA and the Wildlife Agencies will establish success criteria for reintroduced or introduced vernal pool tadpole and fairy shrimp within the first 5 years of Plan implementation. Occupancy at restored and created pools due to translocation will also contribute to CM1 (Establish the Reserve System) and CM2 (Manage and Enhance the Reserve System) by helping to meet Occupancy Rate Standards. The Occupancy Rate Standard applies to all protected, restored, and created pools on the Reserve System, combined. Restored and created pools will only be included (i.e., combined with the occupancy rate of protected pools) in the calculation of occupancy rates on the Reserve System once the occupancy monitoring period of 15 years is complete for that pool (Section 5.3.3.3.1, *Vernal Pool and Grassland Natural Communities*).

The PCA will monitor restored and created vernal pools for vernal pool fairy shrimp and vernal pool tadpole shrimp occupancy annually for at least 15 years after translocation. In at least 4 out of 15 years (one of these years must be between the 12- to 15-year period), presence must be recorded in order for the restored vernal pool to count as occupied. If presence is not documented within the 12- to 15-year period following use of inoculum, then surveys may be continued annually at that location. If wet-year conditions within the 12- to 15-year period are not adequate for branchiopod surveys, the vernal pools will not count until they are surveyed again after this time period and found to have covered branchiopods.

If occupancy is not demonstrated during the first 10 years after translocation, the PCA may continue to survey restored and created vernal pools to demonstrate occupancy. If the species is found in a vernal pool during three out of each successive 5-year survey period, the vernal pool will be considered occupied. Vernal pools may also be considered occupied if other evidence indicates occupancy and if agreed upon by the Wildlife Agencies.

Presence of vernal pool fairy shrimp and vernal pool tadpole shrimp will be assessed with wet season surveys only. The species is considered present in a vernal pool if an individual is found during a survey. As described above, however, presence in any given year does not demonstrate long-term occupancy by the species, and 15 years of monitoring will be required before occupancy can be confirmed.

7.5.11.4 Conduct Targeted Studies

Targeted studies will be conducted as needed in order to meet biological goals and objectives. For example, moderate grazing can benefit vernal pool Covered Species by decreasing evapotranspiration, and thus increasing inundation periods and the amount of time available for Covered Species to complete their life cycles (Marty 2004, 2005; Pyke and Marty 2005). However,

grazing can also lead to trampling of cysts, as well as leading to impaired water quality. The adverse effects of grazing can be minimized by determining optimal stocking rates, using cattle stock that are less likely to congregate in pools, and moving cattle away from vernal pools in the late spring months through fencing and the placement of stock ponds. Because the most optimal grazing regimes for vernal pools have yet to be determined, directed studies (such as pilot projects) can provide much-needed information regarding the grazing regimes that most increase populations of covered vernal pool species.

7.5.11.5 Monitor Potential Threats

In unprotected areas, vernal pools are often degraded by off-road vehicles and other recreation activities. It may be necessary to monitor visitor use, especially at sites that are vulnerable to trespass. This is especially important for covered vernal pool branchiopods, because cysts and adults can be trampled by off-trail hiking and off-road vehicular use. Visitor use can be monitored by using randomized patrols or monitoring the amount of all-terrain vehicle tracks or the amount of trash that is found in and around vernal pools. Threats affecting viability of vernal pool branchiopods will be controlled through increased regulation or enforcement.

Global climate change will likely adversely affect vernal pool ecosystems through changes in the amount and timing of precipitation and changes in temperature. Such changes could adversely affect the hydrological conditions in vernal pools, potentially altering the species composition and diversity in vernal pools. The PCA will monitor indicators of vernal pool community function that can be compared to climate data collected from local weather stations to correlate changes in climate to conditions in vernal pools. Such data may be used to develop hypotheses about the causes of abiotic and ecological changes in vernal pools, which can be further evaluated through directed studies. Directed studies, in turn, could inform new management strategies adapted to treat the new conditions.

7.5.11.6 Summary of Monitoring Requirements

- Report acquisition of vernal pool constituent habitats as part of compliance under the Plan.
- Report advanced acquisition of 160 acres of vernal pool constituent habitat, of which at least 53 acres will be delineated as vernal pools, as part of compliance under the Plan.
- Document the occupancy rates for vernal pool fairy shrimp and vernal pool tadpole shrimp (Area-based and Number of Pool-based Occupancy Rate Standards) of vernal pools in the PFG (at sites to be affected by Covered Activities and sites protected in the PFG) during the Initial Survey Phase to calculate the Occupancy Rate Standards.
- Report the Number of Pool-based and Area-based Occupancy Rate Standards that are set for vernal pool fairy shrimp and vernal pool tadpole shrimp at the end of the Initial Survey Phase.
- Document the locations of occurrences and the occupancy rates of vernal pool branchiopods on the Reserve System.
    - Report the occupancy rates on the Reserve System during the Occupancy Phase (for vernal pool fairy shrimp and vernal pool tadpole shrimp) at each milestone to demonstrate whether the occupancy rates on the Reserve System are greater than or equal to the Occupancy Rate Standard.

- Assess biotic (e.g., vegetation, thatch, percent cover of invasive species) and abiotic (e.g., hydroperiod, depth and size of pools) conditions at vernal pools to evaluate whether conditions are suitable for vernal pool branchiopods and assess the efficacy of enhancement and restoration/creation.
- Document that at least three occurrences of Conservancy fairy shrimp are protected for each occurrence taken.
- Monitor restored/created vernal pools to compare conditions in restored/created pools to success criteria.
- Document occupancy of vernal pool branchiopods in restored/created pools annually for at least 15 years after vernal pools are inoculated with vernal pool branchiopod cysts.

7.6 Adaptive Management Program Implementation

7.6.1 Program Infrastructure

As described above, adaptive management is a critical element of the Plan because it addresses many of the uncertainties of the Plan and provides for continual adjustment and improvement toward meeting Plan goals and objectives. Key to the success of the adaptive management program is a clear and effective structure for making decisions on the basis of new data from Plan monitoring and information from other sources. The PCA will be advised by four groups that play an important role in adaptive management:

- Wildlife Agencies
- Science advisors
- Land managers
- The public

As a preliminary planning step to coordination, the PCA will inventory monitoring projects and programs in the Plan Area, their goals, timelines, design, protocols, etc. This will help coordinate information and will be an important first step in developing the monitoring component of the reserve unit management plans. The PCA's responsibilities for executing the adaptive management program are listed below.

- Designing and implementing a scientifically robust effectiveness monitoring program (described above).
- Gathering monitoring and research data, including relevant information developed by others, and maintaining databases.
- Disseminating monitoring and research data generated by the PCCP, including monitoring reports, conference presentations, and published papers to others.
- Assessing the effectiveness of conservation measures relative to the conservation strategy described in Chapter 5, *Conservation Strategy*.
- Identifying the need to modify existing or to adopt additional conservation measures and defining what to change and how to change it.

- Identifying the need to modify the monitoring program and defining what to change and how to change it.
- Identifying the need for and implementing experimental pilot projects.
- Identifying and prioritizing targeted studies and conducting studies that inform critical uncertainties.
- Developing and updating the monitoring and adaptive management elements of reserve unit management plans.
- Incorporating monitoring, directed studies, and other adaptive management–related activities into reserve unit management plans.
- Creating and maintaining a network of science advisors (see below) to provide advice to the PCA, as needed, on adaptive management and monitoring issues including important data gaps, monitoring and management methods, and data interpretation.
- In Year 20 of implementation, work with the Wildlife Agencies to conduct a formal and complete review of progress toward building the Reserve System.

The PCA will solicit input regarding adaptive management from the Wildlife Agencies, additional agencies, science advisors, and the public. In addition, the PCA may convene technical committees to seek focused advice on key adaptive management topics. The responsibility for which course of action to take in adaptive management rests with the PCA and its senior staff or senior contract biologists. However, the Wildlife Agencies will assist the PCA with the adaptive management program. Major shifts in the adaptive management program need to be reviewed and approved by the Wildlife Agencies. Major shifts include, but are not limited to, proposed actions that may be inconsistent with the Plan or detrimental to a Covered Species, introducing new and untested management techniques, discontinuing and replacing ineffective management techniques that are recommended in the conservation strategy, or applying management techniques on a much larger or smaller scale than envisioned in the Plan. Decisions made in the adaptive management program will be based primarily on which course of action is most likely to meet the conservation strategy described in Chapter 5, *Conservation Strategy*.

7.6.2 Wildlife Agencies

A primary role of the Wildlife Agencies is to provide feedback to the PCA regarding changes to Plan implementation based on the results of targeted studies and monitoring and on the recommendations of the science advisors, academic scientist partners, and others. Where possible, Wildlife Agency staff will provide expertise in the biology and conservation of Covered Species and natural communities, management tools, monitoring program, and all other Plan implementation.

The PCA and the Wildlife Agencies will strive at all times to work in good faith with each other to reach mutual agreement on key implementation tasks such as adaptive management, monitoring, and conservation actions. The primary forum in which these discussions will occur is the Interagency Working Group described in Chapter 8, *Plan Implementation*, Section 8.2.6.4, *Interagency Working Group*. Additional meetings with the Wildlife Agencies may be needed to discuss and resolve key issues related to adaptive management and monitoring. If disagreements arise that cannot be resolved easily, the PCA will follow the “meet and confer” dispute resolution process outlined in Section 6.6.1 of the Implementing Agreement, and if necessary, the “elevation of dispute” process outlined in Section 6.6.3 of the Implementing Agreement (Appendix B).

7.6.3 Science Advisors

The PCA will consult science advisors who will provide regular advice on Plan implementation. The role of the science advisors is to provide the PCA with science-based expert opinion and recommendations, focused "white papers," peer review, and feedback regarding key scientific aspects of Plan implementation such as reserve assembly, reserve management, and monitoring protocols. Science advisors will be contacted by the PCA and its partners, including the Wildlife Agencies, as needed. Science advisors will be selected by the PCA with input from the Wildlife Agencies.

7.6.4 Land Management Agencies

As discussed above, the PCA will share information and resources in implementing management across reserve boundaries and on a regional scale with other land management agencies in the Plan Area (e.g., County Parks, State Parks). Input from other land management agencies in the Plan Area is an important component of successful adaptive management. Land management agencies that manage land on behalf of the PCA (i.e., as part of the Reserve System) will form a Technical Advisory Committee to coordinate management and ensure consistency across the Reserve System.

7.6.5 The Public

Members of the public will have opportunities to learn about Plan status and provide input to the PCA on adaptive management during periodic (at least annual) public hearings and regular meetings of the public advisory committee, which will be open to the public. Members of the public may offer important contributions to a successful adaptive management program, such as providing data on Covered Species, critical reviews of monitoring data, and suggestions for improved land management. Members of the public may also participate in data collection through a volunteer program supervised by the PCA or its designee.

7.7 Data and Reporting

Proper data management, analysis, and reporting are critical to the success of the monitoring and adaptive management program. Data on monitoring methods, results, and analysis must be managed, stored, and made available to PCA staff, decision-makers, scientific advisors, Wildlife Agencies, other interested government agencies, including the U.S. Army Corps of Engineers, Regional Water Quality Control Boards, and other appropriate parties. A database and clear reporting procedure are also required for permit compliance. The requirements for database development, maintenance, and data reporting for monitoring are described in Chapter 8, *Plan Implementation*. The reporting requirements for monitoring include the following (also found in Chapter 8, *Plan Implementation*):

- A description of the landscape-, natural community–, and species-level monitoring undertaken during the reporting period and a summary of monitoring results, including species status and trends. The descriptions will address the monitoring guidelines identified in the landscape-level monitoring section (Section 7.3, *Landscape-level Monitoring Actions*), the natural community-level monitoring section (Section 7.4, *Natural Community-level Monitoring Actions*), and the species-level monitoring section (Section 7.5, *Species-level Monitoring Actions*).

- An update on the PCA's progress toward meeting the landscape-level protection, reserve design, and restoration goals and objectives identify , and the identification of goal and objectives for which the PCA may be falling behind.
- A description of the adaptive management process utilized during the reporting period (e.g., consultation with science advisors, convening of the Independent Conservation Assessment Team).
- A summary of the recommendations or advice provided by the Wildlife Agencies and science advisors regarding adaptive management and monitoring.
- A summary of the monitoring program objectives, techniques, and protocols, including monitoring locations, variables measured, sampling frequency, timing, and duration, analysis methods, and who performed the analyses.
- An assessment of the efficacy of the monitoring and research program and recommended changes to the program based on interpretation of monitoring results and research findings.
- An assessment of the efficacy of habitat restoration and creation methods in achieving performance objectives and recommended changes to improve the efficacy of the methods.
- A description of all directed studies undertaken for the Plan during the reporting period, a summary of study results, and a description of integration with monitoring, assessment, and compliance elements.
- An assessment of the appropriateness of performance indicators and objectives, based on the results of effectiveness monitoring, and recommended changes to performance indicators and objectives.
- A description of any actions taken or expected regarding changed circumstances, including remedial actions.
- A description of any unforeseen circumstances that arose and responses taken.

The monitoring report should follow current U.S. Army Corps of Engineers monitoring and reporting guidelines for compensatory mitigation projects for impacts to waters, including vernal pool constituent habitats, aquatic/wetland constituent habitats, and riverine/riparian constituent habitats. Current guidelines can be found at: http://www.spd.usace.army.mil/Portals/13/docs/regulatory/mitigation/MitMon.pdf.

This Page Intentionally Left Blank

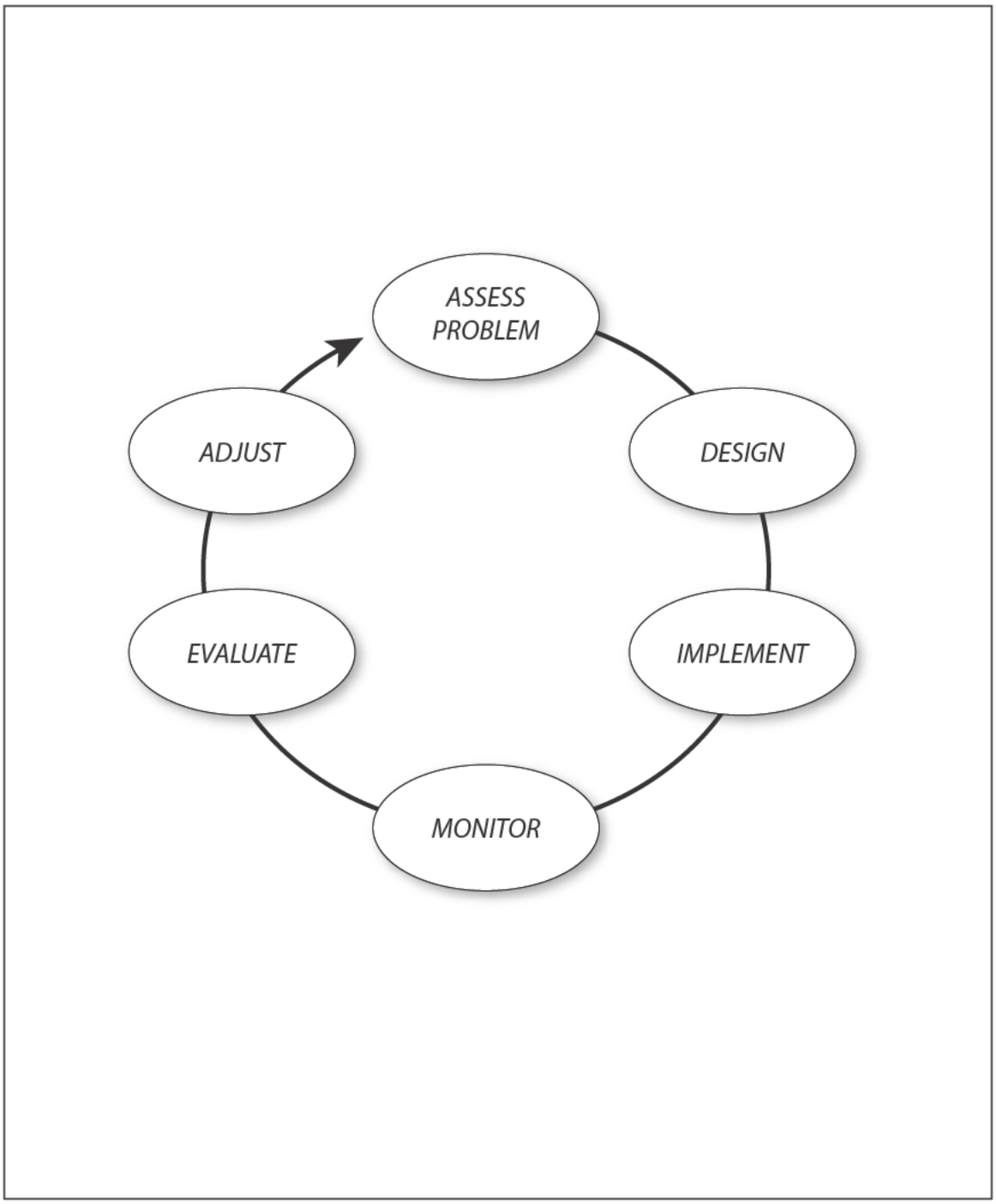
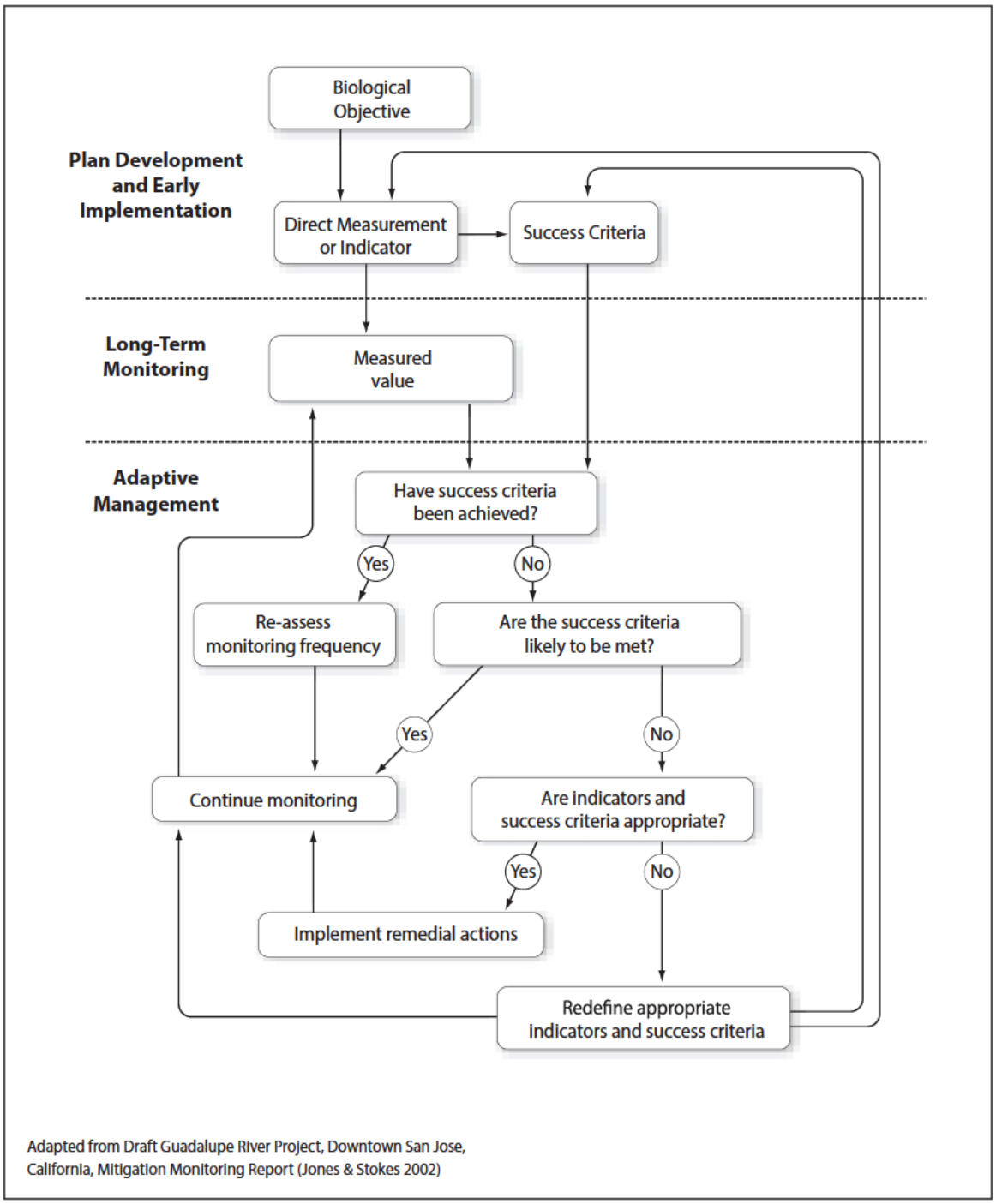


Figure 7-1 Adaptive Management Process

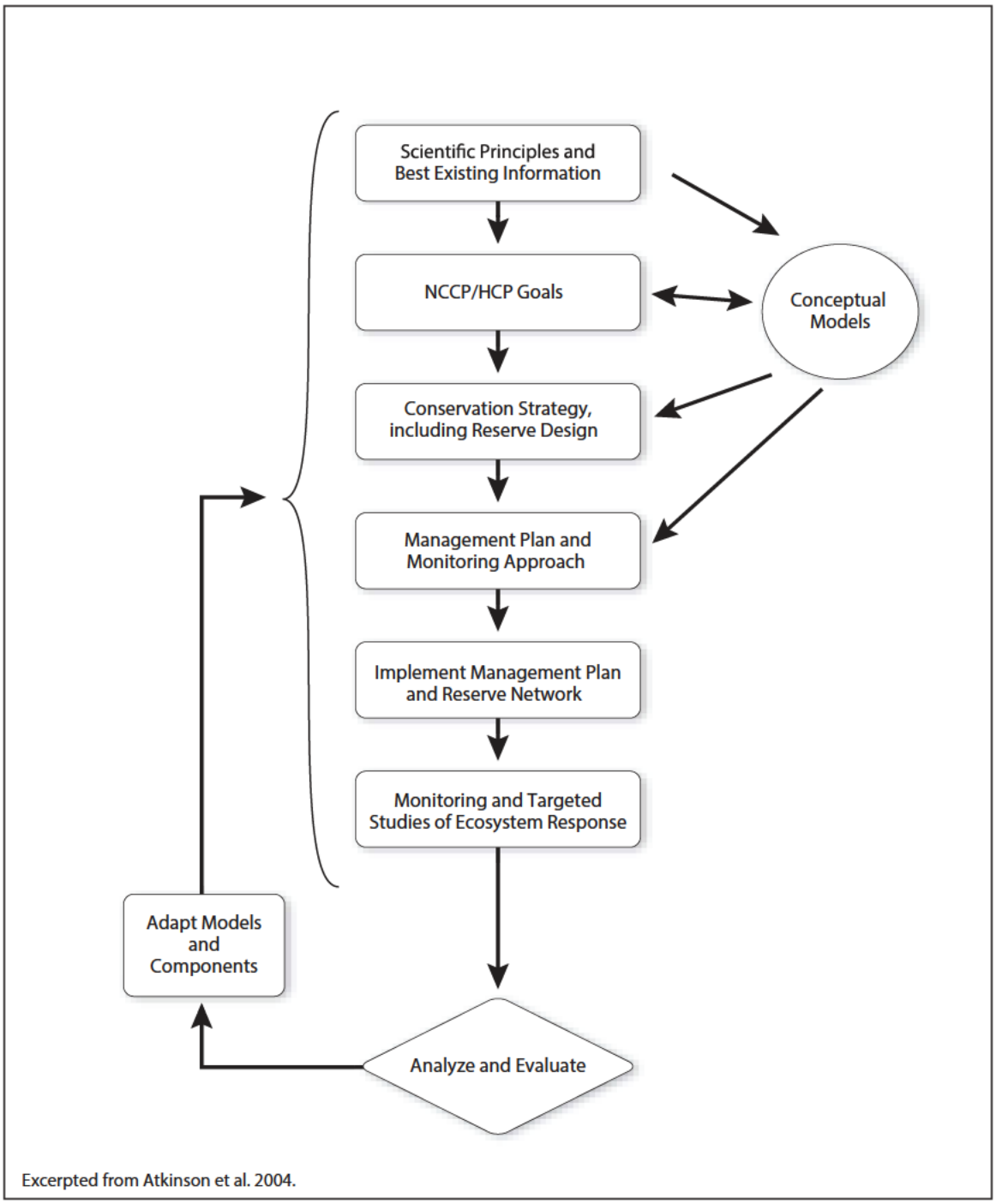
Placer County Conservation Program - Western Placer County HCP/NCCP



Adapted from Draft Guadalupe River Project, Downtown San Jose, California, Mitigation Monitoring Report (Jones & Stokes 2002)

Figure 7-2 Monitoring and Adaptive Management Process

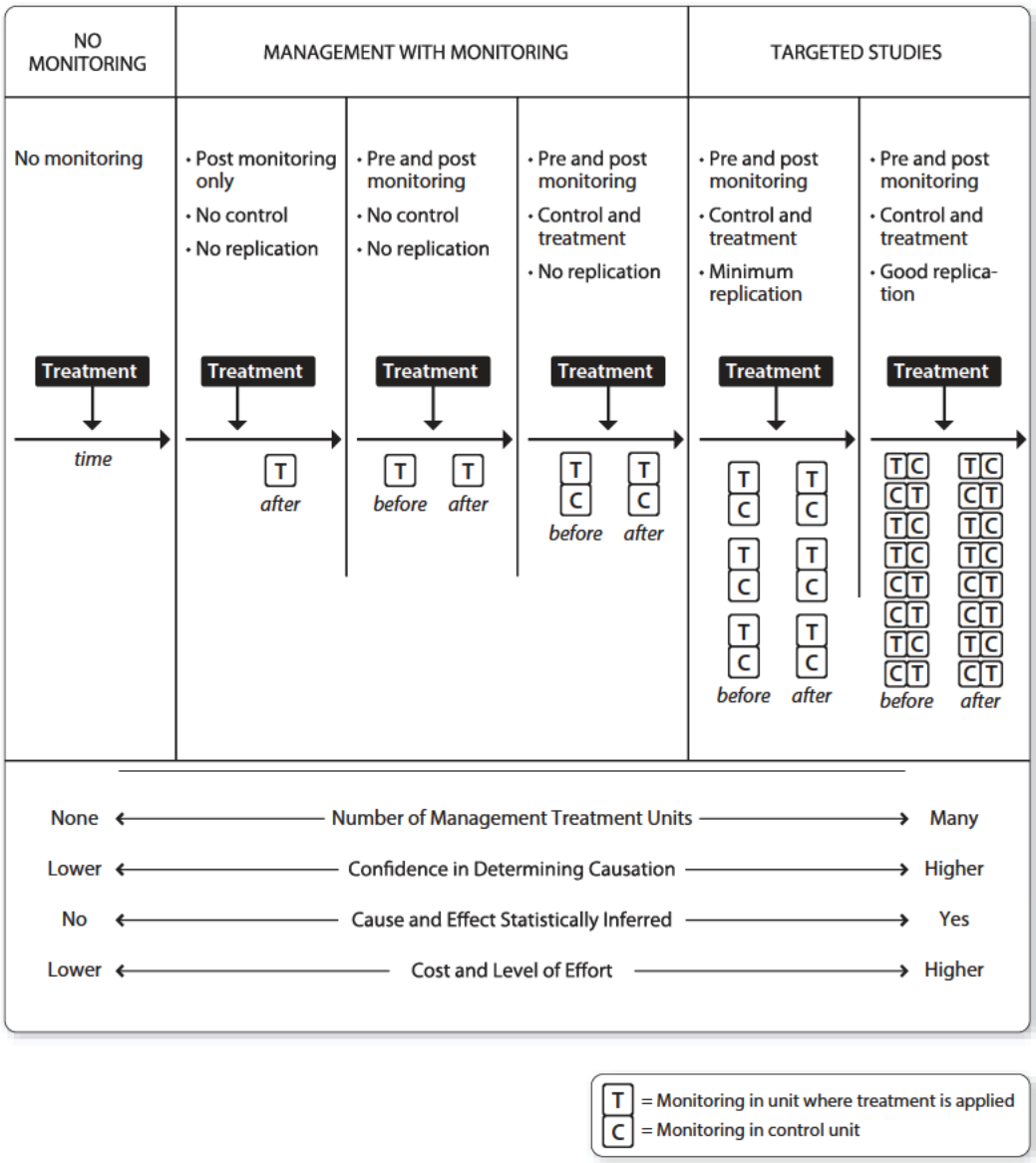
Placer County Conservation Program - Western Placer County HCP/NCCP



Excerpted from Atkinson et al. 2004.

Figure 7-3 Adaptive Management and Role of Conceptual Models

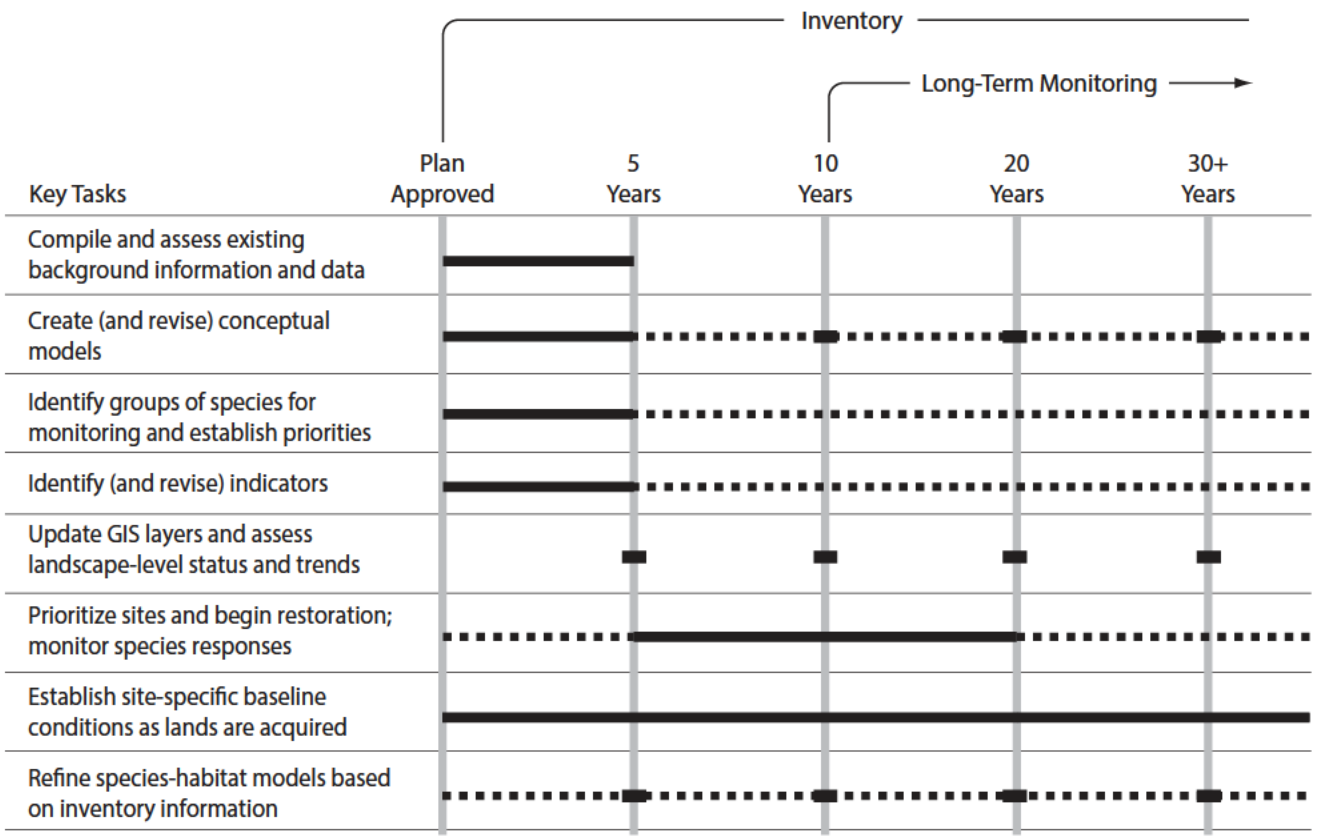
Placer County Conservation Program - Western Placer County HCP/NCCP



Adapted from Elzinga et al. 1998.

Figure 7-4 Experimental Approaches

Placer County Conservation Program - Western Placer County HCP/NCCP



Adapted from Atkinson et al. 2004.

Figure 7-5 Monitoring Program Phases

Placer County Conservation Program - Western Placer County HCP/NCCP

Chapter 8
Plan Implementation

8.1 Overview

This chapter describes how the Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan (referred to as the HCP/NCCP or Plan) will be implemented, including the organizational structure or "implementation structure" for Plan implementation, implementation policies, institutional arrangements, approval processes, how the Reserve System will be assembled and managed, and the roles and responsibilities of participating local, state and federal agencies. The chapter also describes how implementation of the Plan will be coordinated with implementation of the Western Placer County Aquatic Resources Program (CARP) and In-lieu Fee Programs as part of the overall Placer County Conservation Program (PCCP).

8.1.1 The Placer County Conservation Program

The PCCP is a comprehensive natural resource planning effort for western Placer County that addresses native species of fish and wildlife, aquatic resources, and water quality. The PCCP is a local program administered by Placer County (County) and other participating local agencies (City of Lincoln [City], South Placer Regional Transportation Authority [SPRTA], and Placer County Water Agency [PCWA]). However, collaboration with state and federal agencies has been a hallmark of the program from its inception. Under the program, the County and other participating local agencies worked with participating state and federal agencies to develop a comprehensive approach to natural resource conservation in western Placer County. The Western Placer County HCP/NCCP, the CARP, and the In-lieu Fee Program are the culmination of this collaborative planning effort.

The HCP/NCCP, the CARP, and the In-lieu Fee Program compose the PCCP and will be implemented jointly by the participating local agencies as an integrated local program. However, the state and federal legal requirements that apply to the HCP/NCCP are different than those that apply to the CARP and the In-lieu Fee Program. The HCP/NCCP is intended to meet state and federal permit issuance criteria under the Endangered Species Act (ESA) and the California Natural Community and Conservation Planning Act (NCCP Act), and the CARP and In-lieu Fee Program are intended to meet permit issuance criteria under Sections 404 and 401 of the federal Clean Water Act and the standards of the California Porter-Cologne Water Quality Act, as well as local aquatic resource protection requirements and standards. As a consequence, the state and federal agencies involved with implementation of the HCP/NCCP are different than those involved with implementation of the CARP and In-lieu Fee Program. The roles of the participating local, state and federal agencies in the implementation of the PCCP are described below.

Implementation of the PCCP will require coordination among the participating local, state and federal agencies. The PCCP's main components, the HCP/NCCP, the CARP, and the In-lieu Fee Program, are each independently viable and designed to meet relevant state and federal permit issuance criteria fully. However, many, if not most, conservation measures implemented under the HCP/NCCP will serve to implement all three programs. For example, a measure to restore vernal pools would serve to implement and meet the objectives of the HCP/NCCP (i.e., for vernal pool species and habitat), the CARP, and the In-lieu Fee Program (i.e., for wetland function and value and

water quality). Details of, and approaches for, coordination among participating local, state, and federal agencies are described below in Section 8.1.4, *Coordinated Implementation of the HCP/NCCP, the CARP, and the In-lieu Fee Program*.

8.1.2 The Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan

The HCP/NCCP is intended to meet federal permit issuance criteria under Section 10(a)(1)(B) of the ESA and state permit issuance criteria under the NCCP Act. The Wildlife Agencies (U.S. Fish and Wildlife Service [USFWS], National Marine Fisheries Service [NMFS], and California Department of Fish and Wildlife [CDFW]) are the Permittors—the agencies responsible for issuing permits under the HCP/NCCP. Placer County, the City of Lincoln, the PCWA, the SPRTA, and the Placer Conservation Authority (PCA) will be the Permittees. The HCP/NCCP anticipates that the Permittees will receive Section 10(a)(1)(B) incidental take permits and NCCP Act permits that will provide authorization for take that occurs from each Permittee's Covered Activities within the Plan Area. Covered Activities for each of the Permittees are described in Chapter 2, *Covered Activities*.

As Permittees, the local participating agencies will be responsible for compliance with all the terms and conditions of the state and federal permits. They will ensure that all Covered Activities adhere to the Plan and avoid, minimize, and mitigate effects on Covered Species as described in the Plan, and they will monitor Covered Activities to ensure that such measures have been implemented.

Primary responsibility for overall Plan implementation also rests with the participating local agencies. However, the successful execution of the conservation strategy, monitoring and adaptive management program, Covered Activity approvals, and reporting that are part of the Plan will require coordinated actions among the local participating agencies, the Wildlife Agencies, public land managers, and the private sector. As described in this chapter, these entities will also participate in the implementation of the Plan.

Implementation of the HCP/NCCP will begin when the Implementing Agreement is fully executed, the Section 10(a)(1)(B) incidental take permits and NCCP Act permit are issued, and the local implementing ordinances take effect. The Implementing Agreement is explained in Section 8.2.1, *Implementing Agreement*, and the implementing ordinances are explained in Section 8.2.3.1, *Implementation Ordinances*.

8.1.3 The Western Placer County Aquatic Resources Program and In-lieu Fee Program

The CARP is a program for protecting aquatic resources in western Placer County and for streamlining the environmental permitting process for impacts on aquatic resources. It will protect aquatic resources by establishing avoidance, minimization, and mitigation requirements for projects that have the potential to impact such resources. And it will provide a means to fulfill the requirements of federal Clean Water Act, California Porter-Cologne Water Quality Act, section 1600 et seq. of the California Fish and Game Code, and local laws that protect aquatic resources using a comprehensive, long-term, regional conservation strategy. CARP avoidance, minimization, and mitigation requirements are derived from the HCP/NCCP. However, the CARP focuses on aquatic resources specifically and, in some areas, addresses them in greater detail than the HCP/NCCP.

The PCCP will also include an in-lieu fee program under which compensatory mitigation requirements under Section 404 of the Clean Water Act can be fulfilled by payment of a fee. The In-lieu Fee Program will provide aquatic resource mitigation "credits" that can be used to fulfill Section 404 compensatory mitigation requirements. The In-lieu Fee Program will allow proponents of Covered Activities to pay a fee to the PCA for such credits; the PCA will use fee revenues to implement mitigation projects that protect, enhance and restore aquatic resources. The In-lieu Fee Program will provide compensatory mitigation for impacts on aquatic resources for all projects and activities that are covered under the HCP/NCCP and the CARP.

Implementation of the CARP will begin concurrent with implementation of the HCP/NCCP, after the local participating agencies have adopted the CARP and related implementing ordinances or resolutions. Primary responsibility for CARP implementation will rest with the participating local agencies, with the PCA assuming primary responsibility for implementation on behalf of the other local agencies. However, like the HCP/NCCP, successful implementation of the CARP will require coordinated actions among the local participating agencies, Water Resource Agencies (U.S. Army Corps of Engineers [USACE], U.S. Environmental Protection Agency [USEPA], Regional Water Quality Control Board [RWQCB]), public land managers, and the private sector.

8.1.3.1 U. S. Army Corps of Engineers

USACE regulates activities that result in the discharge of dredged and/or fill material into waters of the United States pursuant to Section 404 of the federal Clean Water Act. USACE will take the HCP/NCCP and CARP requirements into consideration in its Section 404 permitting approach for Covered Activities. Covered Activities are expected to meet Section 404 mitigation requirements by incorporating required HCP/NCCP mitigation measures. For HCP/NCCP Covered Activities that require Section 404 permits, USACE will review permit applications and make permit decisions based on a multi-tiered approach and abbreviated procedures established specifically for such Covered Activities. This review and approval process will streamline wetland permitting for Covered Activities in the Plan Area. In addition, USACE will be able to rely on the environmental impact statement (EIS) prepared for the HCP/NCCP to provide some or all of the environmental analysis needed for 404 permitting for Covered Activities.

USACE will also be responsible for issuing and enforcing programmatic Clean Water Act Section 404 permits for HCP/NCCP Covered Activities that will have minimal effects on aquatic resources. The programmatic Section 404 permits will cover the Permittees' activities, as well as the activities of private project applicants. An activity determined to be compliant with the HCP/NCCP, CARP and their implementing ordinances would be authorized under a programmatic general permit, assuming all terms and conditions of the programmatic general permit are met. The programmatic general permit would not impose additional requirements or conditions on individual activities for avoiding, minimizing or compensating for the loss of aquatic resources beyond those required under the HCP/NCCP, CARP, and ordinances.

In addition, the USACE and the Wildlife Agencies will participate in the Interagency Review Team (see Section 8.1.4.2, *Interagency Review Team*). The Interagency Review Team must review and approve proposals for aquatic resource mitigation projects and oversee implementation of such projects, including verification that the projects meet performance criteria.

8.1.3.2 U. S. Environmental Protection Agency

USEPA has an oversight role in the Clean Water Act 404 permitting process and will monitor 404 permitting for HCP/NCCP Covered Activities and other activities covered by the CARP. USEPA will also participate in the Interagency Review Team.

8.1.3.3 Central Valley Regional Water Quality Control Board

The Central Valley RWQCB issues Water Quality Certifications pursuant to Section 401 of the Clean Water Act and also regulates activities that impact waters of the state pursuant to the Porter-Cologne Water Quality Act, including waters not regulated by USACE. The Central Valley RWQCB will be responsible for issuing and enforcing the programmatic Section 401 certification for the programmatic general permit issued pursuant to Section 404 of the Clean Water Act. The Central Valley RWQCB will also review certification requests for larger Covered Activities that are not covered under the programmatic Section 404 permits using the simplified procedures established by USACE for such activities.

The Central Valley RWQCB will also participate in the Interagency Review Team.

8.1.3.4 Participating Local Agencies

The PCA, County of Placer, City, SPRTA, and PCWA are responsible for implementing the CARP and the In-lieu Fee Program. They will ensure that their own activities incorporate CARP avoidance and minimization measures for aquatic resources and provide compensatory mitigation for impacts that are not avoided. The County and City will also ensure that activities covered under the CARP program that are within their land use jurisdiction comply with CARP avoidance, minimization and compensatory mitigation requirements. As explained above, CARP avoidance, minimization and mitigation requirements are derived from HCP/NCCP requirements. Therefore, the County and City will ensure compliance with CARP requirements at the same time and in the same way that they ensure compliance with HCP/NCCP requirements.

As with the HCP/NCCP, the PCA will have primary responsibility for implementing aquatic resource mitigation actions under the CARP. The PCA will also operate the In-lieu Fee Program, which will involve collecting and managing mitigation fee revenues, acquiring land for aquatic resources mitigation projects, designing and implementing mitigation projects, and managing and monitoring mitigation project sites. The PCA's implementation of the CARP will be integrated with HCP/NCCP implementation because the PCA's acquisition of land, implementation of aquatic resource mitigation projects (e.g., wetland enhancement or restoration), and management of mitigation sites, must be carried out in accordance with the HCP/NCCP. For example, lands acquired to assemble the Reserve System and fulfill HCP/NCCP land acquisition commitments, and wetland restoration projects implemented to meet HCP/NCCP restoration commitments, will also fulfill CARP requirements and objectives.

8.1.4 Coordinated Implementation of the HCP/NCCP, the CARP, and the In-lieu Fee Program

The overlap of the HCP/NCCP, CARP and In-lieu Fee Program makes it essential to coordinate their implementation. The local participating agencies will implement all three programs through a coordinated series of land acquisitions, habitat and wetland restoration projects, land management,

monitoring and many other actions. The HCP/NCCP, CARP, and In-lieu Fee Program are separate and distinct because each is intended to meet different state and federal requirements, as described above. However, the PCA will implement all three programs through the same set of procedures and actions.

The actions that will implement the HCP/NCCP, the CARP, and the In-lieu Fee Program are set forth in the HCP/NCCP. The HCP/NCCP is the PCCP's central planning document, and the CARP and the In-lieu Fee program are based on the HCP/NCCP. The CARP and In-lieu Fee Program each identify certain additional standards and procedures that are relevant for purposes of Clean Water Act and Porter-Cologne Water Quality Act compliance. However, the HCP/NCCP defines the PCCP's core implementation program for the HCP/NCCP, CARP, and In-lieu Fee Program. The CARP and In-lieu Fee Program can "piggyback" on the HCP/NCCP in this way because the CARP and In-lieu Fee Program cover impacts (e.g., impacts on vernal pools and other wetlands) that are addressed in the HCP/NCCP. The HCP/NCCP includes avoidance, minimization, and compensatory mitigation requirements for aquatic resource impacts because most, if not all, aquatic resources provide or support habitat for one or more of the HCP/NCCP's Covered Species.

Implementation of the HCP/NCCP, CARP, and In-lieu Fee Program will be coordinated in several ways, including the following:

- Funding: Covered Activities will satisfy the requirements of both the HCP/NCCP and the CARP through payment of the same fee(s). For example, if a Covered Activity affects vernal pool wetlands, it will be required to fulfill mitigation requirements, including payment of a fee to fund one set of compensatory mitigation actions that would occur under both the HCP/NCCP and the CARP. Payment of PCCP fees related to aquatic resources will fulfill both HCP/NCCP and CARP requirements. Funding management and oversight will also be coordinated.
- Avoidance and Minimization: HCP/NCCP and CARP avoidance and minimization requirements will be consistent. For example, avoidance areas and buffer distances for aquatic resources under both the HCP/NCCP and the CARP will be consistent.
- Land Acquisitions: Lands acquired for the Reserve System to fulfill land acquisition commitments in the HCP/NCCP may also be used as sites for aquatic resource mitigation projects for the In-lieu Fee Program.
- Land Management and Enhancement: Reserve System management and enhancement under the HCP/NCCP will also provide management for aquatic resource mitigation sites for purposes of the In-lieu Fee Program.
- Wetland Creation and Restoration: Wetlands restored or created to fulfill restoration and creation commitments in the HCP/NCCP will also create wetland mitigation "credits" under the In-lieu Fee Program.

Coordinating the implementation of the HCP/NCCP, CARP, and In-lieu Fee Program will require coordination among the local, state, and federal participating agencies where the Plan and programs overlap, including the following:

- Funding: The Wildlife Agencies, USACE, and the Central Valley RWQCB will have to coordinate oversight of the PCA's management and expenditure of funding for HCP/NCCP implementation and In-lieu Fee Program implementation.
- Avoidance and Minimization: The PCA, the County, the City, the Wildlife Agencies, USACE and the Central Valley RWQCB will have to coordinate guidance to project proponents regarding

HCP/NCCP, CARP, and Section 404 avoidance and minimization requirements, e.g., to ensure that guidance regarding required avoidance areas and buffer distances for Covered Activities is consistent for the HCP/NCCP, the CARP, and Section 404 permit requirements.

- Land Acquisitions: The approval of the Wildlife Agencies and USACE will be required for acquisitions of land that will be used for aquatic resource enhancement, restoration or creation. The review of proposed acquisitions by the Wildlife Agencies and USACE will have to be coordinated to ensure that the appropriate sites are acquired that will meet the requirements of all of the agencies under the HCP/NCCP and the In-lieu Fee Program.
- Land Management and Enhancements: The approval of the Wildlife Agencies and USACE will be required for management plans for land that will be used for aquatic resource enhancement, restoration or creation. The review of draft management plans by the Wildlife Agencies and USACE will have to be coordinated to ensure that management actions meet all relevant regulatory requirements but are consistent.
- Wetland Creation and Restoration: The approval of the Wildlife Agencies and USACE will be required for proposed wetland enhancement, restoration, or creation projects. The review of restoration/mitigation project proposals by the Wildlife Agencies and USACE will have to be coordinated.

8.1.4.1 Participating Local Agencies

County, City, PCWA, and SPRTA worked together to develop the HCP/NCCP, the CARP, and the In-lieu Fee Program and will continue to work together during their implementation. The PCA will have primary responsibility for implementing all three programs on behalf of the other participating local agencies. The PCA will be the "implementing entity" for both the HCP/NCCP and the CARP, and it will be the "sponsor" of the In-lieu Fee Program.[1] The PCA will ensure that the implementation of all three programs is coordinated at the local level and will facilitate coordination among the local, state and federal agencies. The PCA will fulfill monitoring and reporting responsibilities for all three programs. In addition, the PCA will meet regularly with the HCP/NCCP Interagency Working Group (IAWG), as described in Section 8.2.6, *Wildlife Agencies*, and will coordinate with the Inter-agency Review Team, as described in Section 8.1.4.2, *Inter-agency Review Team*, and the Enabling Instrument for the In-lieu Fee Program.

8.1.4.2 Interagency Review Team

An Interagency Review Team consisting of USACE, USEPA, the Central Valley RWQCB, USFWS, CDFW and NMFS will provide coordinated and consistent guidance and input to the Permittees regarding implementation of the HCP/NCCP and In-lieu Fee Program, and the use of In-lieu Fee Program credits for Covered Activities, to ensure that the HCP/NCCP and the In-lieu Fee Program can be implemented consistently, efficiently, and successfully. The Interagency Review Team will serve as the venue for the USACE, USEPA, and Central Valley RWQCB to coordinate their guidance and input regarding In-lieu Fee Program implementation and the use of In-Lieu Fee Program credits to meet Section 404/401 compensatory mitigation requirements for Covered Activities, with the Wildlife Agencies' guidance and input regarding HCP/NCCP implementation.

[1] "Sponsor" is a term of art that applies to the entity that implements an in-lieu fee program under the Clean Water Act (see 33 Code of Federal Regulations Section 230.92).

8.2 Implementation Structure

To implement a complex plan like the HCP/NCCP so that it will meet its objectives and regulatory obligations, it is important to create an effective governance or implementation structure. Successful implementation of the Plan will require a local administrative structure, effective coordination with local, state and federal partners, and outreach to various private sector stakeholders.

The following public agencies will be Permittees under the state and federal permits:

- County of Placer
- City of Lincoln
- Placer County Water Agency
- South Placer Regional Transportation Authority
- Placer Conservation Authority

Each Permittee will be provided authorization under the state and federal permits for take that results from Covered Activities that they implement and each will sign the Implementing Agreement. The County and the City will also be provided authorization under the state and federal permits for take that results from projects and activities under their jurisdiction (see Chapter 2, *Covered Activities*). The County and the City will be responsible for confirming that such projects and activities are eligible for coverage under the state and federal permits and for determining that each application is complete (see Chapter 6, *Program Participation and Conditions on Covered Activities*). The County and the City may extend take authorization under the state and federal permits, along with other local approvals and entitlements, for eligible projects and activities that meet all applicable requirements of the permits the Plan, and the Implementing Agreement. The County and City are responsible for reporting relevant information about such projects and activities to the PCA for tracking impacts, compliance monitoring, and other purposes, as further described in Chapter 6, *Program Participation and Conditions on Covered Activities*.

The Permittees will give the PCA the power and primary responsibility to implement the Plan on their behalf, as further explained below. However, the Permittees will ultimately be responsible for compliance with all of the terms and conditions of the state and federal permits and for ensuring the success of the PCA. Each Permittee will designate staff to advise the PCA and a primary point of contact for the PCA.

The PCA will be responsible for Plan implementation on behalf of the Permittees. However, many existing organizations and agencies in Placer County already have significant expertise and experience in carrying out the necessary functions and actions of Plan implementation. The PCA may be able to implement the Plan more effectively and efficiently by partnering with these existing institutions for general administrative and other staff support, as well as for specialized support, on a case-by-case basis, with partners that have valuable experience with land management, monitoring, and other specialized functions and actions. In addition, the Wildlife Agencies, other public and private land management organizations, science advisors, and the public, all have important roles in Plan implementation.

The roles, responsibilities, and relationships of entities that will participate in Plan implementation are described in this section and illustrated in Figure 8-1.

8.2.1 Implementing Agreement

An Implementing Agreement among the Permittees and the Wildlife Agencies has been prepared for the Plan (Appendix B, *Implementing Agreement*) to satisfy the requirements of the NCCP Act. The Implementing Agreement specifies the responsibilities of each plan participant and various other provisions agreed to by the Plan participants. The Implementing Agreement cannot alter the terms of the federal permits.

8.2.2 Placer Conservation Authority

The PCA will be a joint exercise of powers agency created by the County and the City to implement the Plan on behalf of the Permittees. The PCA itself will also be a Permittee. The PCA will have the primary responsibility for implementation of the Plan. However, the Permittees collectively share ultimate responsibility for Plan implementation and for compliance with the terms and conditions of the state and federal permits.

The PCA may hold title to lands or easements it purchases and may enter into cooperative agreements with other land management entities to own or manage lands for the PCA as part of the Reserve System. The PCA will provide funds for management and monitoring to agencies and organizations with whom it contracts for such services.

The PCA will also coordinate with science advisors, outside consultants, and land management agencies as needed to ensure adequate and coordinated Plan implementation. The PCA will include, as part of staff or contract resources, scientists, administrators, and other specialists as needed to oversee and carry out planning and design, habitat restoration, monitoring, and adaptive management programs. These roles may be filled by PCA staff, or their functions may contracted out to existing local agencies, non-profit organizations, or private consultants. The PCA will also coordinate with Wildlife Agencies on a regular basis, at least monthly in the first 2 years of implementation, and provide the Wildlife Agencies with annual reports.

The PCA will be governed by a Board of Directors consisting of representatives of the County and the City. PCWA and SPRTA will provide input to the PCA through advisory roles and may each be represented on the Board by ex officio (non-voting) members. The PCA will have an Executive Director, who will report to the Board and will be the PCA's senior staff person. The Executive Director will be dedicated to day-to-day implementation of the Plan and will be the PCA's "point person" for Plan implementation, ensuring the PCA carries out its responsibilities. The Executive Director will also be the PCA's primary point of contact for coordination with the Permittees, the Wildlife Agencies, and the PCA's implementation partners as well as for public outreach.

8.2.3 The County of Placer and the City of Lincoln

County and City will each take the Plan and Implementing Agreement to their respective legislative bodies (i.e., board of supervisors and city council) for adoption and execution. They will each be Permittees and, as such, share responsibility for ensuring that the Plan is implemented. The County and the City will each require that Covered Activities subject to their respective land use authorities avoid, minimize, and mitigate project impacts in accordance with the Plan. Compliance will include meeting the requirements for land dedication and/or payment of a fee, as described in the Plan, as well as implementing all applicable measures described in Chapter 6, *Program Participation and*

Conditions on Covered Activities, to avoid, minimize, and mitigate the take of Covered Species, natural communities, and wetlands.

In addition, the County and the City will support Plan implementation by:

- Receiving, reviewing, and approving Plan participation packages under the Plan from private project proponents according to the procedures and requirements described in Chapter 6, *Program Participation and Conditions on Covered Activities*
- Requiring private and public project proponents to pay Plan fees to the PCA as specified in their local implementing ordinances (see Section 8.2.3.1, *Implementation Ordinances*) and as described in Chapter 9, *Costs and Funding*
- Requiring private and public project proponents to provide land dedications, if necessary to meet land acquisition requirements of the Plan after all other options have resulted in falling behind in needed land acquisition, in addition to, or to replace, the payment of Plan fees
- Periodically (at least quarterly) transferring the Plan fees to the PCA to support Plan implementation
- Reporting what applications have been submitted, and what approvals for take authorization have been made, to the PCA at least quarterly
- Monitoring the implementation of conditions on Covered Activities on project sites, with the assistance of the PCA
- Assisting the PCA with enforcement of conservation easement terms on private lands that may be part of the Reserve System
- Coordinating closely with the PCA regarding Plan implementation
- Assisting the PCA with grant applications

8.2.3.1 Implementation Ordinances

The County and the City must each adopt one or more ordinance(s) to carry out its obligations under the Plan. The ordinance(s) will ensure that Covered Activities within the County's and City's land use authority are required to fulfill relevant Plan requirements and will establish Plan fees, as described in Chapter 9, *Costs and Funding*. The ordinances will be finalized and adopted not later than 1 year after the state and federal permits are issued. A draft template for the ordinance establishing Plan fees is provided in Appendix A, *Implementing Ordinance Template*.

8.2.4 Placer County Water Agency

The PCWA is an independent special district created under the California Water Code. It will adopt the Plan and will be a Permittee. The PCWA is seeking coverage for operation and maintenance of its raw water distribution system, future capital improvement projects within the Plan Area and future construction of PCWA water supply facilities (Section 2.6.5.3, *Water Supply Programs*). PCWA will ensure that its Covered Activities comply with Plan requirements. It will implement the measures described in Chapter 6, *Program Participation and Conditions on Covered Activities,* necessary to avoid, minimize, and mitigate the take of Covered Species. PCWA will contribute funds and/or assist in land acquisition and restoration programs of the Plan as described in Chapter 9, *Costs and Funding*.

8.2.5 South Placer Regional Transportation Authority

SPRTA is a joint exercise of powers agency whose member agencies are the County, the City, the City of Rocklin, and the City of Roseville. SPRTA will adopt the Plan and will be a Permittee solely for purposes of the Placer County Transportation Planning Agency sponsored Placer Parkway Project and Interstate 80/State Route 65 interchange improvements. SPRTA will ensure that its Covered Activities comply with Plan requirements. It will implement any of the measures described in Chapter 6, *Program Participation and Conditions on Covered Activities,* that are necessary to avoid, minimize, and mitigate the take of Covered Species, and it will contribute funds and/or assist in land acquisition and restoration programs of the Plan as described in Chapter 9, *Costs and Funding*.

8.2.6 Wildlife Agencies

The Wildlife Agencies (CDFW, USFWS, and NMFS) are responsible for providing guidance to the PCA and other Permittees about the requirements of the state and federal permits. The Wildlife Agencies share responsibility to monitor Plan compliance and notify the PCA as soon as possible if the Plan is not being implemented as required in the permits. The Wildlife Agencies will take an active role in Plan implementation through review and approval of proposed Reserve System land acquisitions, draft Reserve Unit Management Plans, monitoring plans and other aspects of Plan implementation, as described in the Plan. The Wildlife Agencies will also assist the PCA in attempting to secure state and federal funding for Plan implementation, such as reviewing grant proposals (see Chapter 9, *Costs and Funding,* and Chapter 10, *Assurances*).

The Wildlife Agencies' participation in Plan implementation will be based on each agency's statutory authority and responsibilities. Where the Plan requires review, comment, advice, recommendations, proposals, approval, or other input, from the Wildlife Agencies, it is referring to the Wildlife Agency(ies) with relevant statutory authority and responsibilities for the Covered Species or natural community at issue. For example, where the Plan requires Wildlife Agency approval of exceptions to Swainson's hawk avoidance requirements (see Section 6.3.5.6.2, *Applicable Measures*), it is referring to USFWS and CDFW, which have statutory authority and responsibility for bird species that are Covered Species. Where the Plan refers to the need for input from the Wildlife Agencies that is not specific to a particular Covered Species (e.g., on Reserve Unit Management Plans), it is referring to all three Wildlife Agencies. However, each Wildlife Agency may determine whether, or to what extent, to provide input based on its statutory authorities and responsibilities. For example, NMFS may choose to review only those portions of Reserve Unit Management Plans, if any, that are relevant to Central Valley steelhead or Central Valley fall-/late fall-run Chinook salmon.

8.2.6.1 U.S. Fish and Wildlife Service

USFWS will be responsible for enforcing the provisions of USFWS-issued incidental take permit. USFWS will also participate fully in the IAWG, which will require among other things, reviewing annual status reports, responding to requests for amendments, and providing technical assistance with regard to acquisition and management of reserve lands, implementation of avoidance and minimization measures, and implementation of restoration actions. USFWS also awards grants under Section 6 (the Cooperative Endangered Species Conservation Fund) of the federal ESA, which provides funding to the states for species and habitat conservation actions on non-federal lands. Habitat conservation land acquisition grants are a subset of the Section 6 grants and maybe awarded to states to fund land acquisitions that complement, but do not replace, federal mitigation

responsibilities contained in permitted HCPs. The grant process is a competitive process, but it is expected that some funding from the Section 6 program will be available to help achieve the conservation goals of the PCCP, as described in Chapter 9, *Costs and Funding*.

8.2.6.2 National Marine Fisheries Service

NMFS will be responsible for enforcing the provisions of the NMFS-issued incidental take permit, which will cover only the anadromous fish species (Central Valley steelhead and Central Valley fall-/late fall-run Chinook salmon) that are found in the streams and rivers of Placer County. Like USFWS, NMFS will participate fully in the IAWG and provide funds to contribute to the recovery of Covered Species and help achieve the goals of the PCCP, as described in Chapter 9, *Costs and Funding*.

8.2.6.3 California Department of Fish and Wildlife

CDFW will be responsible for enforcing the provisions of the NCCP Act permit. CDFW will also participate fully in the IAWG, which will require among other things, reviewing annual status reports, responding to requests for amendments, and providing technical assistance with regard to acquisition and management of reserve lands and implementation of avoidance and minimization measures. CDFW will provide funds or lands to contribute to help achieve the goals and objectives of the PCCP (e.g., through its role as the state recipient and administrator of Section 6 habitat conservation land acquisition grants) as described in Chapter 9, *Costs and Funding*.

8.2.6.4 The Interagency Working Group

The IAWG will consist of representatives of the Wildlife Agencies. The IAWG will assist in the implementation of the PCCP by providing coordinated advice, recommendations, proposals, and review and approval (where required by the Plan) regarding the following:

- Acquisition, restoration and management of the Reserve System, as described in Section 8.4, *Establishing the Reserve System*, and Section 8.5, *Management and Enhancement of the Reserve System*
- Application of conditions on Covered Activities (Chapter 6, *Program Participation and Conditions on Covered Activities*) to specific Covered Activities, when needed
- Monitoring and adaptive management, as described in Section 8.8, *Monitoring and Adaptive Management*
- Coordination of local, state and federal funding sources
- Review of monitoring reports and other data that describe measurements of success and provide for remedial actions where necessary
- Compliance with the NCCP Act and ESA

The IAWG will convene as needed to assist in the implementation of the Plan, but it may convene at any time at the discretion of the Wildlife Agencies. To the greatest extent practicable within the context and timeframe of the matter, the IAWG will provide its advice, recommendations or proposals in writing to the PCA, or other Permittees, as applicable. To ensure regular communication with the Wildlife Agencies, the PCA will meet regularly with Wildlife Agency staff to keep them apprised of implementation, such as progress toward Plan goals and objectives,

compliance with the state and federal permits, funding, monitoring and adaptive management, and other relevant topics. Meeting frequency will vary but will most likely be monthly or bi-monthly during the first several years of implementation to ensure close communication. The meetings will be with the IAWG whenever practicable, but the PCA may meet with each Wildlife Agency individually when needed to ensure timely communication. The meetings will serve as a means for the Wildlife Agencies to provide advice to the PCA prior to implementation of key conservation actions. The meetings will also serve as a forum to avoid any issues that might influence permit compliance.

In some cases, Wildlife Agency review and approval will be needed for proposed actions that do not precisely meet Plan conditions or requirements, but would nonetheless help to meet Plan goals and objectives. For example, lands must meet the criteria for Reserve System lands to be credited toward Reserve System land acquisition commitments. However, there might be cases in which a property does not meet one or more specific Reserve System criteria but would provide unusually high Covered Species benefits and, subject to Wildlife Agency review and approval, could be credited toward Reserve System land acquisition commitments. This type of Wildlife Agency review is expected to be handled by the IAWG in less than a day. This type of review is limited to minor deviations from the Plan's standards and conditions; substantial deviations from the Plan's conservation strategy would require an amendment to the Plan and permit(s).

8.2.6.5 Review of Pre-acquisition Assessments for Reserve Land Acquisition

The Wildlife Agencies will review all pre-acquisition assessments and provide comments to the PCA within 30 days of receiving such proposals (see Section 8.4.2.2, *Step 2: Pre-acquisition Assessment*, for the typical information in these proposals). The Wildlife Agencies may, within the 30 day period, request additional information or clarification and up to 30 days of additional review time. The PCA will revise the documents based on Wildlife Agency comments, if any, and provide revised drafts to the Wildlife Agencies within 15 days. These deadlines are established to ensure the timely review and comment on the documents by the Wildlife Agencies and to enable the PCA to complete the land acquisition process expeditiously. If a Wildlife Agency does not, within 30 days, provide either comments or a written request for a maximum of 30 days of additional review time (for a total maximum of 60 days), and the acquisition meets all relevant conditions of the HCP/NCCP, the PCA may proceed with the acquisition, and the acquisition will be credited toward Plan land acquisition commitments.[2]

8.2.6.6 Review of Reserve Unit Management Plans

The Wildlife Agencies will review all draft Reserve Management Plans and provide comments to the PCA within 60 days of receipt of draft plans. The PCA will revise the draft plan based on the Wildlife Agencies' comments, if any, and will provide a revised draft to the Wildlife Agencies, which will have an additional 60-day period to review the revised draft. If an initial draft Reserve Unit Management Plan or any subsequent revised draft Reserve Unit Management Plan adequately addresses a Wildlife Agency's comments, the Wildlife Agency will so notify the PCA within the 60-day review period, and the Reserve Unit Management Plan will be deemed to be approved by that Wildlife Agency. In addition, if a Wildlife Agency does not provide comments within 60 days after receiving

[2] If the proposed acquisition requires a mineral resources assessment, the Wildlife Agencies may review this additional information when it is available and consistent with Section 8.4.2.6.2, *Mineral Resources Assessment*.

the revised draft Reserve Unit Management Plan, the PCA may finalize and proceed to implement the Reserve Unit Management Plan. The PCA will incorporate any comments submitted by the Wildlife Agency after the 60-day period in the revised draft Reserve Unit Management Plan to the extent that the PCA determines the comments can be incorporated without unduly delaying or disrupting implementation of the plan.

8.2.6.7 Dispute Resolution

The PCA and the Wildlife Agencies will work in good faith with each other to reach mutual agreement on implementation tasks and issues, such as adaptive management, monitoring, and conservation actions. If disagreements arise that cannot be resolved easily, the PCA and Wildlife Agencies will follow the dispute resolution process established in the Implementing Agreement (Appendix B, *Implementing Agreement*).

8.2.6.8 Permit Suspension or Revocation

The Wildlife Agencies have the ability under state and federal law to suspend or revoke all or part of the permits if any of the Permittees are out of compliance with the HCP/NCCP or the permits. USFWS and NMFS each have the ability to suspend or revoke all or part of the Section 10(a)(1)(B) permit it issues if continuation of Covered Activities would appreciably reduce the likelihood of the survival and recovery of a Covered Species in the wild (50 Code of Federal Regulations [CFR] 17.22(b)(8), 17.32(b)(8)) or if one or more Permittees do not comply with the conditions of the permit(s) (50 CFR 13.27, 13.28). CDFW has the ability to suspend or revoke all or part of the NCCP permit in accordance with California Fish and Game Code Section 2820. If such a situation arises, the applicable Wildlife Agency will notify the Permittees of the actions they must take, if any, to prevent jeopardy to the species, giving the Permittees a reasonable opportunity to implement such actions. See the Implementing Agreement for details (Appendix B, *Implementing Agreement*).

If one or more of the permits are revoked, the Permittees will have to fulfill all outstanding mitigation requirements for any take impacts that occur prior to the revocation, including land acquisitions, restoration/enhancement actions, and management and monitoring of the Reserve System lands in perpetuity. For example, if the Permittees were behind on the Stay Ahead obligation for land acquisition or restoration, they would be required to meet this obligation. See the Implementing Agreement for details.

8.2.7 Science Advisors and Land Managers

Input from other land management agencies in the Plan Area is an important component of successful adaptive management. The PCA will coordinate informally with land management agencies in the Plan Area to share information and resources in implementing management across reserve boundaries and on a regional scale. The PCA will contact land management agencies with experience or expertise in emerging and ongoing land management issues that arise from management of Reserve System lands.

The PCA will consult Science Advisors on a regular basis to provide advice on Plan implementation. The role of the Science Advisors will be to provide the PCA with science-based expert opinion and recommendations, peer review, and feedback regarding key scientific aspects of Plan implementation such as reserve design, reserve management, monitoring protocols, and grant proposals. Science Advisors will be contacted by the PCA as needed, either individually or as a

group. Science Advisors will be asked to review the Plan's annual report at least once every five years to provide recommendations about how to improve the efficacy of the Plan's monitoring and research program and adaptive management process.

Science Advisors will be scientists and resource managers with expertise in one or more of the following areas:

- Covered Species
- Landscape ecology
- Natural communities in the Reserve System
- Ecological processes
- Resource management
- Biological monitoring and adaptive management
- Statistical analysis and experimental design

Science Advisors will be selected by the PCA with input from the Wildlife Agencies. The PCA may also request that the Science Advisors review the following types of information prepared by or for the PCA:

- Proposals for targeted studies to address important management questions
- Management and monitoring reports and recommendations to the PCA provided by others
- Monitoring priorities, sampling design, survey protocols, data analysis, and data storage
- Proposals for experimental pilot projects to test unproven natural community enhancement/creation/restoration or management techniques
- Proposed changes in reserve design and management, natural community enhancement/restoration/creation techniques, alternative conservation measures, and monitoring methods, based on interpretation of monitoring or research results and consistent with the protocols for, and limitations on, the Monitoring and Adaptive Management Program

The recommendations of the Science Advisors will be considered by the PCA and the Wildlife Agencies. However, such recommendations will be advisory only and will not supersede the PCA's responsibility for making decisions regarding implementation the HCP/NCCP on behalf of the Permittees, or the Wildlife Agencies' responsibility for permit oversight.

8.2.8 Public Input

Public input is fundamental to ensuring the success of and continuing support for the Plan throughout implementation. The NCCP Act requires that the Implementing Agreement provide for periodic reporting to the public on the progress of NCCP implementation. Meetings of the Board of the PCA will be open to the public, and public comments will be solicited and heard at each meeting.[3] In addition, the public can contact the staff of the PCA to comment on various aspects of Plan implementation. With the exception of cultural resource information, all data and reports associated with the monitoring program for this Plan will be available to the public. If it is determined that the

[3] The Governing Board may need to hold periodic closed-door sessions in accordance with the Ralph M. Brown Act to discuss confidential items such as land transaction negotiations or legal matters.

public availability of data and reports associated with the monitoring program would result in the potential take of an animal or plant, the release of that information will be coordinated with the IAWG and legal counsel.

8.2.8.1 Annual Public Meeting

At least once annually, the PCA will convene a meeting to report on the progress of implementation directly to the public. The public meeting will generally coincide with the issuance of the annual report (see Section 8.11, *Reporting*). All public meetings of the PCA will adhere to the open meeting laws in California, including the Ralph M. Brown Act (Government Code Sections 54953(a), 54953(c), 54960.1(d)). The PCA will summarize habitat losses and gains, acquisition of land into the Reserve System, habitat restoration and creation, and management and monitoring accomplishments for the previous year. The meeting(s) will provide an informal forum for the public to pose questions and provide comments directly to the PCA on the overall progress of Plan implementation. The public meeting(s) may coincide with one of the regular PCA Board meetings. The PCA may also conduct periodic formal reviews of Plan progress in a public forum.

8.2.8.2 Public Advisory Committee

The PCA will establish and appoint a public advisory committee to solicit input from stakeholders with interest in Plan implementation. The committee will report to the PCA. Committee meetings will be open to the public and committee members will be drawn from a variety of interest groups, including conservation advocacy organizations, landowner groups, and development interests. Staff from the Permittees and the Wildlife Agencies will very likely participate in advisory committee meetings to help assure broad coordination among those parties interested in and responsible for implementing the Plan. Meeting frequency will be determined by the PCA and the committee. All public meetings of the public advisory committee will adhere to the open meeting laws in California, including the Ralph M. Brown Act (Government Code Sections 54953(a), 54953(c), 54960.1(d)). The committee may sunset at the end of the permit term.

The public advisory committee will provide input to the PCA on all aspects of Plan implementation, with an emphasis on the following topics:

- Expenditure of funds for conservation measures
- The Program Participation process (Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*) (not individual Covered Activities)
- Reserve System management and enhancement
- Achievement of Plan commitments

The criteria listed below will guide establishment and operation of the public advisory committee.

- The committee will include representation of organizations and individuals with direct interest in Plan implementation, and will be composed of the following members appointed by the PCA:
    - Three private project proponents for Covered Activities, (e.g., private developers or their representatives)
    - Three conservation advocates, (e.g., established non-profit environmental organizations that represent members in the Plan Area)

  - Three private landowners
  - Three people representing suburban and rural residents of the Plan Area
- Committee meetings are subject to the open meeting noticing and conduct requirements of the Ralph M. Brown Act. Specifically, committee meetings will be noticed and open to the public, and opportunities given to the public to comment on items on the meeting agenda. Members of the public will be encouraged to participate in discussions and to contribute to committee recommendations.
- The committee will attempt to operate by consensus. When consensus is not possible, the conflicting positions should be communicated to the PCA.
- The committee shall strive in their recommendations to be objective, balanced, and constructive to help the Plan succeed biologically, financially, and within the social context of Placer County.

8.3 Responsibilities of the Placer Conservation Authority

The PCA is primarily responsible for overall and day-to-day implementation of the Plan, including Plan conservation measures (Section 5.3, *Conservation Measures*), the Monitoring and Adaptive Management Plan (Chapter 7, *Monitoring and Adaptive Management Program*), and the Plan funding strategy (Chapter 9, *Costs and Funding*). The PCA will receive advice from a variety of sources, including the Wildlife Agencies, science advisors, and the public and will take the advice into consideration to implement the Plan effectively and cost-efficiently.

The Wildlife Agencies will have review and approval authority over certain aspects of implementation (e.g., Reserve System land acquisitions, restoration actions, Reserve System management plans, and substantial changes in the Monitoring and Adaptive Management Program). However, the PCA will ultimately decide how to implement the Plan and how to comply with the state and federal permits, HCP/NCCP, and Implementing Agreement.

This section describes the PCA's responsibilities for Plan implementation. The PCA may make arrangements for existing entities, including agencies and nongovernmental organizations, to serve some implementation functions or to carry out specific implementation actions, but the PCA will remain responsible for ensuring that those functions and actions are properly implemented and consistent with the Plan.

8.3.1 Implementation of Conservation Measures

The PCA will implement Plan conservation measures as described in Section 5.3, *Conservation Measures*. The conservation measures are divided into four parts. Conservation Measure 1, Establish Reserve System (Section 5.3.1, *Conservation Measure 1: Establish Reserve System*), describes the Plan's acquisition requirements for Reserve System assembly, including reserve design criteria and acreage commitments for natural communities and Covered Species' habitats. Conservation Measure 2, Manage and Enhance Reserve System (Section 5.3.2, *Conservation Measure 2: Manage and Enhance the Reserve System*), describes the actions necessary to maintain and improve the ecological conditions of natural communities and Covered Species' habitat on the Reserve System and along streams outside the Reserve System. Conservation Measure 3, Restore and Create Natural

Communities and Covered Species' Habitat (Section 5.3.3, *Conservation Measure 3: Restore and Create Natural Communities and Covered Species' Habitat*), describes restoration and creation actions the PCA will implement to increase the acres of natural communities and Covered Species' habitat. Conservation Measure 4, Plan Area-wide Actions (Section 5.3.4, *Conservation Measure 4: Plan Area-wide Actions*), describes actions the PCA will implement throughout Plan Area A (i.e., actions that are not limited to the Reserve System), such as implementation of low-impact development standards and public outreach.

In some cases, prescribed conservation measures include actions that are dependent on site-specific conditions and ecological contexts. Implementation of such actions will depend on the on-the-ground assessment of ecological conditions by the PCA's reserve managers. All such actions must be consistent with the PCCP's biological goals and objectives. In addition, if the PCA proposes such an action, and the action is not identified in a prescribed conservation measure, the PCA will first inform the Wildlife Agencies about the action and give them an opportunity to provide input about whether or how the action should be implemented.

The PCA's responsibility for implementing Plan conservation measures includes the following roles and functions:

- Researching land and water acquisition opportunities (fee title or conservation easement) to meet the requirements of the Plan
- Negotiating land acquisitions (fee title or conservation easements) with private landowners
- Negotiating land acquisitions (fee title or conservation easements) in partnership with other organizations
- Acquiring and protecting water rights
- Coordinating the efforts of the Permittees to ensure that the Plan is implemented consistently and effectively
- Reviewing and approving offers of land in lieu of the development fee that may be made by project proponents (see Section 8.4.13, *Land Dedication in Lieu of Land Conversion* Fee) and making determinations on other implementation matters that require approval of the PCA, as specified in this Plan and the Implementing Agreement
- Monitoring and enforcing landowner compliance with conservation easement terms[4]
- Developing a Reserve System-wide fire management plan
- Developing site-specific management plans for individual reserves and reserve units (collections of reserve parcels that share common land-cover types and habitats)
- Designing and implementing plans for habitat enhancement, restoration, and creation and managing the affected areas in an adaptive management framework (see additional detail below)
- Obtaining additional permits for site-specific projects in the Reserve System (e.g., wetlands permits and cultural resources compliance for restoration projects), as needed

[4] Enforcement actions on private land under conservation easement for the Reserve System would be conducted by the PCA with assistance from the appropriate local jurisdiction. Enforcement actions on land in the Reserve System owned by a public agency would be conducted by that agency with assistance from the PCA.

- Constructing and maintaining recreational facilities on the reserves that are compatible with the conservation goals of the Plan or coordinating such efforts with the Permittees
- Conducting outreach to landowners, local community groups, agencies, and the general public regarding the Plan and its goals
- Developing a volunteer program to provide an opportunity for the public to contribute to the successful implementation of the Plan
- Periodic mapping of the Plan Area to update the land-cover map and calculations
- Coordinating and communicating with local, state, and federal land management agencies and private land managers (e.g., land trusts)
- Designing a scientifically valid monitoring program (see Chapter 7, *Monitoring and Adaptive Management Program*) and monitoring habitat and species on reserves, including site inventories, targeted studies, compliance monitoring, and effectiveness monitoring
- Monitoring changed circumstances identified in Chapter 10, *Assurances,* that might arise and, if they do, following the remedial measures and procedures outlined in Chapter 10, *Assurances*
- Developing partnerships with local and regional academic institutions and organizations (including non-profit research and academic institutions) to help direct research toward management and monitoring needs of the Plan
- Conducting or overseeing land and water management activities that are part of the conservation strategy
- Monitoring and tracking land acquisition and other conservation actions within and adjacent to the Plan Area performed by others to ensure coordination and compatibility with Plan actions
- Developing and conducting educational programs for landowners and the public consistent with the conservation strategy
- Complying with vector control requirements within the Reserve System
- Involving the public, science advisors, interested agencies, and others in Plan implementation (see Section 8.2, *Implementation Structure*)
- Resolving disputes among Permittees about the implementation of conservation measures

8.3.2 Administration and Funding

The PCA's administrative responsibilities include, but are not necessarily limited to, the following:

- Developing and maintaining annual budgets and work plans
- Obtaining grants and other outside funding sources, including tracking and reporting grant compliance
- Collecting Plan fees from Permittees or from private project proponents as directed by local jurisdictions and specified in their local implementing ordinances (see Section 8.2.3.1, *Implementation Ordinances*) and as described in Chapter 9, *Costs and Funding*
- Receiving, managing, tracking, reporting, and expending funds, including fee revenues collected or paid by the Permittees to implement the Plan

- Training County and City staff to review participation packages under the Plan (Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*)
- Assisting Permittees to ensure that Covered Activities comply with the conditions on Covered Activities described in Chapter 6, *Program Participation and Conditions on Covered Activities*
- Providing tools to the Permittees to support the participation package review process
- Creating and maintaining databases, on a real time basis, to track all impacts of Covered Activities and progress toward the biological goals and objectives
- Creating and maintaining databases and models to support the evaluation of land acquisition opportunities and other conservation measures to meet the requirements of the Plan
- Ensuring that conservation measures are being implemented proportional in time and amount to the impacts on land-cover types authorized under the Plan (e.g., see Section 8.4.3, *Stay Ahead Provision*), and forecasting land acquisition needs in order to comply with the Stay Ahead provision
- Notifying the Permittees of the requirement to make the land in lieu of fee provision compulsory when the Plan is out of compliance or in jeopardy of being out of compliance with the Stay Ahead provision, as well as notifying them when this requirement may be lifted (see Section 8.4.3, *Stay Ahead Provision*)
- Calculating the amounts of annual fee adjustments and distributing these calculations to the Permittees, in accordance with Chapter 9, *Costs and Funding*
- Performing the periodic fee assessments described in Chapter 9, *Costs and Funding*
- Preparing the Annual Report (see Section 8.11, *Reporting*, below)

8.3.3 Monitoring, Adaptive Management, and Scientific Oversight

Scientific expertise and oversight is needed within the PCA to help direct all technical aspects of Plan implementation, including the Monitoring and Adaptive Management Program (see Chapter 7, *Monitoring and Adaptive Management Program*). The PCA or its designees will collect and analyze data as required by the Plan, keep abreast of current scientific methods and concepts, and provide continuous oversight of the Monitoring and Adaptive Management Program (e.g., monitoring methods, study designs) to ensure that the Reserve System incorporates the most appropriate strategies. The PCA will be responsible for communication with external scientists, including agency scientists, scientific advisors, and the larger conservation science community. Moreover, the PCA will seek input from science advisors regarding conservation biology and planning issues, as described in Section 8.2.7, *Science Advisors and Land Managers*. The PCA will also contact agency and academic scientists to facilitate collaborations that will contribute to the Plan's conservation goals.

8.3.4 Real Estate Activities

The PCA will conduct relevant financial and legal analyses to guide selection of parcels for the Reserve System, and will conduct or manage appraisals (required when state or federal grant funding or public agency general funds are to be utilized) and transactions. The PCA will retain one or more specialists with expertise in real estate law, California land use law, and local regulations, as needed to acquire reserve lands. The PCA may also work with other agencies and organizations to acquire land to fulfill requirements of the Plan. Such agencies and organizations may already have staff with relevant expertise, which the PCA could utilize.

8.3.5 Grant Administration

The PCA is responsible for managing all grants, contracts, and other funding sources during Plan implementation. The PCA will establish clear accounting procedures and methods for disbursing funds and will actively pursue additional funding for Plan implementation by submitting grant applications and other means. The PCA may also work with other agencies and organizations to seek grants to fulfill Plan requirements. Existing agencies and organizations may have staff with relevant expertise, which the PCA could utilize. For any grants received, the PCA or its partner agency or organization will also monitor, track, and report to the granting agency according to the grant requirements.

8.3.6 Budget Analysis

The PCA is responsible for developing and monitoring budgets, processing invoices, managing financial reserves, identifying cost savings, and managing administrative contracts (e.g., liability insurance). The PCA will also track expenditures and cash flow and establish and maintain an internal accounting system and procedures.

8.3.7 GIS/Database Maintenance

The PCA will use geographic information system (GIS) or other equivalent spatially explicit database systems to collect, store, and utilize relevant spatial data necessary for Plan implementation and maintain them to track compliance and to guide reserve design and monitoring and adaptive management programs. For example, the PCA must be able to query the database to summarize take and conservation by year (by land-cover types and plant occurrences) and cumulatively. The PCA will track all data related to the progress of meeting Plan goals and objectives and will report all occurrences of Covered Species to USFWS, CDFW, NMFS, and the California Natural Diversity Database (CNDDB). The PCA will also provide relevant GIS data to the Wildlife Agencies along with annual HCP/NCCP reports (see Section 8.11, *Reporting*) The PCA will also ensure development and management of a public web site for the Plan.

8.3.8 Public Outreach and Education

The PCA will conduct outreach to local private and public landowners and residents that will include education on management goals and objectives as well as implementation techniques. The focus of public education and outreach activities will be to raise landowner and public awareness of reserve management goals, actions and methods, and how the public can support them. Where appropriate, the PCA will develop and publish guidelines for local landowners and provide education programs

to assist in the implementation of such guidelines. Public education and outreach will be coordinated with other local agencies and organizations providing similar services in the Plan Area (e.g., County Parks, University of California Cooperative Extension, Resource Conservation District, Placer Land Trust, Dry Creek Conservancy and Sierra College).

8.3.9 Legal and Financial Services

Legal counsel will provide guidance during Plan implementation on an as-needed basis for drafting and reviewing conservation easements, reviewing purchase and sale agreements, assisting with land transaction negotiations, assisting with legal interpretations of case law and state/federal laws affecting the Plan, assisting with legal challenges, and easement violations if they occur.

Financial analysis assistance will be required periodically to review the program's cost/revenue balance and ensure that Plan fees are adjusted with changing land costs and inflation, as described in Chapter 9, *Costs and Funding*.

8.3.10 Consultants and Contractors

Consultants or contractors will be retained where necessary to meet land stewardship, technical or scientific needs effectively and efficiently. Consultants or contractors will most likely be needed for restoration monitoring and for construction tasks within the Reserve System that require specialized skills or the use of heavy equipment, such as road grading, restoration grading, plant propagation, restoration planting, building recreational facilities, irrigation, erosion control, and water-well construction and maintenance. Consultants or contractors may be non-profit entities or private businesses.

8.4 Establishing the Reserve System

The PCA will establish the Reserve System as described in Section 5.3.1, *Conservation Measure 1: Establish Reserve System*, and this section. The PCA will ensure that lands meet the criteria for Reserve System Lands (Section 8.4.1, *Criteria for Reserve System Lands*) and will assemble the Reserve System in the following ways:

- Placement of a conservation easement on land owned by a Permittee that is to be counted toward Plan land acquisition commitments
- Purchase of land (fee title or conservation easement) from willing sellers
- Purchase of land (fee title or conservation easement) in partnership with other organization(s) (Section 8.4.5, *Land Acquired by Other Organizations or through Partnerships*)
- Acceptance of land (fee title or conservation easement) dedications in lieu of a fee payment if the land contributes to Plan goals and objectives and is approved by the PCA (see Section 8.4.13, *Land Dedication in Lieu of Land Conversion Fee*)
- Acceptance of credits sold in private mitigation and conservation banks if they meet the terms of the Plan (see Section 8.4.7, *Private Mitigation and Conservation Banks*)
- Acceptance of land (fee title or conservation easement) dedications as a gift or charitable donation (see Section 8.4.12, *Gifts of Land*)

8.4.1 Criteria for Reserve System Lands

To be incorporated into the Reserve System and counted toward the Plan's land acquisition commitments, lands must meet all applicable criteria in this section, must be included in a Reserve Unit Management Plan as described in Section 5.3.2.1, *Reserve Unit Management Plans*, and must be included in the Monitoring and Adaptive Management Plan. Acquisitions may be counted toward meeting the land acquisition commitments of the Plan before the Reserve Unit Management Plan has been completed if the PCA owns the land or if the property owner is bound by a conservation easement that requires preparation of a management plan consistent with the requirements in Chapter 5, *Conservation Strategy*.

To be incorporated into the Reserve System and counted toward Plan land acquisition commitments, all lands must meet the following criteria:

- They must contribute to meeting the goals and objectives of the Plan as described in Section 5.2, *Conservation Strategy Framework.*
- They must permanently protect the biological functions and values that contribute to the Plan. Permanent protection must be ensured by a conservation easement consistent with the requirements of Section 8.4.9, *Conservation Easements*, recorded in favor of the PCA. For lands owned by the PCA or a Permittee, permanent protection must be ensured through a conservation easement recorded in favor of a Wildlife Agency or an appropriate third-party easement holder approved by the Wildlife Agencies.
- Have no hazardous materials or property encumbrances that conflict with Plan goals and objectives. The PCA will ascertain the frequency and type of use in these rights-of-way and utility easements and determine whether the affected areas should be counted toward land acquisition commitments. Any rights-of-way or utility easements that are maintained or used regularly cannot be counted toward land acquisition commitments because of the disturbance that occurs within these areas.
- Must not have been used to mitigate a project or activity that is not a Covered Activity, including projects and activities approved and permitted before the Plan is approved, except as provided in Section 8.4.8, *Mitigation for Activities not Covered by the Plan*.

8.4.1.1 Additional Criteria for Reserve System Lands in the PFG

The Reserve System will be located primarily within the Reserve Acquisition Area (RAA). However, important resources occur in the Potential Future Growth Area (PFG). Two thousand acres or more of vernal pool complex and other natural communities within the PFG may be included in the Reserve System if, in addition to the general criteria for Reserve System lands above, they meet the criteria for Reserve System lands in the PFG in Section 5.3.1.4, *Landscape-level Reserve Design*.

8.4.1.2 Additional Criteria for Vernal Pool Complex Lands

Lands acquired to protect vernal pools and vernal pool grassland complexes in the Reserve System must meet the criteria for vernal pool complex lands in Section 5.3.1.5.2, *Vernal Pool Complexes and Grassland Natural Communities*, in addition to the general criteria for Reserve System lands above.

8.4.1.3 Additional Criteria for Lands Acquired for Vernal Pool Restoration and Creation

The PCA will acquire sufficient lands to restore 3,000 acres of vernal pool complex. Lands acquired to provide vernal pool restoration sites must meet the site selection criteria in Section 5.3.1.5.2, *Vernal Pool Complexes and Grassland Natural Communities,* in addition to the general criteria for Reserve Lands above and the additional criteria for vernal pool complex lands in Section 5.3.1.5.2.

8.4.2 Process for Acquiring Lands

The process for acquiring lands for the Reserve System, whether in fee title or through conservation easements, will follow the steps listed below. These steps are also illustrated in Figure 8-2 . The PCA may perform these steps on its own or with acquisition partners.

8.4.2.1 Step 1: Site Identification

Identify sites that have the potential to meet acquisition requirements for particular land-cover types, plant populations, landscape linkages, or to support suitable and occupied habitat for Covered Species. The PCA will use the guidelines in Section 5.3.1.4, *Landscape-level Reserve Design*; Section 5.3.1.5, *Natural Community–level Reserve Design*; and Section 5.3.1.6, *Species-level Reserve Design*, to direct land acquisition and the reserve assembly process.

8.4.2.2 Step 2: Pre-acquisition Assessment

Approach property owners to explain the potential interest in acquiring land through conservation easement or fee title. With landowner's permission, conduct a pre-acquisition assessment of the site to evaluate whether the site is likely to meet Plan requirements. Types of information collected during these assessments will include an evaluation of location, quantity, quality, and presence of Covered Species, Covered Species' habitat; and natural communities present, as well as other site conditions or infrastructure that would benefit or conflict with the Plan's biological goals and objectives. The site's restoration and enhancement potential will also be assessed. The same pre-acquisition assessment will be conducted for land dedications (fee title or conservation easement) proposed by a property owner as a gift or charitable contribution, or in lieu of a fee payment (see Section 8.4.13, *Land Dedication in Lieu of Development Fee*). PCA will develop standard protocols and a report template for pre-acquisition assessments prior to the first acquisition during implementation.

8.4.2.3 Step 3: Site Prioritization

The PCA will determine if the site meets the criteria for Reserve System lands and will rank the site compared to other available sites based on cost, contribution to meeting Plan acquisition commitments and achieving the biological goals and objectives, reserve design principles (Section 5.3.1.3, *Reserve System Components*), and the reserve acquisition strategy (Section 5.3.1.4, *Landscape-level Reserve Design*). Sites that meet specific acquisition commitments, goals, and objectives that are more difficult to fulfill will be assigned a higher priority.

The biological suitability of the site for the Reserve System will be determined on the basis of the following information:

- The results of past biological surveys (not to exceed ten years prior), updated land-cover mapping, assessments of habitat suitability for Covered Species, air photograph interpretation, and the biological resources present or expected on the site
- An evaluation of the site's enhancement and restoration potential
- An evaluation of the site's existing and potential biological value in the context of the remaining unmet biological goals and objectives and land acquisition requirements
- The presence of natural communities and Covered Species' habitat as needed to meet protection commitments specified in Section 5.3.1, *Conservation Measure 1: Establish Reserve System* (Table 5-4 and Table 5-7.

8.4.2.4 Step 4: Wildlife Agency Concurrence

The concurrence of CDFW and USFWS must be obtained for all land acquisitions. The concurrence of NMFS will be required for land acquisitions that support habitat for covered anadromous fish species. As explained in Section 8.2.6.5, *Review of Pre-acquisition Assessments for Reserve Land Acquisition*, the Wildlife Agencies will have 30 days to respond to requests for approval once all relevant and available information has been provided to them (or 60 days if an extra 30-day review is requested). If within the review period there has been no response from an agency, the PCA may proceed with the acquisition, and lands that meet all relevant conditions of the HCP/NCCP will be credited toward Plan land acquisition commitments.

The PCA will discuss potential land acquisitions with the Wildlife Agencies early in the land acquisition process and will provide an opportunity for input during site selection when practicable.

8.4.2.5 Step 5: Appraisal

The PCA will require an independent appraisal of the site's property value (conservation easement or fee title) when state or federal grant funding or public agency general funds are to be utilized. The site's water rights will also be determined.

8.4.2.6 Step 6: Purchase Offer

The PCA will develop purchase offers and negotiate price and other terms and conditions with property owners. For conservation easements, the PCA will reach agreement on easement terms and any necessary management objectives prior to purchase. Conservation easements must be superior to any liens of record or existing interests in the property, unless such liens or interests will not substantially conflict with the property's conservation values. A subordination agreement will be required when necessary to insure that the conservation easement is superior to any such liens of record. The PCA will examine all water rights that apply to the property and include terms that insure that water-dependent Plan objectives for conservation and/or restoration can be managed in perpetuity.

8.4.2.6.1 Due Diligence Requirements

Through the due diligence process, the PCA will ensure that property encumbrances (e.g., existing utility easements, deeds of trust, property title, resource extraction rights, presence of hazardous

materials or archaeological or cultural sites that conflict with management goals) do not conflict with Plan goals and objectives. The PCA will obtain the following for all land acquisitions:

- The pre-acquisition assessment (see Section 8.4.2.2, *Step 2: Pre-acquisition Assessment*)
- A preliminary title report and legal description of the property
- Available evidence of all other easements, covenants, restrictions, reserved rights, and other property interests (including water rights and mineral rights) on the property.
- A Phase I environmental analysis for hazardous materials will be required. If deemed necessary by the Phase I assessment, a Phase II environmental assessment will be required prior to an acquisition being completed
- A map of the parcel in relation to other components of the Reserve System, or other properties subject to other permanent protections for conservation purposes, including lands acquired through other conservation programs (e.g., land trust acquisitions, Natural Resources Conservation Service Wetland Reserve easements, Placer Legacy Open Space and Agricultural Conservation Program).
- A Property Analysis Report or comparable assessment of the initial capital costs (e.g., acquisition and restoration) and ongoing management funds required to manage and monitor the lands (i.e., applicable components of Plan cost estimate)

8.4.2.6.2 Mineral Resources Assessment

As part of the due diligence process, the PCA will ascertain whether the property's mineral rights have been severed from fee title. If there is information in the property's title documents (deed, title policy, or leases) that suggests the mineral rights have been severed, the PCA will assess the likelihood that the severed mineral rights will be used in a manner that will harm the conservation values on the property to be protected based on the following considerations:

- Is the property within a sedimentary basin mapped for oil, gas or geothermal production by the California Department of Conservation's Division of Oil, Gas, and Geothermic Resources?
- Is there evidence of past or current mining on the property, including a permit application or issuance of a permit from the County or the City?

If the PCA concludes based on these considerations that it is reasonably foreseeable that the severed mineral rights will be used in such a manner, the PCA will arrange for a California-licensed Profession Geologist to prepare a mineral assessment report that includes all of the following:

- Title report review
- Description of surface and mineral rights ownerships, including all changes in ownership over the fifteen preceding years and rights to access the surface by the owners of the mineral estate
- Identification of the mineral resources on the property that are included and excluded in the mineral estate
- Review of locatable, useable, and salable mineral resources on the property
- Maps and aerial photographs of property with delineated mineral estates
- Assessment of mineral resource potential, including a map showing locations
- Discussion of environmental constraints to mining

- Preparer's qualifications

If the PCA concludes, based on the mineral assessment report, that the severed mineral rights propose a low risk to the conservation values to be protected on the property, no further action regarding such mineral rights will be required. If the PCA concludes, based on the report, that the severed mineral rights pose a high risk to such conservation values, the PCA will do one of the following:

- Extinguish the severed mineral rights.
- Acquire the severed mineral rights.
- Establish a surface use agreement with the mineral rights holder that prevents use of the mineral rights in a way that will harm the conservation values to be protected on the property.
- Identify areas of the property where the risk is low and proceed with acquisition of those areas.
- Reduce the extent to which the acquisition is credited toward Plan land acquisition commitments.

For any property on which the mineral rights have been severed from the fee title, the PCA will provide the Wildlife Agencies either with:

- The PCA's conclusion that it is not reasonably foreseeable that the severed mineral rights will be used in a manner that harms the conservation values to be protected on the property and an explanation of the PCA's assessment and supporting considerations; or
- A copy of a mineral assessment report prepared for the property, along with the PCA's conclusion regarding the level of risk that the severed mineral rights pose to the conservation values to be protected on the property and, where there is a high risk, any actions the PCA proposes to take to address such risk.

The Wildlife Agencies will have 30 days to review and approve the PCA's assessment, conclusions, and, if applicable, proposed actions with regard to the mineral rights, once all relevant and available information has been provided to them, following the same process described in Section 8.2.6.5, *Review of Pre-acquisition Assessments for Reserve Land Acquisition*. If within 30 days there has been no response from an agency, the PCA may proceed with the acquisition, and the lands will be credited toward Plan land acquisition commitments.

8.4.2.7 Step 7: Facilities Assessment and Site Preparation

If acquired in fee title, the PCA will assess structures and facilities on the property for safety hazards and identify potential land use values, such as for educational applications, land management facilitation, or cultural or historic significance. Structures and facilities will be repaired or demolished, as appropriate, to reduce public hazards, reduce maintenance costs or stabilize functions (e.g., repair of gates and fencing). The PCA will examine all leases that apply to the property for consistency with Plan goals and objectives. Inconsistent leases will be terminated or modified to conform to the Plan.

8.4.2.8 Step 8: Reserve Unit Management Plan

If a site is purchased in fee title, the PCA will prepare a Reserve Unit Management Plan for the site that is based on site conditions and is consistent with the Plan's conservation strategy and the framework for adaptive management.

If a conservation easement, rather than fee title, is purchased, the easement will include terms allowing the implementation of any management actions required by Section 5.3.2, *Conservation Measure 2: Manage and Enhance the Reserve System*, on the site and requiring use of the site to be consistent with such management. If a Reserve Unit Management Plan that applies to the site has already been prepared according to Section 5.3.2.1, *Reserve Unit Management Plans*, the PCA will reference the Reserve Unit Management Plan in the easement and will record simultaneously with the conservation easement a Memorandum of Unrecorded Reserve Unit Management Plan, indicating where that Reserve Unit Management Plan may be found. Such a title record ensures that the Reserve Unit Management Plan will be tied to the conservation easement in the event property ownership changes.

8.4.3 Stay Ahead Provision

Timely assembly of the Reserve System relative to impacts of Covered Activities is critical to the success of the Plan. To assemble the Reserve System in a timely manner, progress toward assembling the Reserve System will stay ahead of take impacts allowed under the permits. This will ensure that assembly of the Reserve System stays ahead of impacts as much as possible, and that the PCA is making steady progress toward completing the Reserve System. This Plan requirement is referred to as the "Stay Ahead" provision or "Stay Ahead" requirement. To meet the Stay Ahead provision during the early phase of Plan implementation, some land will be acquired to "jump start" the Reserve System (see Section 8.4.4, *Jump Start*).

8.4.3.1 Purpose of Requirement

The NCCP Act requires that implementation of mitigation and conservation measures be "roughly proportional in time and extent to the impact on habitat or Covered Species authorized under the plan" (California Fish and Game Code Section 2820(b)(9)). To meet the requirements of this section, CDFW requires that NCCPs make progress toward the final conservation goals (e.g., the ultimate size and configuration of a plan's reserve system) in proportion to the impacts of Covered Activities. The Stay Ahead provision in this Plan addresses this requirement.

The ESA requires that HCPs minimize and mitigate the impacts of the taking to the maximum extent practicable (ESA Section 10(a)(2)(B)(ii)). When conducting their jeopardy analyses, both USFWS and NMFS will consider whether the mitigation proposed is scientifically and rationally related to the impact of the taking. In order to make findings that the proposed impacts are mitigated to the maximum extent practicable, USFWS and NMFS will consider temporal losses (if any) resulting from the time of impact relative to the time of mitigation. The Stay Ahead provision will minimize or eliminate temporal losses.

8.4.3.2 Measure of Compliance

The Stay Ahead provision requires that the amount of each natural community and constituent habitat protected, restored, or created by the PCA as a proportion of the total requirement for each

natural community and constituent habitat (Table 5-6 and Table 5-7) must be equal to or greater than the take impacts on that community and constituent habitat as a proportion of the total take impacts authorized for all Covered Activities (Table 5-3).

To measure compliance with the Stay Ahead provision, land-cover types will be aggregated by natural and semi-natural communities. The amount of each natural community conserved, restored, or created as a proportion of the total requirement by natural community must be equal to or greater than the impact on the natural community as a proportion of the total impact expected by all Covered Activities. For example, if 25 percent of the total expected impacts on vernal pool complex land-cover types have occurred, then at least 25 percent of the overall protection and restoration commitment for all vernal pool complex land-cover types must also occur. This method of aggregating land-cover types only applies to the measurement of the Stay Ahead provision (i.e., requirements for acquisition by each land-cover type still apply for all other purposes).This aggregation method provides flexibility to the PCA to acquire, restore, or create the most sensitive and difficult land-cover types first within each natural community, even if impacts on these land-cover types have not yet occurred.

8.4.3.3 Implementation Guidelines

When Plan implementation begins, the PCA will be establishing its structure, collecting implementation fees, and pursuing land acquisitions. To allow time for these start-up tasks to occur, the Stay Ahead provision will not apply during the first 2 years of implementation (i.e., during the first 2 years after the last implementing ordinance takes effect). After this time, the PCA will ensure compliance with the Stay Ahead requirement by showing that, at the end of each calendar year, the amount of each natural community and constituent habitat protected, restored, or created by the PCA as a proportion of the total requirement for each natural community and constituent habitat is equal to or greater than the take impacts on that community and constituent habitat as a proportion of the total take impacts authorized for all Covered Activities (Section 8.4.3.2, *Measure of Compliance*).

To provide flexibility during implementation, the PCA may fall behind its Reserve System assembly requirement for each natural community or semi-natural community by a maximum of 10 percent for limited periods of time and still remain in compliance with the Stay Ahead provision. The allowance for up to a 10 percent deficit from the Stay Ahead requirement for limited periods of time accounts for the likely pattern of relatively infrequent land acquisition of parcels that provide mitigation for more than one Covered Activity. The PCA will most likely accumulate fee revenues from several Covered Activities, as well as other funding, and will in some cases temporarily fall behind its land acquisition commitments for purposes of meeting the Stay Ahead requirement. It will also very likely jump ahead of the Stay Ahead requirement once such acquisitions are completed.

The PCA will not fall behind in protection, restoration, or creation by more than 10 percent for each natural community or semi-natural community (not for the total acreage required for conservation) or allow any deficit to continue for a prolonged period. To ensure that there is not a prolonged deficit from the Stay Ahead requirement, the PCA will not allow a deficit of any size to last for 3 years. Specifically, the PCA will not allow a deficit of any size in any land acquisition or restoration commitment needed to meet the Stay Ahead requirement to exist at the end of three consecutive calendar years.

Once the permits end (i.e., through expiration, suspension, revocation), the Permittees will be held responsible for any outstanding requirements in the permits, the Plan, and Implementing Agreement. In other words, if the PCA falls behind the Stay Ahead requirement, it must "catch up" if the permits expire or are suspended or revoked (see the Implementing Agreement for detail).

8.4.3.4 Land Acquired by State or Federal Agencies

Land acquired in full or in part by state or federal agencies to assist species recovery under the Plan may be counted toward compliance with the Stay Ahead provision. The Plan assumes some funding by the state and federal governments will be available to implement a portion of the Plan's conservation strategy. However, state and federal funding, including but not limited to Section 6 grants, cannot be used to fulfill mitigation requirements of the Plan. The PCA recognizes, however, that funds from public agencies will be available on budget cycles that may or may not correspond to the timing of Covered Activities. Therefore, the PCA cannot rely on the timely availability of state or federal funds to implement these actions.

8.4.3.5 Land Acquisition and Restoration/Creation

Land may be counted toward Plan land acquisition commitments and the Stay Ahead provision once it is incorporated into the Reserve System (see Section 8.4.1, *Criteria for Reserve System Lands*, for the criteria for incorporating land into the Reserve System). Compliance with the Stay Ahead provision for habitat restoration or creation commitments is tracked separately from land acquisition. Compliance with the Stay Ahead provision and overall crediting for habitat restoration or creation commitments (see Table 5-5) will be measured and counted at the point when construction of the restoration or creation is completed. As part of the monitoring program (Chapter 7, *Monitoring and Adaptive Management*), the PCA will assess success of individual restoration or creation projects relative to pre-established success criteria at fixed intervals depending on land-cover type. If projects do not meet success criteria, the PCA will adaptively manage and monitor the sites until success criteria are met. If necessary, all or a portion of the restoration project may be relocated to a suitable site for supplemental restoration/creation, whereby monitoring efforts relative to unmet success criteria will re-initiate. Requirements for the timing of vernal pool restoration and creation, including requirements for meeting occupancy standards and success criteria, are in Section 5.3.3.3.1, *Vernal Pool and Grassland Natural Communities*.

A natural community or constituent habitat that is created or restored can only be counted as creation or restoration, not preservation. If the creation project occurs after recording the conservation easement (i.e., after preservation credit is assigned), the acreage of the creation project will be subtracted from the preserved natural community or constituent habitat types that the project replaces. For example, on a site that supports 100 acres of grassland, 100 acres of grassland would be counted toward the Plan's preservation commitments when a conservation easement is recorded. When a 10-acre vernal complex creation project is initiated on the site (i.e., when construction has started), 10 acres would be deducted from the acres of grassland counted toward preservation commitments, leaving a total of 90 acres counted toward preservation requirements at the site.

The PCA will document the conditions of wetland restoration sites prior to initiating restoration in order to determine whether the restoration project is enhancing or restoring the wetland according to the definitions in the Plan. If the wetland is being enhanced, then it can only be counted as

preservation. If the project meets the Plan's definition of a restoration project, then it can be counted toward restoration commitments.

Wetland features can be counted according to the functions of the different parts of the wetland. For example, a feature may consistently function as a seasonal wetland or perennial wetland on its margins and function as a pond in the center. If these distinctions are consistent and predictable, wetland constituent habitat types can be apportioned within a single wetland feature and counted for preservation or restoration. Wetland restoration types may change if the wetland type changes (e.g., a pond becoming a perennial wetland, if cattails colonize and dominate the site) before success criteria are met. The final amount of restoration counted toward Plan restoration commitments will be established when the success criteria of the restoration project are met.

The Plan makes sharp distinctions between some land-cover types when, in reality in the field, there are often gradual gradients between land-cover types. In cases where it is difficult to draw a boundary between land-cover types, the PCA will have discretion to identify each land-cover type based on field conditions and professional judgment.

8.4.3.6 Stay Ahead Reporting and Process for Addressing Non-compliance

The PCA will monitor the status of the Stay Ahead provision throughout Plan implementation and will report the status of the Stay Ahead provision in each annual report, beginning with the third annual report. In addition, the PCA will provide quarterly updates regarding land acquisitions and compliance with the Stay Ahead provision on the PCCP webpage. The Wildlife Agencies will evaluate compliance with the Stay Ahead requirement annually. If the Wildlife Agencies determine that the requirements of Section 8.4.3, *Stay Ahead Provision*, have not been fulfilled, they will so notify the PCA in writing, and the PCA and Wildlife Agencies will meet to develop a mutually agreeable plan of action that will fulfill such requirements, in accordance with the Implementing Agreement.

The mutually agreeable plan of action may include a range of potential solutions, including the following:

- Wait for key pending land acquisition negotiations to close that will bring the Plan into compliance with the Stay Ahead provision
- Seek to speed delivery of funding sources or partnerships that will enable more land acquisition to bring the Plan into compliance with the Stay Ahead provision
- Purchase appropriate credits (i.e., the credits must meet all applicable conditions of the Plan; see Section 8.4.7, *Private Mitigation and Conservation Banks*, below) from an approved conservation/mitigation bank
- Further pursue interest from key landowners who may be willing to sell and/or dedicate land to the PCA that would enable compliance with the Stay Ahead provision
- Change the manner in which the Plan is implemented to increase direct acquisition of land by the PCA rather than relying on partnerships, or shifting the PCA's budget allocations to place a higher priority on land acquisition
- Accelerate the process for being able to count land already acquired against Stay Ahead requirements by, for example, recording conservation easements more quickly
- Encourage project proponents to provide land in lieu of implementation fees (see below)

- Temporarily or permanently adjust certain Plan provisions through an amendment or other process (e.g., the method for measuring compliance with the Stay Ahead provision), with the approval of the Wildlife Agencies
- Initiate the land in lieu of fee requirement (see Section 8.4.3.7, *Requirement for Land Dedication*)
- Slow or stop extending take authorization to Covered Activities until land acquisition catches up with take impacts

8.4.3.7 Requirement for Land Dedication

If at any time the HCP/NCCP fails to comply with the Stay Ahead requirement (i.e., by falling behind by more than 10 percent or by any amount for three consecutive years), or if the PCA concludes there is a reasonable likelihood that the HCP/NCCP will fall out of compliance within 1 year, the PCA may recommend that the Permittees provide land or implement conservation actions in Chapter 5, *Conservation Strategy*, and that the County and City encourage project proponents to provide land or implement such conservation actions, in lieu of a portion of Plan development fees. The PCA will provide written notice of such recommendation to the other Permittees and the Wildlife Agencies. The PCA's notice will recommend a scope of Covered Activities or conditions on Covered Activities to which the land or conservation action in lieu of fee requirement would apply, for example, applying the requirement only to Covered Activities that will affect 10 acres or more. All Permittees will thereafter apply the recommended land in lieu of fee requirement to Covered Activities that they implement; the PCA will apply the requirement to Participating Special Entities; and the County and City will consider applying the requirement to private project proponents. Land provided in lieu of Plan development fees must meet the guidelines and criteria in Section 8.4.13, *Land Dedication in Lieu of Development Fee*.

In evaluating the likelihood that the HCP/NCCP will fail to comply with the Stay Ahead requirement, the PCA will take into account pending acquisitions, e.g., whether a purchase and sale agreement has been executed, or outstanding grants have been awarded, but related contracts have not yet been approved.

HCP/NCCP development credits derived from land dedications or the implementation of conservation actions specifically approved for HCP/NCCP development fee credit in accordance Section 9.3.1, *Establish Reserve System*, may be used regardless of any land in lieu of fee recommendation from the PCA.

The County and City acknowledge that failure to apply the land in lieu of fee requirement to private project proponents when needed to meet the Stay Ahead requirement may result in suspension or revocation of the Permits.

The PCA will terminate the requirement for land dedications or implementation of conservation actions (i.e., it will revert back to a voluntary alternative) as soon as the PCA determines, and the Wildlife Agencies concur, that HCP/NCCP implementation is in compliance with the Stay Ahead requirement. Upon making such a determination, the PCA will so notify the other Permittees in writing, and the Permittees may thereafter terminate the requirement with regard to their own Covered Activities and to private project proponents.

8.4.4 Jump Start

Lands have already been acquired to "jump start" the assembly of the Reserve System. Open Space agencies and organizations in the Plan Area have been acquiring land during PCCP development. Consistent with the NCCP Act Section 2810(b)(8) and the Planning Agreement, parcels or portions of parcels acquired after approval of the Planning Agreement in 2001 can be counted toward meeting Plan acquisition commitments according to the procedures and criteria described above for lands acquired by other organizations or through partnerships. Lands acquired during Plan development can only be credited against Plan requirements to the extent the land has not been acquired for mitigation purposes, except as provided in Section 8.4.8, *Mitigation for Activities not Covered by the Plan*. If an acquisition is completed using mitigation funds, only that portion of the acquisition funded by non-mitigation funds can be counted toward Plan acquisition commitments. Lands acquired during Plan development that may be counted toward Plan requirements must meet the criteria for Reserve System lands in Section 8.4.1, *Criteria for Reserve System Lands*, above, and must not have already been permanently protected by a Wildlife Agency approved conservation easement prior to the 2001 Planning Agreement. The PCA may expend funds to augment management of these interim purchases if the augmentation is necessary for the lands to be counted toward Plan land acquisition commitments.

The existing Placer Legacy Open Space and Agricultural Conservation Program and other conserved lands listed below contribute to the biological goals and objectives of the PCCP and will be included in the Reserve System, counted toward Plan acquisition commitments, and counted as "jump start" lands (see Table 8-1). The portion of the lands that have been acquired as mitigation for already approved projects have been deducted from the total and will not be counted toward Plan acquisition commitments or counted as "jump start" lands (Table 8-1).

Table 8-1. Jump Start Lands to Be Counted toward Plan Land Acquisition Commitments by Community Type

	Foothills			Valley			
Natural Communities	**Harvego Bear River Preserve**	**Hidden Falls Regional Park**	**Total Foothills**	**Bradley Property**	**Markham Ravine**	**Total Valley**	**Total Reserve Credit**
Vernal Pool Complex	ND	ND	ND	383.1	278.12	661.23	661.23
Grassland	10.38	63.00	73.38	ND	ND	ND	73.38
Aquatic/Wetland Complex	2.00	ND	2.00	16.6	ND	16.6	18.6
Riverine/Riparian Complex	1.00	26.00	27.00	ND	19.1	19.1	46.1
Oak Woodland	732.20	738.00	1,470.20	ND	ND	ND	1,470.20
Total	*745.58*	*827.00*	*1,572.58*	*399.71*	*297.22*	*696.93*	*2,269.51*
Other Non-mitigation Funding Sources - to be counted toward Conservation Commitments							
Vernal Pool Complex	ND	ND	ND	381.3	446.4	827.70	827.70
Grassland	11.60	27.10	38.70	ND	ND	ND	38.70
Aquatic/Wetland Complex	2.20	ND	2.20	ND	5.63	5.63	7.83
Riverine/Riparian Complex	1.11	11.10	12.21	0.97	ND	0.97	13.18
Oak Woodland	819.00	317.60	1,136.60	23.20	ND	23.20	1,159.80
Total	*833.91*	*355.80*	*1,189.71*	*405.47*	*452.00*	*857.47*	*2,047.21*

Foothills acreage is based on land-cover type estimates. Foothills sites require field verification.
Land cover for the Valley sites have been mapped and verified in the field.
ND = no data
Source: Placer County (3/2/2017)

8.4.5 Land Acquired by Other Organizations or through Partnerships

Land acquired by Permittees that meets the criteria for Reserve System lands will be counted toward Plan land acquisition commitments (see Chapter 5, *Conservation Strategy*). Agencies and organizations who are not Permittees, such as the Central Valley Joint Venture member organizations, Ducks Unlimited, Placer Land Trust, and mitigation/conservation banks are expected to acquire land in the Plan Area during Plan implementation. The PCA will most likely be involved in many of the land acquisitions. If the PCA partners with other groups and provides matching funds, larger land acquisitions will be possible than if the PCA were to purchase land independently. Land acquired through partnerships with non-Permittees can be counted toward Plan goals and objectives (i.e., contribution to recovery) if the acquisition meets the criteria for Reserve System lands (Section 8.4.1, *Criteria for Reserve System Lands*) and the lands are not used to meet other federal mitigation requirements, except as provided in Section 8.4.8, *Mitigation for Activities not Covered by the Plan*.

The PCA will determine, subject to Wildlife Agency approval, the extent to which such acquisitions can be counted toward Plan land acquisition commitments based on the purpose and location of the acquisition, the management of the land acquired, the proportional fair share acreage and function of the property acquired through Plan funding, and consistency with the goals and objectives of the Plan. The Plan budget assumes that the PCA will always fund management and monitoring on land in the Reserve System; actual management and monitoring funding for such partnership acquisitions will be determined on a case-by-case basis. Land acquired through partnerships may be managed and monitored by the PCA or by other groups or agencies as long as a contract or other binding agreement is in place to ensure the management and monitoring occurs according to the terms of the Plan. Land acquired with state or federal money will be credited toward the state/federal contribution discussed in Chapter 9, *Costs and Funding*, in proportion to the state/federal funding contributed to the acquisition. All acquisitions credited toward the land acquisition commitments of the Plan can be credited toward the Stay Ahead provision as discussed in Section 8.4.3.4, *Land Acquired by State or Federal Agencies*, above, regardless of who owns or manages the property and regardless of the source of funding for acquisition or management.

8.4.6 Advance Acquisition of Vernal Pool Complex Lands and Proposed 2-Year Maximum Extent of Take

The PCA will stay ahead of the loss of both vernal pool complex and vernal pool constituent habitats with an advance acquisition of vernal pool complex lands as described in Section 5.3.1.5.2, *Vernal Pool Complexes and Grassland Natural Communities*. Within 2 years of adopting the implementing ordinances, the PCA will acquire vernal pool complex lands containing a minimum of 160 acres of vernal pool constituent habitats (23 percent of the total), of which at least 53 acres will be delineated as vernal pools. The advance acquisition of these vernal pool complex lands will be subject to Wildlife Agency review and approval, and must meet the criteria for Reserve System lands in Section 8.4.1, *Criteria for Reserve System Lands*.

No more than 1,800 acres of vernal pool complex and 80 wetted acres of vernal pool constituent habitats (15 percent of the total allotted effects) will be authorized for take under the Plan until this advance acquisition goal is met.

The jump-start lands listed in Table 8-1 (Section 8.4.4, *Jump Start*) do not contribute towards meeting the advance acquisition goal.[5] However, any additional advance acquisition of vernal pool complex and vernal pool constituent habitats acquired before permit issuance will count towards the advance acquisition goal if occupied by vernal pool branchiopods. The advanced acquisition goal and proposed maximum extent of take to be covered under the Plan are designed to ensure that more high-quality vernal pools and vernal pool complex lands are protected than taken, that the PCA exceeds the Stay Ahead requirement early in the permit term, and that occupied vernal pool complexes are protected early in the permit term to minimize any temporal loss of occupied vernal pools.

8.4.7 Private Mitigation and Conservation Banks

Conservation and mitigation banks manage land for its natural resource values. In exchange for permanently protecting the land, the bank operator is allowed by the Wildlife Agencies that have approved the bank to sell habitat credits to project proponents who need to satisfy legal requirements by compensating for the impacts of projects that affect listed species or their habitat[6]. A conservation or mitigation bank typically is a free-market enterprise that performs the following functions:

- Offers landowners economic incentives to protect and improve natural resources
- Saves project proponents' time and money by providing them with the certainty of preapproved compensation lands
- Provides for permanent protection, monitoring and management of habitat

Because the goals of private mitigation banks are similar to those of regional HCPs or NCCPs, credits purchased from existing or future mitigation and conservation banks within the Plan Area can count toward Plan protection and restoration commitments if they are consistent with all of the relevant standards of habitat enhancement, adaptive management, and monitoring in Chapter 5, *Conservation Strategy*, and Chapter 7, *Monitoring and Adaptive Management Program*.

Operators of existing or future conservation and mitigation banks in the Plan Area may confirm that their banks' available credits can be used to meet Plan commitments by obtaining the approval of the PCA and the Wildlife Agencies. Bank operators wishing to obtain such approval should contact the PCA to arrange for the PCA to review the existing or proposed bank agreement package to determine whether they are consistent with the relevant standards, including frequency of monitoring and management activities, in Chapter 5, *Conservation Strategy*, and Chapter 7, *Monitoring and Adaptive Management Program*. If the PCA concludes that the formation documents are consistent with relevant Plan standards, it will provide to the Wildlife Agencies a written summary of its review and conclusion, together with an explanation of which Plan commitments the bank credits can be counted toward. If the Wildlife Agencies concur with the PCA, credits at the bank may be purchased to meet Plan land acquisition and restoration commitments as specified by the PCA. Thereafter, the PCA may purchase credits at the bank to meet applicable Plan commitments, and proponents of Covered Activities may purchase credits at the bank to fulfill applicable Plan

[5] The Bradley property will count towards the Advance Acquisition goal because it was added to Table 8-1 following publication of the draft HCP/HCCP.

[6] For additional information on banking see: https://www.wildlife.ca.gov/Conservation/Planning/Banking.

conditions on Covered Activities (see Chapter 6, *Program Participation and Conditions on Covered Activities*).

There are currently several existing conservation or mitigation banks in the Plan Area that may seek approval for credits to be used to meet Plan commitments. It is expected that available credits at the existing Big Gun Conservation Bank will be approved for use during the first year of Plan implementation. As described in Section 5.2.7.8, *California Red-legged Frog*, the PCA will purchase at least two California red-legged frog conservation credits at the Big Gun Conservation Bank by the end of the second year of Plan implementation and an additional 2 credits by the end of Year 5. Upon closure of the Bank, the PCA will work with the Bank operator and seek to revise the Bank's conservation easement to give CDFW third-party enforcement rights.

8.4.8 Mitigation for Activities not Covered by the Plan

Land acquired, preserved in perpetuity, and managed for natural resource purposes to mitigate the impacts of projects not covered by the HCP/NCCP may complement and augment conservation achieved by the Plan, if the location and management of the land is consistent with HCP/NCCP goals and objectives. For example, compensatory mitigation from non-participating cities (Roseville, Rocklin, and Auburn) may preserve land in the Plan Area that would not have been preserved under the Plan. Alternatively, mitigation for non-covered projects may help to accomplish conservation objectives of the Plan.

Proponents of projects in or near the Plan Area that are not covered by the Plan but that affect Covered Species may be interested in using the Plan as a vehicle to implement actions to mitigate the impacts of their projects. These non-covered projects may be required to conduct mitigation or conservation actions under a variety of state and federal laws, including but not limited to ESA, CESA, Clean Water Act, Porter-Cologne Water Quality Act, the National Environmental Policy Act (NEPA), or CEQA. In many cases, using the Plan's conservation strategy to guide the actions will ensure compatibility with the Plan and potentially achieve greater conservation benefits by lowering costs (i.e., accomplishing more with mitigation funds). Costs to mitigate non-covered projects through the Plan are expected to be lower than the project-by-project approach because of the economies of scale realized by the Plan in conducting land acquisition, habitat restoration, land management, and monitoring. Therefore, some non-covered project proponents may also be interested in contributing land to the Plan to fulfill their mitigation requirements.

If land acquisitions intended to fulfill mitigation requirements under ESA, CESA, section 1602 of the California Fish and Game Code, or CEQA for a non-covered project is proposed in the RAA, the Wildlife Agencies will confer with the PCA to ensure that the acquisition will not conflict with the Plan or impede the Permittees' ability to meet Plan requirements. For example, CDFW may not be able to make findings under subsequent CESA permits if that permit conflicts with the HCP/NCCP. If the land acquisition will conflict with the Plan or impede the Permittee's ability to meet Plan requirements, the applicable Wildlife Agency(ies) will work with the applicant to design and implement alternative mitigation measures that will avoid such conflict or impediment. For example, if a land acquisition within the RAA is proposed to fulfill mitigation requirements for a non-Covered Activity, and the land proposed for acquisition is needed to fulfill compensatory mitigation requirements for Covered Activities, the applicable Wildlife Agency(ies) will work with the applicant to design and implement alternative mitigation measures. Such alternative mitigation measures may include, but are not limited to:

- Use of Wildlife Agency approved mitigation banks and conservation banks that have a service area boundary that includes the site of the non-Covered Activity
- Compensatory mitigation on lands outside the Plan Area (including lands within the non-participating city limits)
- Additional onsite avoidance
- Onsite restoration

If land acquisitions used to fulfill mitigation requirements for non-covered projects occur within the Plan Area, such lands may, in limited situations and with Wildlife Agency approval, be added to the Reserve System and counted toward the conservation component (but not the mitigation component) of the Plan's land acquisition commitments (see Section 9.4, *Funding Sources and Assurances*) if:

1. The land is critical to meeting the Plan's acquisition commitments due to the overall scarcity of the habitat type in the Plan Area (e.g.., vernal pool grasslands, riverine/riparian);
2. The non-covered project's compensatory mitigation and/or conditions to satisfy other analogous state and federal permit requirements for which the mitigation land is counting toward the conservation component was not approved prior to or during Plan preparation;
3. The lands meet the criteria for Reserve System lands;
4. A conservation easement in a form substantially similar to the Plan conservation easement template is recorded on the land;
5. A Reserve Unit Management Plan is prepared for the lands in accordance with Chapter 5, *Conservation Strategy*; and
6. The project proponent provides the PCA with sufficient funds to manage the lands in perpetuity in accordance with the Habitat Management Plan.

8.4.9 Conservation Easements

Conservation easements will be an important tool in Plan implementation in four ways:

- Conservation easements will be placed on land acquired in fee title by the PCA or one of its land acquisition partners to secure credit under the Plan (see Section 8.4.1, *Criteria for Reserve System Lands*). In some cases, after the conservation easement is recorded, the land may be sold to a third-party, subject to the terms and conditions of the conservation easement. For example, rice lands may be purchased, placed under a conservation easement, then sold to a rice farmer to continue rice cultivation on the lands, subject to the terms and conditions of the easement.
- Conservation easements will be purchased from a private party and placed on some lands still owned by the landowner (i.e., as an alternative to fee title acquisition).
- Conservation easements will be placed on some lands in public ownership at the time of permit issuance (see Section 8.4.4, *Jump Start*).
- Conservation easements on land may be accepted from private landowners for mitigation purposes.

As explained in Section 8.4.1, *Criteria for Reserve System Lands*, to be incorporated into the Reserve System and counted toward Plan land acquisition commitments, all lands must be permanently protected. Permanent protection must be ensured by a conservation easement consistent with the requirements of this section, granted to the PCA, or by fee title dedication of land with a conservation easement to the Reserve System. For lands owned by the PCA or a Permittee, permanent protection must be ensured through a conservation easement granted to a Wildlife Agency or an appropriate third-party easement holder approved by the Wildlife Agencies.

The Plan assumes that the PCA will purchase approximately 20 percent of the land for the Reserve System in conservation easements rather than fee title (see Chapter 9, *Costs and Funding*), with an initial focus on this approach to meet the "jump start" goal (Section 8.4.4, *Jump Start*). Conservation easements are appropriate where landowners wish to remain on the property and the Plan's conservation goals can be met with an easement. For example, ranchers may prefer to sell a conservation easement, rather than selling fee title to their land, so they can remain on the land and continue to conduct livestock operations. Livestock grazing will be an important management tool in the Valley and Foothill regions of the Reserve System (see Chapter 5, *Conservation Strategy*), so this use is likely to be compatible with the Plan's conservation goals and therefore suitable for conservation easements.

This section describes guidelines that will be used by the PCA and its land acquisition partners for conservation easements acquired to meet Plan land acquisition commitments. The PCA will use the template conservation easements attached as Appendix K, *Conservation and Agriculture Easement Templates*, as a model for conservation easements for Reserve System lands. For lands with the purpose to conserve natural communities and habitat for Covered Species, the PCA will use the template "Conservation Easement" included in Appendix K, *Conservation and Agriculture Easement Templates*. For certain agricultural lands, the PCA will use the template "Agricultural Conservation Easement" included in Appendix K, *Conservation and Agriculture Easement Templates*, as further described below in Section 8.4.9.3, *Conservation Easements on Agricultural Lands*. The PCA will follow these template conservation easements as closely as possible. However, reasonable variations from the templates will very likely be needed to address site-specific conditions and circumstances. In addition, for agricultural lands added to the Reserve System as described in Section 8.4.9.3.2, *Cultivated Agricultural Lands and Irrigated Pasture Lands*, the PCA may be required to use other forms of agricultural conservation easements approved by state or federal agencies, such as conservation easement forms approved by the Department of Conservation for use with its grant programs. The PCA and the Wildlife Agencies must review and approve any variations from the "Conservation Easement" template and all baseline documentation reports prepared for such conservation easements.

8.4.9.1 General Guidelines

All conservation easements acquired to meet Plan land acquisition commitments will adhere to the guidelines below. They will:

- Be in perpetuity and in accordance with California Civil Code Sections 815 et seq.[7]
- Be voluntarily offered by the fee title owner of the underlying property.

[7] This section of California law allows placement of restrictions on the use of land for conservation purposes that is binding on all successive owners of that land.

- Be negotiated on a case-by-case basis between the landowner and the PCA. For conservation easements to be effective, participating landowners must abide by the terms of conservation easements. The terms of each conservation easement will be based on the conservation easement templates, with Wildlife Agency approved variations, and will include terms to address specific site conditions, landowner preferences and operations, and species and habitat needs. Some landowners may wish to reserve a portion of their property for uses that are incompatible with the Plan, such as a home site or a recreational facility with intensive use. In these cases, the conservation easement will either exclude the incompatible site or define the portion of the site in which the incompatible uses are allowed.[8] Where reasonably practicable, the site of the incompatible activity will be excluded from the conservation easement. Only the portion of the site that is compatible with Plan goals and objectives will be counted toward Plan land acquisition commitments.
- Ordinarily be transferred to/owned by the PCA. Ownership of easements by one party will contribute to consistency in enforcement, monitoring, and maintenance and will allow for a systematic and efficient approach for required conservation and monitoring actions. However, the PCA may allow dedication of conservation easements to another conservation organization if that organization is approved by the PCA, the Wildlife Agencies, and the landowner and a binding agreement exists between the PCA and the easement holder to ensure compliance with the Plan and the terms of this section. Conservation easements on land owned by the PCA must be held by another conservation organization.
- Include a legal description and map. If the conservation easement boundaries are different from the parcel boundaries, a legal description and plat map specifically of the boundaries of the conservation easement will be required. The legal description and plat map will be prepared by a licensed surveyor (e.g., licensed surveyors in the County Surveyor's Office).
- Include a description of the specific conservation values that will be protected in terms of Covered Species and their habitat, as well as other natural communities and constituent habitats on the property. Conservation values will be described using the natural communities, habitat constituents, and Covered Species' habitat described in Chapter 3, *Physical and Biological Setting*, and the Species Accounts (Appendix D, *Species Accounts*). A baseline inventory of Covered Species and natural communities present will be included for all conservation easements, except for easements on agricultural lands that are not intended to protect specific conservation values for Covered Species or natural communities (see Section 8.4.9.3, *Conservation Easements on Agricultural Lands*, below).
- Ensure that the property will be kept in its natural or existing condition and will protect, existing, enhanced and/or restored conservation values on the property.
- Ensure that the easement cannot be amended without the prior written consent of the PCA, the Wildlife Agencies, and any other third-party beneficiary.
- Confine the allowable uses of the property to activities that do not interfere with the preservation or enhancement of the property's conservation values. A detailed list of the allowable uses will be included.

[8] There may be advantages to having the conservation easement apply to the entire site, for example, to avoid costly boundary surveys needed to define the conservation easement more narrowly than the property boundary.

- Take into account issues of water use efficiency water quality, such as runoff into adjacent or nearby streams and their potential effects on covered salmonids, if applicable.
- Contain provisions for enforcement and available remedies for the PCA (and the Wildlife Agencies as third-party beneficiaries to the easement) or appropriate other party in the event that the landowner or third party violates the terms of the conservation easement.
- Include any specific terms and conditions necessary to maintain or enhance habitat in accordance with Section 5.3.2, *Conservation Measure 2: Manage and Enhance the Reserve System*, and 5.3.3, *Conservation Measure 3: Restore and Create Natural Communities and Covered Species' Habitat*.
- Provide for access by the PCA (and the Wildlife Agencies as third-party beneficiaries to the easement) or its designee to monitor compliance with the terms of the conservation easement and to carry out all applicable management and monitoring requirements described in Chapter 5, *Conservation Strategy*, and Chapter 7, *Monitoring and Adaptive Management Program*, except for conservation easements on agricultural lands, provide the same access to the Wildlife Agencies.
- Name USFWS and CDFW as third-party beneficiaries, except on the agricultural conservation easements on the 6,240 acres of agricultural lands not counted for Covered Species, where only CDFW will be named as a third-party beneficiary
- Restrict public access and recreation on the site as necessary to ensure that management is compatible with the conservation goals of the Plan. In general, there will be limited public access on properties with conservation easements, although some large properties may be identified as passive recreational areas to promote public appreciation, involvement and support for the Plan.
- Be superior to any liens of record or existing interests in the property, unless such liens or interests will not substantially conflict with the property's conservation values. A subordination agreement will be required when necessary to ensure that the conservation easement is superior to any such liens of record.

8.4.9.2 Prohibited Uses

Each conservation easement will prohibit the activities listed below, except as necessary to maintain or enhance conservation values and for necessary conservation measures described in Chapter 5, *Conservation Strategy*, and in the Reserve Unit Management Plan that will be developed for the site by the PCA, or in the portions of the property designated for incompatible activities.

- Unseasonal watering; incompatible use of fertilizers, pesticides, biocides, herbicides or other chemicals; and other activities and uses that may adversely affect the purposes of the conservation easement.
- Use of off-road and other motorized vehicles except on existing roadways (allowances will be made for off-road vehicle use for management purposes and for allowable agricultural activities, such as ranching vehicles, mechanical harvesters, tractors, etc.).
- Agricultural production facilities, and commercial, professional or industrial uses outside of small, clearly defined footprints of allowable intensive uses surrounding existing structures.
- Any legal or de facto subdivision, or judicial partitioning of the property.

- Habitat modification or structural improvements, unless approved for restoration or creation (allowances will be made for construction and maintenance of structures that support management activities).
- Depositing or accumulation of soil, trash, ashes, refuse, waste, bio-solids or any other pollutants.
- Planting, introduction, or dispersal of non-native plant or animal species unless specifically authorized by the conservation easement.
- Filling, dumping, excavating, draining, dredging, mining, blasting, drilling, removing, or exploring for or extraction of minerals, loam, soil, sands, gravel, rocks, or other material on or below the surface of the property.
- Altering the surface or general topography of the property, including building of roads, driveways and parking areas, except as needed to support creation, restoration or enhancement projects associated with the Plan. New road, driveway and/or parking area construction for agricultural operations may be allowed on a case-by-case basis, subject to PCA approval, particularly for agricultural operations that are replacing similar intensively farmed operations that are mitigated through the land conversion requirements. Maintenance of existing roads and associated drainage facilities will not be a prohibited activity.
- Removing, destroying, or cutting of native trees, shrubs, or other native vegetation, except for allowable agricultural and management uses and as required by law for fire breaks, maintenance of existing foot trails or roads, prevention or treatment of disease, or control of invasive plants. If vegetation removal is allowed, limitations should be put on the location, amount, and type of vegetation removed in order to minimize erosion and sedimentation, particularly if the site is near or adjacent to a stream, vernal pool(s) or perennial wetland.
- Manipulating, impounding, or altering any natural water course, body of water, or water circulation on the property, and activities or uses detrimental to water quality, including but not limited to degradation or pollution of any surface or subsurface waters (allowances will be made for enhancement, restoration, or creation of aquatic habitat features consistent with Chapter 5, *Conservation Strategy*).

8.4.9.3 Conservation Easements on Agricultural Lands

Conservation easements have been used throughout California to preserve farms, ranches, and the working landscapes that they support. Plan conservation easements on agricultural lands are expected to protect working landscapes in the Plan Area and allow farms and ranches to thrive. Activities that would otherwise be prohibited by a habitat conservation easement (see Section 8.4.9.2, *Prohibited Uses*) may be allowed in conservation easements on agricultural lands, if the activities directly support an allowable existing agricultural operation. Allowable existing agricultural operations could include cropland, crop rotations, pasture, light to moderate livestock grazing, and others.

8.4.9.3.1 Grazing Lands

Conservation easements on grazing lands will describe the general nature of the grazing to be allowed. The easement will specify the desired vegetation and other habitat conditions and impose limits on the timing, stocking density, residual dry matter, and duration of permitted grazing to meet those conditions. These desired conditions and grazing limitations will be allowed to fluctuate in response to monitoring and the adaptive management of the grazing regimes. Details of vegetation

management and grazing will be contained in the Reserve Unit Management Plan (described in Chapter 5, *Conservation Strategy*) that will be prepared after the conservation easement is recorded. The conservation easement may accomplish this requirement by reference to the separate Reserve Unit Management Plan prepared for the lands covered by the easement.

8.4.9.3.2 Cultivated Agricultural Lands and Irrigated Pasture Lands

One of the Plan's land acquisition commitments is to protect at least 8,240 acres of agricultural lands or natural communities in the Valley, including patches of natural vegetation such as trees and shrubs that may be used by Covered Species, and provide connectivity between natural communities in the Reserve System (see Section 5.3.1.5.6, *Agricultural Land*). Conservation easements on agricultural lands counted toward this agricultural land acquisition commitment will not include restrictions as to the types of crops grown, except for rice land acquired to conserve giant garter snake, which will remain in rice production.[9]

With the exception of rice lands acquired to protect the giant garter snake, the Plan will not use agricultural lands to mitigate effects on Covered Species. To mitigate Covered Activities' effects on habitat on agricultural lands, the Plan provides for the protection, restoration, management and enhancement of natural communities supporting habitat for these species (see Section 5.3.2.4, *Species-level Management and Enhancement Measures*) The purpose of Plan conservation easements on cultivated agricultural lands and irrigated pasture lands will be to preserve open space that provides landscape linkages or connectivity for wildlife, provides buffers between habitat and incompatible uses, or protects hydrology for adjoining habitat. Plan conservation easements on cultivated agricultural lands and irrigated pasture lands will not ordinarily preserve or reestablish natural conditions on site.

Intensive agricultural uses such as nurseries or intensive livestock use (e.g., dairy, feedlot) are generally incompatible with Plan objectives, but they may be allowed in conservation easements on cultivated agricultural lands and irrigated pasturelands if the uses are consistent with the open space preservation purposes of the easement (e.g., providing landscape linkages, connectivity for wildlife, buffering from incompatible uses, or protecting hydrology for adjoining habitat).

8.4.9.3.3 Determining Allowable Existing Agricultural Operations

The PCA will determine on a case-by-case basis what agricultural uses may be allowed in conservation easements acquired to fulfill the Plan's agricultural lands acquisition commitment. The Wildlife Agencies' approval will be required for any proposed allowable agricultural uses that are inconsistent with Section 8.4.9.2, *Prohibited Uses*.

8.4.10 Grazing Leases or Licenses within the Reserve System

Livestock grazing is an important management tool that benefits some Covered Species. As a result, moderate livestock grazing will very likely be used where appropriate in the Reserve System. Existing grazing leases or licenses on lands newly acquired in fee title will continue until a Reserve Unit Management Plan is prepared and approved by the PCA and the Wildlife Agencies. After the management plan is approved, all grazing leases or licenses on the reserve will be reviewed by the

[9] 2,000 acres of rice will be protected for giant garter snake (Conservation Measure 1, GGS-1, Acquisition for Protection of Giant Garter Snake Habitat), and which will be limited to rice production.

PCA for consistency with the management plan and with the terms of the PCCP. If necessary, leases or licenses will be revised and brought into compliance with the Plan's conservation strategy and the framework for adaptive management.

If livestock grazing is introduced to a reserve that is acquired in fee title, or if the preexisting grazing lease or license expires, the PCA or other Permittee agency (e.g., County Parks) will enter into a lease agreement or license with the livestock operator. The lease agreement or license will specify the desired vegetation and other habitat conditions and impose limits on the timing, stocking density, residual dry matter, and duration of permitted grazing to meet those conditions. The lease agreement will also outline the responsibilities of each party for maintaining reserve infrastructure (e.g., fences, ponds and other watering facilities), weed control (including any necessary herbicide application), and feral pig management.

Grazing leases or licenses will be reviewed annually with the lessee to adjust grazing practices to best meet habitat goals. At the expiration of the lease or license, the PCA will review monitoring data to determine whether the lease or license should be reissued with no changes in grazing management, reissued with changes in the grazing regime, or not reissued. All new and renewed leases or licenses will include the following conditions of agricultural use and covenants to protect resources:

- Grazing capacity and stocking rates
- Evaluation of fencing of riparian areas and wetlands
- Residual dry matter guidelines
- Conditions under which the desired stocking rate can be changed or exceeded (e.g., seasonal adjustments to maintain habitat quality)
- Grazing and livestock practices
- Pest control restrictions
- Reporting requirements

8.4.11 Willing Sellers

A key principle of the Plan is that the PCA will acquire land for the conservation strategy only from willing sellers.

8.4.12 Gifts of Land

The PCA may accept lands in fee title, or conservation easements on lands, as a gift or charitable donation. Such lands may be added to the Reserve System only if they meet the criteria in Section 8.4.1, *Criteria for Reserve System Lands*. The PCA may sell or exchange lands it receives as a gift or donation that do not meet the criteria in Section 8.4.1, *Criteria for Reserve System Lands*.

8.4.13 Land Dedication in Lieu of Land Conversion Fee

Some private project proponents may own land that can help meet the conservation goals of the Plan. Project proponents that own land within the RAA or other areas suitable for conservation (e.g., within or adjacent to the Stream System) may wish to donate or place a conservation easement on all or a portion of their property to reduce their Plan fee amount for development on the remaining

portion of their property. Some project proponents who wish to develop parcels in the PFG may own other parcels in the RAA or the PFG; dedicating or placing a conservation easement on the parcels in the RAA or PFG could substantially reduce the Plan fee amount for the development project on their development parcel in the PFG. Project proponents may prefer to acquire their own mitigation lands within the RAA and dedicate these lands to the PCA instead of a portion of the Plan fees. Finally, a Permittee (e.g., the PCWA) may wish to dedicate land to the PCA or establish conservation easements on their land in lieu of paying all or a portion of Plan fees for their own Covered Activities. See Section 9.4.1.10, *Land Provided in Lieu of Development Fees*, for details regarding Plan fees and fee credits.

8.4.13.1 Criteria for Providing Land in Lieu of Fees

Land may be provided in lieu of all or a part of the PCCP land conversion fee if it meets all of the conditions listed below.

- The land meets the criteria for Reserve System Lands in Section 8.4.1, *Criteria for Reserve System Lands*.
- Adding the lands to the Reserve System will mitigate the effects on Covered Species from the Covered Activity for which the dedication is offered.
- The transaction is approved by the PCA and the Wildlife Agencies.
- The PCA and the project proponent enter into a land dedication agreement (see Section 8.4.13.4, *Land Dedication Agreement*).

8.4.13.2 Calculating Fee Reduction

The PCA will consider requests for a fee reduction or waiver in exchange for land dedication (fee title or conservation easement) on a case-by-case basis. The amount of the reduction in the land conversion fee will also be determined case-by-case, based on the amount of land dedicated and the conservation value of the land. The amount of land required to fully offset the land conversion fee for each project may be higher or lower depending on the conservation value of the land and its importance to the assembly of the Reserve System.

8.4.13.3 Land in Lieu of Fee Proposals

Private project proponents will be required to provide the following in proposals to dedicate land in lieu of paying Plan fees:

- Baseline data on the property(ies) proposed for dedication that documents their biological value to the Plan
- A description of how the land mitigates impacts on Covered Species
- An explanation of how the site meets land acquisition requirements and biological goals and objectives of the PCCP

In addition, the property owner must provide access to the proposed site to allow PCA or its designees to conduct a pre-acquisition assessment (Section 8.4.2.2, *Step 2: Pre-acquisition Assessment*). As part of the pre-acquisition assessment, the PCA will assess whether and how the proposed site meets the criteria for Reserve System Lands in Section 8.4.1, *Criteria for Reserve System Lands*. The PCA will also consult local land managers when evaluating land in lieu proposals

to help determine long-term management and monitoring issues, feasibility, and costs. The project proponent will be required to pay the cost of other due diligence such as Phase 1 or 2 (if necessary) environmental assessments, appraisal (required when state or federal grant funding or public agency general funds are to be utilized), and title search.

8.4.13.4 Land Dedication Agreement

All land dedications in lieu of payment of a portion of the land conversion fee will require a "land dedication agreement" between the PCA and project proponent. The land dedication agreement must be executed, and the lands must be dedicated (i.e., transferred to the PCA or other land acquisition partner) in accordance with the agreement, before Plan fees are due for the proponent's Covered Activity. The land dedication agreement will specify:

- The lands that are proposed for dedication, including a map of the parcel(s) in relation to other components of the Reserve System, or other properties subject to other permanent protections for conservation purposes, including lands acquired through other conservation programs (e.g., land trust acquisitions, Natural Resources Conservation Service Wetland Reserve easements, Placer Legacy Open Space and Agricultural Conservation Program).
- The amount of land proposed for dedication
- The land's conservation values, as identified in the pre-acquisition assessment, and how the lands contribute to assembling the Reserve System
- The proposed Covered Activity subject to the land conversion fee for which the credit will be provided
- How the land's conservation values mitigate the effects of the Covered Activity
- The amount of credit toward the land conversion fee that will be provided

8.5 Management and Enhancement of the Reserve System

The PCA will direct the management and enhancement of land acquired for the Reserve System, as described in Section 5.3.2, *Conservation Measure 2: Manage and Enhance the Reserve System*. The PCA will coordinate with managers of other protected areas to help form a biologically cohesive network of protected lands in the Plan Area. The PCA will be responsible for directing landscape-level management and enhancement actions (Section 5.3.2.2, *Landscape-level Management and Enhancement*), natural community-level management and enhancement actions (Section 5.3.2.3, *Natural Community–level Management and Enhancement*), and species-level management and enhancement actions (Section 5.3.2.4, *Species-level Management and Enhancement Measures).* Management measures will include such things as regular patrol, trash removal, fence/gate installation and repair, road maintenance, and other necessary activities.

Some management and enhancement measures that occur either in or outside the Reserve System must be performed by the County and City. For example, Placer County Parks Division would be responsible for maintaining all County parks that are part of the Reserve System, including Hidden Falls Regional Park. The PCA will coordinate with the County, City, and other local agencies to

implement some management or enhancement measures that it cannot perform itself or would perform less efficiently.

8.5.1 Reserve Unit Management Plans

The PCA is responsible for developing system-wide management plans for the Reserve System, as well as Reserve Unit Management Plans for all units of the Reserve System to guide site-specific management (see Section 5.3.2.1, *Reserve Unit Management Plans*). The PCA will also be responsible for interim management of acquired lands prior to completion of these Reserve Unit Management Plans.

System-wide Reserve Unit Management Plans will be maintained for the entire Reserve System (i.e., invasive plant management, animal pest management, recreation management, and fire management). Specific Reserve Unit Management Plans will be developed for individual reserve units (multiple parcels in the same area with similar management needs) and will be kept up to date through adaptive management. System-wide Reserve Unit Management Plans will serve as guiding management plans for the entire Reserve System and for the development of reserve unit–specific management plans. Specific Reserve Unit Management Plans will tailor the system-wide Reserve Unit Management Plans to the site-specific conditions of each reserve unit.

The PCA will prepare System-wide and Specific Reserve Unit Management Plans for each reserve unit with review and approval from the Wildlife Agencies, land managers (Section 8.2.7, *Science Advisors and Land Managers*), and current agricultural or grazing lessees, if any, and they will be subject to approval by the Wildlife Agencies. Initial preparation and periodic updates of Reserve Unit Management Plans will serve as the primary formal mechanism for many of the Wildlife Agency approval processes specified in the Plan. Management plans will also serve to inform other agencies and the general public.

8.6 Management Conducted by Third Parties

The PCA may contract with a third-party agency or organization to conduct management activities within the Reserve System on the PCA's behalf. As described in Chapter 4, *Effects of Covered Activities*, some of these management activities may result in take of Covered Species, even if the actions are beneficial (e.g., prescribed burning, handling species to identify or mark them). To ensure that the third-party manager adheres to the terms of the permits, the Plan, and the Implementing Agreement, the PCA will include in its contract with the third party all applicable terms of the Plan and permits, and will describe the take authorization that is extended to the third party, if applicable. If the third-party manager or monitoring agency is not a Permittee or a contractor of the PCA, it can apply for take authorization as a Participating Special Entity (Section 8.9.4, *Take Authorization for Participating Special Entities*). If a third-party conducts management on behalf of the PCA, the PCA will monitor the third party's management to ensure the management is carried out in accordance with the terms of the permits, the Plan, and the Implementing Agreement.

8.7 Restoration and Creation of Natural Communities and Covered Species' Habitat

The PCA will be responsible for restoring and creating natural communities and Covered Species' habitat within the Reserve System, as described in Section 5.3.3, *Conservation Measure 3: Restore and Create Natural Communities and Covered Species' Habitat*. The PCA will be responsible for natural community-level restoration and creation actions (Section 5.3.3.3, *Natural Community–level Restoration/Creation*), and species-specific restoration actions (Section 5.3.3.4, *Species-specific Restoration Actions*). Restoration and creation actions will restore degraded and lost natural communities and habitat for Covered Species to conserve the species, to improve landscape-level ecosystem function, and to mitigate for the direct and indirect effects of Covered Activities.

8.7.1 Restoration Plans

The PCA will direct the development and implementation of detailed restoration plans and specifications for individual restoration sites or stream reaches based on specific geomorphic, soil, hydraulic, and hydrologic conditions; extent and quality of existing natural communities; existing wildlife use; and the potential for adverse effects (e.g., disturbance and/or removal of existing habitat). Restoration plans will satisfy the requirements listed below:

- Collect and analyze baseline data (e.g., soil type and suitability for riparian planting, low-flow conditions, past land use history/alterations)
- Define restoration goals and objectives
- Identify suitable/feasible restoration measures
- Develop conceptual restoration designs
- Develop detailed restoration designs (plans and specifications) that identify and describe construction methods, planting areas and methods, planting species (including collection and propagation methods), and maintenance requirements
- Obtain all necessary local government approvals (e.g., grading permits) and other federal and state permits (Lake and Streambed Alteration, 404, 401), as necessary.
- Prepare an adaptive management and monitoring plan based on the guidelines in Chapter 7, *Monitoring and Adaptive Management Program*, that includes descriptions of responsible parties; monitoring methods and schedule; indicators (e.g., vegetative cover); measurable success criteria (e.g., 20 percent cover by Year 5); and adaptive management measures (e.g., replanting with different species)

8.7.2 Restoration or Creation in Lieu of Special Habitat Fees

As provided in Section 9.4.1.4.2, *Wetland Restoration or In-stream Enhancement Provided in Lieu of Fee*, the PCA can approve credit for all or a portion of the special habitat fees in exchange for the restoration or creation, management, and monitoring of wetlands, streams, or riparian areas that meets all applicable requirements of Chapter 6, *Program Participation and Conditions on Covered Activities*, and Section 8.4.1, *Criteria for Reserve System Lands*, or the purchase of appropriate wetland restoration or creation credits in a conservation bank or mitigation bank approved by the PCA in accordance with Section 8.4.7, *Private Mitigation and Conservation Banks*. A Permittee,

Covered Activity, or Participating Special Entity seeking a fee credit for restoration or creation of wetlands, streams or riparian areas must submit a restoration or creation proposal to the PCA for approval. The PCA will evaluate such proposals based, in part, on the history of the proponent or proponent's consultant performing successful wetland restoration elsewhere, as well as whether the restoration or creation project meets the requirements of Chapter 6, *Program Participation and Conditions on Covered Activities*, and Section 8.4.1, *Criteria for Reserve System Lands*. The PCA may only approve a credit for the special habitat fees in exchange for the creation or restoration of wetlands or other aquatic features if the Permittee, Covered Activity, or Participating Special Entity seeking the credit provides adequate assurances that it will construct, manage, and monitor the mitigation site in accordance with the requirements of the HCP/NCCP, including any remediation necessary to meet success criteria, and construction activities associated with the restoration or creation of the wetlands or other water features are initiated concurrent with the initiation of ground-disturbing activities for the Covered Activity for which the fee credit is requested. For Covered Activities, the County or City, as applicable, must require such assurances as an enforceable condition of project approval. For Covered Activities implemented by a Permittee, the Permittee must enter into an agreement with the PCA to provide this assurance. After the restoration or creation is complete and all success criteria are met, and necessary funding is provided, the PCA will assume management and monitoring responsibility for the restoration or creation site as part of the Reserve System.

The PCA will prepare a written determination of whether a restoration or creation proposal, or a proposal to purchase credits at a conservation bank or wetland mitigation bank, conforms to the HCP/NCCP and is therefore approved by the PCA. The written determination will include the amount of any approved credit for the special habitat fees.

8.8 Monitoring and Adaptive Management

Adaptive management is a critical element of the Plan because it addresses many planning uncertainties and provides for continual adjustment and improvement of conservation actions to achieve Plan goals and objectives. Key to the success of the adaptive management program is a clear and effective structure for making decisions on the basis of new data from Plan monitoring and information from other sources.

The PCA's responsibilities for implementing the adaptive management program include the following roles and functions:

- Designing and implementing a scientifically robust effectiveness monitoring program
- Gathering monitoring and research data, including relevant information developed by others, and maintaining databases
- Disseminating monitoring and research data generated by the Plan, including monitoring reports, conference presentations, and published papers, to the Wildlife Agencies and others
- Assessing the effectiveness of conservation measures relative to the biological goals
- Identifying the need to modify existing or to adopt additional conservation measures and defining what to change and how to change it
- Identifying the need to modify the monitoring program and defining what to change and how to change it

- Identifying the need for, and the implementation of, targeted studies
- Incorporating monitoring, research, and other adaptive management–related activities into annual work plans;
- Incorporating adaptive management-related activities in Reserve Unit Management Plans
- Creating and maintaining a network of science advisors (see below) to provide advice to the PCA, as needed, on adaptive management and monitoring issues including important data gaps, monitoring and management methods, and data interpretation

8.8.1 Adaptive Management Input

The PCA will seek input from the following groups, which will play an important role in adaptive management:

- Wildlife Agencies
- Science advisors (Section 8.2.7, *Science Advisors and Land Managers*)
- Land managers (Section 8.2.7, *Science Advisors and Land Managers*)

The primary role of the Wildlife Agencies in the adaptive management program will be to provide feedback to the PCA regarding recommended changes to Plan implementation based on the results of research and monitoring and on the recommendations of the science advisors. Wildlife Agency staff will also provide expertise in the biology and conservation of Covered Species and natural communities. Types of feedback the Wildlife Agencies are likely to provide could include assessments of the consistency of proposed changes with terms and conditions of the state and federal permits, how conservation measures are working in practice and how they can be improved, guidance on aligning the Plan with species recovery goals and recovery criteria, and attainment of overall Plan goals and objectives.

The PCA will consider all input regarding adaptive management recommendations from Wildlife Agencies and science advisors, as well as other outside experts as the need arises. In addition, the PCA may convene technical committees to seek focused advice on key monitoring and adaptive management topics.

Ultimately the PCA will determine what actions are appropriate based on input and recommendations provided in the adaptive management program. Decisions made in the adaptive management program will be based primarily on which course of action is most likely to meet the biological goals and objectives of the Plan within budget constraints and while avoiding or minimizing conflicts with other biological goals and objectives. However, the PCA will collect and consider all feedback from the Wildlife Agencies in determining management and monitoring practices, and the Wildlife Agencies' approval will be required for any major changes in management plans.

8.8.2 Approval of Monitoring Personnel for Take of Covered Species

Some monitoring activities may require handling or disturbing listed Covered Species; such activities constitute take. The selected methods used to monitor Covered Species and natural communities will minimize effects on species, particularly species with small populations. Take of

Covered Species resulting from monitoring activities is authorized under the permits provided that certain conditions are met. Simple surveys, such as habitat assessments will be conducted by the PCA or consulting biologists. However, more complex biological fieldwork will be carried out by biologists "certified" under the Plan. To certify biologists, the PCA will follow standard procurement protocols for establishing a pre-qualified list of consultants. The PCA will send out a Request for Qualifications, and applicants will be reviewed and ranked by the PCA. The recommended pre-qualified list will be reviewed by the Wildlife Agencies and approved by the PCA. The outcome would be a list of "certified" biologists who are approved to conduct survey work for a 5-year period. This certification would reduce the need for the Wildlife Agencies to review qualifications on a case-by-case basis during implementation.

Take resulting from monitoring work performed by "certified" biologists would be covered under the Plan's state and federal permit under the following conditions:

Such take occurs during activities specifically described in the monitoring protocols developed for Plan and is consistent with monitoring provisions set forth for specific sites in the Reserve Unit Management Plans, which will be reviewed by the Wildlife Agencies.

The person performing the monitoring activities demonstrates an understanding of the monitoring protocols, data collection techniques, and handling procedures for the Covered Species through (1) training with the PCA or its representatives on these procedures and standards or (2) appropriate previous experience with the federally listed Covered Species or similar species.

The person performing the monitoring activities carries out his/her duties in conformance with the protocols and procedures specified in the training.

The names, contact information, and written certification of training and qualifications for the monitoring personnel handling or disturbing Covered Species are provided to CDFW and USFWS for terrestrial species and CDFW and NMFS for fish prior to each person conducting this monitoring. The appropriate wildlife agency must approve each person before he/she is authorized to take Covered Species. This documentation will also be on file with the PCA.

8.9 Take Authorization under the Plan

8.9.1 Permittee Responsibilities

The Permittees will be issued permits for take of Covered Species that results from Covered Activities that comply with the requirements of the Plan. For projects implemented by a Permittee, the Permittee will be responsible for ensuring that the project complies with the requirements of the Plan, following the evaluation process described in Section 6.2.1, *Evaluation Process for Permittee Projects*.

The permits also cover projects authorized by the County or the City. The permits will allow the County and the City to extend take coverage to projects proposed by third parties, provided that the projects are Covered Activities, are subject to the County's or City's land use authority, and are in compliance with the requirements of the Plan. To receive take authorization under the state and federal permits, third-party project proponents must apply to the City or the County for take authorization following the process described in Section 6.2.2, *Application Process for Private Projects*. The County and the City will each review participation packages submitted within their

jurisdictions and determine whether to extend take authorization as described in Section 6.2.2, *Application Process for Private Projects*. The PCA will develop a checklist for evaluating third-party applications within the first 6 months after the permits take effect.

For projects within the Plan Area that are not subject to the land use authority of the County or the City (e.g., special districts), the project proponent must apply to the PCA as a Participating Special Entity (see Section 8.9.4, *Take Authorization for Participating Special Entities*) to receive take authorization under the permits.

8.9.2 PCA Responsibilities

The PCA will have limited responsibilities with regard to the Permittees' use of take authorization and extension of take authorization to projects applicants. The PCA will provide support to the Permittees' for their decisions regarding the use and extension of take authorization, such as draft checklists, template planning survey reports, and fee calculator. The PCA will also provide advice, upon request, to the County and the City regarding their review of participation packages and will promote coordination among the Permittees to ensure that conditions on Covered Activities are implemented and enforced consistently and effectively.

In addition, the PCA will have the following specific responsibilities and authorities related to the Permittees' use of take authorization and extension of take authorization to project proponents:

- Reviewing applications from Participating Special Entities (Section 8.9.4, *Take Authorization for Participating Special Entities*) and authorizing take as appropriate.
- Reviewing proposals for land in lieu of fees (Section 8.4.13.3, *Land in Lieu of Fee Proposals*) and for restoration or creation of jurisdictional wetlands or riparian habitat in lieu of wetland/riparian fees (see Chapter 9, *Costs and Funding*). The Permittees will refer any such proposals to the PCA for review, approval, and calculation of the required fees. The PCA will review proposals on a case-by-case basis. If the PCA approves the proposal, the terms of the land offer, habitat restoration/creation, and any remaining fees will be forwarded to the appropriate Permittee for incorporation into the project conditions of approval.
- Verifying that proposals to defer fee payment through ongoing assessments or other mechanisms conform to Plan requirements (see Chapter 9, *Costs and Funding*). The PCA must approve these proposals prior to adoption by the County or the City.
- Approving fee waivers when dedications of land within the Stream System are offered (see Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*). The PCA must approve these proposals prior to adoption by the local jurisdiction.
- Suspending the option for early payment of fees and authorization of take under certain circumstances, as described in Chapter 9, *Costs and Funding*. The PCA will notify all Permittees of any such suspension.
- Recalculating the fees annually and providing the new fees to the Permittees, as described in Chapter 9, *Costs and Funding*. The PCA will notify each Permittee of the new fees.
- Determining fees to be paid by Participating Special Entities.

8.9.3 Wildlife Agency Responsibilities in Approving Take Authorizations for Covered Activities

The Wildlife Agencies will not be involved in approving take authorization for the Permittees' projects or for third-party development projects, except in limited circumstances (e.g., where Section 7 consultations are still required [see Section 10.4.2, *Federal Section 7 Consultations*]) and as identified below. The Wildlife Agencies' main focus will be on ensuring that the Permittees are in compliance with the state and federal permits and the Plan.

The Wildlife Agencies will monitor compliance with the permits primarily by reviewing and commenting on annual reports and monitoring reports (see Section 8.11, *Reporting*, and Section 8.12, *Schedule and Milestones*). The Wildlife Agencies may also monitor the Permittees as they extend take for Covered Activities, including both projects implemented by the Permittees and third-party projects that receive take authorization from the County or the City. The Permittees will not ordinarily transmit copies of application materials, or Permittee consistency documentation, to the Wildlife Agencies. The Permittees will, however, provide such information to the Wildlife Agencies upon request. The Wildlife Agencies may offer comments to Permittees, but the granting of take authorization to individual Covered Activities will remain the purview of the Permittees. The purpose of Wildlife Agency monitoring take authorization for Covered Activities will be to ensure compliance with the state and federal permits, not to determine whether take authorization may be extended to any individual Covered Activity. However, consultation with, or review and approval of, the Wildlife Agencies is required for the following conditions on Covered Activities before take authorization can be provided:

- Updates to best management practices used to minimize Stream System effects, as described in Section 6.3.3.2, *Stream System Condition 2, Stream System Mitigation: Restoration*
- Updates to conditions to minimize effects on specific Covered Species, as described in Section 6.3.5, *Conditions to Minimize Effects on Specific Covered Species*
- The frequency and timing of surveys for projects implemented over multiple years, and any changes to modeled habitat maps used to determine the location of surveys, as described in Section 6.3.5.1, *Surveys for Select Covered Wildlife Species*
- Waivers of Swainson's hawk avoidance measures, as described in Section 6.3.5.6.2, *Applicable Measures*
- Survey protocols for California black rails, as described in Section 6.3.5.7.1, *Survey Requirements*
- Burrowing owl exclusion plans, as described in Section 6.3.5.8.2, *Applicable Measures*
- Tricolored blackbird survey protocols, as described in Section 6.3.5.9.1, *Survey Requirements*
- Exceptions to no-activity buffer distances for tricolored blackbirds, as described in Section 6.3.5.9.2, *Applicable Measures*
- Survey requirements for Conservancy fairy shrimp, as described in Section 6.3.5.14.1, *Survey Requirements*
- Conservancy fairy shrimp avoidance measures, as described in Section 6.3.5.14.2, *Applicable Measures*

8.9.4 Take Authorization for Participating Special Entities

Public or private entities not subject to the jurisdiction of the County or the City may propose projects or activities within the Plan Area that could affect listed species and that may require take authorization from USFWS, NMFS, or CDFW. Such entities may include existing or future school districts, water districts, irrigation districts, transportation agencies, local park districts, geologic hazard abatement districts, other utilities or special districts, or other public or private landowners, such as those within the Roseville Annexation Areas (Section 8.9.4.2, *Potential Roseville Annexation Area*, below). These entities can apply for coverage for their projects under the state and federal permits as "Participating Special Entities" (Section 8.9.4.1, *Application Process for Participating Special Entities*).

Participating Special Entities must apply directly to the PCA to receive take coverage under the permits. In order to grant take authorization to a Participating Special Entity, the PCA will need to establish a legally enforceable contractual relationship.

The following are examples of special districts that occur in the Plan Area and that are eligible to apply for coverage as a Participating Special Entity, provided they meet the criteria described below in Section 8.9.4.1, *Application Process for Participating Special Entities*:

- Sierra College
- Sacramento Municipal Utility District
- Pacific Gas & Electric
- K–12 School Districts
- Independent Special Districts – Sanitary and Water
- Fire Protection Districts
- Placer County Resource Conservation District
- Placer County Flood Control & Water Conservation District
- South Sutter Water District
- San Juan Water District
- Nevada Irrigation District
- Placer County Mosquito and Vector Control District

8.9.4.1 Application Process for Participating Special Entities

Each Participating Special Entity must submit to the PCA a Plan participation package for the proposed project (see Section 6.2.4, *HCP/NCCP Participation Package*), along with any environmental analysis that has been prepared to comply with CEQA or NEPA. When the PCA determines that the PCCP participation package is complete, it will provide copies to the County or the City (depending on where the project is proposed) and to the Wildlife Agencies.

The PCA will determine whether the proposed project complies with the Plan and which Plan conditions and fees will apply. The PCA may choose not to extend take authorization to a Participating Special Entity, or may impose conditions or fee amounts in addition to those required

by the Plan to cover PCA staff time and to cover a portion of the costs of conservation measures designed to contribute to the recovery of Covered Species.

If the PCA chooses to extend take authorization, it will issue a Certificate of Inclusion to the Participating Special Entity that provides take authorization under the permits for the proposed project if the PCA finds, and the Wildlife Agencies concur, that the following conditions are met:

- The Participating Special Entity agrees to enter into an agreement with the PCA binding the Participating Special Entity to the relevant terms and requirements of the Plan (a "Participating Special Entity Agreement").[10]
- The proposed project complies with the terms and requirements of the permits, the Plan, and the Implementing Agreement.
- The effects of the proposed project have been evaluated as part of the potential future growth and are included as part of the potential take covered in the permits.
- There is a sufficient amount of take coverage remaining under the permits for the proposed project, taking into consideration the need to cover Covered Activities authorized or implemented by the other Permittees.
- The proposed activity does not conflict with the conservation strategy or the ability of the PCA to meet the Plan goals and objectives.

The Certificate of Inclusion will be issued to the Participating Special Entity by the PCA upon payment of the fee specified in the Participating Special Entity Agreement and completion of any conditions in the Agreement that must occur prior to issuance of the Certificate of Inclusion. The Certificate of Inclusion will include a map depicting the parcel number, acreage, and owner of lands to which the take authorization(s) would apply. A template of the Certificate of Inclusion is included as an exhibit in the Implementing Agreement (Appendix B, *Implementing Agreement*). Also see the Implementing Agreement for additional details and procedures that apply to Participating Special Entities.

8.9.4.2 Potential Roseville Annexation Area

The area shown in Figure 8-3 is located in the PFG and is currently within the County's land use authority. The effects of Covered Activities in the Potential Annexation Area have been evaluated as part of the potential future growth in the Plan Area and is included as part of the potential take covered in the permits; Covered Activities in the Potential Annexation Area do not conflict with the Plan's conservation strategy or the ability of the PCA to meet Plan goals and objectives. Covered Activities in the Potential Annexation Area are therefore eligible for take authorization under the permits and could receive take authorization through the County. The City of Roseville is currently evaluating the possibility of annexing the lands comprising the Potential Annexation Area. Any such annexation would not affect the boundaries of the PFG or the RAA. In the event the Potential Annexation Area is annexed to the City of Roseville, which is a non-participating city, then the proponent(s) of Covered Activities within the Potential Annexation Area will be eligible to secure incidental take coverage as a Participating Special Entity, if the PCA determines that the project meets the following conditions:

[10] In the event of failure to uphold the terms of the PCCP, the contract gives the PCA the ability to force action by the Participating Special Entity through legal means.

- The project proponent has submitted to the PCA a complete Plan participation package for the project (see Section 6.2.4, *HCP/NCCP Participation Package*), along with any environmental analysis that has been prepared to comply with CEQA or NEPA.
- The proposed project complies with the terms and requirements of the Plan, Implementing Agreement and permits.
- The project proponent agrees to enter into an agreement with the PCA binding the project proponent to such terms and requirements and to any fee amounts in addition to those required by the Plan that the PCA determines is necessary or appropriate to cover PCA staff time and a portion of the costs of conservation measures designed to contribute to the recovery of Covered Species.

If the proposed project meets these conditions, the PCA will enter into a Participating Special Entity Agreement with the project's proponent and issue a Certificate of Inclusion. The Agreement would be between PCA and the owners of the project site, and the rights and obligations of the Agreement and the Certificate of Inclusion would run with the land in the event of any subsequent transfer of the land, provided any subsequent landowners agree in writing to the terms and conditions of the Agreement and the Certificate.

The application process and requirements for the Potential Annexation Area described in this section are in place of, and not in addition to, the process and requirements for other Participating Special Entities described in Section 8.9.4.1, *Application Process for Participating Special Entities.*

8.9.5 Placer Vineyards Specific Plan

The Placer County Board of Supervisors approved the Placer Vineyards Specific Plan (PVSP) in 2007 and approved amendments to the PVSP in 2015. PVSP infrastructure includes both onsite and offsite components. The PVSP is the largest planned development in western Placer County. Some portions of PVSP may be constructed prior to the issuance of the HCP and NCCP permits, while most PVSP development will occur under the Plan. This section describes how the transition will occur between PVSP prior to the Plan and PVSP under the Plan.

Implementation of all of the PVSP within Placer County is a Covered Activity. Portions of some offsite infrastructure facilities related to the PVSP are not within the Plan Area because they are outside of Placer County and are, therefore, not covered by the Plan. With the exception of these out-of-county infrastructure facilities, the Plan included in its analysis the PVSP's projected effects and take of Covered Species. There may be future amendments to the PVSP, which will be covered under the Plan, provided they would not cause the take limits under the permits to be exceeded, the amendment does not result in effects on Covered Species beyond those analyzed for the Plan, and conditions are applied to the PVSP consistent with Appendix N, *Placer Vineyards Specific Plan*.

All PVSP development is required to comply with the "Placer Vineyards Mitigation Strategy" adopted by Placer County in connection with the PVSP (the PVSP Mitigation Strategy). The PVSP Mitigation Strategy, which was developed in consultations between the Placer Vineyards owners group, the County, the Sacramento Area Council of Governments, various environmental groups, and state and federal resource agencies, identifies (among other things) wetland and species-related mitigation standards for development within the PVSP. The PVSP Mitigation Strategy is an integral component of, and was designed to be consistent with, the Plan's conservation strategy.

Because the land plan for the PVSP was finalized while the Plan was still in development, some of the avoidance and minimization measures and conservation requirements in the PVSP Mitigation Strategy differ slightly from the Conditions on Covered Activities in Chapter 6, *Program Participation and Conditions on Covered Activities*, as described in Appendix N, *Placer Vineyards Specific Plan*. However, all PVSP projects that receive incidental take coverage under the Plan and permits will be subject to Plan fees, as described in Chapter 9, *Costs and Funding*.

Some projects within the PVSP may be built before the Plan is finalized and approved. To comply with the ESA, these interim PVSP projects will each obtain incidental take authorization in accordance with the Programmatic Biological Opinion (BO) issued for the entire PVSP[11] , which incorporates the PVSP Mitigation Strategy. In the Programmatic BO, the USFWS analyzed the PVSP as a whole to ensure that projects receiving incidental take authorization through project-specific BOs prior to approval of the Plan are in alignment with the regional conservation strategy for western Placer County. Prior to the issuance of each Corps of Engineers permit for an interim project, the USFWS will review that project's final mitigation plan and append to the Programmatic BO an incidental take statement for that project. Once the Plan is approved, any projects in the PVSP that have not already received incidental take authorization as described above will obtain take authorization through the Plan under the same terms and conditions as other Covered Activities, except as otherwise provided in Appendix N, *Placer Vineyards Specific Plan*, and will receive the regulatory assurances provided for Covered Activities (Chapter 10, *Assurances*). Any PVSP projects that received incidental take authorization under the Programmatic BO as described above will not receive such regulatory assurances. Any differences between the PVSP-specific conditions described in Appendix N, *Placer Vineyards Specific Plan*, and the conditions described in Chapter 6, *Program Participation and Conditions on Covered Activities*, of this Plan will only apply to PVSP projects (including covered offsite infrastructure), and will not apply to other, non-PVSP Covered Activities.

The following actions will be implemented to smoothly incorporate PVSP compensatory mitigation lands into the Reserve System and to account for PVSP take.

8.9.5.1 Proposed Maximum Extent of Take

Upon issuance of the USFWS permit for the Plan, the Programmatic BO will expire and any PVSP project that has not been appended to the Programmatic BO would be covered by the Plan's permits. All take authorized within the Plan Area under the Programmatic BO for the PVSP will be counted against the proposed maximum extent of effects in the Plan's permits in terms of land cover and applicable Covered Species' habitat, unless the proposed maximum extent of take under the Plan's permits already reflect a reduction in allowable take based on take authorized for interim PVSP projects under the Programmatic BO. The transition of incidental take authorization from the Programmatic BO to the Plan's permits will not increase the amount of take authorized for the Plan. After the transition, the PCA will assume responsibility for tracking take limits for the PVSP (as with all other Covered Activities).

8.9.5.2 Compensatory Mitigation for Interim PVSP Projects

The Plan assumes as part of its Covered Activities effects analysis and conservation strategy that the PVSP will be fully implemented and that the PVSP will provide compensatory mitigation that is

[11] USFWS, April 1, 2016, Programmatic Biological Opinion for the Placer Vineyards Specific Plan Project, Placer County, California (Corps File Number SPK-1999-00737) Service File Number: 81420-2008-F-0983-3 as amended.

consistent with Plan requirements. Compensatory mitigation for interim PVSP projects—PVSP projects that receive take authorization by being appended to the Programmatic BO—may be provided through the In-lieu Fee Program, through dedication of land to be enrolled into the HCP/NCCP Reserve system, or through purchase of credits at a mitigation or conservation bank that meets Plan requirements (see Section 8.4.7).

The In-lieu Fee Program is designed to develop and implement mitigation projects that are consistent with Plan requirements. Interim PVSP projects that use the ILF will fund implementation, management, and monitoring of In-lieu Fee Program mitigation projects through the payment of mitigation fees. In-lieu Fee program mitigation projects will be included in the Plan's Reserve System, will be managed and monitored as part of the Reserve System, and will be included in reporting regarding the Reserve System as provided in Section 8.11*, Reporting*. Lands protected and managed under the ILF Program to provide compensatory mitigation for interim PVSP projects will also contribute to the Plan's biological goals and objectives, be counted toward the Plan's land acquisition commitments, and included in the Reserve System.

If mitigation for interim PVSP projects is provided through dedication of land, the lands protected and managed to provide compensatory mitigation will contribute to biological goals and objectives for the Plan and can be counted toward the Plan's land acquisition commitments. These lands will be included in the Reserve System once the PCA prepares a Reserve Management Plan for the lands in accordance with Section 8.4.2.8, *Step 8: Reserve Unit Management Plan*, and the applicable interim PVSP projects provide the PCA with sufficient funding to manage the lands in accordance with the Reserve Management Plan. Both onsite (i.e., within the PVSP Area) and offsite PVSP compensatory mitigation lands can be added to the Reserve System in this way. No such lands will be transferred to the PCA unless and until sufficient management funding is provided in accordance with this Section..

8.9.5.3 Conservation Easements on Mitigation Sites

The PVSP Programmatic BO requires conservation easements to be recorded on any onsite and offsite PVSP compensatory mitigation sites for interim PVSP projects. Under the PVSP Mitigation Strategy, Placer County, or a third-party conservation organization approved by both the County, the USFWS, and CDFW, will own the conservation easements. Fee title ownership of PVSP compensatory mitigation lands may vary from site to site, but will in all cases have a USFWS- and CDFW- approved conservation easement, long-term management plan, and endowment held by a USFWS- and CDFW-approved entity.

The PVSP conservation easements will include language to provide for transfer of the conservation easements to the PCA, or a third-party approved by the PCA, the USFWS, and CDFW, when PVSP compensatory mitigation lands are added to the Reserve System.

8.9.5.4 Long-term Management

Under the Programmatic BO for the PVSP, any PVSP offsite mitigation sites must have management plans and funding for long-term management. When PVSP compensatory mitigation lands are added to the Reserve System as described in Section 8.9.5.2, *Compensatory Mitigation Lands for Interim PVSP Projects*, the County will oversee management of the lands based on the Reserve Management Plan prepared for them.

8.9.5.5 Funding for Long-term Management

When PVSP compensatory mitigation lands are added to the Reserve System as described in Section 8.9.5.2, *Compensatory Mitigation Lands for Interim PVSP Projects*, funds that have been provided by interim PVSP projects for long-term management and monitoring in accordance with the applicable Reserve Management Plan will be transferred to the PCA to allow for management and monitoring of the lands as part of the Reserve System, consistent with the Plan. The PCA will deposit a share of the funds provided by the interim PVSP projects to provide for long-term management and monitoring of the PVSP compensatory mitigation sites in the Plan's endowment for post-permit costs (Chapter 9, *Costs and Funding*). The share of funding deposited in the endowment will be determined by the PCA, with the approval of USFWS and CDFW.

8.9.5.5.1 Restoration and Mitigation Plans

The transition of incidental take authorization from the PVSP Programmatic BO to the Plan permits will not alter responsibilities under restoration and mitigation plans approved in accordance with the PVSP Programmatic BO or any project-specific PVSP BO. Any outstanding obligations under such plans, including, but not limited to, completion of restoration actions or meeting performance criteria for such actions, will be completed as provided in the applicable plan. Once the USFWS permit is issued for the Plan, PVSP projects that have not already been appended to the Programmatic BO will comply with Plan requirements for Covered Activities in accordance with Chapter 6, *Program Participation and Conditions on Covered Activities*, except as otherwise described in Appendix N, *Placer Vineyards Specific Plan*, and restoration and mitigation actions to offset the impacts of such PVSP projects will be implemented as required by the Plan.

8.9.5.6 Use of Surplus Compensatory Mitigation Lands Among Projects in the PVSP

Some interim PVSP projects may provide lands that exceed the requirements of the PVSP Mitigation Strategy. For example, the lands provided could include more acres of Covered Species' habitat than is needed for project mitigation under the PVSP Mitigation Strategy. Such surplus lands may be freely assigned by private agreement between interim PVSP projects. Once the USFWS permit for the Plan is issued, such surplus land may be proposed as a land dedication in lieu of a portion of the Plan land conversion fee in accordance with Section 8.4.13, *Land Dedication in Lieu of Land Conversion Fee*, for any PVSP project.

8.9.6 Coverage Option for Certain Minor Activities

Section 2.7, *Activities not Covered by this Plan* (paragraph 12) defines "minor activities" not subject to the requirements of the Plan to include activities on parcels existing at the time of Plan adoption equal to or less than 20,000 square feet (0.46 acre). Small additions of less than 5,000 square feet to existing improved properties are also defined as minor activities not covered by the Plan. Existing lots of this small size and small additions to existing structures are not subject to Plan requirements and are not covered by the Plan or the permits because they are not expected to have adverse effects on Covered Species. However, if a property owner of such a site were to find a Covered Species, he or she may wish to be covered under the Plan.

The types of activities and projects on these small sites are the same as those activities and projects already covered by the Plan, so the effects analysis in Chapter 4, *Effects of Covered Activities*, has

already considered any potential impacts. Because their impacts would be very small and this opt-in allowance would be granted very rarely, the allowable take can be accommodated within the proposed maximum extent of effects already established by the Plan. Therefore, with the advance approval of the PCA, proponents of such minor projects and activities may apply for coverage under the permits in accordance with Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*. To receive coverage under the permits, such projects and activities must meet all applicable criteria for Covered Activities in Chapter 2, *Covered Activities*, and must fulfill all applicable conditions of coverage in Chapter 6, *Program Participation and Conditions on Covered Activities.*

8.10 Compliance Tracking and Data Management

8.10.1 Compliance Tracking

The PCA will track all aspects of compliance with the terms and conditions of the permits. To track compliance, the PCA will maintain baseline data as specified below.

- The location, extent, and timing of land acquisition and establishment of the Reserve System within the Plan Area according to the requirements in Chapter 5, *Conservation Strategy*
- The location, extent and timing of implementation of each conservation measure listed in Chapter 5, *Conservation Strategy,* including restoration, enhancement, and creation of applicable land-cover types, and preparation of Reserve Unit Management Plans
- Descriptions of conservation agreements, lands acquired in fee title, interagency memorandums of agreement, or any other agreements entered into for the purposes of protecting, enhancing, or restoring Covered Species' habitat or natural or semi-natural communities
- The location, extent, and timing of effects on land-cover types, by year and cumulative total, and the implementation of avoidance and minimization measures, based on reports submitted by applicants and Permittees for take authority under the Plan

The purpose of monitoring this information will be to track the amount of take that has occurred and the PCA's progress toward achieving HCP/NCCP biological goals and objectives for Covered Species and natural communities (see Chapter 5, *Conservation Strategy*). This tracking of progress will help ensure compliance with the Stay Ahead provision.

8.10.2 Database Development and Maintenance

The PCA will develop and maintain a comprehensive data repository to track permit compliance and all other aspects of Plan implementation for which reporting is required, including land and stream management and monitoring. The initial data repository to track permit compliance will be operating within 12 months after the local implementing ordinances taking effect. Additional components of the data repository (e.g., monitoring) can be added later as these components of the Plan are developed.

Compliance tracking data will be linked to supporting information documenting Plan compliance. These reports and other data will be stored and archived electronically whenever possible. Appropriate supporting information includes the following categories:

- Participation packages submitted for Covered Activities
- Preconstruction survey reports
- Reports and other documentation related to the screening, selection, and acquisition of reserve lands
- Designs for Covered Activities that demonstrate compliance with relevant conditions in Chapter 6, *Program Participation and Conditions on Covered Activities* (e.g., urban-wildlands interface design elements)

The data repository will be designed to be "user friendly," such that a trained staff person (as opposed to a technician or programmer) can enter data. Additionally, the data repository will allow for future expansion and integration with external databases (e.g., linkage to agency or other GIS map libraries). The data repository will be structured to meet the following requirements:

- Data documentation such that future users can determine why, how, and where data were collected (documentation standards should be consistent for all types of monitoring and over time; adequate documentation will facilitate the future use of monitoring data)
- Quality assurance and quality control of the data
- Access and use of the most current information in assessment and decision making (the database will allow repeated access to current and past information over time)
- Storage of spatial information in a GIS-linked or similar database

The primary types of information for which the data repository will be developed and maintained are listed below.

- Species occurrences, including pre-existing and newly identified occurrences
- Status of Covered Activities, including implementation and impacts on Covered Species and natural communities
- Status of Plan preservation/enhancement/ creation and restoration measures
- Plan funding and expenditures
- Data from monitoring and targeted studies
- Adopted changes to the Plan, including administrative changes, minor amendments, or major amendments (all defined in Chapter 10, *Assurances*)
- All reports and documents generated by the PCA or the Permittees related to the Plan

The PCA may choose to develop a web-linked database to facilitate controlled transfer of information by others into and out of the database. Examples of benefits that could be associated with maintaining controlled web-linked access to selected elements of the comprehensive Plan database include:

- Development of database entry forms or use of handheld devices that could allow direct input of information into the database by those charged with implementing Covered Activities, conservation measures, monitoring surveys, and directed studies
- Access by entities helping to implement the Plan to digital monitoring, research, and other data for purposes of generating internal reports that may be needed to facilitate their participation in the Plan

- Access by agencies implementing other ecosystem conservation and restoration programs, outside researchers, and other interested parties to Plan reports and documents

The PCA will comply with the information sharing requirements of the Implementing Agreement. If the PCA allows additional access to the project databases, such access will require strict controls and monitoring to ensure that the integrity of the databases are maintained (e.g., use of passwords to limit access of a particular entity to selected database functions, sampling data entry forms to ensure that entered information is complete, compatible, and accurate).

8.11 Reporting

The PCA will prepare annual reports over the term of the PCCP that document permit compliance (see Section 8.10, *Compliance Tracking and Data Management*), conservation measures, management measures, restoration/creation measures, and monitoring results. The annual reports will summarize the previous calendar year's implementation activities and be completed by March 1 following the reporting year. No annual report will be required for the first partial calendar year. Annual reports will require synthesis of data and reporting on important trends such as land acquisition, fee collection, and habitat restoration. A due date of March 1st will allow time for the data from the previous year to be assembled, analyzed, and presented in a clear and concise format.

Annual reports will be submitted to the Permittees, the Wildlife Agencies, and other interested parties, and will be available to the public and posted on the Plan web site. The PCA will also distribute these reports to science advisors periodically for their review (Section 8.2.7, *Science Advisors and Land Managers*). These advisory bodies will use results presented in the annual reports, as well as other available information and any additional monitoring reports produced through the Monitoring and Adaptive Management Program (Chapter 7, *Monitoring and Adaptive Management Program*), to assess the Plan's success in meeting its biological goals and objectives and to formulate recommendations to the PCA for Plan implementation in subsequent years.

The goals of the annual report are to:

- Provide the information and data necessary for the Permittees to demonstrate to the Wildlife Agencies and the public that the Plan is being implemented properly and as anticipated
- Disclose any problems with Plan implementation so they can be addressed
- Document issues with Plan implementation that may require consultation with the Wildlife Agencies
- Identify administrative or minor changes to Plan components required to increase the success of conservation measures

At a minimum, annual reports will include the following information:

- A description of all Covered Activities implemented during the reporting period categorized by major activity type (per Chapter 2, *Covered Activities*) and acreage.
- A summary of permanent and temporary impacts on natural and semi-natural communities and constituent habitats associated with implementation of Covered Activities and conservation measures throughout the Plan Area. Impacts on riparian and wetland land-cover types will also be reported by watersheds.

- A cumulative summary of impacts and conservation, including the jump start lands, for all natural and semi-natural communities and constituent habitats (i.e., from the start of the permit term).
- A summary accounting for all conditions on Covered Activities applied to these activities (see Chapter 6, *Program Participation and Conditions on Covered Activities*).
- A description of all natural community protection, enhancement, restoration, and creation measures implemented during the reporting period.
- A year-to-date and cumulative summary of the extent of natural and semi-natural communities and constituent habitats protected, enhanced, restored, and created.
- An assessment of progress toward meeting species occupancy requirements.
- A copy of all easements recorded during the reporting year.
- An assessment of the progress toward all land acquisition commitments by local, state, and federal sources, including natural and semi-natural communities and constituent habitats, landscape linkages, and wetland protection. This assessment will include evaluation of compliance with the reserve design and assembly principles in Chapter 5, *Conservation Strategy* (e.g., minimizing edge).
- An assessment of compliance with the Stay Ahead provision (Section 8.4.3, *Stay Ahead Provision*) and a forecast of expected take and land acquisition needs for the next 2 years.
- An accounting of all revenues received, by type (e.g., Plan fees, grants) and an assessment of progress toward total revenue goals. Funding from local, state, and federal sources must be tracked separately. Any fee adjustments must also be reported.
- A summary of Plan costs and expenditures for the reporting period and a summary of the last fee assessment performed (see Section 9.4.1.7.2, *Periodic Assessment and Adjustment of Fees*).
- An assessment of progress toward a complete funding strategy for implementation after the permit term (see Chapter 9, *Costs and Funding*).
- A summary of all management and enhancement measures undertaken on and off the Reserve System and a discussion of the management issues facing the PCA.
- A presentation of the conceptual ecological models developed to date and any changes to them that have taken place.
- A description of the landscape-, natural community–, and species-level monitoring undertaken during the reporting period and a summary of monitoring results, including species status and trends.
- A description of the adaptive management process utilized during the reporting period (e.g., consultation with science advisors).
- A summary of the recommendations or advice provided by the Wildlife Agencies and Science Advisors, regarding implementation of the monitoring and adaptive management program.
- A summary of the monitoring objectives, techniques, and protocols including monitoring locations, variables measured, sampling frequency, timing, and duration, analysis methods, and who performed the analyses.

- An assessment of the efficacy of the monitoring and research program and recommended changes to the program based on interpretation of monitoring results and research findings.
- An assessment of the efficacy of habitat restoration and creation methods in achieving performance objectives and recommended changes to improve the efficacy of the methods.
- A description of all Plan targeted studies undertaken during the reporting period, a summary of study results, and a description of integration with monitoring, assessment, and compliance elements.
- An assessment of the appropriateness of performance indicators and objectives based on the results of effectiveness monitoring, and recommended changes to performance indicators and objectives.
- A description of any actions taken or expected regarding changed circumstances, including remedial actions.
- A description of any unforeseen circumstances that arose and responses taken.
- A year-to-date and cumulative summary of Certificates of Inclusion issued.
- A summary of any administrative changes, minor modifications, or major amendments proposed or approved during the reporting year (see Chapter 10, *Assurances*).

8.12 Schedule and Milestones

To ensure a successful Plan, the PCA will need to be making progress on a variety of tasks simultaneously. Tasks during the first several years of implementation will be particularly important to ensure positive momentum and early compliance with Plan terms and conditions. This schedule does not preclude the Permittees from initiating and accomplishing these milestones earlier than anticipated.

During the first 6 months of the permit term, emphasis will be placed on forming the PCA, hiring key administrative staff for the PCA (or contracting out their functions), establishing the local implementing ordinances required to fund and implement the Plan, and developing implementation tools (e.g., survey protocols and templates). Within the first 6 months of the permit term, the tasks of grant writing, land acquisition, and Plan implementation training will transfer from the Permittees to the PCA or its agent (e.g., a local land management agency). During the permit term, the PCA will be responsible for these tasks. Both the local jurisdictions and the PCA will be responsible for collecting Plan fees throughout the permit term. Within the first year, the PCA will secure necessary staff, identify science advisors, create a Plan implementation web site, establish the required databases, and investigate habitat restoration opportunities.

Over the following 5 years, additional Reserve System staff will be hired or contracted, and more specific management plans will be created and initiated to manage and monitor the expanding Reserve System. Environmental compliance and design for habitat restoration and creation will be initiated. Throughout the permit term, fees will be updated and adjusted on a regular basis, and conservation assessments will be conducted. In addition, the hiring and contracting of staff will be completed to implement the Plan and manage the Reserve System in perpetuity. Habitat restoration and design will continue, as will the adaptive management and monitoring of biological resources.

Between Years 6 and 50, the PCA will continue to implement the conservation strategy, implement monitoring and adaptive management, and refine these programs as monitoring and other data are collected. By Year 20 or halfway through take authorization, whichever comes first, the post-permit funding sources and implementation structure will have been finalized. All land acquisition must be completed by Year 45, and all restoration and creation measures must be completed by Year 40 to allow time to meet performance criteria within the permit term. Key implementation milestones are listed in Table 8-2.

Table 8-2. Schedule for Implementation Tasks

Time Period	Tasks and Milestones [If applicable, HCP/NCCP reference included]	Responsible Party
Prior to Permit Issuance (i.e., Year 0)		
	Complete final versions of Implementing Agreement and Implementation Ordinances in preparation for permit issuance; form PCA. [Section 8.2, *Implementation Structure*]	Permittees
	Where feasible, apply for state/federal grants for land acquisition (after publication of Draft Plan). Acquire remaining Jump Start lands and begin process of acquiring lands to meet land acquisition requirements in Chapter 5, *Conservation Strategy*. [Section 8.3.2, *Administration and Funding*; Section 8.4.4, *Jump Start*; Chapter 9*, Costs and Funding*]	Permittees
	Develop template participation package for use by private applicants and Permittees that includes all items required in Chapter 6, *Program Participation and Conditions on Covered Activities.*	Permittees
	Establish PCCP account and procedures to collect and manage PCCP Development Fees [Chapter 9, *Costs and Funding*]	Permittees
	Complete vernal pool branchiopod occupancy rate protocol [Chapter 7, *Monitoring and Adaptive Management Program*, Section 7.5.11, *Vernal Pool Branchiopods*]	PCA
	Complete reserve unit management plan templates [Chapter 5, *Conservation Strategy*, Section 5.3.2.1, *Reserve Unit Management Plans*]	PCA
	Complete conservation easement templates [Chapter 8, *Plan Implementation*, Section 8.4.9, *Conservation Easements*]	PCA
Post-permit		
0 to 6 months		
	Develop a set of biologist qualifications and establish pre-approved list of biologists per Chapter 6, *Program Participation and Conditions on Covered Activities*. This task will be ongoing.	PCA
	Train local jurisdiction staff to prepare, review, and process Plan applications. This task will be ongoing.	Permittees, with ongoing assistance from PCA
	Review private development participation packages for coverage under the HCP/NCCP. This task will be ongoing. [Chapter 6, *Program Participation and Conditions on Covered Activities*; Chapter 8, *Plan Implementation*]	County and City

Time Period	Tasks and Milestones [If applicable, HCP/NCCP reference included]	Responsible Party
	Prepare and review participation packages for public sector activities under the HCP/NCCP. This task will be ongoing. [Chapter 6, *Program Participation and Conditions on Covered Activities*; Chapter 8, *Plan Implementation*]	Permittees
	Establish Public Advisory Committee. [Section 8.2.8.2, *Public Advisory Committee*]	PCA
	Where feasible, apply for state/federal grants for land acquisition. Continue process of acquiring lands to meet land acquisition requirements in Chapter 5, *Conservation Strategy*. These tasks will be ongoing. [Chapter 8, *Plan Implementation*; Chapter 9, *Costs and Funding*]	PCA
	Collect development fees. This task will be ongoing. [Chapter 8, *Plan Implementation*; Chapter 9, *Costs and Funding*]	County and City, PCA
	Update County and City Tree Ordinances in accordance with HCP/NCCP [Chapter 6, *Program Participation and Conditions on Covered Activities*, Section 6.3.2.3.2, *Community Condition 3.2, Valley Oak Woodland and Individual Valley Oak Trees Restoration*]	County and City
6 months to 1 year		
	Establish Plan Implementation web site. [Chapter 8, *Plan Implementation*]	PCA
	Establish and maintain database to track permit compliance (e.g., land acquisition and Covered Activity impacts). This task will be ongoing. [Chapter 8, *Plan Implementation*]	PCA
1 to 5 years		
	By the end of year 2, acquire vernal pool complex containing a minimum of 160 acres of vernal pool constituent habitat, of which at least 53 acres will be delineated as vernal pools [Chapter 5, *Conservation Strategy*, Section 5.3.1.5.2, *Vernal Pool Complexes and Grassland Natural Communities*]	PCA
	Update fees annually according to Chapter 9, *Costs and Funding*. Provide new fee schedule to Permittees. This task will be ongoing. [Chapter 8, *Plan Implementation*; Chapter 9, *Costs and Funding*]	PCA, County and City
	At intervals specified in Chapter 9, *Costs and Funding*, assess and adjust funding and development fees. This task will be ongoing. [Chapter 9, *Costs and Funding*]	PCA
	Submit annual report to the Wildlife Agencies. This task is performed on an annual basis by March 1 of every year for the previous reporting year. [Section 8.11, *Reporting*]	PCA
	Prepare reserve unit management plans as described in Chapter 5, *Conservation Strategy*, for each reserve unit. [Chapter 5, *Conservation Strategy*]	PCA
	Initiate adaptive management and monitoring of biological resources. This task will be ongoing. [Chapter 7, *Monitoring and Adaptive Management Program*]	PCA

Time Period	Tasks and Milestones [If applicable, HCP/NCCP reference included]	Responsible Party
	Initiate or continue management and monitoring in Reserve System. [Chapter 5, *Conservation Strategy*, and Chapter 7, *Monitoring and Adaptive Management Program*]	PCA
	Continue to acquire land to assemble Reserve System and meet Stay Ahead provision requirements (by Year 2). This task will be ongoing; however, all land acquisition must be completed by Year 45. [Chapter 5, *Conservation Strategy*; Chapter 8, *Plan Implementation*]	PCA
	Begin wetland restoration and creation design and additional environmental compliance for restoration and creation. This task will be ongoing. [Chapter 5, *Conservation Strategy*]	PCA
	By the beginning of Year 4, renew the Migratory Bird Treaty Act Special Purpose Permit for another 3-year term. [Chapter 6, *Program Participation and Conditions on Covered Activities*]	PCA
	Develop procedure and templates (similar to Plan Participation Package) that Permittees will use to document their compliance with the HCP/NCCP for their own activities. [Chapter 6, *Program Participation and Conditions on Covered Activities*, Section 6.2.1, *Evaluation Process for Permittee Projects*]	Permittees
	Prepare System-wide Fire Management Plan [Chapter 5, *Conservation Strategy*, Section 5.3.2.2, *Landscape-level Management and Enhancement*]	PCA
More than 50 years		
	Continue adaptive management and limited monitoring of biological resources to ensure management actions are working. [Chapter 7, *Monitoring and Adaptive Management Program*]	PCA

The responsible party is the entity that must ensure the task or milestone is achieved. In many cases, the responsible party may delegate implementation of the task to a third party (e.g., a Permittee, landowner, or consultant).
HCP/NCCP = Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan
PCA = Placer Conservation Authority

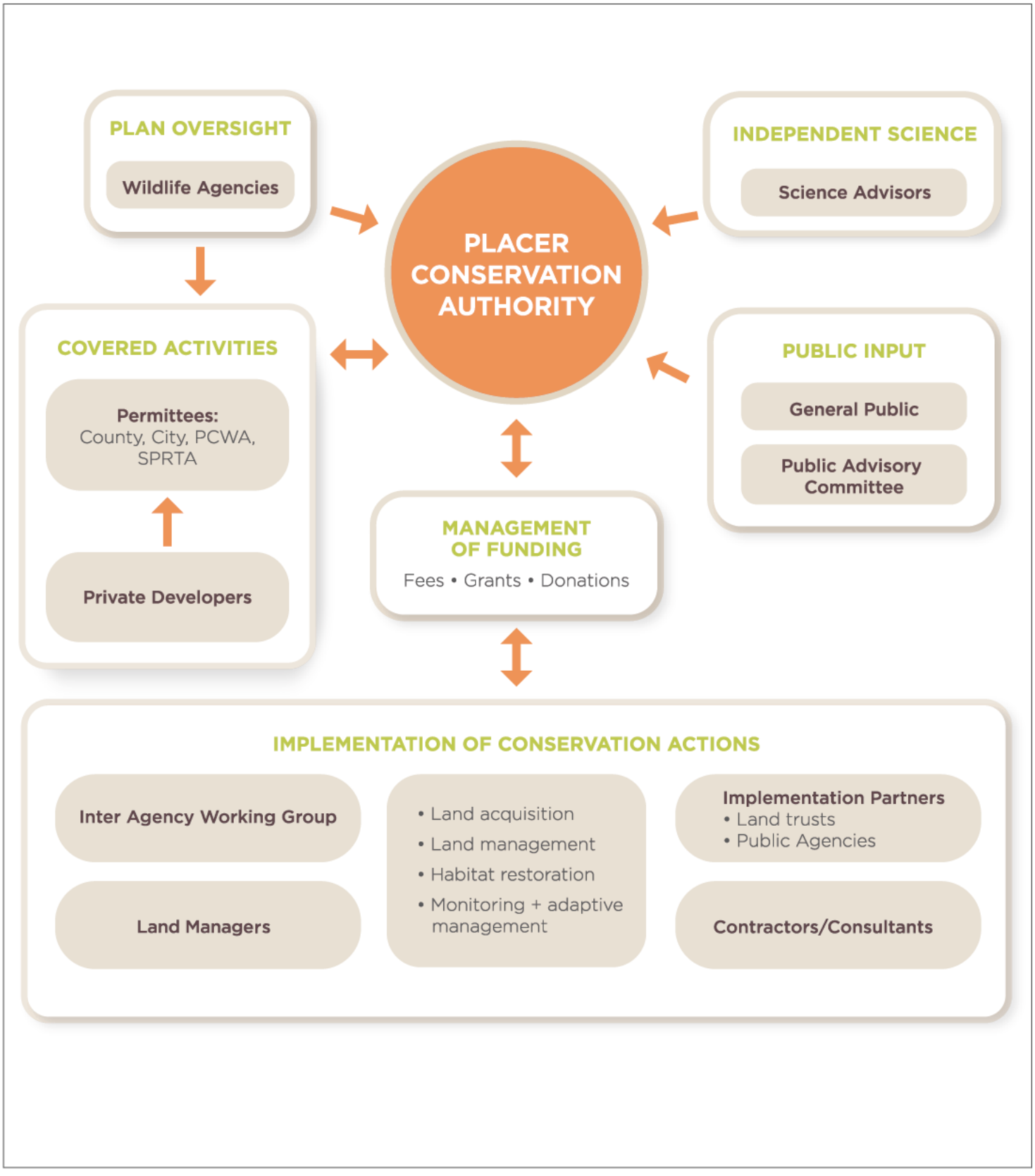
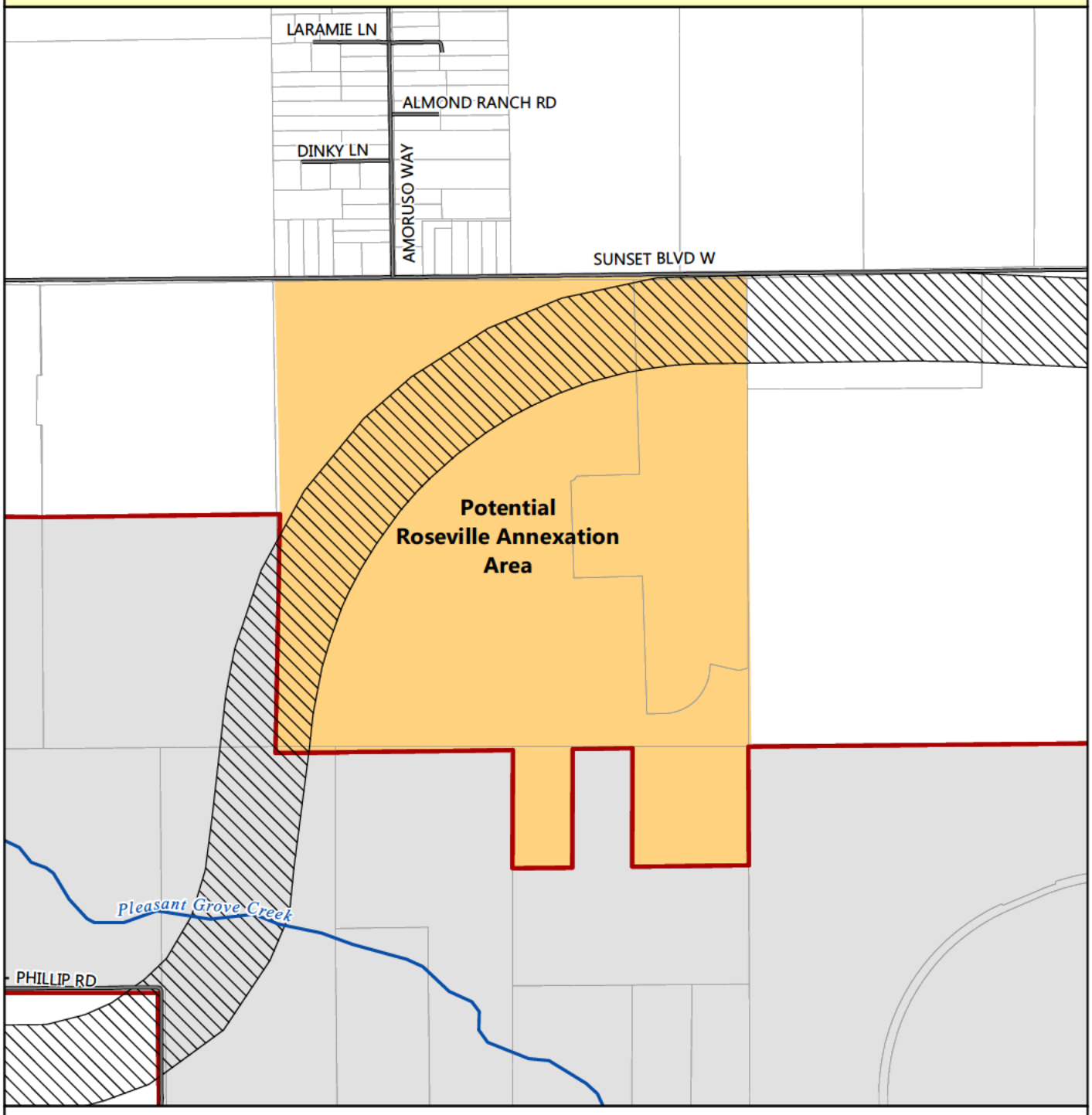


Figure 8-1 Relationship of the Placer Conservation Authority to External Parties

Figure 8-2 Land Acquisition Process

Figure 8-3

POTENTIAL ROSEVILLE ANNEXATION AREA



LEGEND

- POTENTIAL ROSEVILLE ANNEXATION AREA
- CITY OF ROSEVILLE
- PROPOSED PLACER PARKWAY CORRIDOR
- PARCELS
- PERENNIAL RIVER/STREAM

N

0 1,000 2,000
Feet

Path: L:\PROJECTS\HCP\ARCMAP\Potential_Roseville_Annexation_Area_160906.mxd 9/6/2016

Chapter 9
Costs and Funding

9.1 Introduction

This chapter presents estimates of costs to implement the Western Placer County Conservation Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP or Plan) and describes the methods used to estimate the costs and funding needed for the permit term and in perpetuity. The chapter identifies fees and other funding sources that support implementation of the Plan, the funding needed to support ongoing management of the Reserve System after the permit term ends (in perpetuity), and funding adequacy.

9.2 Cost to Implement the HCP/NCCP

Estimating the full costs of the Plan is an essential step in demonstrating adequate funding to meet regulatory standards. The numerous cost assumptions described in this chapter are based on the conservation strategy outlined in Chapter 5, *Conservation Strategy*. Costs presented in this chapter are estimated to inform the HCP/NCCP funding plan. The Placer Conservation Authority (PCA) has primary responsibility for overall and day-to-day implementation of the Plan. For Plan implementation, the PCA will annually prepare and approve a budget, based on current information and projections regarding Plan assets, revenues, and expenses (see Section 8.3.2, *Administration and Funding*).

The major cost categories detailed in this chapter reflect Plan conservation measures and the monitoring and administrative activities required to support those measures. The cost categories are listed below and described in detail under Section 9.3, *Cost Estimate Methodology and Assumptions*.

1. Establish Reserve System (Section 9.3.1)
2. Restore natural communities and Covered Species' habitat (Section 9.3.2)
3. Manage and enhance the Reserve System (Section 9.3.3)
4. Monitoring, research, and scientific review (Section 9.3.4)
5. Environmental compliance (Section 9.3.5)
6. Plan administration (Section 9.3.6)
7. Contingency (Section 9.3.7)
8. Costs in perpetuity (Section 9.3.8)
9. Plan preparation costs (Section 9.3.9)

Table 9-1 shows the anticipated cost of each category for this HCP/NCCP by 5-year period and cumulatively for the 50-year permit term, excluding costs in perpetuity and plan preparation costs. The capital budget refers to the acquisition and replacement of assets while the operating budget refers to all other ongoing implementation costs such as labor. Costs are expressed throughout the

chapter in constant 2019 dollars. Cost estimates summarized here by 5-year periods are generalized predictions of the timing of funding needs. Annual costs will vary over the 50-year permit term due to the increase in the size and complexity of the Reserve System over time and the schedule of restoration/creation activity. Actual costs will be assessed at least every 5 years during Plan implementation, and land cost and other inflation factors will be applied annually to the HCP/NCCP development fees ensure that funding keeps pace with Plan costs (see Section 9.4.1.7, *Adjustment of Development Fees*).

Management, monitoring, and administrative responsibilities will continue in perpetuity beyond the permit term, although at a somewhat reduced level, as described below in Section 9.3.8, *Costs in Perpetuity*. Those costs are estimated as an average annual cost.

9.3 Cost Estimate Methodology and Assumptions

To estimate the costs of this HCP/NCCP, the Permittees developed a cost model identifying specific costs in the major cost categories (listed above). Appendix L, *Cost Model and Assumptions*, provides the assumptions and output of the model. The Permittees designed the cost model to generate reasonable estimates of HCP/NCCP–related costs. The Permittees refined the model structure from cost models developed for other regional HCPs and NCCPs.[1] The cost model generates estimates of the expenses of the PCA over the permit term and in perpetuity to allow the Permittees to determine funding needs and develop an appropriate fee structure. During Plan implementation, the PCA will update the cost model and funding plan as cost assumptions are refined based on actual experience.

The sections that follow describe the cost categories and unit cost factor assumptions and sources. The Permittees developed cost assumptions using local comparable cost data from land managers, habitat restoration contractors, real estate brokers, and land appraisers active in the Plan Area, and from other sources where data from local sources were not available. Examples of local sources of cost data included the Placer Land Trust, Placer County (County), City of Roseville, Natomas Basin Conservancy, University of California Cooperative Extension Farm Advisor for Placer and Nevada Counties, and mitigation banks active in Placer County. Initial cost estimates were presented to a Finance Committee assembled by Placer County in 2013 to review and comment on preliminary cost and funding analysis for the Plan.[2] In 2015, the cost and financial analyses were the subject of a peer review commissioned by the Placer County Landowners Group. The review found no basis for any changes to cost model assumptions and concluded that the model's "detailed cost assumptions" and "comprehensive consideration of all potential cost categories" were consistent in approach with models used in many regional HCP/NCCPs. In 2017, 2015 cost factors were increased based on a generalized inflation factor reflecting changes in the Consumer Price Index (applied to non-land-acquisition costs) and land acquisition cost factors were adjusted based on recent trends in land values. In 2019, restoration construction costs were updated based on recent actual aquatic and wetland restoration project experience in Western Placer County. Review of trends in agricultural land values determined that no change was warranted for all land acquisition costs except rice, where an inflation factor based on area trends was applied. Other cost factors were increased based

[1] The Santa Clara Valley Habitat Plan (an approved HCP/NCCP), the East Contra Costa County HCP/NCCP (approved), and the Yolo County HCP/NCCP (approved).

[2] The Finance Committee was broadly representative, including owners/managers of conservation lands, brokers, landowner/developers, appraisers, Biological Working Group stakeholders, and staff from the City of Lincoln, City of Roseville, Placer County, and the Placer County Water Agency.

on generalized inflation factors reflecting changes in the the California Construction Cost Index (all other restoration types) and the Consumer Price Index (applied to all other non-land acquisition costs).

This Page Left Intentionally Blank.

Table 9-1. Summary of Capital and Total Cumulative Operating Costs through 50-Year Permit Term (rounded)

	TOTAL COST PER PERIOD AND CUMULATIVE OVER 50 YEARS												Annual Average
	Start Up	**1 - 5**	**6 - 10**	**11 -15**	**16 - 20**	**21 -25**	**26 - 30**	**31 -35**	**36 - 40**	**41 - 45**	**46 - 50**	**TOTAL**	
TOTAL BUDGET													
Establish Reserve System	360,000	27,722,000	33,020,000	43,618,000	43,618,000	56,872,000	67,990,000	62,233,000	59,592,000	51,138,000	46,362,000	**$492,525,000**	$9,850,500
Restore, Manage & Monitor Natural Communities	127,000	15,884,000	19,501,000	25,039,000	25,730,000	32,538,000	38,127,000	35,851,000	35,245,000	32,044,000	30,400,000	**$290,486,000**	$5,809,720
Reserve Management and Enhancement	116,000	4,255,000	5,079,000	7,007,000	7,635,000	9,343,000	11,590,000	12,044,000	13,898,000	14,367,000	15,243,000	**$100,577,000**	$2,011,540
Monitoring, Research, and Scientific Review	116,000	2,554,000	3,767,000	4,545,000	5,251,000	6,052,000	6,585,000	6,907,000	7,453,000	8,048,000	8,561,000	**$59,839,000**	$1,196,780
Environmental Compliance	-	2,279,000	2,990,000	2,988,000	2,988,000	2,989,000	2,989,000	2,988,000	2,988,000	2,278,000	2,277,000	**$27,754,000**	$555,080
Plan Administration	2,482,000	8,736,000	8,933,000	9,149,000	9,219,000	8,705,000	8,838,000	9,113,000	9,234,000	8,878,000	8,941,000	**$92,228,000**	$1,844,560
Contingency Fund	85,000	1,966,000	2,352,000	2,985,000	3,047,000	3,785,000	4,437,000	4,194,000	4,158,000	3,760,000	3,583,000	**$34,352,000**	$687,040
Total	**$3,286,000**	**$63,396,000**	**$75,642,000**	**$95,331,000**	**$97,488,000**	**$120,284,000**	**$140,556,000**	**$133,330,000**	**$132,568,000**	**$120,513,000**	**$115,367,000**	**$1,097,761,000**	**$21,955,220**
CAPITAL BUDGET													
Establish Reserve System	360,000	26,645,000	31,742,000	41,939,000	41,939,000	54,691,000	65,389,000	59,849,000	57,308,000	49,174,000	44,579,000	**$473,615,000**	$9,472,300
Restore Natural Communities (incl. contingency)	15,000	13,870,000	16,307,000	21,140,000	21,184,000	27,242,000	32,252,000	29,671,000	28,502,000	24,761,000	22,595,000	**$237,539,000**	$4,750,780
Reserve Management and Enhancement	4,000	916,000	965,000	1,675,000	1,285,000	1,514,000	2,229,000	1,823,000	2,510,000	2,124,000	2,198,000	**$17,243,000**	$344,860
Monitoring, Research, and Scientific Review	4,000	50,000	9,000	28,000	19,000	57,000	23,000	28,000	17,000	56,000	16,000	**$307,000**	$6,140
Environmental Compliance	-	1,000	1,000	-	-	1,000	1,000	-	-	1,000	-	**$5,000**	$100
Plan Administration	28,000	83,000	18,000	87,000	9,000	102,000	14,000	84,000	9,000	100,000	6,000	**$540,000**	$10,800
Contingency, Land Acquisition and Site Improvements	-	1,332,000	1,587,000	2,097,000	2,097,000	2,735,000	3,269,000	2,992,000	2,865,000	2,459,000	2,229,000	**$23,662,000**	$473,240
Total	**$411,000**	**$42,897,000**	**$50,629,000**	**$66,966,000**	**$66,533,000**	**$86,342,000**	**$103,177,000**	**$94,447,000**	**$91,211,000**	**$78,675,000**	**$71,623,000**	**$752,911,000**	**$15,058,220**
OPERATING BUDGET													
Establish Reserve System	-	1,077,000	1,278,000	1,679,000	1,679,000	2,181,000	2,601,000	2,384,000	2,284,000	1,964,000	1,783,000	**$18,910,000**	$378,200
Restore, Manage & Monitor Natural Communities[b]	112,000	2,014,000	3,194,000	3,899,000	4,546,000	5,296,000	5,875,000	6,180,000	6,743,000	7,283,000	7,805,000	**$52,947,000**	$1,058,940
Reserve Management and Enhancement	112,000	3,339,000	4,114,000	5,332,000	6,350,000	7,829,000	9,361,000	10,221,000	11,388,000	12,243,000	13,045,000	**$83,334,000**	$1,666,680
Monitoring, Research, and Scientific Review	112,000	2,504,000	3,758,000	4,517,000	5,232,000	5,995,000	6,562,000	6,879,000	7,436,000	7,992,000	8,545,000	**$59,532,000**	$1,190,640
Environmental Compliance	-	2,278,000	2,989,000	2,988,000	2,988,000	2,988,000	2,988,000	2,988,000	2,988,000	2,277,000	2,277,000	**$27,749,000**	$554,980
Plan Administration	2,454,000	8,653,000	8,915,000	9,062,000	9,210,000	8,603,000	8,824,000	9,029,000	9,225,000	8,778,000	8,935,000	**$91,688,000**	$1,833,760
Operating Contingency Fund	85,000	634,000	765,000	888,000	950,000	1,050,000	1,168,000	1,202,000	1,293,000	1,301,000	1,354,000	**$10,690,000**	$213,800
Total	**$2,875,000**	**$20,499,000**	**$25,013,000**	**$28,365,000**	**$30,955,000**	**$33,942,000**	**$37,379,000**	**$38,883,000**	**$41,357,000**	**$41,838,000**	**$43,744,000**	**$344,850,000**	**$6,897,000**

2019 dollars; detail may not add to total due to independent rounding.

[a] Does not include plan preparation and post-permit costs. Plan preparation costs are reported in Section 9.3.9 *Plan Preparation Costs*and post-permit costs are reported in Section 9.3.8, *Costs in Perpetuity*

[b] Includes cost of long term management and monitoring on restored lands.

This Page Left Intentionally Blank

Details of each cost category and the key assumptions the Permittees used to develop this Plan's cost estimate are described below. Section 9.3.8, *Costs in Perpetuity*, describes the costs in perpetuity. See the cost model in Appendix L, *Cost Model and Assumptions,* for an accounting of all assumptions.

9.3.1 Establish Reserve System

Establishing the Reserve System entails acquiring land for both protection and restoration/creation purposes (see Section 5.3.1, *Conservation Measure 1: Establish Reserve System*). The cost to establish (or assemble) the reserve is the largest single component of the Plan's costs, totaling about $493 million over the permit term, or about 45 percent of Plan costs (Table 9-1). The reserve assembly cost category includes acquisition costs (the price of fee title or conservation easements), the cost to conduct pre-acquisition surveys, due diligence and transaction costs, and costs for site improvements such as roads, fencing, and gates for lands acquired in fee title. Costs for restoration/creation activity on reserve lands and management and monitoring of reserve lands are included in other cost categories and described in subsequent sections of this chapter.

The reserve assembly cost estimates are based on the acquisition commitments (Table 5-6) and reserve design parameters specified in Chapter 5, *Conservation Strategy*, for *Conservation Measure 1: Establish Reserve System*. By the end of the permit term, the PCA will have acquired 47,300 acres to complete the Reserve System.

Land acquisition and associated surveys, transactions, and site improvement costs would only be incurred during the 50-year permit term of the HCP/NCCP. These costs will end once the permit term has ended.

9.3.1.1 Acquisition Costs

The cost model and funding plan require reasonable planning-level estimates of this important component of Plan implementation. The cost model necessarily uses per-acre averages, based on the best available current information. Actual land costs and easement values will vary significantly around these averages, depending on numerous parcel-specific factors. Qualified appraisals (required when state or federal grant funding or public agency general funds are to be utilized) of each potential acquisition site will establish actual fee title and conservation easement costs. Chapter 8, *Plan Implementation,* details the steps in the land acquisition process in Section 8.4.2, *Process for Acquiring Lands*.

Fee title land cost assumptions are based on analysis of property values in the Plan Area conducted by the appraisal firm, Bender Rosenthal, Inc. (BRI), in April 2011.[3] The analysis evaluated transactions occurring in the 2008 to 2011 time period. In 2012 and 2013, the land cost assumptions were updated with analysis of more recent land transaction records from the Placer County Assessor's Office, information from real estate brokers, and records of transactions involving conservation land in the general vicinity. *Trends in Agricultural Land and Lease Values California and Nevada,* published annually by the California Chapter of the American Society of Farm Managers and Rural Appraisers, was another source of information for the land cost factors. A 2015 peer review

[3] See Appendix L, *Cost Model and Assumptions*, for "Land acquisition cost factors for the Placer County Conservation Plan: 2012 estimates—DRAFT FOR REVIEW AND COMMENT" memorandum dated July 30, 2012. The appendix also includes the cover page to the BRI *Report on Property Value Ranges for Placer County Conservation Plan*, noting that the full report is on file with the Placer County Planning Department.

commissioned by the Placer County Landowners Group provided a more recent review and found no reason to change the cost model land cost assumptions. In 2017 and 2019, land cost factors for the Valley were updated based on observed recent trends in agricultural land values. Information on rural residential values in the Foothills indicates that prices have been generally stable over this period.

The BRI analysis confirmed that parcels in the Foothills are generally more costly than parcels in the Valley. This is due to a number of factors such as average parcel size, topography, water access, soil type, and the value attributable to demand for rural residential development. For the transactions evaluated, the weighted average fee title price was $5,800 per acre for larger Valley parcels and $6,600 per acre for smaller Valley parcels. In the Foothills, parcel size makes a bigger difference; parcels in the range of 40 to 100 acres sold for a fee title price of $10,500 per acre on average—a 50 percent premium over Foothills parcels larger than 100 acres, which averaged $6,900 per acre for fee title.

The BRI analysis did not include land acquisitions accomplished recently in the Plan Area by Placer County and the Placer Land Trust. Adding these fee title transactions for large conservation and open space areas to the database lowered the weighted average land cost per acre in the Foothills subarea. The weighted average fee title price per acre for parcels larger than 100 acres in the Foothills was reduced to $6,000 per acre, just above the weighted average for parcels larger than 100 acres in size in the Valley subarea.

The 2011/2012 analysis and the 2013 review by the Finance Committee indicated that land prices appeared to be stabilizing after the speculative volatility of the mid-2000s. Over time, land acquisition costs for the Plan will be influenced by scarcity considerations, particularly for key mitigation land-cover types (e.g., vernal pool grasslands). The scarcity premium could be as much as 25 percent in the Valley and 10 percent in the Foothills. This cost model assumes an even higher premium applies to wetland land-cover types (vernal pool grasslands, aquatic and wetland, and riparian land-cover types) reflecting their particular value to the Reserve System. A separate factor applies to rice, reflecting agricultural market values. Applying the scarcity factors to the average cost factors indicated above and adjusting the original land cost factors in the Valley for recent trends in values results in the following land cost factors for fee title acquisitions in the cost model:

- All natural communities except wetlands and rice, larger parcels of 100 acres or more in the Valley: $7,685 per acre
- All natural communities except wetlands and rice, larger parcels of 100 acres or more in the Foothills: $6,600 per acre
- All natural communities except wetlands and rice, smaller parcels of 20 to 80 acres in the Valley: $8,745 per acre
- All natural communities except wetlands and rice, smaller parcels of 20 to 80 acres in the Foothills: $11,500 per acre
- Wetlands: $13,250 per acre
- Rice: $11,000 per acre

For planning purposes, the cost model assumes all land needed for restoration land base and land with specific land management requirements, such as management for the giant garter snake, will be acquired in fee title. In the Valley, 90 to 100 percent of vernal pool complex, aquatic/wetland

complex, riverine/riparian complex and grassland reserves, 60 percent of oak woodland reserves, and 40 percent of rice or other agricultural land will be acquired in fee title. In the Foothills, the proportion of fee title acquisition will be lower—generally about 30 percent of all reserve land. Conservation easements are likely to be concentrated on cultivated land, grazing land, and in oak woodlands (based on past practice and land ownership patterns). Based on input from knowledgeable appraisers and Placer County experience, the cost model assumes the PCA can acquire easements at about 60 percent of fee title values. This is the high end of the range acceptable to the State of California if any state funds are involved in the transaction. This constraint on the easement cost would not apply if state funding were not involved.

Per-acre cost factors were applied to the acquisition commitments by community type outlined in the conservation strategy (Chapter 5, *Conservation Strategy*). The timing of acquisitions in the Valley is a function of a land development scenario, associated effects analysis, and mitigation requirements, while acquisitions are assumed to occur evenly over the permit term in the Foothills.

Although land costs per acre are likely to increase over time during certain points in the real estate cycle, the cost model assumes no *real* increase in per-acre land values. All costs in this chapter and in the model are expressed in 2019 dollars assuming costs keep pace with inflation. During Plan implementation, actual costs, including changes in the land market, will be fully evaluated at least every 5 years and annually updated using appropriate indices every year. The mechanisms for addressing these cost increases and fee levels are described in Section 9.4.1.7, *Adjustment of Development Fees*.

9.3.1.2 Transaction Costs

Transaction costs include costs for appraisals, which are required when state or federal grant funding or public agency general funds are to be utilized, title reports, property line surveys, and preparing legal descriptions, negotiating easement terms, and other due diligence activities such as Phase 1 environmental site assessments for hazardous materials.[4] These costs can vary significantly depending on the size of the site, the conditions present on the property and the complexity of the land transaction. For the purposes of this cost estimate, based on the experience of local entities acquiring and managing habitat lands, these costs are assumed to be 3.75 percent of the acquisition cost.

9.3.1.3 Pre-acquisition Surveys

As described in Chapter 5, *Conservation Strategy*, the PCA will undertake pre-acquisition assessments to determine the ability of a property to meet the Plan's biological goals and objectives prior to inclusion into the Reserve System. Pre-acquisition assessments include surveys for the following characteristics (Section 8.4.2.2, *Step 2: Pre-acquisition Assessment*):

- Baseline conditions, including ecological functions
- Land-cover type, including assessment of infrastructure and other site conditions and restoration, creation, and enhancement potential
- Covered Species' habitat and presence
- Wetlands and streams (i.e., wetland delineations)

[4] A Phase 1 Environmental Site Assessment is a preliminary investigation to determine if a site might contain hazardous materials.

- Covered wildlife populations
- Landscape linkages and ecosystem functions

The model estimates the cost of pre-acquisition surveys based on the estimated number of hours required for each type of survey and associated report writing for a typical 200-acre parcel and the cost per hour, including travel costs, for consulting qualified biologists to conduct the surveys. To account for due diligence investigation of sites investigated but not acquired, the model assumes a 25 percent premium on these costs.

9.3.1.4 Site Improvements

Site improvements will be required on reserve land the PCA acquires in fee title. Site improvements may include demolition or repair of unsafe facilities; removal of hazardous materials and solid waste; repair and construction of boundary fences; repair and replacement of gates; and installation of signs (e.g., boundary and landmark signs). Cost estimates are based on a per-acquired-acre cost factor and cost assumptions provided by the Placer Land Trust and the Placer County Public Works and Facilities Department, among others. For reserve land protected by means of conservation easements, the landowner retains responsibility for repair and maintenance of those site improvements not associated with meeting biological goals and objectives.

9.3.1.5 Cost to Acquire Credits at Big Gun Conservation Bank

To meet specific biological goals and objectives for the California red-legged frog, the conservation strategy requires protection of occupied habitat. The PCA will achieve this objective by purchasing conservation credits at the Big Gun Conservation Bank. The Big Gun Conservation Bank shown in Figure 1-1 is identified as Plan Area B5 and is located about 20 miles east of Auburn. The cost of those credits (which include funding for perpetual management and monitoring) is included as a reserve assembly cost.

9.3.1.6 Existing Conservation Lands Credit

Existing protected lands that contribute to the biological goals and objectives of the Plan can be enrolled in the Reserve System (see Section 5.3.1.3.5, *The Role of Existing Protected Areas in the Conservation Strategy*, and Table 8-1).

The cost and funding models calculate a credit against reserve acquisition costs based on the appropriate acquisition cost factors by natural community and location. The credit is applied in the Funding Plan (see Section 9.4, *Funding Sources and Assurances*).

9.3.2 Restore Natural Communities and Covered Species' Habitat

The cost model estimates natural community and Covered Species' habitat restoration/creation costs to be approximately $290 million over the permit period representing, on average, spending of roughly $5.8 million per year (Table 9-1). The budget covers the activities listed below.

- Surveys to select sites, delineate wetlands, and prepare detailed habitat maps and species reports for restoration/creation plans
- Soil sampling or geomorphologic mapping

- Design of restoration and creation projects
- Development of plans, specifications, and engineering documents
- Construction bid assistance
- Pre-construction surveys
- Restoration and creation of habitat (construction activities)
- Construction oversight and monitoring
- Post-construction monitoring and maintenance
- Restoration repair necessary to meet success criteria specified in each reserve unit management plan (monitoring component) and site restoration plans
- Costs associated with using contractors to assist or do any of the restoration and creation components identified in the items above or payments to partner agencies for restoration and creation activities consistent with this Plan on behalf of the PCA
- Costs associated with PCA field and technical staff management and oversight of the work of contractors or partner agencies
- Management and long-term monitoring of the restored/created habitat during and after the permit term
- Research studies to reduce the level of uncertainty related to restoration/creation activities and species goals and objectives
- Contingency of 7.5 percent to account for the greater uncertainty in these costs (contingency costs for restoration/creation actions are independent of, and higher than, costs assumed for the general contingency fund described below in Section 9.3.7, *Contingency*)

The cost to acquire reserve land on which restoration/creation activities will take place is counted as a reserve assembly cost. Specifically, the PCA will acquire about 6,200 acres of grassland, rice, and field agriculture in fee title and restore that land to other natural community and species habitat. Tables B.3 and B.3 in Appendix L *Cost Model and Assumptions* show that Plan restoration commitments would occur on about 4,400 acres of grassland acquired in fee title, about 1,800 acres of rice, and about 50 acres of other agricultural land. The cost model tables show the detail in terms of acres acquired ("From") and habitat acres restored ("To") for both the Valley and Foothills subareas.

The Plan calls for the restoration/creation of the following:

- Vernal Pool Complex and vernal pool constituent habitats, including delineated vernal pools
- Grassland
- Aquatic/Wetland Complex, including Fresh Emergent Marsh
- Riverine/Riparian Complex
- Valley Oak Woodlands
- Oak Woodlands

The cost model estimates restoration/creation costs for each 5-year period based on the area of each land-cover type estimated to be restored/created during that period. For planning purposes, this estimate is based on the analysis of the acres of each natural community lost as a result of Covered Activities[5] and generalized assumptions[6] about the allocation between Valley and Foothill subareas for the conservation strategy. Actual restoration/creation will depend on the pace of the Covered Activities and conservation actions during implementation. The pace of restoration also will comply with the milestones described in Chapter 8, *Plan Implementation*.

Table 9-2 presents the restoration cost factor assumptions for the natural community types to be restored/created. Restoration and creation projects will be completed by contractors or alternatively by third-party partners that have access to the necessary labor, vehicles and equipment. The PCA will not maintain in-house the types of labor resources and specialized equipment needed for habitat restoration and creation projects. For large-scale projects, a great deal of labor is typically required (e.g., grading, planting seedlings, cuttings, or container stock for riparian restoration projects), which specialized contractors are best equipped to provide. PCA staff time is included in this cost category to account for the time needed to prepare restoration management plans and to hire and oversee contractor designs, specifications, and construction.

The cost estimates assume all land to be restored or created will require biological surveys and planning. Restoration construction cost factors are expressed per acre of land restored and cover construction labor and materials. Restoration/creation construction costs for vernal pool constituent habitats and aquatic/wetland type habitat reflect different assumptions about the activities required to restore or create the various types of constituent habitats within each natural community.

Nearly all vernal pool wetland restoration or creation will be done on grassland or on existing vernal pool grassland where hydrology supports greater wetland density. About 10 percent of vernal pool wetland restoration/creation is assumed to take place on other land-cover types—primarily former rice lands and a small amount of other suitable agricultural land; vernal pool restoration/creation costs assume a premium for vernal pool restoration on rice compared to grassland.

Other restoration and creation costs are estimated as a function of the base construction cost, with adjustment factors reflecting the type of restoration/creation and the level of monitoring assumed to be required. The costs for post-construction maintenance and monitoring of restoration/creation projects apply during a 5-year period for all restoration activity except vernal pool complex, where a 10-year post-restoration maintenance and monitoring period is assumed after submission of as-built mapping after construction.

[5] See "Western Placer County HCP/NCCP growth scenario and land conversion estimates, 2015" Final Memorandum dated August 31, 2015 in Appendix M, *Growth Scenario Memo*, especially Figure 8 and associated text for estimates of the pace of land conversion in the Valley subarea over time.

[6] See Tables B.1 through B.4 in Appendix L, *Cost Model and Assumptions*, for restoration assumptions by community type, constituent habitat, and subarea.

Table 9-2. Habitat Restoration Cost per Acre by Natural Community Type

	VERNAL POOL TYPE HABITATS			AQUATIC / WETLAND TYPE HABITATS			RIVERINE / RIPARIAN TYPE HABITATS	GRASSLAND	OAK WOODLANDS	
Restoration Cost Element	**Vernal Pool**	**Seasonal Wetland in Vernal Pool Complex**	**Seasonal Swales**	**Fresh Emergent Marsh**	**Lacustrine**	**Non-Vernal Pool Seasonal Wetland**	**Riparian and Riverine Type**	**Grassland from Rice**	**Oak Woodland**	**Valley Oak Woodland**
Pre-construction restoration planning surveys	$140	$140	$140	$140	$140	$140	$140	$40	$70	$70
Plans, specifications, and engineering	$15,800	$7,500	$12,300	$8,800	$6,300	$7,500	$5,000	$1,700	$280	$2,080
Bid assistance	$700	$500	$530	$530	$380	$500	$400	$100	$10	$80
Construction activity	$46,900	$25,000	$35,000	$35,000	$25,000	$25,000	$20,000	$6,600	$1,100	$8,300
Inoculum salvage, transportation, storage, and placement	$7,100									
Construction biological monitoring	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140
Construction oversight	$18,000	$10,000	$14,000	$14,000	$10,000	$10,000	$10,000	$330	$60	$420
Post-construction restoration monitoring & maintenance	$56,300	$15,000	$21,000	$21,000	$15,000	$15,000	$24,000	$2,200	$1,300	$10,000
Total per acre, before contingency	**$145,080**	**$58,280**	**$83,110**	**$79,610**	**$56,960**	**$58,280**	**$59,680**	**$11,110**	**$2,960**	**$21,090**
Restoration contingency	**$10,900**	**$4,400**	**$6,200**	**$6,000**	**$4,300**	**$4,400**	**$4,500**	**$800**	**$200**	**$1,600**
Total per acre, including contingency	**$155,980**	**$62,680**	**$89,310**	**$85,610**	**$61,260**	**$62,680**	**$64,180**	**$11,910**	**$3,160**	**$22,690**
Weighted average cost per acre, Constituent Habitats[a]			**$103,700**			**$73,100**	**$64,180**			

Notes:
2019 dollars
[a] The cost factors for vernal pool constituent habitats restoration and aquatic/wetland type habitats restoration are weighted averages based on a mix of types of specific constituent habitats that might be restored.
N/A = not applicable

This Page Left Intentionally Blank

Costs for post-construction monitoring and maintenance include the costs to monitor and replant restoration/creation sites in the event that plantings fail due to site conditions, human error, animal browsing, or other factors. The cost model calculated these costs as 8.5 to 30 percent of the cost to restore or create an acre, depending on land-cover type.[7] Restoration/creation repair costs will be unnecessary once performance standards are met. Repair costs do not include costs associated with responsive measures for changed circumstances, which apply to the destruction of restoration/creation sites from foreseeable natural disasters such as flooding, fire and climate change (see Chapter 8, *Plan Implementation*). Section 9.3.3.4, *Responsive Measures for Changed Circumstances,* describes costs associated with responsive measures to deal with changed circumstances.

For planning purposes, the cost model assumes restoration/creation occurs as a function of a land development scenario for the Valley, associated effects analysis, and mitigation requirements and evenly over the course of the permit term for the Foothills. Ongoing management and monitoring of restoration/creation sites will continue throughout the permit term. The cost model and funding plan include these costs in the Habitat Restoration cost category and therefore in the calculation of fees for specific wetland effects. Post-permit management and monitoring on restored/created lands is included in post-permit cost estimates.

9.3.3 Manage and Enhance the Reserve System

Once lands have been acquired, the PCA will implement actions to ensure that the reserves are managed to achieve the biological goals and objectives identified in Chapter 5, *Conservation Strategy*. This cost category includes costs for management planning and reserve management activities. Also included are habitat enhancements to improve habitat values for species. Reserve management and enhancement activities are budgeted at about $100 million in total or $2.0 million per year on average during the permit term.

The PCA will actively manage lands acquired in fee title, estimated to be about 75 percent of the Valley reserve lands and 30 percent of the Foothills reserve lands. According to the assumptions used for cost and funding planning, at the end of the permit term, the PCA will own and actively manage about 29,300 acres of reserve land (see Appendix L, *Cost Model and Assumptions*, for additional details on assumptions[8]). Active reserve management activities include fencing, gate, and signage installation and repair; trash/debris removal; vegetation and pest management; and wetland and pond maintenance, protection, and dredging. About 6,200 acres of these reserve lands acquired in fee title will be acquired to meet restoration commitments, and the PCA will actively manage these reserve lands. As noted above in Section 9.3.2, *Restore Natural Communities and Covered Species' Habitat*, the cost model includes costs for these ongoing management activities on restored lands in the Habitat Restoration cost category. This ensures that the funding plan captures all costs related to wetland effects in the special habitat fees, paid in addition to the generally applicable land conversion fee for impacts on wetland and other communities (see Section 9.4.1, *HCP/NCCP Development Fees*, and specifically Section 9.4.1.4, *Special Habitat Fees*).

[7] This percentage is based on the assumptions that restoration repairs will be needed on a minority of restoration projects, and these repairs will be substantially less expensive than the original construction costs. Restoration contingency funds or general contingency funds could also be used to repair restoration projects, if necessary.

[8] See specifically Worksheet A_Plan Input Acquisition, Worksheet C_Plan Input Final Reserve, Worksheet_M_Fee Title vs Easement, Worksheet 2_Establish Reserve, Worksheet 3_Restore Natural Communities, and Worksheet 4_Manage_Enhance.

On the other reserve lands (estimated for the purposes of cost and funding planning to be about 18,000 acres), the private landowner retains use of the land, while the PCA holds a conservation easement specifying terms related to habitat protection consistent with this Plan's biological goals and objectives and allowing the PCA access to the land as needed to carry out any necessary management actions. Most of the easements will be on cultivated lands, oak woodlands and grasslands. PCA staff (or contractor) responsibilities include the costs to monitor these reserve lands annually to ensure that the landowner's management is in compliance with the terms of the conservation easements; these costs are included in the Plan Administration cost category.

The management cost obligation increases over time as the Reserve System is assembled and the number of acres under stewardship increases. The Plan requires reserve management in perpetuity, although at a somewhat reduced level to that in effect during the permit term.

9.3.3.1 Habitat Enhancements

As outlined in Chapter 5, *Conservation Strategy*, the PCA will manage reserve lands to increase the habitat functions they support. The Plan identifies habitat enhancements that would have beneficial effects for Covered Species and includes costs for those enhancements in the Plan budget for the 50-year permit term. Cost assumptions are specific to proposed activities, estimated as a function of restoration/creation costs for that same natural community, or identified as a budget allowance for planning purposes.

Planned enhancements include the following:

1. Planting, protecting, and irrigating acorns and seedlings within existing oak woodlands
2. Enhancing hydrologic conditions in degraded vernal pools
3. Enhancing basking habitat, native vegetative cover, hydrology, and water quality in wetlands and ponds
4. Improving in-channel features in streams by reconstructing channel geometry, removing non-native vegetation, installing large woody material and other in-stream structural elements, removing armored levees, modifying unscreened water diversions, and cleaning and replenishing gravel
5. Removing or modifying identified fish passage barriers with the cooperation of the owner of the dam or facility acting as a barrier
    a. Hemphill Dam on Auburn Ravine – Nevada Irrigation District
    b. Cottonwood Dam on Miners Ravine – privately owned
    c. Doty Ravine: Garden Bar Road Culvert – County of Placer
    d. Nelson Lane Dam on Auburn Ravine – unknown owner
    e. Gaging station on Coon Creek at Waltz Road near the Sutter county line – South Sutter Water District

9.3.3.2 Reserve Management Activities

Reserve management and maintenance activities include the following costs:

1. A portion of the PCA's field and technical staff costs
2. Reserve unit management plans for two reserve units and four system-wide plans (fire management, vegetation/invasives management, water management, and recreation management) including initial plans and periodic updates, most likely a contractor cost
3. Agricultural advisory services staffing
4. Construction and maintenance of field facilities once the reserve has grown to a threshold size
5. Site maintenance (repair and replacement of gates, fencing, and signage, general water supply infrastructure maintenance, trash and debris removal)
6. Management tools, equipment, and materials
7. Managing non-native animal species (purchase of traps, tags, etc.)
8. Controlling invasive species (grazing, prescribed burns, herbicide application, mechanical and hand tool weed management)
9. Controlling red sesbania (*Sesbania punicea*) in creeks
10. Maintaining waterways and ponds (clearing debris, dredging ponds, repairing spillways)
11. Providing and maintaining water points for grazing
12. Providing some of the water costs for farmed rice land
13. Adaptive management, including staff time to evaluate the results of monitoring and research to determine the effectiveness of reserve management (see Section 9.3.3.3, *Adaptive Management*, below)
14. Hiring contractors for specialized construction and maintenance of facilities (e.g., fencing, gates, roads, bridges, culverts) and related planning activities
15. Measures to respond to changed circumstances (described below)

Management activities may be implemented by the PCA, contractors, or third-party partners. PCA employees or contract staff will conduct as much of the management and maintenance activities within the Reserve System as possible and appropriate, using contractors for tasks requiring specialized skills and experience. PCA field and technical staff will also provide on-site assistance to and oversight of contractors and consultants. The PCA staffing plan and budget assume reserve maintenance staff positions (increasing as the reserve grows in size), costs for purchased vehicles, trailers, and small trucks, and leases for larger tractors and trucks used only periodically.

Planning and permitting costs for reserve management tasks are included in field and technical oversight, reserve management planning, environmental compliance costs, and program administration costs.

9.3.3.2.1 Vegetation Management

The PCA will manage invasive plants and fuel loads with a combination of grazing, hand and mechanical treatments, mastication, herbicide application, and prescribed burning as needed. Vegetation and other fuel-load management activities, other than grazing, apply to the perimeter of grassland and woodland parcels and some portion of the interior parcel. The cost per acre for vegetation management and fuel-load management (except grazing) includes labor and materials. Costs are estimated for initial treatments and subsequent maintenance (annually for grassland and every 5 years for other natural communities). Cost assumptions are near the midpoint of a range where the high end assumes contractors do the work and public contracting rules and prevailing wages apply and the lower end of the range assumes use of California Conservation Corps or other subsidized labor. PCA reserve maintenance staff may also do some of the work.

Where grazing is used for vegetation and fuel load management, the land would be leased to a grazing operator. The PCA would have no grazing management cost on grassland and woodland reserve land leased for grazing although the cost model includes a cost to provide and maintain water points. Grazing lease revenue is estimated in the cost model but is not assumed as a local revenue source in the funding plan.

The cost model includes a higher than average cost for contracted grazing services to provide vegetation and fuel-load management on Stream System corridors in the Valley and smaller natural open space areas in the Potential Future Growth Area (PFG) that might be incorporated in the reserve. Transportation costs to reach small, isolated properties and labor and fencing costs on the reserve site, are a factor in these cost estimates.

9.3.3.2.2 Rice and Other Agriculture

The conservation strategy calls for the PCA to acquire 10,050 acres of rice and other agriculture, managing at least 2,000 acres of rice land to benefit the giant garter snake. The rice land managed for the giant garter snake will be acquired in fee title. To ensure that 2,000 acres of rice would always be actively managed as rice, the cost model assumes 2,240 acres of rice will be acquired in fee title. The PCA intends to retain this reserve land in rice production leasing the land to rice farmers, along the successful model established for the last 20 years by the Natomas Basin Conservancy. The PCA will pay half the cost for water supply on land leased to rice farmers (during the permit term and in perpetuity) and the farmer will be responsible for all other costs of rice production. For the purposes of conservative analysis, the PCA conservatively assumes an average lease revenue on these 2,240 acres of $200 per acre (the 2017 realistic range for lease revenue is $250 to $300 per acre in Placer County). The PCA will monitor the rice farming strategy during implementation and will adjust cost and revenue assumptions during regular 5-year updates of the plan implementation budget and funding plan.

Of the total rice or other agricultural land acquired, 1,810 acres will be acquired in fee title to provide the land base for meeting natural community restoration/creation commitments and will therefore be ultimately managed as other natural habitat land. Rice land may be included in the balance of the agricultural land acquired for the reserve (6,000 acres). Those reserve lands will be acquired and protected by means of conservation easements so there will be no management cost except managing and monitoring the easement. The land will be available for rice or other agricultural use (see Section 5.2.6.5, *Agriculture and Other Open Space*).

9.3.3.3 Adaptive Management

Adaptive management activities within the Reserve System include any change in the management of the Reserve System necessary to meet the goals and objectives described in Chapter 5, *Conservation Strategy*. Monitoring commitments described in Chapter 7, *Monitoring and Adaptive Management Program*, informs these changes.

As currently designed, the adaptive management decision-making process is part of the regular responsibilities of the PCA. Costs for the associated external scientific review are itemized in Monitoring, Research, and Scientific Review.

9.3.3.4 Responsive Measures for Changed Circumstances

Chapter 10, *Assurances,* describes several categories of changed circumstances that could occur and outlines responsive measures that would be implemented. The responsive measure cost estimate is an additional 10 percent of the costs of management activities on reserve lands to provide for the reserve management response to changed circumstances. For the purposes of the cost analysis and funding plan, the responsive measure reserve is a total of about $11.5 million over the permit term.

As described in Chapter 10, *Assurances,* the PCA is required to respond if any of the changed circumstances occur. The PCA will maintain sufficient financial reserves to fund remedial measures when they arise. Starting in year 5 of implementation, the PCA will annually assess its funding reserves and supplement those reserves to fund implementation of the most expensive responsive actions that are reasonably foreseeable in the coming 5 years, based on historic events and frequency. Funds used to supplement these financial reserves could come from outside the PCA or from within the PCA budget (i.e., funds shifted from other HCP/NCCP uses). This approach will ensure that adequate funds are available immediately in the event of a changed circumstance occurring.

Annual funding for responsive measures will accrue each year, and annual funding for responsive measures will grow each year in proportion to the size of the Reserve System. The combination of these two factors will lead to substantial responsive measures funding reserves generated later in the permit term. Changed circumstances described in Chapter 10, *Assurances,* are more likely to occur on a larger scale later in the permit term due to the greater size of the Reserve System and the expected effects of climate change.

The cost assumptions are made for planning purposes and will not limit the PCA's obligation to respond to these changed circumstances. Responsive measures for the Reserve System are not required after the permit term so these costs are assumed to apply only during the permit term.

9.3.4 Monitoring, Research, and Scientific Review

Monitoring and research costs are estimated to be $59.8 million over the permit term and, on average, $1.2 million annually (Table 9-1). The cost model based the monitoring cost estimates on the monitoring and adaptive management program outlined in Chapter 7, *Monitoring and Adaptive Management Program*. Contractors will complete most of the field work, data collection, analysis, and reporting. PCA staff will manage the contractors, provide oversight of field work and research studies, and coordinate the input of science advisors (see Section 8.2.7, *Science Advisors and Land Managers*). Compliance monitoring to track and document the status of HCP/NCCP implementation is covered as a staff cost in the Plan Administration cost category.

The cost model and funding plan account for the costs of monitoring restoration/creation projects in the Habitat Restoration cost category. This ensures that all restoration/creation costs are reflected in one cost category and aids in the calculation of fees for effects on special habitats including wetlands (see Section 9.4.1.4, *Special Habitat Fees*).

Monitoring and research costs cover the following items:

- PCA staff landscape-level monitoring activities, oversight of monitoring contractors, and management of research studies.
- Planning, conducting, analyzing, and reporting for baseline ecological surveys for natural communities and Covered Species within the Plan Area.
- Planning, conducting, analyzing, and reporting for periodic status and trends surveys of natural communities and Covered Species within the Plan Area, including evaluating the effectiveness of conservation measures (the cost of monitoring habitat restoration projects is included in the habitat restoration category).
- Research directed at management and monitoring needs of the Reserve System.
- Stipends for the science advisors for scientific review and meetings.
- Natural community monitoring is the largest component of monitoring costs. In particular, vernal pool complex monitoring represents two-thirds of natural community monitoring cost and more than one-quarter of the total monitoring cost.

The cost estimates are based on reserve parcel-size assumptions, the pace of reserve site acquisition, the number of qualified biologists required to conduct each survey, the hours of surveying required and the hours required for data analysis and reporting, the number of years required to establish baseline data, and the frequency of survey updates. These assumptions vary by natural community and species. Some species surveying is accomplished within natural community monitoring (e.g., surveys of Swainson's hawk and tricolored blackbird foraging habitat is covered at the natural community level).

The PCA will fund targeted studies consisting of projects investigating management and monitoring techniques, adaptive management experiments, and targeted studies (see Section 7.2.1.3, *Targeted Studies*) to resolve management uncertainties. PCA staff in consultation with the science advisors will define and manage the studies that graduate students, university researchers, or other scientists will conduct. Research will depend on outside collaborations and outside funding sources. The cost model considers that most research will be undertaken in the first 15 years of the permit term. Reserve management costs include the costs of implementing the adaptive management recommendations of these studies.

Scientific review costs include costs for scientists to provide advice to the PCA throughout the permit term. Although the method of obtaining scientific input will depend on specific scientific questions and issues that arise during implementation, the cost model allows for a panel of 10 science advisors, each earning a stipend of $2,700 per year for meetings and peer review.

All research costs and most monitoring costs will be completed during the permit term. Some monitoring tasks are required in perpetuity.

9.3.5 Environmental Compliance

Restoration and creation projects and some reserve management activities may trigger environmental compliance documents and permitting costs, including fees. This includes compliance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), Sections 401 and 404 of the Clean Water Act (CWA), Section 106 of the National Historic Preservation Act (NHPA), Sections 1600–1607 of the California Fish and Game Code, and other miscellaneous requirements (e.g., County grading permits, road encroachment permits, stormwater pollution prevention plans). The environmental impact report/environmental impact statement (EIR/EIS) for the Plan is expected to address the CEQA and NEPA compliance issues for most or all Covered Activities on the Reserve System conducted by the PCA, but individual projects may require some level of CEQA or NEPA review to ensure full compliance based on specific project plans and designs. Restoration/creation and management activities involving effects on state or federal jurisdictional waters will require compliance with Section 404 of the CWA, Section 401 of the CWA, and/or Section 1602 of the California Fish and Game Code. Projects with a federal nexus (e.g., CWA Section 404 permits) could require NHPA compliance, including cultural resource inventories.

For the purposes of cost modeling to estimate adequate funding, the cost model assumes in-house compliance staff at 0.5 full time equivalent (FTE) in years 1 through 5, increasing to 1.0 FTE in years 6 through 40, and decreasing to 0.5 FTE for the last 10 years of the permit term. In-house staff will manage the permitting process, conduct cultural resource and archaeological surveys, prepare NHPA Section 106 cultural resource reports, and prepare CEQA exemptions and mitigated negative declarations and NEPA categorical exclusions, as needed. Per-project costs will vary, depending on the location and scale of the project and the nature of the resources at the project site. Some projects will be covered by general permits or agency letters of permission and will trigger minimal additional compliance cost.

All environmental compliance costs are expected to be incurred during the permit term. Covered Activity sponsors will bear the environmental compliance costs of their Covered Activities unrelated to conservation actions; this cost estimate does not include those compliance costs.

9.3.6 Plan Administration

Plan administration costs are the expenses for PCA administrative staff, office space, supplies, and professional services to carry out HCP/NCCP requirements. Plan Administration costs are estimated to average $1.8 million annually during the permit term (Table 9-1). This update to the cost model includes about $2.4 million in Plan Administration start-up costs to cover staff and overhead expenditures before permits are issued. Some Plan Administration costs will be necessary beyond the permit term.

For the purpose of estimating administration costs, the cost model assumes that the PCA will administer the Plan with a cost structure similar to that for Placer County departments with comparable responsibilities and staffing. This assumption ensures that the model does not understate potential costs of staffing and plan administration. There may be alternative management structures that result in cost savings. For example, the PCA may instead contract with non-profit land managers or researchers working in the Plan Area to accomplish some of the work identified for PCA staff positions, especially in the early phase of PCCP implementation. The PCA may also leverage existing resources of Permittees and agencies already working in the Plan Area to

use funding as efficiently as possible. Examples include sharing facilities and equipment. Any such savings would be reflected in the periodic financial review of PCCP implementation.

Administrative costs incurred by Permittees other than the PCA to fulfill their own responsibilities under this are not included in the cost estimates. For example, the County and City of Lincoln (City)will incur costs when reviewing applications for take authorization from project proponents. The County and City may recover these costs from applicants according to the fee policies in place at each local jurisdiction. The fee amounts specified in PCCP do not reflect the costs of application review by the local jurisdictions, and revenues from this PCCP's fees will not be used to cover these costs. Similarly, the cost of all conditions on Covered Activities described in Chapter 6, *Program Participation and Conditions on Covered Activities*, will be borne by the project proponents, either public agencies or private developers.

9.3.6.1 Staffing

The PCA staffing plan identifies up to 14.75 FTE staff positions annually at the peak for Plan implementation in years 20 to 30. Staffing levels start at 3.5 FTE positions (management, budget analyst, conservation planner, and wetland biologist) during the start-up period before permits are issued, increasing to a range from 8.6 to 12.25 FTE positions during the first 10 years of implementation to meet the targets for reserve assembly, restoration/creation, reserve management planning, assessing resources, and developing monitoring plans. Reserve management staffing increases in rough proportion to the size of the reserve. By the end of the permit term, the staffing level is stable at 13.25 FTE positions annually, with a staffing level of 4.5 FTE positions assumed for the post-permit period. Other staffing mixes could fulfill the obligations of this HCP/NCCP; the staffing mix presented here is conservative and satisfies the purposes of the cost analysis and funding plan.

The cost estimate assumes the following administrative staff positions to carry out the HCP/NCCP's implementation as described in Chapter 8, *Plan Implementation*:Placer County Conservation Program Administrator, IT – Database/geographic information system (GIS) Management, Budget Analyst, Acquisition Specialist, Grant Specialist/Conservation Planner, Public Outreach/Advocacy, and Administrative Support. There may also be the following field and technical staff positions: Senior Scientist, Reserve Project Manager, Wetland Biologist, Technical Staff, and Reserve Maintenance staff. There is an allowance for a Compliance Manager position. These positions are listed in listed in Appendix L, *Cost Model and Assumptions* (Table 10a), and proposed for the type of role required to support implementation of this HCP/NCCP. The actual staff hired may be different or these functions contracted to consultants to perform. PCA staff may also assist the Permittees with their regulatory decisions and such support may provide some recovery for PCA costs.

Cost estimates for implementation staff and associated overhead are split among various cost categories for the purposes of the cost and funding analysis. Administrative staffing is covered in the Plan Administration cost category. Field and technical staff and associated overhead costs are allocated equally to the Habitat Restoration, Reserve Management, and Monitoring, Research, and Scientific Review cost categories. The Compliance Manager staff is accounted for in the Environmental Compliance cost category.

9.3.6.2 Staff and Associated Overhead Costs

Placer County staff provided estimates for staff and overhead costs to support the projected PCA staffing plan. The cost factors are based on analysis of current County operating costs for comparable functions. Staff costs are based on FTE positions and include employee salaries and benefits. Annual salaries are based on Placer County's salary schedule for County equivalent positions at the midpoint of the salary range. Benefits include payroll taxes, retirement plan, worker's compensation, and employee group insurance and reflect costs of 58 percent of base salary.

The Plan Administration category also includes all overhead costs associated with administrative operations. This includes office rent and utilities, office equipment and supplies, phones, IT support, vehicle and equipment maintenance, travel, insurance and County administrative support. The overhead cost factor also covers legal, annual audit, and periodic financial analysis services required during the course of plan implementation. A factor of about 71 percent of combined salary and benefit cost covers these overhead expenses. Separate cost items cover expenses for specialized GIS software, specialized cameras for site assessments and surveys, and public outreach materials. Fixed asset costs are separately estimated. Expenses include workstations and office furniture, plotters, and a GIS/CAD server. Cost estimates include initial and periodic replacement costs.

9.3.6.3 Public Safety

Public safety services are required on PCA reserve lands. The Plan Administration cost category includes an annual expense line item for in-lieu law enforcement and fire-protection services. The cost factor is based on service levels for natural lands under comparable types of management.

9.3.6.4 State and Federal Agency Staff Support

The PCA will fund partial staff positions at state and federal agencies to ensure appropriate support for implementing this HCP/NCCP. Specifically, the PCA will fund one half-time position at the California Department of Fish and Wildlife (CDFW) and at the U.S. Army Corps of Engineers. Funding for CDFW is assumed to be higher in years 1 to 3 of Plan implementation to account for a more senior staff position. All staff funding for both agencies is assumed to continue for the duration of the permit term.

9.3.7 Contingency

To account for uncertainties in costs and the differences between planning level estimates and actual implementation experience, the model includes a contingency of 5 percent for acquisition costs and 3 percent for all other costs exclusive of restoration/creation. Contingency funds will be used on a short-term basis to offset any program costs that are higher than predicted. Contingency funds are modest because Plan fees are designed to keep pace with Plan costs, particularly for reserve assembly (see Section 9.4.1, *HCP/NCCP Development Fees*). The PCA will use contingency funds only when needed to address costs beyond those predicted in this cost estimate and in annual budgets. Contingency funds could be used for:

1. Acquiring materials and/or data not forecast in the budgets
2. Adding temporary staff or consulting services to address new issues

3. Acquiring land that is more expensive than planned or property that generates extraordinary transaction costs
4. Applying more expensive management techniques in response to adaptive management needs and/or conducting additional monitoring
5. Addressing unforeseen administrative costs

Adaptive management needs may arise throughout the permit term in response to monitoring results or external data that dictate shifts in management techniques and protocols. Costs for routine adaptive management needs are included in the Reserve Management cost category. Contingency funds could address other management needs, such as expected actions that simply cost more than budgeted, or minor adjustments in management that result in higher costs. As this contingency budget will accrue over time, it is expected to be adequate to supplement the adaptive management budget described above if necessary. It could also be used to fund other HCP/NCCP needs.

Contingency funds are assumed to be needed only during the permit term because most Plan costs will be complete (e.g., reserve assembly, restoration/creation) and other annual costs will not only be well understood by then but will also drop substantially after the permit term.

9.3.8 Costs in Perpetuity

Some costs will be incurred only during the permit term (reserve assembly, restoration and creation, environmental compliance, remedial measures, and contingency); some responsibilities and associated costs will continue in perpetuity. Because most of the effects of the Covered Activities are considered permanent (see Chapter 4, *Effects of Covered Activities*), mitigating conservation actions must also be permanent. For example, management must continue beyond the permit term to ensure that the Reserve System retains the biological values maintained and enhanced during the permit term. Similarly, in most cases, limited species biological monitoring must continue beyond the permit term to ensure that management actions are effective, and restoration/creation monitoring will continue to ensure that restoration and creation success criteria are met.[9] The funding available for post-permit needs is sufficient and flexible enough to meet all Plan restoration and creation commitments.

Overall, annual costs beyond the permit term are estimated to be about 16 percent of average annual costs in the final years of the permit term—about $78 per reserve acre (Table 9-3). Many reserve management activities continue beyond the permit term, but restoration, creation, and enhancement actions will be discontinued and management planning will be reduced. The post-permit budget assumes that water costs for giant garter snake habitat are not reduced post-permit and the budget also includes a contingency factor to ensure that grazing continues as a vegetation management strategy. The costs for directed research, scientific review, monitoring plans, and natural communities monitoring will be discontinued, and ongoing species biological monitoring costs will be at about 25 percent of the level in place at the end of the permit term (although monitoring of restored/created wetlands will continue at the same level as during the permit term). Staffing and other administration costs will be at about 50 percent of the level in effect during the

[9] The level of effort required to monitor restored wetlands does not change after the permit term. The cost in perpetuity assumes the same cost for this monitoring activity as during the permit term.

last 5 years of the permit term. Appendix L, *Cost Model and Assumptions*, describes the assumptions used to estimate these costs.

Table 9-3. Western Placer County HCP/NCCP Implementation Budget: Post Permit (2019 dollars)

Cost Category	Annual Costs	Assumptions
Total Budget		
Establish Reserve System	$0	
Restore, Manage & Monitor Natural Communities	$0	
Reserve Management/Enhancement	$2,153,835	
Monitoring, Research, and Scientific Review	$652,765	
Environmental Compliance	$0	
Plan Administration	$875,150	
Contingency Fund	$0	
Total	$3,681,751	
Capital Budget		
Establish Reserve System	$0	Acquisition complete during permit term
Restore Natural Communities	$0	Restoration projects constructed during permit term[a]
Reserve Management/Enhancement	$77,256	Replacement period doubled
Monitoring, Research, and Scientific Review	$7,204	Replacement period doubled
Environmental Compliance	$0	
Plan Administration	$3,069	Replacement period doubled
Contingency, Land Acquisition and Site Improvements	$0	Not required, post permit
Total	$87,530	
Operating Budget		
Establish Reserve System	$0	Acquisition complete during permit term
Restore, Manage & Monitor Natural Communities	$0	Restoration complete during permit term
Reserve Management/Enhancement	$2,076,579	Reduced staffing; Reserve planning at 50% of annual cost in year 50; 75% of permit-term management assumed; see Cost Model for detail
Monitoring, Research, and Scientific Review	$645,561	One-third of long-term monitoring contractor cost in year 50; no change to long-term monitoring on restored wetlands; other obligations reduced.
Environmental Compliance	$0	Not required, post permit
Plan Administration	$872,081	Reduced staffing plus 100% of per employee cost
Operating Contingency Fund	$0	Not required, post permit
Total	$3,594,221	
Average annual cost per reserve acre:	$78	
Percent of average annual cost years 45 -50:	16%	

Notes:

[a] Funds for remediation of restoration projects (construction completed by year 40) would be available after the permit term, if needed.

Based on the endowment model, an endowment fund of approximately $103 million in 2019 dollars would be needed at the end of the permit term to generate average real returns (i.e., inflation-adjusted) sufficient to fund post-permit term Reserve System management and monitoring, including accounting for inflation after the permit term. Annual real returns on endowment fund balances were assumed to equal 3.25 percent. This key assumption was based on a current habitat endowment management program operated by the National Fish and Wildlife Foundation under agreement with the CDFW (note: the 3.25 percent annual real rate of return is net of inflation and National Fish and Wildlife Foundation administrative fees).

The endowment will be able to grow over the entire permit term through allocation of a percentage of development fee revenue (see Section 9.4.1, *HCP/NCCP Development Fees*), interest earnings on endowment fund balances, and the absence of any withdrawals until the end of the permit term. Nominal rates of return on endowments routinely exceed inflation. Consequently, of the total endowment fund balance required at the end of the permit term, only 40 percent will come directly from development fee revenue, or about $42 million (2019 dollars). The remainder of the funding will come from endowment capital gains, interest, and dividend income on endowment investments. Fee levels will be adjusted as needed to ensure sufficient endowment funding by the end of the permit term (see Section 9.4.1.7, *Adjustment of Development Fees*).

9.3.9 Plan Preparation Costs

Plan preparation costs are based on $13.2 million of actual County staff and consulting services costs associated with preparation of the Plan from fiscal year 1999/2000 through fiscal year 2017/2018. These costs only include Plan preparation costs funded through Placer County general funds and exclude costs funded by other sources such as federal Section 6 grants.

9.4 Funding Sources and Assurances

Methods for assembling and equitably distributing the costs associated with the HCP/NCCP have been the subject of extensive discussion and consideration by members of the public; officials from local, state, and federal agencies; and elected officials. The HCP/NCCP, which incorporates the input from this diverse group, offers a balanced approach to mitigating the effects of Covered Activities and conserving species and habitats while equitably distributing the costs.

The HCP/NCCP establishes a framework for compliance with state and federal endangered species laws and regulations that accommodates future growth in the Plan Area, as well as local general plan land conservation and open space policies and programs. Without the HCP/NCCP, public and private entities whose activities affect threatened or endangered species and their habitats would be required to obtain permits and approvals from the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and/or CDFW before undertaking those activities to mitigate the effects of their activities on the affected species. To comply with the California Natural Community and Conservation Planning Act (NCCP Act) and thereby obtain long-term permits necessary to cover activities that would take Covered Species, including, but not limited to, species listed under the California Endangered Species Act (CESA), the HCP/NCCP also provides for the conservation and management of the Covered Species in the Plan Area. Proponents of private and public development activities will benefit from this comprehensive approach in several ways: they will be assured of state and federal take coverage, they will avoid the time and expense of securing their own

regulatory approvals, and they will have certainty and predictability with respect to their permit obligations and costs. Consequently, the development fees imposed to implement the HCP/NCCP include a fair share of the costs of providing for the conservation of Covered Species in the Plan Area that are necessary to meet the requirements of the NCCP Act.

The HCP/NCCP provides additional benefits particularly in the Foothills subarea of Plan Area A. These benefits include open space in support of County of Placer General Plan goals and objectives (see Section 2.4.2.3, *General Plan Conservation and Open Space Policies*), implementation of the Placer Legacy Open Space and Agricultural Conservation Program (see Section 2.4.2.4, *Placer Legacy*), compliance with CEQA (Public Resources Code 21083.4) regarding protection of Oak Woodlands, and fuels management that will reduce fire risks (see Section 5.2.6.4, *Oak Woodland Natural Communities*).

Plan funding will come from several different sources, which fall into one of three categories.

- **HCP/NCCP Development Fees.** This source includes a land conversion fee on private and public sector development. Fees are also charged for effects specific to wetlands, streams, and other particularly sensitive habitats (special habitat fees) and temporary effects (temporary impact fee). These development fees are described in Section 9.4.1, *HCP/NCCP Development Fees*.
- **Local Funding.** Other local funding will come from several sources and, depending on the source, be allocated to either mitigation or conservation actions and contributions to recovery of Covered Species. Sources include other development funding for open space, credit for dedication of existing open space, investment and interest income, and leases on rice land. Local funding sources are described in Section 9.4.2, *Local Funding*.
- **State and Federal Funding.** This source includes federal and state grant programs. Most state and federal funding can only be used for portions of the HCP/NCCP that provide for conservation actions and contributions to recovery that benefit Covered Species in the Plan Area (i.e., not for mitigation).[10] Potential state and federal funding sources are described in Section 9.4.3, *State and Federal Funding*.

Table 9-4 summarizes the expected revenues and their sources over the 50-year permit term. The funding plan fully funds all costs associated with the HCP/NCCP described in Section 9.3, *Cost Estimate Methodology and Assumptions*. In addition to the costs shown in Table 9-1, the funding plan shown in Table 9-4 includes costs associated with endowment contributions (see Section 9.3.8, *Costs in Perpetuity*) and plan preparation costs (see Section 9.3.9, *Plan Preparation Costs*). Funding from development fees and other local sources shown in Table 9-4 under the *Mitigation Funding* heading is calculated to fund the fair share of total costs associated with compensatory mitigation. Non-fee funding from state, federal, and other local sources shown in Table 9-4 under the *Other Funding* heading is calculated to fund the fair share of total costs associated solely with the conservation commitment of the HCP/NCCP. Each funding source is described below.

[10] The exception to this rule is if a state agency seeks permit coverage for a public project under the HCP/NCCP as a Special Participating Entity (see Section 9.4.1.11, *Participating Special Entities*).

Table 9-4. Funding Plan

	Valley		Foothills		Total	
Plan Funding						
Mitigation Funding						
Land Conversion Fees	$531,420,000	*56%*	$83,030,000	*32%*	$614,450,000	*51%*
Special Habitat Fees	$172,840,000	*18%*	$60,770,000	*23%*	$233,610,000	*19%*
Temporary Effects Fees	negligible	*<1%*	negligible	*<1%*	negligible	*<1%*
Foothills Open Space & Fire Hazard Management Fee	$-	*<1%*	10,610,000	*4%*	10,610,000	*<1%*
Existing Reserve Credit[a]	$9,830,000	*1%*	$11,980,000	*5%*	$21,810,000	*2%*
Bickford Ranch Open Space	$-	*<1%*	$500,000	*<1%*	$500,000	*<1%*
Subtotal	*$714,090,000*	*75%*	*$166,890,000*	*65%*	*$880,980,000*	*73%*
Other Funding						
State & Federal Grants	$115,170,000	*12%*	$36,180,000	*14%*	$151,350,000	*12%*
Existing Reserve Credit[a]	$12,230,000	*1%*	$8,790,000	*3%*	21,020,000	*2%*
Operating Interest Income	$2,100,000	*<1%*	$400,000	*<1%*	$2,500,000	*<1%*
Agricultural Leases	$7,990,000	*<1%*	$-	*<1%*	$7,990,000	*<1%*
Other Local, State & Federal[b]	$59,480,000	*6%*	$29,240,000	*11%*	$88,720,000	*7%*
Endowment Investment Earnings	$43,950,000	*5%*	$7,180,000	*7%*	$61,130,000	*5%*
Subtotal	*$240,920,000*	*25%*	*$91,790,000*	*35%*	*$332,710,000*	*27%*
Total PCCP Funding	**$955,010,000**	**100%**	**$258,680,000**	**100%**	**$1,213,690,000**	**100%**
Plan Costs[c]						
Plan Implementation (Permit Term)	$868,600,000	*91%*	$229,150,000	*89%*	$1,097,750,000	*90%*
Endowment Fund Balance, Yr. 50	$73,860,000	*8%*	$28,870,000	*11%*	102,730,000	*8%*
Plan Preparation	$12,550,000	*1%*	$660,000	*<1%*	$13,210,000	*1%*
Total PCCP Costs	**$955,010,000**	***100%***	**$258,680,000**	***100%***	**$1,213,690,000**	***100%***
Plan Net Revenue						
Surplus/(Deficit)	**-**	***0%***	**-**	***0%***	**-**	***0%***

Notes:
All amounts in 2019 dollars.
[a] Value of existing reserve credit allocated to "Mitigation Funding" if original funding was not restricted to conservation purposes, otherwise allocated to "Other Funding".
[b] Estimate of new sources of funding from a combination of local, state, and federal sources, including nonprofits and foundations, reasonably anticipated during the 50-year permit term.
[c] Costs allocated by subarea based on source of funding not location of effect.

As discussed in Chapter 1, *Introduction,* NCCPs are required to provide for the conservation of Covered Species in the Plan Area. To achieve this standard, this conservation strategy exceeds typical project mitigation requirements. Although the HCP/NCCP provides a single conservation strategy to mitigate effects and provide for the conservation of Covered Species in the Plan Area, it is important to roughly delineate the mitigation obligations of the HCP/NCCP from the conservation components, because USFWS and CDFW can fund only land acquisition for the conservation component of an HCP or NCCP (i.e., they cannot subsidize mitigation). It is also important for purposes of demonstrating plan compliance with CEQA and with the state Mitigation Fee Act (California Government Code Sections 66000 through 66025). See Section 9.4.3.3, *Mitigation and Conservation Components* for further explanation of the mitigation and conservation components of the Plan.

9.4.1 HCP/NCCP Development Fees

The HCP/NCCP utilizes a variety of development-based fees paid as a result of private and public Covered Activities to assist in meeting both Endangered Species Act (ESA) and NCCP Act requirements. Fees will generate sufficient funding to offset a proportionate share of HCP/NCCP costs including endowment contributions to fund all post-permit activities in perpetuity (see Section 9.3.8, *Costs in Perpetuity*) and reimbursement of the local share of plan preparation costs (see Section 9.3.9, *Plan Preparation Costs*). This proportionate share is based on the cost of mitigation that will offset losses of land-cover types, Covered Species' habitat, and other biological values, as well as benefits related to open space and fuels management. These one-time fees pay for the full cost of mitigating project effects on the Covered Species and natural communities.

Fees are based on the maximum allowable permanent loss of land-cover types presented in Chapter 4, *Effects of Covered Activities*. Land-cover effects are used because land cover and the associated presence of species is the best predictor of potential species habitat and is applicable to all of the Covered Species (see Appendix A, *Implementing Ordinance Template,* and Appendix D*, Species Accounts*). Effects on land cover are also used, in part, as the basis of the conservation strategy (see Chapter 5, *Conservation Strategy*, for details that determines Plan costs). The following HCP/NCCP development fees (development fees) will apply in the Plan Area.

- Land Conversion Fee
- Special Habitat Fees
- Temporary Effect Fee

The County and City also have existing ordinances that regulate the removal of native tree species including oak trees and riparian woodland species (see Section 6.3.2.3.2, *Community Condition 3.3, Valley Oak Woodland and Individual Valley Oak Trees Restoration*). Covered Activities will be subject only to the HCP/NCCP development fees and will not be subject to mitigation fees that could be imposed pursuant to these native tree ordinances.

Table 9-5 provides a summary of the rationale for each of the development fees. Figure 9-1 provides a schematic of how the fees would be applied across the landscape, focusing on application of the special habitat fees within the stream system. Tables 9-6 and 9-7 provide the amount of each development fee described in Table 9-5. See Figure 2-4 in Chapter 2, *Covered Activities*, for a map of Plan Area components referred to in Table 9-6.

Table 9-5 summarizes the various effects of Covered Activities and the applicable development fee for funding conservation measures to mitigate those effects. The first column of the table describes the effects mitigated by the fee and identifies the specific relationship to the effects analysis in Chapter 4, *Effects of Covered Activities*. The second column describes how the area of effect (area of project impact) is measured to calculate the total fee for a project applying for coverage under the Plan. Refer to Chapter 6, *Program Participation and Conditions on Covered Activities*, for details on how effects are measured. The third column lists the applicable fee using a key tied to Tables 9-6 and 9-7, and whether the fee is additive to other fees. The fourth column identifies how effects and therefore fee revenues are tracked. The tracking of effects and revenues shown in the table is only for evaluating progress toward completion of the funding plan, and does not supplant tracking of effects subject to permit limits presented in Chapter 4, *Effects of Covered Activities*. The final column summarizes the conservation measures funded by each fee to mitigate effects.

The following subsections describe the HCP/NCCP's development fees, the areas within the Plan Area to which they are applied, and how they are calculated. These sections also describe the process and timing for collecting fees and how fees are adjusted over time. The PCA will comply with all applicable provisions of the Mitigation Fee Act[11] as to the deposit, accounting, expenditure, and reporting of such fee revenues and any other applicable legal requirements.

The underlying analysis for the development fee calculations will be fully documented in the *Development Fee Nexus Study for the Western Placer County HCP/NCCP,* prepared by Urban Economics prior to Plan adoption.

[11] California Government Code Sections 66000 through 66025.

Table 9-5. Chart of Effects and Development Fees

Effects Mitigated by Fee (see Chapter 4)	Area Subject to Fee (see Chapter 6)	Applicable Fee[a] (Tables 9-6, 9-7)	Tracking and Permit Limits[b] (see Chapter 4)	Use of Fee Revenues (see Chapter 5)
Land Conversion Fee				
Direct and indirect effects of land conversion of natural, semi-natural, and other agricultural communities except effects mitigated by special habitat fees (Tables 4-1, 4-3, 4-4, 4-5)	Parcel area except avoided land[c]	Land conversion fee (fees 1a through 3c)	Direct effects tracked; debited from total permit limit by subarea (Tables 4-1, 4-3)	Mitigation of direct and indirect effects of Covered Activities except costs funded by special habitat fees (Table 5-5)
Vernal Pool Special Habitat Fees				
Direct effects of ground disturbance of vernal pool constituent habitats (Table 5-4)	Wetted area[d] altered by ground disturbance; includes entire delineated wetland area if only part is affected	Vernal pool fee (fee 4a); paid in addition to land conversion fee	Tracked; debited from vernal pool constituent habitats permit limit by subarea (Table 5-4)	Restoration of vernal pool constituent habitats (Table 5-4)
Immediate watershed indirect effects on vernal pool constituent habitats <u>on site;</u> related to direct effects but not explicitly estimated (Tables 4-4, 4-5)	Wetted area[d] <u>on</u> project site not altered by ground disturbance but within an immediate watershed[e] that is altered by ground disturbance	Vernal pool immediate watershed effects fee (fee 4b); paid in addition to land conversion fee; no temporary effects fee	Tracked; not to exceed 10% of vernal pool constituent habitats permit limit by subarea (Table 5-4)	Mitigation of indirect effects on vernal pool constituent habitats and part of activities funded by land conversion fee
Immediate watershed indirect effects on vernal pool constituent habitats <u>off site;</u> included in indirect effects from urban adjacency (Tables 4-4, 4-5)	Wetted area[d] <u>off</u> project site when ground disturbance occurs in immediate watershed[e] on project site	No specific fee; mitigation funding provided by land conversion fee	Tracked; not subject to permit limit	Not applicable; mitigation funded by land conversion fee

Effects Mitigated by Fee (see Chapter 4)	Area Subject to Fee (see Chapter 6)	Applicable Fee[a] (Tables 9-6, 9-7)	Tracking and Permit Limits[b] (see Chapter 4)	Use of Fee Revenues (see Chapter 5)
Aquatic/Wetland Special Habitat Fee				
Direct effects of ground disturbance of aquatic/wetland constituent habitats (Table 5-4)	Area of aquatic/wetland constituent habitat altered by ground disturbance	Aquatic/wetland fee (fee 4c); paid in addition to land conversion fee	Tracked; debited from aquatic/wetland constituent habitats permit limit by subarea (Table 5-4)	Restoration of aquatic/wetland constituent habitats (Table 5-4)
Streams and Watersheds Special Habitat Fees				
Direct effects of ground disturbance of riverine/riparian constituent habitats (Table 5-4)	Area of riverine/riparian constituent habitat altered by ground disturbance	Riverine/riparian fee (fee 4d); paid in addition to land conversion fee	Tracked; debited from riverine/riparian constituent habitats permit limit by subarea (Table 5-4)	Restoration of riverine/riparian constituent habitats and closely associated land cover types (Table 5-4)
Indirect effects of ground distrubance on riverine/riparian constituent habitat	Area altered by ground disturbance not in stream system but within 50 feet of delineated riverine/riparian constituent habitat	Riverine/riparian buffer fee (fee 4e); paid in addition to land conversion fee; no temporary effects fee	Tracked; not subject to permit limits	Mitigation of indirect effects on riverine/riparian constituent habitats and part of activities funded by land conversion fee
Direct effects of stream system encroachment (Table 5-4)	Area of stream system altered by ground disturbance and not subject to a separate special habitat fee	Stream system encroachment fee (fee 4f); paid in addition to land conversion fee; no temporary effects fee	Tracked; not subject to permit limits[f]	Restoration of riverine/riparian constituent habitats and closely associated land cover types (Table 5-4)
Direct effects of salmonid stream channel alteration (Tables 4-7A, B)	Linear extent (feet) of salmonid stream channel habitat altered or covered	Salmonid stream channel fee (fee 4g); paid in addition to land conversion fee and any other special habitat fee; no temporary effects fee	Tracked; debited from permit limit by subarea (Tables 4-7A, B)	Mitigation share of costs associated with measures RAR-3 and RAR-4 under Conservation Measure 2

Effects Mitigated by Fee (see Chapter 4)	Area Subject to Fee (see Chapter 6)	Applicable Fee[a] (Tables 9-6, 9-7)	Tracking and Permit Limits[b] (see Chapter 4)	Use of Fee Revenues (see Chapter 5)
Indirect effects on watersheds from increased urbanization (Tables 4-8A, B, C)	Land area subject to land conversion	No specific fee; mitigation funding provided by land conversion fee	Tracked by watershed; not subject to permit limit	Not applicable; mitigation funded by land conversion fee

[a] Except where noted, Covered Activities that otherwise would be subject to the land conversion fee or special habitat fee, but for their temporary effect, pay a temporary effect fee (see Section 9.4.1.5, *Temporary Effect Fee*, for details).

[b] Tracking against permit limits is based on location: either Plan Areas A1 and A2 (Valley), Plan Areas A3 and A4 (Foothills), or Plan Area B.

[c] See Chapter 6, *Program Participation and Conditions on Covered Activities*, particularly Section, 6.3.1.3, *General Condition 3, Land Conversion*, for avoidance criteria. The land conversion fee is also applied per dwelling unit in the Foothills subarea of Plan Area A. In certain circumstances the fee may be calculated based on the disturbed area footprint rather than total parcel area (see Section 6.3.1.3.2, *Permanent Effect Avoidance for Low Density Rural Development*).

[d] "Wetted area" refers to wetted area of a vernal pool constituent habitat delineated wetland.

[e] "Immediate watershed" refers to the area around an aquatic feature with a hydrologic connection to the aquatic feature. The default buffer for a vernal pool constituent habitats is a 250-foot surrounding buffer. See Section 6.3.2.1.1, *Community Condition 1.1, Avoidance for Vernal Pool Constituent Habitat Wetlands*.

[f] Permit limits in Tables 4-1 and 4-3 will apply to effects on natural, semi-natural, and other agricultural communities within the Stream System; there is no separate permit limit for the Stream System itself.

Table 9-6. Land Conversion Fee Schedule

Plan Area A - Valley (Components A1 and A2)			
	Any Existing Parcel up to 20,000 square feet	No fee (not a Covered Activity)	
1a	Total covered activiy on existing parcel greater than 20,000 square feet up to 1.0 acre	$5,197	per acre
1b	Single family residential on existing parcel greater than 1.0 acre or on any parcel created by subdivision of an existing parcel into four or fewer total parcels	$3,897 Plus $1,299 $12,990	per dwelling unit per acre up to maximuma
1c	All other development	$26,473	per acre
Plan Area A - Foothills (Components A3 and A4)			
	Any Existing Parcel up to 20,000 square feet	No fee (not a Covered Activity)	
2a	Residential project on existing parcel greater than 20,000 square feet up to 1.0 acre	$2,279	per dwelling unit
2b	Non-residential project on existing parcel greater than 20,000 square feet up to 1.0 acre	$2,757	per acre
2c	Single family residential on existing parcel greater than 1.0 acre or on any parcel created by subdivision of an existing parcel into four or fewer total parcels	$2,279 Plus $1,332 $13,320	per dwelling unit per acre up to maximuma
2d	Single family residential on any parcel created by subdivision of existing parcel into five or more total parcels and multi-family residential	$2,279 Plus $7,560	per dwelling unit per acre
2e	Non-residential project on existing parcel greater than 1.0 acre or on any parcel created by subdivision	$10,317	per acre
Plan Area B			
Valley (Component B1: Roseville / Rocklin / Loomis area)			
3a	All covered activities	$26,473	per acre
Foothills (Component B1: Auburn area and Component B2)			
3b	Covered activity on existing parcel up to 1.0 acre	$2,757	per acre
3c	Covered activity on existing parcel greater than 1.0 acre	$10,317	per acre

Notes:
All amounts in 2019 dollars.
Fee schedule applies to permanent effects. See PCCP, Chapter 9, Section 9.4.1.5, Temporary Effect Fee, for application of fee to projects with temporary effects.
Non-covered activities are not subject to PCCP Development Fees but may be subject to other local fees for impacts to other resources such as open space and native trees.
Per acre fees apply to the entire parcel area excluding areas improved at time of Plan adoption and where avoidance occurs pursuant to Section 6.3.1.3, General Condition 3, Land Conversion, including land approved by the PCA set aside as habitat. Per acre fees apply only to the disturbed area footprint of Covered Activities on low density rural development limited to structures or activities that are appurtenant or accessory to rural residential uses and activities or structures that support rural nonresidential land uses (see Section 6.3.1.3.2, Permanent Effect Avoidance for Low Density Rural Development).
"Existing Parcel" refers to a parcel at time of Plan adoption.
For mixed use projects with multi-family residential, the project pays the higher fee of either category 2d or category 2e.
Plan Area A - Foothills includes that portion of Plan Area A - Valley that is the higher elevation portion of the City of Lincoln planning area roughly eastward of a line dropped due south from the intersection of Virginiatown Road and Hungry Hollow Road and pulled west to follow the 200' elevation line which runs roughly along the NID irrigation ditch north of Hwy. 193 and Oak Tree Lane.
a Maximum amount per parcel applies to per acre fee only. Per dwelling unit fee is in addition to per acre fee.

Table 9-7. Special Habitats Fee Schedule

	Name	Amount		Temporary Effects Fee Applicable?
4a	Vernal Pool Direct Effects	$171,167	per acre	Yes
4b	Vernal Pool Immediate Watershed Effects[a]	$28,586	per acre	No
4c	Aquatic/Wetland	$121,025	per acre	Yes
4d	Riverine/Riparian	$107,637	per acre	Yes
4e	Riverine/Riparian Buffer[b]	$53,819	per acre	No
4f	Stream System Encroachment[c]	$107,637	per acre	No
4g	Salmonid Stream Channel[d]	$654	per linear foot	No

Notes:
All amounts in 2019 dollars.
All special habitat fees are paid in addition to the land conversion fee.
Fee schedule applies to permanent effects. See PCCP, Chapter 9, Section 9.4.1.5, Temporary Effect Fee, for application of fee to projects with temporary effects.
[a] Vernal pool constituent habitat delineated wetland on project site not altered by ground disturbance but within an immediate watershed that is altered by ground disturbance. See Sec. 6.3.2,1.1 Community Condition 1.1, Avoidance for Vernal Pool-Type Wetlands.
[b] Ground disturbance not in stream system but within 50 feet of riverine/ripairan constituent habitat.
[c] Area subject to stream system encroachment excludes any area already subject to a constituent habitat fee (such as riverine/riparian fee).
[d] Salmonid stream channel fee paid in addition to any other applicable special habitat fees.

9.4.1.1 Projects or Activities not Covered by the Plan

Projects or activities not covered by the Plan do not receive take authorization under the Plan and do not pay Plan development fees. See Section 2.7, *Activities not Covered by this Plan*, for a list of activities not covered by the Plan. These non-Covered Activities do not pay HCP/NCCP development fees

For all minor activities that would affect a Covered Species, property owners would need to obtain any necessary authorizations or permits directly from the Wildlife Agencies under CESA, ESA, or CEQA. With approval of the PCA, such property owners may opt in for coverage under the HCP/NCCP pursuant to Section 8.9.6, *Coverage Option for Certain Minor Activities.*

Development fees will also not apply to activities that are excluded from coverage because they do not meet the criteria in Section 2.5, *Permit Coverage*, and Section 2.6, *Categories of Covered Activities*. Activities that fall within the definition of Covered Activities, but are not Covered Activities because they are not implemented by or subject to the land use authority of a Permittee, may seek coverage under the Plan at the discretion the PCA (see Section 9.4.1.11, *Participating Special Entities*).

9.4.1.2 Exemptions from Development Fees

The development fees do not apply to projects that generally fall within the definition of Covered Activities but were approved by the County or the City prior to adoption of fees by the Permittees. The development fees will be required for such previously approved projects for any project modifications that require subsequent, additional approvals resulting in land conversion or effects on special habitats not previously approved by the Permittees or otherwise not previously subject to permits issued by the state and federal regulatory agencies. If a previously approved project

receives take authorization under the Plan, regardless of whether development fees are paid or not, the project's effects will be tracked and reported by the PCA, included in assessing compliance with the Stay-Ahead requirement, and counted against permit term limits.

In addition, implementation of conservation actions described in Chapter 5, *Conservation Strategy* (or otherwise consistent with the HCP/NCCP's conservation strategy), are exempt from all development fees. The beneficial impacts of these actions will be tracked by the PCA and reported as supporting the conservation strategy. The adverse effects associated with the implementation of conservation actions will be minor and temporary in most, if not all, cases.

The determination of whether an activity is exempt from fees will be made by the applicable Permittee as it processes applications and follows the procedures set forth in Section 6.2.4, *HCP/NCCP Participation Package*.

9.4.1.3 Land Conversion Fee

The primary component of the HCP/NCCP's development fees is a land conversion fee. This fee is based on the cost of mitigating each Covered Activity's direct and indirect effects on Covered Species and natural communities as measured by acres of land conversion, except for costs of mitigating direct effects funded by special habitat fees (see below). The land conversion fee is designed to help achieve the goals and objectives of the conservation strategy, which includes mitigating the aggregate direct and indirect effects of Covered Activities, as described in Chapter 5, *Conservation Strategy*.

Land conversion fees on Covered Activities will be assessed based on parcel area as defined in Section 6.3.1.3, *General Condition 3, Land Conversion* and on the number of dwelling units for fees on certain residential projects (see Table 9-6). The land conversion fee will be based on the entire subject parcel area excluding improved areas at time of Plan adoption, or a portion of the parcel if the area of impact is reduced due to permanent effect avoidance (see Sections 6.3.1.3.1, *Permanent Effect Avoidance in the PFG*. Per acre fees apply only to the disturbed area footprint of Covered Activities that are limited to certain parcels with low density rural development, including structures or activities that are appurtenant or accessory to rural residential uses and activities or structures that support rural nonresidential land uses. (see Section 6.3.1.3.2, *Permanent Effect Avoidance for Low Density Rural Development*). The fee will also not apply to any land set aside for the Reserve System, either in fee title or through conservation easement.

The land conversion fee is calculated based on the fair share of the total HCP/NCCP costs associated with mitigating direct and indirect effects of Covered Activities. Although the fee is applied based on parcel area net of permanent effect avoidance, the amount of the fee includes the cost of mitigating associated indirect effects within the Plan Area. As a result, Covered Activities will fund through the land conversion fee the mitigation of both direct and indirect effects within the Plan Area, except wetland restoration and stream enhancement funded by special habitat fees.

Mitigation of wetland and in-stream direct and indirect effects by protection of existing wetland and stream area (not restoration of new areas) is included in the overall land conversion fee, which will fund acquisition of the landscape where existing wetlands and streams are found. Mitigation of wetland direct effects by restoration or in-stream effects by enhancement are funded by separate special habitat fees (see Section 9.4.1.4, *Special Habitat Fees*).

The land conversion fee includes costs for upland restoration (Grassland, Valley Oak Woodlands, Oak Woodlands) to mitigate direct and indirect effects on these community types because there is not a separate special habitat fee for upland restoration as there is for wetland and stream effects.

Land conversion fee revenues may fund any type of Plan cost, including costs excluded from the fee calculation, to the extent that other revenue sources directly offset land conversion fee revenues by funding a portion of Plan costs for compensatory mitigation. For example, state and federal funding could fund a greater share of land acquisition costs in exchange for development fees funding a greater share of other Plan costs such as ongoing management, monitoring, and administration costs, as well as endowment and plan preparation costs (see Section 9.4.3.1, *Measuring State and Federal Contributions*). Regardless of the exact use of funds, in no case shall development fees pay more than the fair share of total HCP/NCCP costs associated with compensatory mitigation, nor shall state and federal funding pay more than the fair share of total HCP/NCCP costs associated with conservation.

The general guidelines listed below were used to allocate Plan costs and develop the land conversion fee schedule shown in Table 9-6.

- The land conversion fee is calculated separately for the Valley (Plan Area A, components A1 and A2) and Foothills (Plan Area A, components A3 and A4) to reflect differences in Plan costs and benefits associated with effects in each subarea, including:[12]
    - Differences in the types of reserve land acquired, and associated management, monitoring, and post-permit term costs;
    - Mitigation of Oak Woodland effects in the Valley through purchase of Oak Woodland located in the Foothills; and
    - Allocation of a portion of upper watershed reserve acquisition across both the Valley and Foothills due to the importance of that land-cover type to salmonid species, and effects on salmonid stream channels by Covered Activities in both the Valley and the Foothills.
- The special habitat fees are the same throughout the Plan Area because restoration and enhancement costs are not estimated to vary by subarea.
- The land conversion fee for Plan Area B components is based on the fee for the adjacent Plan Area A subarea (Valley or Foothills). The Valley fee applies to the Roseville/Rocklin/Loomis area of component B1, and the Foothills fee applies to the Auburn area of component B1 and component B2.
- Per acre land conversion fees are less on lower density single family residential development projects (fee categories 1b and 2c in Table 9-6) than for other development projects because lower density single family residential development is typically rural and tends to have reduced direct effects per parcel acre (see 4.3.1.2, *Land Conversion In the Foothills*). Parcel acreage is used as the basis for applying the fee so the fee per acre is lower to reflect these reduced direct effects.
- Fees are lower on small lots (fee categories 1a, 2a, and 2b in Table 9-6) because of the reduced effects of fragmentation compared to larger lots.

[12] The higher elevation portion of the City of Lincoln planning area in the Valley shares the community characteristics of the adjacent Foothills and is assigned the same land conversion fee schedule as the Foothills (Plan Area A, components A3 and A4). See Table 9-6, *Land Conversion Fee Schedule*.

The proposed per acre and per dwelling unit fee amounts by category were verified by calculating total revenue based on aggregate land conversion under permit term limits. Land conversion projections are summarized in Section 2.6, *Categories of Covered Activities*, and further detailed in the *Development Fee Nexus Study for the Western Placer County HCP/NCCP (prepared by Urban Economics prior to Plan adoption)* and the land use projections included in Appendix L, *Cost Model and Assumptions*. Total revenue equaled the total mitigation share of costs allocated to the land conversion fee.

9.4.1.4 Special Habitat Fees

Public and private project proponents are required to map constituent habitats (vernal pools, aquatic/wetlands, and riverine/riparian) and stream habitats as part of the HCP/NCCP's application package (Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*). Public and private project proponents that affect these wetland or stream land-cover types will be required to pay one or more of the applicable special habitat fees in addition to the land conversion fee.

The special habitat fees combined with the land conversion fee will cover the full cost of wetland restoration or creation and in-stream enhancement at a 1.5-to-1 mitigation ratio (1.52-to-1 mitigation ratio for riverine/riparian constituent habitat and stream system). Costs funded by the special habitat fees include design, implementation, post-construction monitoring, management, and remediation throughout the permit term, as well as stream channel enhancements. The cost of land acquisition associated with these effects is included in the land conversion fee. Special habitat fees vary by land-cover type to account for the different costs of restoration or enhancement.

9.4.1.4.1 Calculating Fees for Wetland or Stream Effects

The fees for effects on wetlands is calculated by multiplying the applicable special habitat fee by the amount of direct impact on the constituent habitat or Stream System (see Table 9-5 and Table 9-8). All special habitat fees are calculated per acre except the salmonid stream channel fee is calculated per linear foot of stream impacts. The vernal pool constituent habitat fees (fees 4a and 4b) are applied to the entire wetted area even if only a portion of the wetted area may be impacted by a covered activity.

Mitigation of indirect effects on wetlands and streams is funded by the land conversion fee that is paid in addition to special habitat fees, except for (1) mitigation of on-site indirect effects on vernal pools that are funded by the vernal pool immediate watershed effects fee (fee 4b), and (2) mitigation of on-site indirect effects on riverine/riparian constituent habitat that are funded by the riverine/riparian buffer fee (fee 4e). Covered Activities that do not completely avoid indirect effects on wetlands, as described in Section 6.3.2, *Conditions to Avoid and Minimize Effects on Specific Natural Communities*, and Section 6.3.5, *Conditions to Minimize Effects on Covered Species*, will be considered to have permanent indirect effects on such wetlands, or temporary effects if the impact is defined as temporary (see Section 9.4.1.5, *Temporary Effect Fees*).

On-site vernal pool constituent habitat that is not altered by ground disturbance may be subject to the vernal pool immediate watershed effects fee (fee 4b) when ground disturbance activities or signifianct changes in hydrology are located in close proximity to the constituent habitat. If the ground disturbance and change in hydrology occurs in a downstream or down-gradient location within 50 feet of the edge of a consituaent habitat, the immeediage watershed effects fee 4b will apply. If the ground disturbance or change in hydrology occurs in an upstream or up-gradient location within 250 fee of the edge of a constituent habitat, the immediate watshed effects fee 4b

will apply. If a project applicant can demonstrate that the constituent habitat is hydologically isolated from the area of ground disturbance, the immediate watshet effects fee will not apply. For application of the two fees for vernal pools (direct effects and immediate watershed effects), refer to Table 9-5, *Chart of Effects and Development Fess*, and Section 6.3.2.1.1, *Community Condition 1.1,* Avoidance for Vernal Pool-Type Wetlands.

All special habitat wetland effects and in-stream effects to salmonid stream channels may overlap in which case both the applicable wetland fee and the salmonid stream channel fee would be paid. Except for the salmonid stream channel fee (fee 4g), special habitat fees do not overlap. The stream encroachment fee (4f) will apply to ground disturbance within the stream system wherever another constituent habitat fee (4a, 4c, or 4d) does not apply. The vernal pool immediate watershed effects fee (fee 4b) will only apply to vernal pools not subject to ground disturbance but within the immediate watershed of ground disturbance. The riverine/riparian buffer fee (fee 4e) only applies outside the stream system to areas within 50 feet of riverine/riparian constituent habitat. See Figure 9-1, above, for a schematic demonstrating how the special habitat fees are applied. Appendix I, *Project Specific Take and Mitigation Assessment Examples*, provides examples of how the development fees may apply to different types of development projects that are Covered Activities.

9.4.1.4.2 Wetland Restoration or In-stream Enhancement Provided in Lieu of Fee

Unlike the land conversion fee, special habitat fees cannot be waived in lieu of land dedication (see Section 9.4.1.10, *Land Provided in Lieu of Development Fees*). Project proponents, however, have the option of restoring, managing, and monitoring their own wetland, stream, or riparian mitigation site (on or off site) in lieu of paying all or part of the special habitat fee. For project proponent-initiated wetland, stream, or riparian mitigation, construction of wetland restoration will be initiated prior to construction of the Covered Activity; the mitigation will be consistent with the requirements of Chapter 6, *Program Participation and Conditions on Covered Activities*; the site will be protected by a conservation easement; and management and monitoring will be funded in perpetuity. Applicants may propose paying the PCA to manage and monitor the site after construction is completed. Construction of all wetland restoration and stream enhancement projects must comply with the Stay-Ahead provision of the HCP/NCCP and must be completed by year 40, consistent with the requirement for the PCA to do the same (see Chapter 6, *Program Participation and Conditions on Covered Activities*).

Applicants may purchase appropriate wetland restoration credits in a mitigation bank in the Plan Area that has been approved separately by USFWS and CDFW to service the HCP/NCCP (see Section 8.4.7, *Private Mitigation and Conservation Banks*, for more details).

Alandowner may seek to provide project proponent-initiated mitigation. Under this option, it is necessary to obtain the PCA's advance approval to perform wetland restoration or stream enhancement in lieu of paying the special habitat fee. The PCA will evaluate proposals to perform restoration in lieu of special habitat fees based, in part, on the history of the applicant or applicant's consultant performing successful wetland restoration elsewhere and whether the restoration project is consistent with the conservation strategy and requirements of the HCP/NCCP and ILF. Restored wetland features must also meet the reserve design and assembly criteria in Chapter 6, *Program Participation and Conditions on Covered Activities*. For the PCA to approve wetland restoration in lieu of fees, the local jurisdiction approving the project must secure a guarantee through conditions of approval that the restoration or creation will be implemented and remediated if success criteria are not met. In the case of a Permittee (County, City, PCWA, SPRTA) being the

project proponent proposing the restoration in lieu of special habitat fees, the Permittee must sign an agreement with the PCA to provide this guarantee. After success criteria are met and the applicant assures funding, the land will be dedicated and the PCA will assume all management and monitoring responsibility of the restoration site as part of the Reserve System (also see Section 8.7.2, *Restoration or Creation in Lieu of Special Habitat Fees*).

9.4.1.5 Temporary Effect Fee

Some Covered Activities result in temporary effects as defined in Section 4.3.2, *Methods: Temporary Direct Effects*. Covered Activities that otherwise would be subject to the land conversion fee or special habitat fee, but for their temporary effect, pay a temporary effect fee. The temporary effect fee is based on the amount of the land conversion or special habitat fee that would otherwise apply, with the fee reduced to reflect the temporal aspect of the effect. Exemptions to the temporary effect fee are described below in Section 9.4.1.5.1, *Activities not Subject to the Temporary Effect Fee*.

Examples of permitted temporary effects include routine maintenance in stream channels for flood control, maintenance along roadsides for highways, short-term disturbance of the landscape for a linear project such as a pipeline. Most construction projects will not qualify as temporary effects due to their size and their level of land disturbance, which usually cannot conform to the required 1-year time frame for complete restoration from time of groundbreaking.

Projects subject to the temporary effect fee for land conversion or special habitat will pay the fee in one of two ways, as selected by the applicant:

1. For activities that will occur once or infrequently, the project proponent will pay a fee equal to 2 percent of the land conversion fee that would otherwise apply to that project footprint for each year in which the activity occurs. Two percent represents 1 year out of the 50-year permit term. Failure to complete the project and return the site to pre-project conditions within 1 year of groundbreaking due to delays in construction or for any other reason will result in application of the full fee.
2. For activities that meet the technical requirement of restoration within 1 year but occur frequently, the project proponent may elect to pay a one-time fee equal to 100 percent of the land conversion fee that would otherwise apply to that project footprint which will cover repeated implementation of the activity for the entire permit period.

Temporary effects that occur in the same location repeatedly during the permit term and that pay the full land conversion fee will be counted and tracked as a permanent effect. Temporary effect fees paid on a site can be credited toward any permanent effect fees that may be required on the same affected area in the future.

All or a portion of the temporary effect fee can be waived in exchange for land dedication, based on the nature of the effect. The amount waived will be determined by the PCA on a case-by-case basis according to the rules and principles described in Section 9.4.1.10, *Land Provided in Lieu of Development Fees,* and Section 9.4.1.4.2, *Wetland Restoration or In-stream Enhancement Provided in Lieu of Fee*.

Temporary effects that occur within certain special habitats also will be assessed a temporary effect fee according to the formula shown above, but based on the applicable special habitat fee (see Table 9-7). See Section 9.4.1.5.1, *Activities not Subject to the Temporary Effect Fee*, for Covered Activities within certain special habitats that would not be subject to the temporary effect fee.

Applicants have the option of developing and implementing their own wetland restoration or stream enhancement project in lieu of all or a portion of the temporary special habitat fee. If the applicant's restoration or enhancement plan is approved by the PCA and any applicable state or federal agency (e.g., U.S. Army Corps of Engineers), then no temporary wetland effect fee is required (also see Section 8.7.2, *Restoration or Creation in Lieu of Special Habitat Fees*). The PCA will verify that the applicant's wetland restoration or stream enhancement project is constructed according to specifications and that the project meets its success criteria.

Temporary effects and consequent fee revenue are likely to be quite small relative to permanent effects, and are difficult to forecast. Therefore, temporary effect fee revenue is not estimated for purposes of the funding plan. Any such revenue will be credited to the funding plan at each 5-year adjustment and other revenue sources adjusted accordingly (see Section 9.4.1.7, *Adjustment of Development Fees*).

9.4.1.5.1 Activities not Subject to the Temporary Effect Fee

To reduce administrative costs, fees will not be assessed on any covered project with temporary effects of less than 0.10 acre, except for effects on wetlands and in streams. All Covered Activities that result in temporary effects on wetlands and in streams of any size will be tracked against the HCP/NCCP's effect limits and charged a temporary impact fee.

The conservation and monitoring actions described in Chapter 5, *Conservation Strategy,* will not be assessed a fee. For example, wetland, stream, and riparian restoration projects conducted for the HCP/NCCP may result in temporary effects; however, because these actions support the conservation strategy, they will not be subject to fees.

Covered Activities such as sediment removal in artificial off-channel detention basins or groundwater recharge ponds, when free of vegetation, as well as mowing, tree trimming, and other activities resulting in temporary effects that occur in non-natural communities (such as urban land-cover types) will not be subject to fees because the effects analysis assumed these non-natural community land uses have little or no value for the Covered Species.

There are no temporary effect fees for the following special habitat fees (i.e., such fees would only apply for permanent effects):

- Vernal pool immediate watershed effects fee (fee 4b)
- Riverine/riparian buffer fee (fee 4e)
- Stream System encroachment fee (fee 4f)
- Salmonid stream channel fee (fee 4g)

9.4.1.6 Collection of Development Fees

Permittees will collect all fees paid by private applicants to their jurisdictions. Permittees will transfer these fees to the PCA on a regular basis, at least twice annually. The transfer schedule and process will be determined by the PCA early in Plan implementation.

All fees paid by the Permittees for their own Covered Activities will be similarly collected and transferred to the PCA according to the same process and schedule developed by the PCA for fees from private applicants.

9.4.1.7 Adjustment of Development Fees

The dynamic nature of the costs associated with HCP/NCCP implementation, including land acquisition costs and operating, maintenance, and management costs, requires a flexible approach to funding through time. The HCP/NCCP includes two mechanisms for adjusting fee levels: automatic adjustments and periodic assessments. The PCA will perform both adjustments, with periodic assessments performed in coordination with the Wildlife Agencies, and will provide the results to all Permittees.

9.4.1.7.1 Automatic Adjustment of Fees

The two primary costs of the HCP/NCCP—land acquisition and operations/maintenance—will most likely change at different rates over time. Land acquisition costs can fluctuate on an annual basis at rates significantly different from the general inflation rate. Other HCP/NCCP costs, including the cost of personnel, supplies, and equipment involved in managing, operating, restoring, and maintaining the Reserve System, will more closely follow the general rate of inflation. To account for these differing rates of inflation, the PCA will update the development fee automatically on an annual basis by a date determined by the PCA. The PCA will determine the date within the first 6 months of Plan implementation based on the indices and procedures described in Table 9-8.

The variation in the cost of land due to site-specific factors means that it is difficult to develop land cost indices; consequently, no such indices are available. However, the American Society of Farm Managers and Rural Appraisers (ASFMRA) publishes annual estimates of agricultural land values that can be used to identify trends in the cost of land. The index to be used to adjust the land acquisition cost portion of fees will be developed by the PCA based on the most recent data available for western Placer County and published by ASFMRA in their annual report, *Trends in Agricultural Land and Lease Values*.

The PCA will use the Consumer Price Index from the U.S. Bureau of Labor Statistics to adjust the non–land cost portion of fees. The U.S. Bureau of Labor Statistics does not have an index specific to the Sacramento metropolitan area; therefore, the PCA may use the index for the West Region.

The PCA may decide to use other indices during Plan implementation instead of either the ASFMRA data or Consumer Price Index if other indices are developed that better predict the costs of the HCP/NCCP.

Table 9-8. Development Fee Adjustment Indices

Fee / Cost Component	Initial Index Weight[a]	Annual Adjustment Index
Land Conversion Fee		
Land Acquisition Costs[b]	33%	Annual changes in land values in western Placer County based on the most recently available data for comparable land cover types as published by the American Society of Farm Managers and Rural Appraisers in their annual report, *Trends in Agricultural Land and Lease Values*.
All Other Plan Costs	67%	Consumer Price Index - All Urban Consumers change for the most recent 12-month period for the West Region or comparable metropolitan area.
Total	**100%**	
Special Habitat Fee		
All Costs	100%	Same index as land conversion fee for "All Other Plan Costs."

[a] Index weight based on estimated sources and uses of land conversion fee revenue over entire permit term. As the reserve is assembled these ratios may change and should be recalculated as part of the 5-year periodic adjustment (see Section 9.4.1.7.1, *Automatic Adjustment of Fees*).

[b] Fee title and conservation easement acquisition costs only. Excludes all other costs associated with reserve assembly transactions such as staff costs, pre-acquisition surveys, due diligence, legal costs, and other capital costs such as fencing and site improvements.

9.4.1.7.2 Periodic Assessment and Adjustment of Fees

Every 5 years, the PCA will complete a fee assessment in coordination with the Wildlife Agencies to review the costs and the underlying assumptions the PCA developed as part of the original funding plan, as well as estimate the remaining costs to implement the HCP/NCCP. The review could include comparing appropriate land sales in the Conservation and Rural Development Components of Plan Area A transacted after the start of the HCP/NCCP, as well as wetland restoration and stream enhancement costs, with the original land cost assumptions (see Appendix L, *Cost Model and Assumptions*). The PCA will also compare the actual costs of operating the Plan, and maintaining, managing, and monitoring the Reserve System to the original estimates of these costs to determine the actual change in all costs other than land acquisition. Finally, the PCA will review development densities, specifically dwelling units and parcel acreage subject to the fee compared to direct effects subject to permit limits, and adjust the fee as necessary to fully fund the mitigation costs associated with that fee. The PCA will adjust fees based on this analysis to ensure full funding of the mitigation share of remaining HCP/NCCP costs, including endowment contribution and Plan preparation. Automatic annual fee adjustments will resume after the periodic fee assessment and will continue until the next periodic assessment.

9.4.1.8 Timing of Development Fee Payment

The Plan fee obligation will be based on the fee schedule in effect at time of land conversion authorization[13] that triggers payment of the fee. The total special habitat fee obligation for a Covered Activity, including any special habitat temporary effect fee, will be paid prior to issuance of a land conversion authorization that allows ground disturbance of a special habitat. The land conversion fee will be paid pursuant to the requirements described in the subsections below.

9.4.1.8.1 Land Conversion Fees Applied Per Acre Only

For land conversion fees only applied on a per acre basis (fee categories 1a, 1c, 2b, 2e, 3a, 3b, and 3c in Table 9-6), the fee obligation will be due at the first applicable step in the project approval process that results in ground disturbance depending on which one occurs first (not all projects require all steps):

1. Grading permit or grading plan issuance
2. Improvement plan approval
3. Building permit issuance
4. Any other final action for a Covered Activity that authorizes an action that will result in an impact on a Covered Species or its habitat

Except as provided for in Section 9.4.1.9, *Private Applicant Options to Pay Fees with Special Tax or Assessment District*, if a development project requires either a grading permit or improvement plan and in addition requires a building permit then the applicant could make an initial payment at the grading permit or improvement plan step and subsequent payment(s) at building permit issuance. Any such splitting of fee payments would require the following:

- The initial payment equals no less than fifty percent (50%) of the total fee obligation and thereby sufficient to fund one-time costs associated with reserve acquisition, post-permit endowment, and plan preparation costs as determined by the PCA (securing this share of the total fee obligation concurrent with initial effects).[14]
- Subsequent payment(s) equal no more than fifty percent (50%) of the total fee obligation and thereby limited to funding ongoing operating costs during the permit term.
- Each subsequent payment is based on the fee schedule in effect at time of the subsequent payment (not the fee schedule in effect at time of the initial payment).
- The Permittee must financially guarantee to the PCA that the entire fee obligation is paid within 3 years from the date of the initial fee payment (and the Permittee may enforce a similar obligation on the applicant).

[13] "Land conversion authorization" means any permit or approval that authorizes a ground disturbing activity, including, but not limited to, specific plan, tentative map, parcel map, conditional use permit, minor use permit, administrative review permit, design/site agreement, variance, grading permit, grading plan, improvement plan, and building permit. Also includes approvals for County-sponsored capital improvement projects and operations and maintenance activities.

[14] The portion of the total land conversion fee obligation associated with reserve acquisition, post-permit endowment, and plan preparation costs is approximately 42 percent of the total fee obligation at time of Plan adoption.

The Permittee will allocate the remaining fee obligation by parcel. The remaining fee obligation for each parcel will be due when the first building permit is issued for that parcel. A single development entity could make a lump sum fee payment on some or all parcels where a partial fee payment is due. The Permittee will track fee payments and re-allocate the remaining fee burden as necessary during development of the project to ensure full funding of the fee obligation upon issuance of all building permits.

For development projects with common areas such as parks subject to development fees but not subject to future building permit issuance, the entire fee obligation associated with this acreage will be due at grading permit, grading plan issuance, or improvement plan approval.

For projects with multiple phases, the fee for each phase is due at the time of issuance of grading permits, improvement plans or building permits as described above. Backbone infrastructure improvements that serve more than one phase on multi-phase projects will pay fees at grading permit issuance or improvement plan approval regardless of the number of future phases served by the infrastructure. A developer of a multiphase project may pay in advance for all effects identified in CEQA/NEPA documents and the project entitlement(s).

Fees on low density rural development that only include structures or activities that are appurtenant or accessory to rural residential uses and activities or structures that support rural nonresidential land uses are applied based on the disturbed area. For example, an applicant subdividing a parcel and installing roads and other backbone infrastructure, but then selling finished lots, would pay the per acre fee based on the amount of land area disturbed. The subsequent home builder would pay the remaining fee obligation based on the total applicable fee minus a credit for any prior fee payment apportioned equally among all final lots.

9.4.1.8.2 Land Conversion Fees Applied Per Dwelling Unit and Per Acre or Per Dwelling Unit Only

For land conversion fees applied on a per acre and per dwelling unit basis (fee categories 1b, 2c, and 2d in Table 9-6), the total per acre component of the fee obligation will be due prior to issuance of the first permit that results in ground disturbance. The per dwelling unit fee component may be paid concurrent with the per acre component and will be due prior to issuance of the building permit for the dwelling. The category 2a fee is only applied per dwelling unit and therefore will be due prior to issuance of the building permit for the dwelling.

9.4.1.9 Private Applicant Options to Pay Fees with Special Tax or Assessment District

The PCA may allow private applicants to fund all or a portion of their development fees with a special tax or special assessment applied only to a specific project covered by the Plan. Private applicants may apply a special tax or assessment to their covered project by forming a Community Facilities District or a special assessment district to the extent allowed by the appropriate enabling statute. When used, this option would benefit the PCA as well as private applicants. Private applicants would benefit by reducing up-front costs. The PCA would benefit by receiving an ongoing stable source of revenue for operating costs instead of reliance on development fees and real estate cycles. As described below, any portion of the total fee obligation fee funded by an ongoing project-specific special tax or assessment and not fully funded immediately from bond proceeds is limited to that portion of the fee that will pay for ongoing operating costs such as administration, management,

and monitoring. All other portions of the fee obligation must be paid according to Section 9.4.1.8, *Timing of Development Fee Payment*.

One option is to pay the fee based on Section 9.4.1.8, *Timing of Development Fee Payment*, and then allow the private applicant to be reimbursed through bond proceeds upon formation of and issuance of bonds backed by the special district. The special tax or assessment is used to retire the bond debt over time. Under this approach the PCA would receive the fee obligation as determined by Section 9.4.1.8, *Timing of Development Fee Payment*. The Permittee and private applicant would be responsible for arranging reimbursement through special district bond proceeds.

A second option is for a private applicant to pay the portions of the land conversion fee as those costs are incurred by the PCA (all special habitat fees must be paid according to Section 9.4.1.8, *Timing of Development Fee Payment*). The private applicant would pay a share of the total land conversion fee obligation sufficient to fund one-time costs associated with reserve acquisition, post-permit endowment, and plan preparation costs at the time the development fee is typically due (see Section 9.4.1.8, *Timing of Development Fee Payment*). For the remaining portion of the fee, the private applicant could form a Community Facilities District or special assessment district to pay the remaining share of the total fee obligation associated with ongoing operating costs during permit term. This approach ensures that the development fees are paid before or at the time that the impacts occur and the PCA incurs the costs.

Certain special taxes and assessment may be used to fund public services. In the case of the PCA fee obligation, this funding would be used for PCA ongoing operating costs during the permit term.[15] Securing payment of the fee obligation in this manner is the only way to extend payment beyond building permit issuance as described in Section 9.4.1.8, *Timing of Development Fee Payment*. This option requires that the portion of the fee obligation funded with an ongoing special tax or assessment:

- Must not be greater than fifty percent (50%) of the total fee obligation and thereby limited to funding ongoing operating costs during the permit term
- Must exclude the shares of the total fee obligation associated with reserve acquisition, post-permit endowment, and plan preparation costs that would be due pursuant to Section 9.4.1.8, *Timing of Development Fee Payment*
- Must be levied in a substantially equal annual amounts plus adjustments to reflect changes in costs calculated pursuant to Section 9.4.1.7, *Adjustment of Development Fees*
- Must fully retire the outstanding fee obligation prior to the end of the permit term
- Must be backed by a guarantee by the Permittee with jurisdiction over the project to the PCA providing that, if the special district fails for any reason to fund the outstanding fee obligation fully, the Permittee will pay the shortfall upon the failure of the special district[16]

The PCA must approve the use of this tool consistent with the Plan and the requirements above. For the County, any use of a special district would require the project applicant to submit an application to the Placer County Bond Screening Committee. The Committee would have the authority to

[15] The portion of the total land conversion fee obligation associated with ongoing operating costs is estimated to be 58 percent of the total land conversion fee obligation at time of Plan adoption.

[16] No California special district has ever failed to fund its obligations for ongoing public services.

recommend funding of the fee obligation for approval by the Board of Supervisors in accordance with the Committee's adopted rules and procedures (most recently updated January 1, 2012).

9.4.1.10 Land Provided in Lieu of Development Fees

9.4.1.10.1 Basic Land Dedication Policy

Any public or private project proponent subject to the land conversion fee may propose dedication of land to the reserve in lieu of payment of a portion of the land conversion fee. Any land dedication in lieu of a fee obligation shall require a land dedication agreement with the PCA. The PCA and the project proponent must execute the agreement before commencement of Covered Activities to which the credit will be applied.

The land dedication agreement (Agreement) will specify the following terms:

1. **Characteristics of dedicated land**: Identify the HCP/NCCP objectives based on Section 5.3.1, *Conservation Measure 1: Establish Reserve System,* that will be met by inclusion of the lands proposed for dedication, including identification of the specific parcels to be dedicated. The landowner must allow access to, or fund surveys of, the lands to establish its conservation value. Also, the landowner may need to pay due diligence costs (e.g., Phase 1 or 2 environmental assessments) to ensure that the property is suitable to meet the Plan's objectives in perpetuity.
2. **Amount of potential land dedication credits (expressed in acres)**: Determine how many potential land dedication credits are granted (one for each acre of land to be dedicated, based on the specific areas identified for dedication).
3. **Conversion to approved land dedication credits (expressed in dollars)**: The project proponent may convert potential land dedication credits (expressed in acres) to approved land dedication credits (expressed in dollars) as the land proposed for dedication is transferred to PCA ownership. The project proponent may determine the timing of dedication in consultation with the PCA. The dollar amount of the dedicated land will be based on fair market value determined by a qualified appraisal (required when state or federal grant funding or public agency general funds are to be utilized).
4. **Activation of approved land dedication credits in lieu of a land conversion fee obligation**: The Agreement will specify the specific Covered Activities that are eligible to activate approved land dedication credits in lieu of a fee obligation. Credits are activated only at the current minimum fee credit per acre of impact and not at any higher dollar amount unless the Agreement includes a land dedication incentive (see Section 9.4.1.10.2, *Land Dedication Incentive Policy*). The minimum fee credit per acre of impact represents that portion of the land conversion fee that the PCA must allocate to land acquisition considering other funding sources that may be restricted to land acquisition only, such as state and federal grants. This share is estimated at 33 percent of the Valley land conversion fee though this share may change during Plan implementation (see Table 9-8, above). The project proponent will pay the remaining fee obligation per acre to ensure that all other costs associated with project impacts are fully funded as those impacts occur. These other costs include (1) plan preparation reimbursement costs, (2) PCA costs during the permit term excluding land acquisition, and (3) post-permit term endowment contribution. The PCA will not incur any obligations under the permit for management and monitoring of dedicated lands until effects occur on lands against which a land dedication credit is activated.

5. **Transfer of land dedication credits:** Land dedication credits (dollar value) may only be used for Covered Activities specified in the Agreement and may not be transferred to other Covered Activities.
6. **Remaining dollar value of outstanding land dedication credits** will be based on the value per acre used to establish the original dollar value of the credits and adjusted based on any annual or periodic adjustments to the land conversion fee schedule (see Section 9.4.1.7, *Adjustment of Development Fees*)
7. **Agreement term:** The Agreement will include an expiration date that will apply to any potential land dedication credits and any approved land dedication credits that are not activated.

9.4.1.10.2 Land Dedication Incentive Policy

If land proposed for dedication is of sufficient conservation value to the reserve, the PCA may offer an incentive to the project proponent for the land dedication. The PCA shall determine the conservation value of lands proposed for dedication based on the PCA's analysis of current reserve requirements and the role that the proposed lands will play in meeting those requirements. The land dedication incentive may include one or both of the following components that alter the basic land dedication in-lieu policy (see Section 9.4.1.10.1, *Basic Land Dedication Policy*).

- **Activation of land dedication credits in lieu of a land conversion fee obligation:** The PCA may allow land dedication credits in lieu of the land conversion fee obligation to be activated at higher than the minimum fee credit per acre of impact (modifying item no. 4 in Section 9.4.1.10.1, *Basic Land Dedication Policy*). This incentive allows the project proponents to activate land dedication credits faster than would be the case under the land conversion fee obligation.
- **Transfer of land dedication credits:** The PCA may grant an applicant the ability to transfer land dedication credits to Covered Activities other than those specified in the Agreement (modifying item no. 5 in Section 9.4.1.10.1, *Basic Land Dedication Policy*). This mechanism is a reasonable incentive particularly for applicants that have conservation lands with value that exceeds their own development fee obligations. The PCA may place an expiration date on the transfer of credits and require that all credit transfers be reported to the PCA to reliably track transferable credits and prevent credits from remaining a long-term liability to the agency.

The ability of the PCA to grant incentives for land dedication will depend on several factors, including:

- The PCA's ability to fund its obligations under the Plan based on its current and projected cash flow
- The maximum amount of land acquisition to be funded by the land conversion fee

9.4.1.11 Participating Special Entities

Participating Special Entities are described in Section 8.9.4, *Take Authorization for Participating Special Entities*. For activities performed by a Participating Special Entity, the Participating Special Entity will pay any applicable development fees to receive take authorization. The PCA will also require an additional fee amount to cover direct and indirect costs of extending permit coverage under the HCP/NCCP, including the costs of PCA staff time and legal evaluation to assist with permit coverage, and any other applicable or appropriate Plan implementation costs.

9.4.1.12 Option to Opt In to the HCP/NCCP

Some private projects exempt from the HCP/NCCP's fees and ordinance may wish to pay Plan fees or comply with other Plan conditions as a way to facilitate compliance with environmental laws other than the ESA, CESA, or NCCP Act. For example, projects otherwise exempt from HCP/NCCP fees may wish to pay Plan fees and apply applicable conditions on Covered Activities in Chapter 6, *Program Participation and Conditions on Covered Activities,* through their local development approval process to enhance their project for other purposes (e.g., CEQA or the federal CWA). These private projects are still subject to the regulatory requirements of the ESA and CESA, if applicable.

9.4.2 Local Funding

Funds for Plan implementation will come from local sources other than Plan development fees (Table 9-4), as described below in this section. The Permittees are not expected or required to utilize local general funds for implementation of the HCP/NCCP unless, at the discretion of the Permittee, general fund revenues are utilized to mitigate for effects caused by the Permittees' Covered Activities or other Plan implementation costs. Private foundations and non-profit organizations that support open space acquisition and biodiversity planning have not played a significant role in funding land conservation in Placer County and therefore are not expected to play an important role in supporting the HCP/NCCP. Funding shortfalls, and the options available if they occur, are discussed below in Section 9.4.4, *Funding Adequacy*.

9.4.2.1 Open Space and Fire Hazard Management Fee

The County is considering adoption of an open space impact fee that would apply within the Foothills subarea. The fee would only apply to land development in the Foothills subarea that is a non-covered activity and therefore would not pay HCP/NCCP development fees. Revenue from the open space impact fee would be used to achieve the goals and policies of the County's General Plan to preserve and enhance open space lands, and to reduce fire risk through fuels management.. Some or all of the actions implemented using open space fee revenues would help to achieve Plan goals and objectives. See Section 2.7, *Activities Not Covered by This Plan*, for a list of activities not covered by the Plan and that would pay the open space impact fee in the Foothills subarea.

9.4.2.2 County Parks and Non-profit Land Stewardship Organizations

Placer County Department of Parks and Recreation anticipates dedicating existing reseve lands described in Section 9.3.1.6, *Existing Conservation Lands Credit*. The value of these lands in reduced land acquisition costs to the funding plan is $30.8 million. Of this total, $11.6 million is associated with lands purchased with the County's Open Space Trust fund, and the remainder ($19.2 million) is associated with other funding sources. At the County's discretion, the Open Space Trust fund portion may be used as a credit against any component of the funding plan, including mitigation obligations. The remaining portion may only be used as a credit against the conservation (not mitigation) components of the funding plan.

The County is allocating the $11.6 million portion of the existing reserve lands credit funded by the Open Space Trust fund to funding costs associated with mitigation, and is specifically credited against the mitigation costs in the Foothills subarea of Plan Area A. The $19.2 million in land value associated with other funding sources is shown separately under "Other Funding" in Table 9-4.

9.4.2.3 Bickford Ranch Open Space Fee

The development agreement for the Bickford Ranch Specific Plan requires the developer to pay an open space fee of $265 per dwelling unit. This fee would generate approximately $500,000 through build out of the 1,890 dwelling units allowed under the Specific Plan.

As shown in Table 9-4, this open space funding is allocated to funding costs associated with mitigation, and is specifically credited against the mitigation costs in the Foothills subarea of Plan Area A.

9.4.2.4 Agricultural Leases

Rice leases on reserve lands are estimated to generate $8.0 million over the permit term as shown in Table 9-4. Rice lease revenue is estimated to continue after the permit term and offset a small portion of annual post-permit term costs.

9.4.2.5 Interest Income

A small source of income to the PCA will come from interest and other earnings on fund balances generated by development fee revenues held prior to expenditure. The interest estimate for fee revenues held prior to expenditure assumes that the HCP/NCCP's fund balances will earn an average annual interest rate of 0.62 percent, the most recent 5-year average rate on the Local Agency Investment Fund, a pooled money fund managed by the California State Treasurer. The PCA is estimated to have about half of the annual average development fee revenue on hand at any one time, or about $8.5 million, generating annual interest of $50,000 and a 50-year estimate of $2.5 million (2019 dollars) (see Table 9-4). The HCP/NCCP assumes no interest generated from grant funds due to the typical requirement to spend grants immediately or to encumber funds in advance and seek reimbursement at close of escrow for acquisitions, or over time or at the end of the grant term for planning grants.

A large amount of interest income is expected from earnings prior to the end of the permit term on the endowment established to fund post-permit costs. The real rate of earnings (above inflation) on the endowment is estimated at 3.25 percent, as discussed in Section 9.3.8, *Costs in Perpetuity*. The rate of return for the endowment is higher than on operating fund balances because the endowment has the flexibility provided by a long-term investment horizon to invest in a wide range of investment vehicles at levels of risk and return appropriate for a fund managed in perpetuity. Based on a constant level of annual contributions, the endowment is estimated to generate $54 million over the permit term (see Table 9-4).

9.4.3 State and Federal Funding

The U.S. Congress and the California Legislature have determined that conserving species and their natural habitats is an issue of both national and state importance. The federal and state governments will strive to assist local governments and property owners to assemble, manage, and monitor the HCP/NCCP's Reserve System. This assistance will very likely contribute to the land acquisition requirements of the HCP/NCCP, provide for the conservation of Covered Species in the Plan Area, and reduce or avoid the need to list additional species as threatened or endangered.

State or federal funding is mostly restricted to land acquisition and special habitat restoration capital costs based on existing funding sources. Funding could come from a variety of sources, including several sources administered by CDFW and USFWS (Table 9-9). Land contributions by USFWS and CDFW could be provided through contributions by the Wildlife Conservation Board and through periodic issuance of state bonds that fund a wide diversity of conservation programs. An assessment of progress toward this goal will be made annually and included in the annual report of the PCA submitted to the Wildlife Agencies.

The record of state and federal funding for approved HCP/NCCPs in California provides reasonable assurance that state and federal contributions to the HCP/NCCP, though significant, will be fulfilled over the permit term. New funding sources are expected to arise, increasing the likelihood of achieving this goal even further. If, however, after the exercise of all available authority and utilization of all available resources, the CDFW, USFWS, and NMFS are unable to contribute to the reserve, as identified below in Section 9.4.3.1, *Measuring State and Federal Contributions*, the PCA, the other Permittees, CDFW, and USFWS will re-evaluate the HCP/NCCP's conservation objectives and work together to develop a mutually acceptable solution.

Implementation of the HCP/NCCP is subject to the federal Anti-deficiency Act and the availability of appropriated funds. Nothing in this Plan will require the obligation, appropriation, or expenditure of any money from the United States Treasury. USFWS will not be required to expend any federal agency's appropriated funds until an authorized official of that agency commits these funds in writing. Similarly, CDFW will not be required to expend any state agency's appropriated funds until an authorized official of that agency commits these funds in writing. The state and federal agencies will use their best effort to contribute the amount of land to the reserve identified below (Section 9.4.3.1, *Measuring State and Federal Contributions*).

Table 9-9. Likely Federal and State Funding Sources for HCPs and NCCPs in California

Program Name	Program Administrator	Funding Available in California	Year	Description	Eligibility	PCCP Potential
Federal						
Cooperative Endangered Species Conservation Fund (Section 6 Grants)	USFWS, CDFW	$2,000,000 annual award cap per plan	2002–present (cap began 2014) 2001–present	Grants for HCP Land Acquisition; current USFWS policy requires non-federal match of 25 percent. Grants for Recovery Land Acquisition; current USFWS policy requires non-federal match of 25%.	Approved HCPs (see text for details) Draft and approved recovery plan for an endangered or threatened species	Strong
Land and Water Conservation Fund[a]	USFWS, California Department of Parks and Recreation	$3,000,000 maximum grant request	1964–2017	Dollar-for-dollar matching grants for planning, acquisition, and development of outdoor recreation areas and facilities.	Cities, counties, and districts with authority to acquire, develop, operate, and maintain public park and recreation areas	Moderate
Environmental Quality Incentives Program (through Farm Bill)[b]	Natural Resources Conservation Service	$450,000	2014–2018	Financial assistance to plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air, and related resources on agricultural land and non-industrial private forestland.	Owners of active agricultural, forest production, or ranch lands that have a natural resource concern	Uncertain; could provide support to private landowners enrolled in the PCCP's Reserve System
North American Wetlands Conservation Act Grant Program[c]	USFWS	$39,300,000	2017	Program provides matching grants to aid in wetland conservation projects, including land acquisition, restoration, and enhancement. Non-federal match must be at least 1:1.	Non-federal agencies, organizations, or individuals	Uncertain
Central Valley Project Improvement Act Habitat Restoration Program[d]	USFWS and U.S. Bureau of Reclamation	$2,100,000	2018	Provides funds for land acquisition, management, monitoring, research, restoration for endangered/ threatened species affected by the Central Valley Project.	Federal and state government agencies, private non-profit or profit organizations, and individuals	Strong

Program Name	Program Administrator	Funding Available in California	Year	Description	Eligibility	PCCP Potential
State Proposition 1						
Watershed Restoration and Delta Water Quality and Ecosystem Restoration Program[e]	CDFW	$372,500, 000 over the life of the proposition	Expected 2015–2025	Provides $285 million for ecosystem restoration projects outside the Sacramento-San Joaquin Delta and $87.5 million for projects that benefit the Delta.	Public agencies, nonprofit organizations, public utilities, federally recognized Indian tribes, state Indian tribes listed on the Native American Heritage Commission's California Tribal Consultation List, and mutual water companies engaged in either watershed restoration projects of statewide importance outside the Delta, or projects benefiting water quality, ecosystem restoration, and fish protection in the Delta.	Strong
Water Quality, Supply, and Infrastructure Improvement Act of 2014	Wildlife Conservation Board	$5,000,000	2015-Present		Approved NCCPs in the Delta.	
Oak Woodlands Conservation Act of 2001 and Rangelands, Grazing Land and Grassland Protection Program	Wildlife Conservation Board	$5,000,000		Grants for purchase of oak woodland easements, restoration or enhancement projects, long-term leases or cost-sharing incentive payments.	Approved Oak Woodlands Management Plan	
State, Other[f]						
Habitat Conservation Fund[f]	California Department of Parks and Recreation	$2,000,000 annually	1990–present	Program requires 50 percent match from grantees for nature interpretation programs to bring urban residents into park and wildlife areas, protection of various plant and animal species, and acquisition and development of wildlife corridors and trails.	Cities, counties, and districts	Moderate

Program Name	Program Administrator	Funding Available in California	Year	Description	Eligibility	PCCP Potential
Sustainable Agricultural Lands Conservation Program	California Strategic Growth Council	$33,960,000	2016-2017	Supports the protection and management of California's agricultural lands with the goal of preventing increases in greenhouse gas emissions by limiting opportunities for expansive, vehicle dependent forms of development. The program accomplishes this through three major elements (Sustainable Agricultural Land Strategy Plans, Agricultural Conservation Easements, and Financial Incentives for Adoption and Use of Land Management Practices) that emphasize planning, the permanent protection of farm and ranch lands via agricultural conservation easements, and support for agricultural programs that reduce greenhouse gas emissions.	**Sustainable Agricultural Land Strategy Plans** – Counties and/or cities in collaboration with other partners that will inventory and evaluate agricultural lands and develop local strategies for long-term protection. **Agricultural Conservation Easements** – Cities, counties, nonprofit organizations, RCDs, regional park or open-space districts or regional park or open-space authorities that have the conservation of farmland among their stated purposes, as prescribed by statute, or as expressed in the entity's locally adopted policies.	Moderate
California Clean Water and Safe Parks Act (Proposition 68)	Wildlife Conservation Board	$52,000,000	2018-ongoing (until bond allocation reached)	Funding is part of a total statwide bond authorization of $4.1 billion approved in June 2018 for natural resource- related projects. Specific amont ($52 million) designated for aquisition, development, rehabilitation, restoration, protection, and expansion of habitat for NCCPs.	Implementation of NCCPs adopted pursuant to the Natural Community Conservation Planning Act (Chapter 10 (commencing with Section 2800) of Division 3 of the Fish and Game Code)	Strong

[a] California Department of Parks and Recreation 2017.

[b] Natural Resources Conservation Service 2014.

[c] U.S. Fish and Wildlife Service 2017.

[d] U.S Bureau of Reclamation, 2018.

[e] Water Quality, Supply, and Infrastructure Improvement Act of 2014.

[f] California Department of Parks and Recreation 2017.

CDFW = California Department of Fish and Wildlife; HCP = habitat conservation plan; NCCP = natural community conservation plan; PCCP = Placer County Conservation Program; RCD = Resource Conservation District; USFWS = U.S. Fish and Wildlife Service

9.4.3.1 Measuring State and Federal Contributions

State and federal contributions to the HCP/NCCP are based on costs associated with the 29.4 percent share of the Reserve System (13,905 acres) that provides for the conservation of Covered Species in the Plan Area (see Section 9.4.3.3, *Mitigation and Conservation Components*). State and federal contributions also include costs associated with the restoration and enhancement of wetland habitats that are independent of the effects of Covered Activities. State and federal contributions cannot be used for the mitigation share of total costs for the HCP/NCCP.

The PCA will measure contributions by the state or federal government in terms of the amount of land acquired or restored rather than in dollars provided. This approach helps to ensure the Plan's land acquisition requirements can be met regardless of the fluctuation of land prices and restoration costs or the variations in land availability.

State and federal funding is estimated to provide $151 million (Table 9-4). To meet this goal, federal and state governments will endeavor to contribute $136 million for a maximum of 13,905 acres to the Reserve System. This funding is based on the weighted average acquisition cost for fee title or conservation easements of $10,007 per acre. State and federal funding is also assumed to contribute $15 million for the Plan's conservation commitment associated with direct capital costs for 82 acres of special habitat restoration (vernal pools, aquatic/wetland, and riverine/riparian constituent habitats) plus costs for salmonid stream channel enhancements.

Estimates of state and federal funding are based on current sources that are generally limited to land acquisition and direct wetland restoration or enhancement costs. Current funding restrictions generally exclude reserve assembly costs associated with pre-acquisition surveys, due diligence, and site improvements, ongoing costs for management, monitoring, and program administration, and one-time costs for endowment and plan preparation.[17] As state and federal funding sources evolve over the 50-year permit term, the PCA expects these funding sources to become more flexible in terms of the types of costs they can cover. For the time being, the PCA will identify other funding for costs associated with lands acquired, restored, or enhanced with state or federal funding but not funded by those sources.

In the unlikely event that a state or federal agency acquires and manages land credited to the reserve, the anticipated state and federal land contribution will be adjusted to account for the additional financial contribution of management and monitoring. If the state or federal agency assumes some but not all responsibility for management and monitoring, then the land acquisition contribution will be accounted for by mutual agreement between the Wildlife Agencies and the PCA. As with other partners, all land acquired by state or federal agencies must be managed in accordance with the standards of the HCP/NCCP.

If the state and/or federal governments contribute a portion of the costs of a land acquisition, the PCA will measure the state and/or federal contribution as a share of the overall amount of land acquired that is in proportion to the state and federal share of the overall costs of the acquisition.

[17] State and federal funding can pay for some limited management or monitoring costs if these funds represent a minority of the project's costs and are spent within the three-year term of the grant award. To be conservative, this potential funding is not included in the state and federal funding estimate but could be added during Plan implementation.

9.4.3.2 State and Federal Funding Sources

9.4.3.2.1 Federal Endangered Species Act Section 6 Program

The USFWS Cooperative Endangered Species Conservation Fund authorized under Section 6 of the ESA is likely to provide an important source of grant funding for the HCP/NCCP. USFWS annually provides significant funds to local jurisdictions developing and implementing regional HCPs. The Section 6 grant program is divided into three funding categories: HCP Assistance (for planning), HCP Land Acquisition, and Recovery Land Acquisition Grants. Grants are submitted to, and administered by, CDFW. The HCP/NCCP has already received nine grants from the HCP Planning Assistance Program totaling over $3.1 million. Once the federal ESA permit is issued, the HCP/NCCP will be eligible for HCP Land Acquisition grants.

Since 2002, USFWS has made available, on average, $43.8 million in land acquisition funds nationally. Of this, an average of approximately 45 percent—nearly $20 million—was awarded annually for land acquisition for HCPs and NCCPs in California. Since 2002, California has received more than $219 million in land acquisition funding for approved HCPs and NCCPs, by far the largest share of any state. Funding for the HCP Land Acquisition program has declined substantially since 2010. It appears, however, to have stabilized at about $15 million every year since 2012. In fiscal year 2014, USFWS instituted a cap on individual awards of $2.0 million. It is unknown whether this funding cap will remain or if total funding amounts will change. The program is assumed to continue and to support implementation of the HCP/NCCP.

9.4.3.2.2 State Funding Sources

As described in Table 9-5, various sources are available for state funding, including existing California propositions (e.g., Proposition 1 passed by voters in 2014). Proposition funding for the HCP/NCCP can come from a variety of sources, including the Department of Conservation, Strategic Growth Council, Wildlife Conservation Board, and California Department of Parks and Recreation. More state bond measures for open space preservation and management are expected to be issued as California propositions during the 50-year term of the HCP/NCCP. For example, Proposition 1 was passed by California voters in the November 2014 general election by a margin of 67.1 percent. This proposition provides bond funding for water, park, and natural projects. The California Clean Water and Safe Parks Act (Proposition 68) approved in June 2018 by a margin of 56.7 percent, provides funding for a range of natural resource-related projects and includes a specific allocation for land acquisition to support implementation of NCCPs in the State.

9.4.3.3 Mitigation and Conservation Components

As described above, the PCA determined development fees on the basis of mitigation requirements without the HCP/NCCP. The *Development Fee Nexus Study for the Western Placer County HCP/NCCP,* prepared by Urban Economics prior to Plan adoption, documents mitigation ratios by community type (defined in Chapter 3, *Physical and Biological Setting*) that are reasonably applicable at a regional scale in the context of the HCP/NCCP to mitigate effects (see Chapter 4, *Effects of Covered Activities*). Mitigation ratios estimated for each land-cover type are reasonably applicable at a regional scale in the context of the HCP/NCCP to offset effects on habitat for the Covered Species. Based on these ratios, the overall mitigation component of the HCP/NCCP is estimated at 70.6 percent of the total Reserve System of 47,300 acres, equivalent to 33,395 acres. The conservation component of the HCP/NCCP is the remaining 29.4 percent or 13,905 acres. This calculation does

not include additional conservation commitments for restoration and enhancement of natural communities and constituent habitats (see Chapter 5, *Conservation Strategy*).

This analysis is provided to help delineate eligibility for state and federal grant funding for the conservation portion of the HCP/NCCP. The calculation above cannot be applied as a project mitigation ratio on a specific site because it was calculated based on the substantial economies of scale provided by the HCP/NCCP (e.g., preserving large blocks of land that support many Covered Species). Also, project mitigation ratios are typically calculated based on the results of site-specific surveys and the likely presence of listed species. By contrast, the HCP/NCCP covers listed and non-listed species as well as occupied and unoccupied habitat. The Plan therefore provides substantially more regulatory assurances to Plan participants than are available on a project-by-project basis. For these reasons, it is inappropriate to compare the calculation above to a project mitigation ratio.

The HCP/NCCP is a single plan that must be implemented as a whole. Permits will be issued on the basis of implementation of the entire Plan. The development fees will cover the responsibilities and requirements of the PCA and Permittees to mitigate their effects. State and federal contributions, continuing local, state, and federal conservation efforts, and other non-development fee funding such as funding from agricultural leases and private competitive grants can contribute to the conservation component of the HCP/NCCP.

9.4.4 Other Local, State and Federal Sources

The funding category Other Local, State & Federal in Table 9-4 includes a $88 million of future funding from new local, state, or federal funding sources. The PCA makes no assumption regarding the share of this future funding from new local, state, or federal sources.

The local funding estimates described in previous sections are based on information about local funding sources available in 2018. During the 50-year term of the HCP/NCCP permit, local agencies are expected to generate new local sources of funding through a variety of mechanisms such as funding from private foundations, donations of land, surcharges on Special Participation Entities, or future open space taxes and fees. Although not expected to be substantial, these future new local funding sources could contribute to the conservation costs of the HCP/NCCP.

Like local sources, the PCA expects additional state and federal funding sources to arise during the 50-year term of the permit which could help to fund a variety of HCP/NCCP costs. New federal and state grant programs are expected to be created during the permit term that would add to the federal and state funding of the HCP/NCCP. These new grant programs may also be more flexible than existing federal or state grants in terms of what types of HCP/NCCP costs they can cover.

9.4.5 Funding Adequacy

Funding sources described in this chapter are conservative estimates; actual funding from local, state, and federal sources may exceed these projections. For example, foundations, academic institutions, and other non-governmental organizations not identified in this chapter may contribute funds to the Plan. Alternatively, additional revenue may be secured from sources not included in the funding plan shown in Table 9-4, such as fees on Special Participating Entities, fees for temporary effects, or other mitigation fee programs that are not a part of the regulatory framework of this Plan (e.g., Placer County Tree Ordinance mitigation fees or National Pollutant Discharge Elimination System mitigation fees). Despite conservative assumptions and additional revenue sources, revenue

may fall short of costs. This section further discusses the adequacy of the HCP/NCCP's funding in the event of funding shortfalls.

9.4.5.1 Additional Funds Needed for Management or Monitoring

The PCA will adjust development fees annually to keep pace with increases in management and monitoring costs due to inflation (see Section 9.4.1.7, *Adjustment of Development Fees*). Every 5 years, the PCA will conduct a funding assessment to determine actual implementation costs. The purpose of this assessment will be to ensure that the annual adjustments have been adequate to ensure that revenues track actual costs. If actual costs are found to be higher than the revenue provided by the development fees, or earnings are less than needed to adequately fund the endowment, the PCA will increase the development fee proportionate to the mitigation share of total remaining Plan costs. These mechanisms are intended to ensure that Reserve System management and monitoring costs will be paid for throughout Plan implementation.

A final safeguard is the contingency associated with management and monitoring costs (see Sections 9.3.7, *Contingency*). Contingency funding is primarily intended to offset land management or monitoring costs that are higher than predicted by the HCP/NCCP on a short-term basis. If this funding is inadequate to offset these costs, or if costs are predicted to exceed revenue on a long-term basis, then the PCA will consider whether to adjust management and monitoring requirements without jeopardizing meeting the HCP/NCCP's conservation requirements, or to raise revenue from development fees or other sources to offset the funding shortfall. When feasible, the PCA will make reasonable adjustments to revenue to meet the obligations of the HCP/NCCP. Some changes may require a minor modification or major amendment to the HCP/NCCP (see Chapter 8, *Plan Implementation,* for rules regarding changes to the HCP/NCCP).

9.4.5.2 Actions Required If Land Acquisitions Lag Behind Effects

The NCCP Act requires that conservation keep pace with development in "rough proportionality." The Stay-Ahead provision of the HCP/NCCP (see Chapter 8, *Plan Implementation*) is intended to ensure that land acquisition and enhancement, restoration, and creation (i.e., both mitigation and conservation) keep pace with the loss of natural communities and Covered Species' habitat. Meeting this requirement, however, depends on the steady acquisition of land from willing sellers.

The nature of land acquisition is such that assembly of the Reserve System is not likely to be accomplished in a constant or predictable fashion. It is expected that large (500 acres or more) land acquisitions will compose an important part of the total size of the Reserve System. Acquisition of large parcels (or combinations of parcels) is typically more complex and may take longer to accomplish than acquisition of small parcels. Therefore, many additions to the Reserve System are expected to be episodic. As a result, the PCA may fall behind in land acquisition relative to effects for short periods of time while the PCA negotiates and processes large land acquisition deals (see Section 8.4.2, *Process for Acquiring Lands*). Over the long term, large land acquisitions will save money because of their typically lower price per acre and lower per acre land transaction costs.

The PCA will be responsible for performing the conservation actions necessary to comply with the Stay-Ahead provision, as described in Chapter 8, *Plan Implementation*.

9.4.5.3 Actions Required Should Development Fee Funding Fall Short of Expectations

This section describes the funding expected from development fees from the implementation of Covered Activities by public agencies (the Permittees) and private developers. These estimates are based on long-term projections of development based on historic patterns and the approved planning documents of local jurisdictions.

The revenue expected from public and private Covered Activities is conservatively estimated so as not to overestimate potential revenue sources. Despite these assumptions, however, the amount of Covered Activities and the revenue they generate could fall short of projections. Other elements of the Plan must continue regardless of the pace of development fees, such as reserve management and monitoring and program administration. Development fees are essential to cover the costs of ongoing management and monitoring because many public funding sources cannot be used for such activities.

Revenue from non-fee funding sources could offset the shortfall in fee funding in the short term, especially for land acquisition. In the short term, if fee funding cannot keep pace with the operations and management needs of the Reserve System, the PCA will consider the following options in consultation with the Wildlife Agencies:

- Continued acquisition of land from willing sellers for the Reserve System to take advantage of lower land costs but deferral of non-essential management and monitoring of these lands for up to 5 years or when development fee revenue is sufficient, whichever comes first (see below for additional details on this option)
- Identifying new funding sources that will cover the costs of operations and maintenance of the Reserve System until fee revenue increases to meet these costs over the long term
- With the approval of the Wildlife Agencies, defer implementation tasks that are not critical for compliance with the permits, Implementing Agreement, and the Plan.
- Other options that meet the biological goals and objectives of the Plan and are consistent with the permits, Implementing Agreement, and the Plan

As described in Chapter 5, *Conservation Strategy,* if development fee funding falls short of expectations but the Reserve System is expanding as fast or faster than it should to meet or exceed the Stay-Ahead requirement, the PCA may defer most management of these lands until development fee funding (or other sources) is available. Specifically, if needed, the PCA may limit management to essential management tasks and defer non-essential management tasks for up to 5 years from the purchase of the first parcel of each reserve unit, or when development fees become available, whichever comes first. Essential management tasks are defined as those tasks necessary to ensure that the condition of the reserve unit does not degrade below the existing condition at the time it was incorporated into the Reserve System. This standard will be measured in terms of the amount and condition of natural land cover and habitat for Covered Species known or expected to occupy the site. Existing conditions will be documented by the PCA through the pre-acquisition assessment and the site inventory, described in Chapter 5, *Conservation Strategy*, and Chapter 7, *Monitoring and Adaptive Management Program*. Management in response to changed circumstances is considered essential management and therefore cannot be deferred.

Over the entire permit term, fee revenue may also fall short of expectations if fewer Covered Activities occur than assumed under the HCP/NCCP. Although unlikely, this shortfall will make it difficult for the Permittees to meet their conservation obligations. If it appears that take authorized under the permits will fall short of expectations, substantially reducing fee revenue, the PCA and other Permittees will work with the Wildlife Agencies to apply for extensions to the permits to allow the full use of the authorized take and allow full implementation of the HCP/NCCP. As described above, the Permittees are not expected to, nor are they required to, utilize their general funds for HCP/NCCP implementation in the event of funding shortfalls of any kind.

Alternatively, if revenues fall far short of expectations and it is unlikely that the Permittees will meet their permit obligations, they may apply to reduce the authorized take and reduce the permit obligations in line with reduced revenue forecasts. Any permit term extension or request for reductions in Plan obligations will follow the requirements for an amendment described in Chapter 8, *Plan Implementation*.

9.4.5.4 Actions Required Should Non-fee Funding Fall Short of Expectations

Sections 9.4.2, *Local Funding*, 9.4.3, *State and Federal Funding,* and 9.4.4, *Other Local, State and Federal Sources* describe the non-fee funding sources that are being committed or are expected to be provided by local, state, and federal agencies, as well as nonprofits and foundations. These commitments and expectations are based on conservative assumptions and a track record of providing similar funding locally or to other HCPs and NCCPs in California. Despite these assumptions, it is possible that these non-fee funding sources will fall short of expectations.

In the event of shortfalls in non-fee funding, the PCA will make reasonable adjustments to expenditures to reduce costs while still meeting the obligations of the Plan. If these adjustments are inadequate to address the shortfall, the PCA will consult with the Wildlife Agencies regarding the best course of action. As described above, the Permittees are not expected to, nor are they required to, utilize their general funds for the HCP/NCCP's implementation in the event of funding shortfalls as a result of less non-fee revenue than expected. Actions considered will include reducing take authorization and conservation obligations in proportion to the funding shortfall. Such reductions would need to follow the amendment process described in Chapter 8, *Plan Implementation*.

9.4.6 Funding for Post-permit Management and Monitoring

After the permit term, the Permittees will continue to protect, manage, and maintain the Reserve System in perpetuity. This includes adaptive management and monitoring at a level sufficient to determine whether management is effective. Other obligations, however, end after the permit term. For example, the Permittees will no longer be obligated to annually report the status of the HCP/NCCP to the Wildlife Agencies. Preservation, enhancement, restoration, and creation obligations will also be completed prior to the end of the permit term and will not continue post-permit. Responsive measures and contingencies will also no longer need to be funded after the permit term because the regulatory assurances associated with these obligations end with the permit.[18] Detailed assumptions regarding post-permit costs were presented in Section 9.3.8, *Costs in*

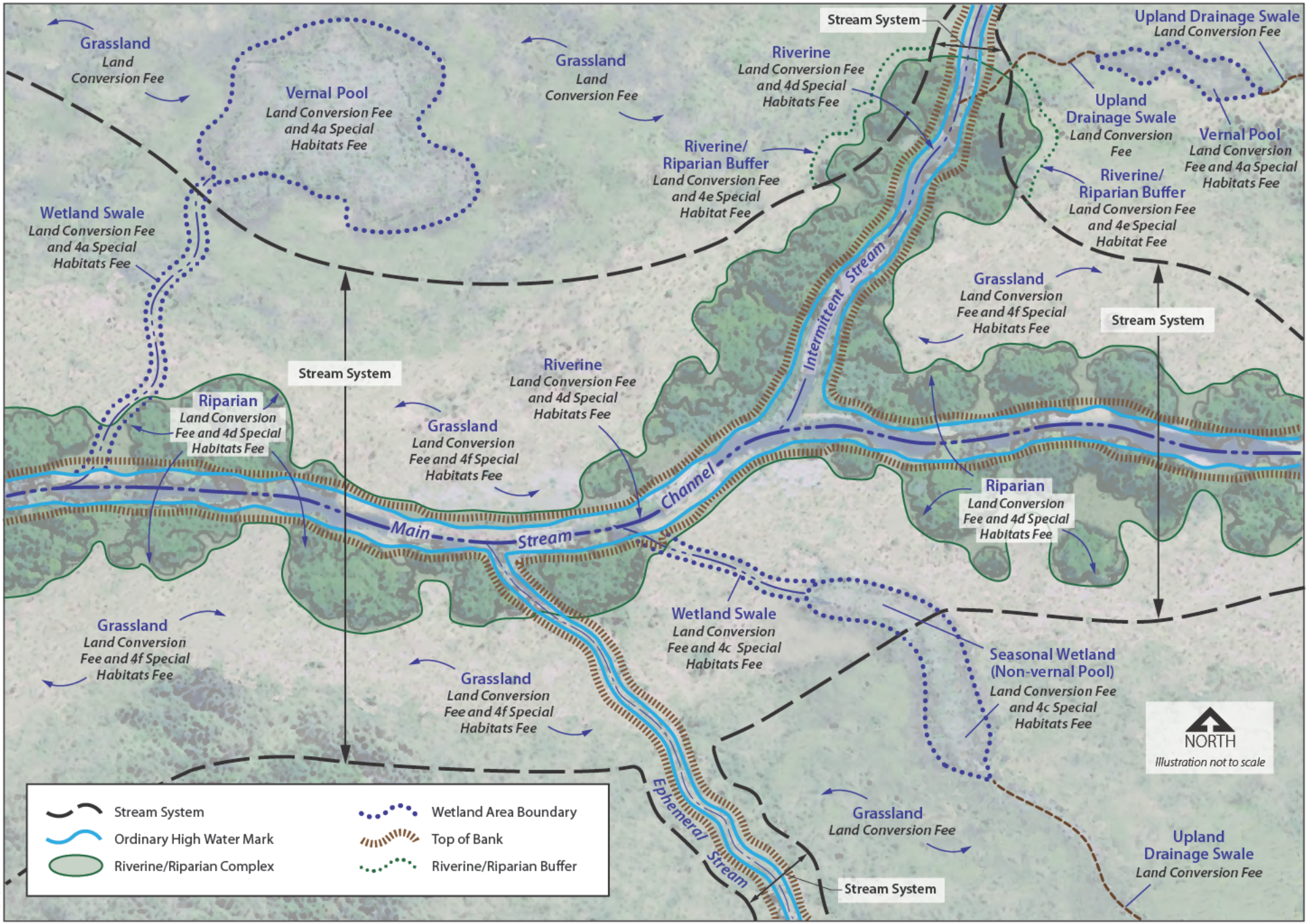
[18] Some contingencies associated with wetland restoration may continue after the permit term to comply with obligations under the CWA Programmatic General Permit. See the County Aquatic Resources Plan for details.

Perpetuity. Responsibility for funding long-term management and monitoring rests solely with the PCA.

The PCA may manage and invest endowment funds directly or under contract to any organization allowed by state law. The PCA shall ensure that the endowment is managed, invested, and disbursed in furtherance of the long-term stewardship of the Reserve System by:

- Managing endowment funds efficiently
- Achieving a reasonable long-term rate of return on investment of endowment funds similar to those of other prudent investors for endowment funds
- Achieving a long-term rate of return that at a minimum is equal to the capitalization rate of 3.25 percent annually assumed in the Plan, after deducting inflation and fees, as adjusted by the periodic assessment and adjustment of fees (Section 9.4.1.7.2, *Periodic Assessment and Adjustment of Fees*)
- Fully funding the endowment by the end of the permit term based on a schedule that allocates a fixed percentage of each land conversion fee payment to the endowment as adjusted by the periodic assessment and adjustment of fees (Section 9.4.1.7.2, *Period Assessment and Adjustment of Fees*)
- Managing and investing endowment funds in good faith and with the care an ordinarily prudent person in a like position would exercise under similar circumstances, consistent with the Uniform Prudent Management of Institutional Funds Act (Part 7 [commencing with Section 18501] of Division 9 of the Probate Code)
- Utilizing generally accepted accounting practices as promulgated by either the Financial Accounting Standards Board or any successor entity for nonprofit organizations or the Governmental Accounting Standards Board or any successor entity for public agencies, to the extent those practices do not conflict with any other requirements of law
- Disbursing endowment funds on a timely basis and only for the long-term stewardship of the Reserve System

As described in Section 9.3.8, *Costs in Perpetuity,* funding provided by development fee contributions and interest earnings on endowment fund balances during the permit term will grow the endowment sufficient to fully fund post-permit costs in perpetuity. Any shortfalls in the endowment during the permit term will be identified by the 5-year funding assessments conducted by the PCA. If the endowment is not growing fast enough to reach its target size, then the land conversion fee will be increased to make up the shortfall. With these built-in safeguards in the endowment, post-permit funding is expected to be adequate to fully offset necessary post-permit costs of management and monitoring.



NOTES: *1) The development fees are found in Table 9-6 for the Land Conversion Fee and Table 9-7 for Special Habitat Fees.*
2) The figure does not include the 4b Vernal Pool Immediate Watershed Effects special habitat fee that applies to vernal pool constituent habitat indirectly affected by land conversion within the immediate watershed and is paid in addition to the land conversion fee.
3) The figure does not include the 4f Salmonid Stream Channel special habitat fee that applies to linear feet of direct effects in a salmonid stream channel and is paid in addition to the land conversion fee and any other special habitat fee such as fee 4d Riverine/Riparian.

Figure 9-1
Mitigation within the Stream System and Adjoining Areas

Chapter 10
Assurances

10.1 Introduction

This chapter discusses the rights and responsibilities of the Permittees, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and California Department of Fish and Wildlife (CDFW) with regard to changed and unforeseen circumstances that may occur over the permit term. The No Surprises Regulation limits the scope of a Permittee's responsibility to provide additional mitigation under the Endangered Species Act (ESA) and the California Natural Community and Conservation Planning Act (NCCP Act) provides similar assurances. This chapter also defines the process by which the parties can make minor and major modifications to the Western Placer County Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP or Plan).

10.2 Definitions

Changed circumstances are defined in the federal No Surprises Regulation[1] and for the state of California in the NCCP Act.[2] With respect to HCPs, Congress recognizes that "circumstances and information may change over time and that the original plan might need to be revised" (H.R. Rep. No. 97-835, 97th Congress). Section 10 regulations[3] describe changed and unforeseen circumstances and specify procedures for addressing changed circumstances that may arise during the permit term. Changed and unforeseen circumstances describe what changes can and cannot be anticipated over the permit term and thus bound the Permittees' commitment, as described in Section 10.4.1, *Federal No Surprises.*

10.2.1 Changed Circumstances

Changed circumstances are defined by the HCP No Surprises Rule as "changes in circumstances affecting a species or geographic area covered by a conservation plan that can be reasonably anticipated by the plan developers and the Service and that can be planned for (e.g., the listing of a new species, or a fire or other natural catastrophic event in areas prone to such events)."[4] The NCCP Act defines changed circumstances as "those circumstances that are reasonably foreseeable and could affect a Covered Species or geographic area covered by the plan."[5] Accordingly, these regulations require that potential changed circumstances be identified in the Plan, along with responsive actions that would be taken to address these changes. The changed circumstances that could arise in the Plan Area have been identified and are described below.

[1] 63 *Federal Register* 35 (1998) (amending 50 CFR 17.22(b)(5), and 222.307(g)).

[2] California Fish and Game Code § 2805(c).

[3] 50 Code of Federal Regulations (CFR) Sections 17.22(b)(2),17.32(b)(2) and 222.307

[4] 50 CFR Section 17.3.

[5] California Fish and Game Code Section 2805(k).

If a changed circumstance, as defined in this section, occurs within the Plan Area, the Placer Conservation Authority (PCA) will implement the responsive actions prescribed in this section. The Wildlife Agencies will not require any conservation and mitigation measures to respond to changed circumstances, except those provided for in this section, as long as the HCP/NCCP is being properly implemented. Properly implemented means the Permittees have been implementing the Plan in accordance with the terms and conditions of the Permits, Plan, and Implementing Agreement.

10.2.2 Unforeseen Circumstances

Unforeseen circumstances are defined by federal regulation as "changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the Service at the time of the conservation plan's … negotiation and development, and that result in a substantial and adverse change in the status of the Covered Species."[6] The NCCP Act defines unforeseen circumstances as "changes affecting one or more species, habitat, natural community, or the geographic area covered by a conservation plan that could not reasonably have been anticipated at the time of plan development, and that result in a substantial adverse change in the status of one or more Covered Species."[7]

New or changed conditions that are not identified as changed circumstances in the Plan are unforeseen.

10.3 Changed and Unforeseen Circumstances Addressed by this Plan

Changes in the environment are anticipated and will be addressed adaptively as part of the conservation strategy and its adaptive management program. Nonetheless, HCPs are required to identify specific changed and unforeseen circumstances affecting a species or geographic area of the plan and describe responsive actions the Permittees will take to address changed circumstances. Changed and unforeseen circumstances recognized by this Plan are provided below, along with a description of responsive actions to address changed circumstances. The PCA has allocated a portion of the Plan implementation budget for the responsive actions below.

1. Covered Species Listed
2. Non-Covered Species Listed
3. Destruction of Restoration Projects Due to Fire
4. Expansion of New or Non-native Species or Disease
5. Flooding of Vernal Pools and Riparian Restoration or Enhancement Sites
6. Destruction of Restoration Projects through Drought
7. Climate Change

[6] 50 CFR Section 17.3.

[7] California Fish and Game Code Section 2805(j).

Changed circumstances are focused on changes to the environment that could affect Covered Species or natural communities protected under the Plan. Below we describe each of the changed and unforeseen circumstances associated with implementing the Plan's conservation strategy. These changed and unforeseen circumstances, along with associated responsive actions, are summarized in Table 10-1, which lists each changed circumstance and associated responsive actions, which are funded by the Plan. The table also lists the thresholds for unforeseen circumstances beyond which responses are not funded by the Plan. If a change to the environment involves more than one changed circumstance described below, and for one change circumstance a responsive action is required, but for another changed circumstance a responsive action is not required, the required responsive action shall be implemented. For example, a fire could occur that does not affect oak woodlands, but results in the spread of non-native invasive plants. Although a responsive action is not required under Section 10.3.3. *Destruction of Woodlands Due to Fire*, a responsive action could be required under Section 10.3.4 *Expansion of Non-native Species or Disease*.

Table 10-1. Thresholds and Responsive Actions for Changed and Unforeseen Circumstances Addressed by the Plan

Changed Circumstance	Trigger for Responsive Action	Responsive Actions	Unforeseen Circumstance
Covered Species Listed	• USFWS or NMFS lists a species already covered by the Plan.[1]	• No changes to the terms and conditions of the Implementing Agreement or modifications to conservation measures will be required.	• There is no unforeseen circumstance associated with the listing of a species already covered by the Plan.
Non-Covered Species Listed	• USFWS, NMFS, or CDFW lists a species that is not covered by the Plan.	• Evaluate potential impacts of Covered Activities on the newly listed species, including an assessment of the presence of suitable habitat in impact areas. • Develop guidance and provide guidance to all Permittees regarding the avoidance of take of the newly listed species in consultation with the relevant Wildlife Agency.	• There are no unforeseen circumstances associated with the listing of a species not covered by the Plan.
Destruction of Woodlands Due to Fire	• Any wildfire affecting woodlands in the Reserve System. Note that grassland fires do not negatively affect the grassland land-cover type and will therefore not be tracked as changed circumstances by the PCA.	• Initiate a post-fire damage assessment of natural communities and specific restoration and enhancement projects within 6 months of a fire. The assessment should follow the process established by the federal Interagency Burned Area Emergency Response. • Determine passive or active responses to restoration or enhancement projects affected by fire. • Develop and implement strategies to minimize the spread of invasive species as a result of fire. • Reduce erosion and possible sedimentation of streams following a fire and/or initiate appropriate erosion control (e.g., seeding with native species) if these measures are found to be appropriate to restore native vegetation and Covered Species' habitat. • Actively or passively enhance or restore oak woodlands through the adaptive management program (see Chapter 7, *Monitoring and Adaptive Management Program*).	• Fires collectively affecting more than 200 acres of woodland within any rolling 10-year period.

Changed Circumstance	Trigger for Responsive Action	Responsive Actions	Unforeseen Circumstance
Expansion of Non-native Species or Disease	• Spread of disease or non-native species affecting units within the Reserve System.	• Prepare a damage-assessment report (provided to Wildlife Agencies upon request). • Determine the best method for measuring and tracking extent. • Recommend and take actions to address the threat.	• Infestations of new diseases or new non-native invasive species affecting 25% or more of the extent (i.e., acres) of a predominant natural community (i.e., oak woodland) or occupied Covered Species' habitat within the Reserve System. Spread of existing non-native species or diseases to a level 25% or more above baseline conditions within the Reserve System.
Flooding of Vernal Pools and Riparian, including Restoration or Enhancement Sites	• Any flood that adversely affects vernal pools and/or riparian restoration or enhancement sites.	• Evaluate the affected restoration or enhancement sites following a flood event to determine the appropriate responsive actions to ensure that the site is recreated through active management or natural processes. For both vernal pool and riparian restoration sites these actions may be passive or may include proactive measures such as re-planting, seeding, and inoculating with vernal pool species, or re-contouring. Note that vernal pool enhancement or restoration sites will not be located in the 10-year floodplain. • Work with the Wildlife Agencies to re-establish protocols for meeting occupancy standards at a given vernal pool location.	• Three or more flood events affecting the Reserve System with a magnitude equal to or greater than the 10-year flood event within any 10-year (rolling) period • Eight or more flood events affecting the Reserve System with a magnitude equal to or greater than the 10-year flood event over the permit term • Two or more flood events affecting the Reserve System with a magnitude equal to or greater than the 100-year flood event over the permit term.
Destruction of Restoration and Enhancement Projects through Drought	• Any drought defined by the Palmer Drought Severity Index as moderate, severe, or extreme that lasts 12 months or more	• Prepare damage assessment report on affected restoration sites (provided to Wildlife Agencies upon request). • Recommend and implement actions to improve effects on restored or enhanced habitat (e.g., supplemental irrigation). • Implement measures through the adaptive management program (see Chapter 7, *Monitoring and Adaptive Management Program*).	• Four or more droughts within any 10-year (rolling) period • Six or more droughts (12 months or more) over the permit term • Any single drought event lasting 47 months or more.

Changed Circumstance	Trigger for Responsive Action	Responsive Actions	Unforeseen Circumstance
Climate Change	• Increase in the 10-year running average (0.5°F or more) for any three monthly mean temperature metrics compared to the baseline period[2]	• Identify target species most vulnerable to climate change (e.g., conduct climate vulnerability analysis) and increase species-specific monitoring for those species. • Enhance natural community monitoring to detect ecological responses to climate change. • Alter conceptual ecological models for natural communities and Covered Species as a tool to devise improved management action. • Alter or conduct additional management actions on target/vulnerable species through the adaptive management program (see Chapter 7, *Monitoring and Adaptive Management Program*). • Conduct more aggressive control of threats, such as invasive species that respond positively to climate change.	• Increases of 6.0°F or more in the 10-year running average compared to the baseline period for any of the three monthly mean temperature metrics

[1] All species covered by the NCCP are listed on the 2835 permit at the time the permit is issued. If any of the Covered Species are listed by the state during the permit term, these species are already covered by the permit, and no further action is required by CDFW or the Permittees.

[2] Baseline defined below in Section 10.3.7, *Climate Change*.

°F = degrees Fahrenheit

CDFW = California Department of Fish and Wildlife

NCCP = Natural Community Conservation Plan

NMFS = National Marine Fisheries Service

PCA = Placer Conservation Authority

USFWS = U.S. Fish and Wildlife Service

10.3.1 Covered Species Listed

10.3.1.1 Description

Fourteen species are covered under the Plan. Of these, seven are currently listed and seven are not listed, but have a strong probability of becoming listed during the permit term. Each Covered Species in the HCP/NCCP has been treated as though it is listed under ESA and the California Endangered Species Act (CESA). All Covered Species, whether listed or non-listed, will be covered under the permits.

10.3.1.2 Responsive Measures

The Permittees understand that the Section 10(a)(1)(B) permits will be effective for all listed Covered Species upon issuance. Should NMFS or USFWS list a Covered Species during the permit term, take coverage will become effective for that species at the time of listing, once USFWS and/or NMFS convert the Conference Opinion for that species to a Biological Opinion. No changes to the terms and conditions of the Plan or the Implementing Agreement will be required.

Under Section 2835 of the California Fish and Game Code, CDFW may issue take authorization for Covered Species (plants or wildlife), regardless of their listing status. As stated in the NCCP Act, "At the time of plan approval, the department may authorize by permit the taking of any Covered Species, including species designated as fully protected species pursuant to Sections 3511, 4700, 5050, or 5515, whose conservation and management is provided for in a natural community conservation plan approved by the department."

10.3.2 Non-Covered Species Listed

10.3.2.1 Description

Over the course of Plan implementation (50 years), the Wildlife Agencies may list as threatened or endangered under ESA or CESA species that are not covered under the Plan.

10.3.2.2 Responsive Measures

If a non-Covered Species is listed, the following responsive actions will be taken:

- The potential impacts of Covered Activities on the newly listed species will be evaluated, including an assessment of the presence of suitable habitat in impact areas.
- If Covered Activities could cause take of the newly listed species, the PCA will, in consultation with the relevant Wildlife Agency, develop measures to fully avoid impacts on the newly listed species until the Plan is amended to cover these species or compliance with ESA and CESA is achieved through other means (such as individual Section 7 consultations, 2081s, etc.) and will provide these required measures to all Permittees.

In addition, the Plan and permits could be modified or amended to cover the species, or the Permittees could apply for new and separate permits to cover the species. Procedures for modifications and amendments to the Plan are outlined in Section 10.5, *Modifications to the Plan*, below.

10.3.3 Destruction of Woodlands Due to Fire

10.3.3.1 Description

Fire is a natural component of Placer County ecosystems and vegetation types. Vegetation evolved under the influence of a natural fire regime that affected community regeneration and species distribution, composition, and extent. Within the Plan Area, pre-1900 median fire return intervals[8] were shorter than those of the 20th century and ranged from 8 to 15 years, depending on vegetation type (Skinner and Chang 1996). Periodic fire (from both lightning strikes and human ignition) shaped the landscape mosaic. For example, fires kept woody vegetation from invading grassland and converting it to scrub or oak woodland types. By far, the most dramatic impact on natural fire regimes has been the policy of fire prevention and suppression over the past 100 years. As a consequence of this policy, the frequency and extent of fires are much lower than historical values, and now Placer County's vegetation types have essentially ceased to have any significant natural fire regime. For additional discussion on wildfire and natural communities in the Plan Area (see Section 3.2.5*, Wildfire*, and Appendix F, *Fuel Management*).

The California Department of Forestry and Fire Protection rates the majority of undeveloped portions of the Plan Area as having a moderate (greater than 300 years) to high (100 to 300 years) fire return interval. The practice of fire suppression in the Plan Area has caused unnaturally high fuel loads and increased encroachment by woody species into grassland and within woodland systems. These conditions can result in increased fire intensities, faster rates of spread, and larger fires. Larger, faster, and more intense fires could have a negative impact on natural communities, restoration projects, and Covered Species. More frequent, intense fires could favor early successional species or cause type conversion.[9] For example, with frequent intense fire, shrub species may not have time to regenerate and reproduce before the next fire, and annual and short-lived perennial herbs and grasses would prevail.

10.3.3.2 Conservation Measures and Monitoring

Appendix F, *Fuel Management,* describes a comprehensive approach to appraising and managing fire risk in future HCP/NCCP reserves. It identifies different fire risk management strategies for oak woodlands, riparian woodlands, and grasslands, including vernal pool complex lands. Among these three, oak woodlands are the greatest challenge.

Guidelines emphasize management to reduce fuel loads and minimize potential for severe wildfires and their uncontrolled spread. The guidelines also contain recommendations for minimizing the impacts of fire suppression on the Reserve System if a fire occurs. In addition, The PCA will develop a system-wide fire management plan for the Reserve System, which will require review and approval from the Wildlife Agencies. This plan will be developed using guidance from *Wildfire Management in Conservation Reserves* (see Appendix F, *Fuel Management*). Reserve unit–specific management plans will include site-specific measures, which will be based on the system-wide fire management plan. One component of that plan will address methods to reduce wildfire risk and prevent degradation of reserve quality by fire suppression actions if a fire occurs. Appendix F, *Fuel Management,* identifies a broad range of candidate measures that can be taken to reduce fire risk.

[8] Number of years between two successive fires in a specified area.

[9] The replacement of one natural community type by another natural community. In this case, replacement of woodland by grassland.

The cost model and finance plan described in Chapter 9, *Costs and Funding*, take into account the application of these fire-risk reduction measures as part of the cost estimates for reserve management. For example, cost estimates include fuel modification for acquired oak woodlands, using existing roads and terrain features to break expanses of fire-prone woodlands into management blocks, typically one quarter section (160 acres) in extent. Fuel management treatments, as described in Appendix F, *Fuel Management,* may extend over 10 percent of the woodland area maintained in reserves. By applying these guidelines, most adverse impacts on natural communities from fires are expected to be avoided.

Preventative actions that could be incorporated into the reserve unit management plans include those listed below.

- Create or redesign fuel breaks to limit fire spread.
- Encourage native fire-adapted plants and control non-fire-adapted invasive plants.
- Implement strategies for fire suppression and habitat protection during fire, in conjunction with local fire agencies.
- Incorporate public-awareness programs into reserve unit management plans. This includes public outreach to neighboring landowners to minimize fire risk.

Nonetheless, during the permit term, fire is anticipated in the Plan Area at large and within the Reserve System specifically. Should a wildfire take place, the PCA will follow protocols established in the reserve unit management plans and work closely with fire response crews to minimize impacts on sensitive natural communities and Covered Species. The PCA will identify and develop appropriate post-fire plans (see Section 5.3.2.1, *Reserve Unit Management Plans*). Landscape-level monitoring will assess broad changes to the distribution of land cover across the Reserve System, and natural community–level monitoring will assess the response of invasive plants (see Section 7.3, *Landscape-level Monitoring Actions*).

10.3.3.3 Thresholds

The frequency, size, and severity of fires in the Reserve System will depend on weather, vegetation type, fuel loads, topography, and other factors. Fire could affect the distribution of vegetation within the Reserve System. Because the preservation and enhancement of natural communities is a metric by which the success of the Plan is measured, the PCA will allocate funds for remedial actions associated with the changed circumstance of fire.

To help understand fire within the proposed Reserve System during the permit term, fire history from western Placer County was reviewed. Although fire history is not necessarily an accurate indicator of future fire risk because of changes in fire management protocols over time, as well as changes in vegetation type and land use, it provides a guide for estimating the potential scope and magnitude of fire. Figure 3-4 shows that most of the wildfires over the past several decades have been in the lower-elevation grasslands, with relatively few fires in woodlands (riparian and oak woodlands) associated with the Foothills.

Because wildfire is a natural process in grasslands and almost entirely beneficial, there is no changed circumstance threshold defined for fires in grasslands. Grasslands are expected to recover from fire with minimal or no intervention. In all cases, the PCA will assess fire effects on grasslands and determine the appropriate response as part of grassland management. Conversely, fire in woodlands, particularly oak woodlands, could have significant negative effects on this natural

community. Fire in woodlands has the potential to damage oaks such that natural regeneration is prevented and type conversion to grassland results. In addition, woodlands in the Reserve System have rarely burned, and intense fire resulting from an accumulation of dry, flammable debris is foreseeable. Therefore, fire analysis within the Plan is focused on the potential effects on woodland. The woodland land use category includes all oak woodland land cover and riparian woodlands (see Table 2-1) and was used for this analysis. Even so, because of the limited size and frequency of such fires, statistically reliable analyses are difficult. For the purposes of this analysis fires were analyzed from 1950 to 2014 (see Table 10-2). Over this time period, a total of 4,098 acres of woodlands burned, an average of 64 acres per year. However, urban growth over the last 15 years has caused the landscape to become increasingly fragmented. This fragmentation, combined with higher fuel loads and quick response to fire, has led to smaller but more frequent fires, as shown in the first column of Table 10-2, which lists the number of events per calendar year. In the 14 years from 2000 to 2014, there were 20 separate fire events involving 5 acres or more of woodland, for an average of 76 woodland acres burned per year. Four individual fires burned more than 100 acres of woodland; the largest was the 2008 Gladding fire, which burned 246 acres of woodland. For this reason, and to be conservative, the most recent fire period, with higher fire frequency, is used to predict future fire in the Reserve System.

Table 10-2. Burned Acres by Land Use Type throughout the Plan Area (1950 to 2014)

Year	Events	Rangeland/ Wetland	Woodland	Agriculture	Rural Residential	Urban/ Suburban	Total
1950	1	73	318	-	11	6	407
1951	2	838	13	-	187	232	1,271
1953	1	53	103	-	-	102	257
1954	1	170	1,194	2	625	35	2,027
1958	1	18	533	-	-	-	551
1961	2	108	383	-	-	119	610
1962	1	101	-	-	-	2	103
1964	1	266	-	-	24	3	293
1965	1	84	-	-	-	185	268
1970	1	380	2	-	3	-	385
1972	1	24	39	-	8	118	189
1979	1	40	10	-	-	713	763
1980	1	-	-	-	-	236	236
1981	2	753	434	14	33	3	1,238
1982	1	355	-	-	82	2	439
1983	1	788	-	-	28	5	821
1984	1	840	-	-	37	-	876
1985	1	1,484	-	104	-	266	1,854
1986	3	375	11	5	4	3	398
1987	1	155	-	-	29	0	183
2000	1	-	148	-	-	-	148
2001	3	1,732	8	-	6	195	1,941
2002	2	349	398	9	95	28	878
2003	2	53	23	0	3	0	79
2007	13	1,213	61	11	7	20	1,312

Year	Events	Rangeland/ Wetland	Woodland	Agriculture	Rural Residential	Urban/ Suburban	Total
2008	10	861	305	246	84	34	1,529
2009	9	595	46	-	9	17	666
2010	12	695	47	152	12	6	912
2011	2	95	-	0	2	0	97
2012	5	378	1	0	-	0	380
2013	7	257	24	45	2	10	338
2014	3	118	-	2	4	3	128
Total	94	13,253	4,098	590	1,295	2,343	21,578

Source: California Department of Forestry and Fire Protection 2016; Placer County GIS 2016; MIG | TRA February 3, 2016.

Notes: This table presents information for all woodlands throughout the Plan Area and the non-participating cities, or more than 60,000 acres of woodlands. The Reserve System proposes to protect a subset (one-sixth) of these woodlands to have a proportionally lower probability of fire, based on size. Also note that land use classification is based on the current (2002 through 2011) land use mapping applied to the location of historical wildfire events. Historic wildlife events before this period may have affected a different land use. For example, wildfires in the early decades of the record tabulated as "urban/suburban" may have actually taken place in rangeland prior to its urban development. For this and other reasons, the focus of the analysis has been on recent fire history.

Because the Reserve System will contain only a fraction of all woodlands in the Plan Area, it is useful to use a percentage of woodland acres burned to define thresholds for the burning of woodlands within the Reserve System. Between 2000 and 2014, roughly 1.4 percent of all woodland in western Placer County, or 1 percent per decade, has burned. Because climate change may increase the probability of fire, this estimate was increased by 30 percent (i.e., 1.3 percent per decade). The Reserve System will contain approximately 10,300 acres of woodland. This equates to 134 acres of woodland fire per decade within a Reserve System.

A factor of 30 percent was selected because recent literature that analyzed and modeled the relationship between climate change and fire frequency in California identified a median fire occurrence and burned area increase of 30 percent by 2050 (Westerling et al. 2009). This is a statewide estimate, with fire occurrence increases ranging from 11 to 55 percent and burned area increases ranging from 11 to 70 percent. The largest increases for both fire occurrence and burned area are expected to occur in the Sierra Nevada, along the northern California coast, and in the southern Cascade Ranges. The Plan Area is not within any of the three most-vulnerable areas of California. In addition, fuel load management activities may reduce the risk of fire and the size of fires should they occur. Placer County is a fire-aware community, with a number of voluntary organizations (e.g., the Placer County Fire Safe Alliance), a well-funded local fire department for wildland responses, a robust presence from the California Department of Forestry and Fire Protection, implemented fuel-load management practices, and a growing biomass utilization program.

The estimated amount of woodland fire (estimated above at 134 acres per decade) is rounded up to 200 acres to account for data limitations. Wildfire in woodlands in the Reserve System will trigger remedial actions on up to 200 acres in any rolling 10-year period. Fire on more than 200 acres of oak woodlands on reserve lands burned in any rolling 10-year period is considered an unforeseen circumstance. Once the 200 acre limit is reached, any additional acres burned over a 10-year period will be considered unforeseen.

10.3.3.3.1 Responsive Measures

Although fire is a natural component of regional ecosystems, fire has the potential to cause type conversion of protected land cover and destroy on-the-ground restoration efforts. The effects of fire on protected land cover will be dealt with adaptively as part of the conservation strategy and the adaptive management program. Under that program, the PCA will seek to maintain the acres of various natural community types acquired as part of the Reserve System. The PCA will implement the responsive actions outlined below after fires in woodlands in the Reserve System up to the unforeseen circumstances thresholds defined above.

- Initiate a post-fire damage assessment of natural communities and specific restoration and enhancement projects within 2 months of a fire. The damage assessment will be completed within 6 months. This time period is necessary in order to be able to assess the pace and type of natural recovery (a longer assessment period may be needed if the fire occurs early in the fire season).
- Determine passive or active responses to restoration or enhancement projects affected by fire. The PCA will determine the potential responses available as part of the system-wide fire management plan for the Reserve System to be approved by the Wildlife Agencies.
- Develop and implement strategies to minimize the spread of invasive species as a result of fire.
- Reduce erosion and possible sedimentation of streambanks following a fire and/or initiate appropriate erosion control (e.g., seeding with native species) prior to the next rainy season if these measures are found to be appropriate to restore native vegetation and Covered Species' habitat. This action may need to occur immediately following a fire, even before the damage assessment is completed.
- Implement natural community rehabilitation, if needed, through the adaptive management program (see Chapter 7, *Monitoring and Adaptive Management Program*).

10.3.4 Expansion of Non-native Species or Disease

10.3.4.1 Description

Non-native species currently occur in the Plan Area and will be present in the Reserve System. Additionally, there may be diseases, as well as parasites, in the Plan Area that have the potential to adversely affect the Covered Species and natural communities within the Reserve System. However, it is possible that a number of events could occur despite implementation of the conservation strategy and monitoring program, including the following:

- New or existing non-native plant and animal species could invade or increase within the Reserve System.
- Infestations of a yet-unknown disease could affect Covered Species, or existing disease could spread.
- Climate change could exacerbate the spread of disease, non-native plants, and non-native animals.

A number of diseases and non-native species may affect or threaten Covered Species and the natural communities on which they depend. In general, the effects of diseases on the survival and reproduction of Covered Species is poorly known. The method for measuring the extent of new

diseases will be different for each disease (e.g., number of trees affected, proportion of species' range, number of populations).

The list of invasive non-native plants and animals is much more extensive. Non-native plants are described in association with natural community types in Chapter 3, *Physical and Biological Setting*. Himalayan blackberry is common and invasive in western Placer County; other potentially occurring noxious weeds include bull thistle, Bermuda grass, perennial pepperweed, nimblewell (*Muhlenbergia schreberi*), Johnsongrass, hydrilla (*Hydrilla* spp.), purple loosestrife, Eurasian milfoil (*Myriophyllum spicatum*), water hyacinth (*Eichhornia Kunth*), giant reed, and parrot's feather (*Myriophyllum aquaticum*) as well as others. Non-native animals include, but are not limited to, crayfish, bullfrogs, and introduced fish such as bass.

10.3.4.1.1 Conservation Measures and Monitoring

The conservation strategy includes measures to reduce existing and prevent future infestations of non-native invasive species and diseases (see Section 5.3.2.1.2, *Content of Reserve Unit Management Plans*). The monitoring program will identify and map existing non-native species in the Reserve System so that new ones can be identified quickly and a control or eradication plan can be put into place. In addition, best management practices will be incorporated into Reserve System management activities to prevent weed establishment. Long-term monitoring will assess the effectiveness of threat-prevention and threat-reduction efforts.

10.3.4.1.2 Thresholds

The monitoring program will identify and map invasive plants, document occurrences of invasive animals, and monitor disease within the Reserve System. However, it is possible for new diseases, new non-native species, and existing diseases and non-native species to spread. The spread of non-native plants will be addressed for each reserve unit as part of the conservation strategy and adaptive management program.

The following thresholds will be used to determine unforeseen circumstances for non-native species and disease:

- Spread of new or existing disease affecting 25 percent or more of a Covered Species population in the Plan Area or spread of existing disease affecting an additional 25 percent of the population relative to baseline conditions as determined upon acquisition of individual reserve units, and/or
- Infestations of new or existing non-native invasive species affecting 25 percent or more of the extent (i.e., acres) of a predominant natural community (i.e., oak woodland) or occupied Covered Species' habitat within any individual reserve unit between survey or spread of existing non-native invasive species relative to baseline conditions as determined upon acquisition of individual reserve units

The status of species, along with identified threats, will be tracked as part of the monitoring program, and any changes correlated to the spread of non-native animals will be dealt with on a case-by-case basis as part of the adaptive management program.

10.3.4.1.3 Responsive Measures

When a new disease or non-native species is detected or an existing disease or non-native species begins to spread, the PCA will contact the Wildlife Agencies to collaborate on determining the best method of measuring, monitoring, and eradicating or controlling the disease. Reducing or minimizing the spread of diseases or non-native animals will be dealt with adaptively as part of the conservation strategy. Responsive actions that address the invasion of non-native plants in individual reserve units are described below.

- Determine the best method for measuring and tracking extent within 3 months of detection.
- Prepare a damage-assessment report within 6 months of detection. Recommend and take actions to address the threat within 6 months of detection.

If the non-native invasive plant infestations result in substantial impacts on natural communities restored or enhanced under the Plan such that they cannot be addressed under the existing operating budget, the PCA will prepare a report identifying the problem and include a cost analysis for funding a control program. The PCA may seek additional outside funding and partnerships from sources other than development fees to fund and implement the program to reduce or eradicate the infestation.

10.3.5 Flooding of Vernal Pools and Riparian Sites

10.3.5.1 Description

Flooding is a natural event in stream systems. However, in the short term, flooding can negatively affect restoration projects. For example, along stream channels with new riparian plantings, floods could destroy restoration sites and require remediation. Although repeated large floods are not anticipated, flooding and remediation of restoration sites are anticipated components of the restoration budget.

Streams and rivers in the future Reserve System (Reserve Acquisition Area [RAA] and Existing Reserves) include the Bear River, located along the northern boundary of Placer County with Yuba and Nevada Counties, and a small number of streams within the Cross Canal watershed, including Auburn Ravine, Raccoon Creek, Curry Creek, Doty Ravine, Markham Ravine, Orchard Creek, and Pleasant Grove Creek (Figure 3-6). Damage from flooding within the Reserve System is most likely to affect new restoration projects. Also note that flooding creates habitat conditions that promote forest regeneration; therefore, a natural flooding regime contributes to diverse and productive forests. In addition, vernal pool restoration sites and vernal pool occupancy standards may be affected by flooding. Vernal pools, by their nature, are flooded. They contain plants and vernal pool branchiopods that have adapted to flooding, ponding, or saturated conditions. The potential exists for extreme flood events to lead to erosion and deposition, which could permanently alter vernal pool conditions or temporarily reduce or eliminate occupancy. However, over the long term, these same dynamic processes also create vernal pools. For example, large flood events promote channel cutoffs that result in the “stranding” of the previous channel. Vernal pools can form within the abandoned channel. These dynamic processes create or eliminate individual pools; at the landscape scale, these processes maintain vernal pools over time.

10.3.5.2 Thresholds

Several major floods have been documented since European settlement of Placer County, most recently in 1983, 1986, 1995, 1997, and 2005. Although a flood with a recurrence interval of 100 years or greater has a 39 percent chance of occurring during the 50-year permit term, the probability of flooding and the frequency of events at specific reaches is difficult to determine. Flooding probability is a function of each stream's capacity, the runoff potential of the stream's catchment, and rainfall patterns across the county. Furthermore, climate change may alter the precipitation patterns currently observed in the Plan Area and influence the frequency of flooding relative to the historical baseline. Climate change models also demonstrate clear trends toward earlier snowmelt, accompanied by increased frequency of winter flooding (Dettinger et al. 2004); however, models and research differ over whether precipitation will increase or decrease in the Plan Area (Kim et al. 2005; Kiparsky and Gleick 2003; Hayhoe et al. 2004).

Flooding events are anticipated over the permit term, including flooding that affects occupied vernal pools and restored riparian sites. For the purposes of defining changed and unforeseen circumstances, flooding is addressed as 10-year and 100-year events. Any flood event that affects restoration sites or vernal pool occupancy within a reserve is a changed circumstance, thereby triggering responsive actions. Three or more flood events affecting the Reserve System with a magnitude equal to or great than the 10-year flood event within any 10-year period are considered unforeseen, and eight or more flood events with a magnitude equal to or greater than the 10-year recurrence interval during the 50-year permit term are considered unforeseen. One flood equal to a 100-year flood is considered a changed circumstance that will trigger responsive actions. More than one flood event with a magnitude equal to or greater than the 100-year flood event is considered unforeseen. Determinations regarding floods will be based on the continuously monitored stage or the flow gauge nearest the affected area. Because FEMA periodically revises their estimates of the magnitude associated with an event of a given recurrence interval, the Plan will update flood event magnitudes accordingly.

10.3.5.3 Responsive Measures

Flooding is a natural process that may both destroy and create vernal pool and riparian habitat. Most flooding is not anticipated to have negative effects on these habitat types or associated species. Following a foreseen flood event, the affected restoration or enhancement site within the Reserve System will be evaluated to determine the appropriate responsive actions necessary to ensure that the site is recreated through active management or natural processes. For both vernal pool and riparian restoration sites, these actions may be passive or may include pro-active measures such as re-planting, seeding, and inoculating with vernal pool species or re-contouring.

For vernal pools, foreseen floods may delay or otherwise interfere with years of consecutive occupancy, as described in Chapters 5 and 7, *Conservation Strategy* and *Monitoring and Adaptive Management Program*, respectively. Should a foreseen flood affect occupancy, the PCA will work with the Wildlife Agencies to re-establish protocols for meeting occupancy standards at a given location. Responsive actions may be needed to maintain occupancy at protected sites. Responsive measures may be passive if it is determined that new sites will be recolonized naturally. Active responsive actions may consist of re-seeding vernal pools with vernal pool plant species and inoculating with vernal pool branchiopod cysts.

10.3.6 Destruction of Restoration Projects through Drought

10.3.6.1 Description

Drought is a natural part of the Mediterranean climate system to which species and natural communities have adapted. However, a prolonged drought could damage new restoration plantings that have yet to become established. The following analysis was conducted to define droughts and estimate their expected frequency of occurrence in the Plan Area. Droughts that occur within this expected frequency are considered a changed circumstance and are expected and therefore the cost model includes funding over the course of Plan implementation; droughts outside this frequency are not considered reasonably foreseeable and are treated as an unforeseen circumstance.

10.3.6.1.1 Conservation Measures and Monitoring

The reserve unit management plans described in Chapter 5, *Conservation Strategy*, will include drought monitoring and protection measures that will minimize the risk of losing mitigation plantings and restored habitats as a result of drought. Vernal pool occupancy standards may be difficult to verify during times of drought. The PCA will work with the Wildlife Agencies to re-establish protocols for meeting occupancy standards at a given vernal pool location. Measures for preventing impacts on restoration projects due to droughts are listed below.

- Monitor natural inflow data in the Plan Area to determine if the seasonal inflow at the end of March and April indicates a dry year (near 75 percent of median inflow).
- Monitor mitigation sites that are beyond their establishment periods (i.e., no longer sustained by irrigation) for stress due to low soil moisture or high evapotranspiration rates.

10.3.6.1.2 Thresholds

For the purposes of defining changed circumstances, drought is measured by using the Palmer Drought Severity Index (PDSI), which was devised in 1965 and is available online at http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/.
The PDSI uses temperature and precipitation data to calculate water supply and demand, incorporates soil moisture, and reflects long-term drought. Several categories of drought severity are assigned in the PDSI, including extreme, severe, and moderate drought; mid-range; and moderately, very, and extremely moist.

Listed below are the months and years in which moderate to extreme droughts occurred in Climate Division 02 over the last 50 years (1966 to 2016) for more than a 12-month period (Table 10-3). In some cases, 1 month is listed as mid-range (neither drought nor moist) in the midst of a run of months that are in drought. These are indicated below.

Table 10-3. Drought History for Placer County over the Past 50 Years

Date Range	Length of Drought (months)	Notes
1/76–4/77	14	9/76 was a mid-range month
4/87–6/88	15	
11/06–12/07	13	12/06 was a mid-range month
3/08–2/09	12	
3/13–6/16	39	9/13 and 12/14 were mid-range months

Source: Palmer Drought Severity Index for Climate Region 02. Available: http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/.

If the mid-range months are counted as part of the drought (to be conservative), data show that a drought of 2 years or more occurred only once over the 50-year period. That drought period lasted 30 months. All other droughts lasted 15 months or less (National Oceanic and Atmospheric Administration 2015a).

The Department of Water Resources' state climatologist reported at the 2009 Extreme Weather Symposium that climate change will most likely result in more extreme events, both drought and flooding, within the Northern California area. Future precipitation patterns as a result of climate change will result in reduced Sierra Nevada snowpack over the long term. However, although climate change is anticipated to result in increased drought potential, the extent of such change is not fully understood. Thus, the predicted drought potential during the permit term is inflated by 30 percent.

As defined above, droughts last 12 months or longer and are classified as moderate, severe, or extreme by the PDSI. Droughts are anticipated over the permit term. For the purposes of establishing changed and unforeseen circumstances, the following are considered unforeseen:

- Four or more droughts in any 10-year (rolling) period
- Six or more droughts over the permit term
- Any single drought event lasting 51 months (or more)
- No more than 120 months of total drought over the permit term

10.3.6.2 Responsive Measures

Should damage or losses due to drought occur at restoration or enhancement sites, the PCA will assess the drought damage and initiate the following responsive actions:

- Prepare damage assessment report within 6 months.
- Recommend actions to reduce effects on restored or enhanced habitat (e.g., supplemental irrigation) within 6 months.
- Implement measures through the adaptive management program (see Chapter 7*, Monitoring and Adaptive Management Program*).

10.3.7 Climate Change

10.3.7.1 Description

Global climate change is occurring as a result of high concentrations of greenhouse gases in Earth's atmosphere and has already produced long-term changes in climate during the 20th century (National Research Council 2010; Intergovernmental Panel on Climate Change 2013; Melillo et al. 2014). Past changes and future trends in climate is universally recognized in the scientific community and has become a planning principle in national and international governments and in the state of California.

As discussed in Section 3.5, *Trends and Foreseeable Change*, current global and regional trends suggest that climate change is likely to have an effect on natural communities in the Plan Area. By mid-century, the average annual mean temperature in California is projected to rise 1.8 degrees Fahrenheit (°F) to 5.4°F (Cayan et al. 2012). For precipitation, although there is significant variability between models and emissions scenarios, projections suggest a 10 to 20 percent decrease in total annual precipitation by mid-century in California (Luers et al. 2006). In the Sacramento region, declines in precipitation are anticipated, particularly during the second half of the century (Cayan et al. 2012). Consequently, it is likely that the climate in the Plan Area will become warmer and dryer and that incidences of severe weather-related events (tornados, fire, drought, flooding) will increase. Several potential effects from climate change on species are discussed in Chapter 3, *Physical and Biological Setting*.

10.3.7.1.1 Conservation Measures and Monitoring

The conservation strategy, Reserve System, and monitoring and adaptive management program of this Plan anticipate possible effects of climate change using a multi-scale approach that views conservation through landscape, natural community, and species levels. This approach focuses on protecting and enhancing ecosystems, environmental gradients, wildlife corridors, and large landscape blocks that can support ecological processes, natural communities, and habitats for Covered Species. All these features will be important as climate change shifts the availability and quality of physical conditions, natural resources, and, ultimately, habitat for Covered Species in the Plan Area.

Implementing conservation actions that protect a variety of landscapes over a large scale provides flexibility for shifts in the range and distribution of species and natural communities due to climate change. Land acquisition actions target properties that provide connectivity to allow for species movement, maintenance and restoration of habitat linkages, and reduced habitat fragmentation. In addition, habitat types across environmental gradients would be targeted for acquisition in the Reserve System to provide topographic diversity, thereby reducing the chance of population extinction (Murphy and Weiss 1992). As a result, some species and natural communities in the Plan Area would continue to be able to migrate in response to climate change, allowing for shifts in range and distribution.

At the natural community level, conservation and monitoring actions were developed to address issues related to natural communities, primarily through the enhancement, restoration, and management of vegetation types (i.e., land-cover types) and monitoring changes. Habitats will be managed to ensure natural community and species persistence if either communities or species are affected by climate change. Enhancement, restoration, and management actions will most likely

increase the resilience of natural communities by improving habitat quality overall and controlling invasive plants and non-native predators.

At the species level, conservation and monitoring actions were developed to supplement and focus actions developed at broader scales and ensure that all the needs of particular species are addressed. These species-specific actions will help ensure that shifts of range, distribution, and abundance driven by climate change are buffered by protection and enhancement of individuals, populations, and groups of populations. Status and trends monitoring will serve as an early warning for the possible effects of climate change and allow the conservation strategy to adapt to ensure species persistence in the Plan Area.

In addition to the conservation actions, monitoring actions will allow for the early detection of trends driven by climate change over multiple scales. Landscape-level monitoring is designed to detect large-scale changes, such as changes in ecosystem processes, shifts in natural community distribution, and the integrity of landscape linkages. Natural community–level monitoring would, in turn, detect changes in the composition and function of natural communities, populations of key predator or prey populations, invasive species, and other important habitat factors for Covered Species. Finally, species-level monitoring would measure the effects of management actions on Covered Species and the status and trends of Covered Species in the Reserve System. Collectively, these monitoring actions will allow the PCA to detect and respond to the effects of climate change. Monitoring carried out at each of these scales is also necessary to anticipate potential ecological thresholds that may be encountered because of changing climate conditions. Taken together, the conservation and monitoring actions described above will help buffer against the effects of climate change in the Plan Area.

10.3.7.2 Thresholds

Climate change is considered a foreseeable event that affects the environment in the Plan Area. It is therefore described as a potential changed circumstance. The PCA will use a method consistent with the California Climate Action Team for measuring temperature change within the Plan Area. Because climate and associated temperatures are inherently variable, a 10-year running average[10] is used to measure change. For the purposes of the Plan, three baseline temperature categories will be analyzed:

- Average annual temperature
- Average summer temperature (June, July, and August)
- Average winter temperature (December, January, and February)

The baseline index, as measured from the nearest weather stations that record temperature data (i.e., Auburn and Sacramento Federal Aviation Administration Airport), will be used to establish the baseline (using the currently normed baseline from 1981 to 2010) and quantify future temperature change, as shown in Table 10-4.

[10] In statistics, a running average is a calculation that uses a series of averages of different subsets of the full data set. In this case the running average is the most-recent 10-year period.

Table 10-4. Baseline Mean Temperature (°F) 1981 to 2010

	Sacramento	Auburn
Annual	60.7	60.8
Winter	46.9	47.2
Summer	74.4	75.3

Source: National Oceanic and Atmospheric Administration 2015b.

Temperatures have been rising steadily globally and within California over the last several decades. The average temperature for the Plan Area has already increased relative to this historic period (Western Regional Climate Center 2016). Nonetheless, continued climate change has the potential to affect Covered Species and vegetation in unknown ways. Projected California climate-change trends (Cayan et al. 2012) indicate that annual mean temperature could increase by an additional 5.4°F by mid-century. By the end of the permit term, temperature increases of up to 6.0°F relative to current conditions are foreseeable. For the purposes of this Plan, any detectable change (i.e., 0.5°F or more) in any of the temperature categories over a running 10-year average will constitute a changed circumstance.

Although climate change and general warming within the Plan Area are foreseen, extreme change beyond that level is not foreseen. Increases in any of the temperature categories above 6.0°F in the 10-year running average could cause environmental consequences beyond the Plan's ability to respond. This level of warming is unforeseen.

The climate change thresholds described in this section address only mean temperature. However, other anticipated effects of climate change are accounted for in other sections to address these changed circumstances (i.e., destruction of woodlands due to fire, flooding of vernal pool and riparian sites).

10.3.7.3 Responsive Measures

The PCA's response to the changed circumstance of global climate change will vary by the character and magnitude of the physical and biological changes observed. Responses may include those listed below. All responses will occur within 6 months of identifying the changed circumstance, unless the Wildlife Agencies concur on a case-by-case basis that specific responsive actions would require more time to initiate.

- Identification of target species most vulnerable to climate change and increased status-and-trend monitoring for those species
- Enhanced monitoring to detect ecological responses to climate change, including potential ecosystem thresholds
- Alterations to the conceptual ecological models for natural communities and Covered Species as a tool to devise improved management action
- Altered or more intensive management actions on target/vulnerable species and their habitats through the adaptive management program
- More aggressive control of threats, such as invasive species, that respond positively to climate change

10.4 Assurances

The Permittees have prepared the Plan and submitted applications for the permits, in part, to obtain the following assurances from the Wildlife Agencies. Assurances specific to state or federal agencies are described in Sections 10.4.1 (*Federal No Surprises*) and 10.4.2 (*Federal Section 7 Consultations*) (NMFS and USFWS), and 10.4.3 (*Federal Critical Habitat Designations*) and 10.4.4 (*State NCCP Assurances*) (CDFW).

10.4.1 Federal No Surprises

The federal No Surprises Regulation was established by the Secretary of the Interior on March 25, 1998. It provides assurances to Section 10 permit holders that no additional money, commitments, or restrictions of land or water will be required should unforeseen circumstances requiring additional mitigation arise once the permit is in place. The No Surprises Regulation states that if a Permittee is properly implementing an HCP that has been approved by USFWS and/or NMFS, no additional commitment of resources, beyond that already specified in the plan, will be required.

The Permittees request regulatory assurances (No Surprises) for all Covered Species in the Plan. In accordance with No Surprises, the Permittees will be responsible for implementing and funding measures in response to any changed circumstances, as described in this chapter. The Permittees will not be obligated to address unforeseen circumstances but will work with the Wildlife Agencies to address them within the funding and other constraints of the Plan should they occur.

The Permittees understand that No Surprises assurances are contingent on the proper implementation of the permits, Implementation Agreement, and Plan. The Permittees also understand that USFWS or NMFS may suspend or revoke the federal permit, in whole or in part, in accordance with federal regulations (50 Code of Federal Regulations [CFR] Sections 13.27 and 13.28 and other applicable laws and regulations) in force at the time of such suspension.

10.4.2 Federal Section 7 Consultations

An important goal of the Plan is to provide a framework for ESA compliance for Covered Species for all Covered Activities in the Plan Area. Whether a Covered Activity occurs under Section 7 or 10 of the ESA, the Plan will provide the framework for future Section 7 consultations.

Federal projects, which are subject to Section 7 of the ESA, are evaluated under standards that are different from those of non-federal projects, which are subject to Section 10. Non-federal projects must obtain a permit for take of listed species, while federal agencies must consult with USFWS or NMFS whenever their actions have the potential to affect a listed species. For example, the definition of "affect" differs slightly from that of "take" and may be applied differently, depending on the species and the project. In addition, compliance under Section 7 does not provide No Surprises assurances.

The Plan is not intended to alter the obligation of a federal agency to consult USFWS or NMFS pursuant to Section 7 of the ESA. USFWS or NMFS will conduct ESA consultations for Covered Activities in accordance with the established regulatory process and deadlines (50 CFR Section 402.14). Unless otherwise required by law or regulation, USFWS and NMFS will ensure that the biological opinion for the proposed project covered by the Plan is consistent with the biological opinion issued for the conservation plan and the federal permit. Section 7 consultations apply only

to federally listed species; therefore, only those Covered Species that are federally listed at the time of the consultation need be included in the consultation. Unless otherwise required by law or regulation, USFWS and NMFS will not impose measures on applicants for coverage under the Plan in excess of those that have been or will be required by the permits, HCP/NCCP, and Implementing Agreement. Before completing a Section 7 consultation for a Covered Activity in which USFWS or NMFS proposes to require a measure that exceeds the requirements of the Implementing Agreement, the Plan, or the permits, USFWS or NMFS will meet and confer with the Permittee with jurisdiction over the affected project to discuss alternatives to the imposition of the measure that would meet the applicable legal or regulatory requirements.

10.4.3 State NCCP Assurances

The NCCP Act (Section 2820(f)) includes provisions to ensure that "if there are unforeseen circumstances, additional land, water, or financial compensation or restrictions on the use of land, water, or other natural resources shall not be required without the consent of the plan participants..." The NCCP Act specifies that assurances for Plan participants may be provided commensurate with long-term conservation assurances and associated implementation measures provided in an NCCP. CDFW's determination of the level of assurances and the time limits specified in the Implementing Agreement will be based on the overall knowledge of the species and natural communities, the strength of the conservation strategy, and the size and duration of the conservation plan (Sections 2820(f)(1)[A through H]).

10.4.4 Conservation Contributions by State and Federal Agencies

State and federal agencies, including the Wildlife Agencies, may contribute to the conservation components of the Plan. The Permittees recognize that state and federal funds cannot be guaranteed in advance of the approval of yearly budgets, nor can they be guaranteed by agency staff members who do not have the authority to commit these funds. However, the Permittees seek assurance that the Wildlife Agencies will make every effort to assist the PCA in securing the funding outlined in Chapter 9, *Costs and Funding*, to contribute to species recovery and help implement the conservation portion of the Plan.

10.4.5 Assurances for Approved Covered Activities

10.4.5.1 Take Authorization Assurances

All Covered Activities described in the Plan will receive take authorization according to the procedures and requirements described in the Plan (see Section 6.3, *Conditions on Covered Activities*, and Section 8.9, *Take Authorization under the Plan*). Take authorization will be granted under a single non-severable permit from each Wildlife Agency. Consequently, if USFWS, NMFS, or CDFW suspend or revoke its permit, the Permittees' authority to extend take coverage for Covered Activities within their jurisdiction would also be suspended or revoked. As such, for projects conducted by private developers under the jurisdiction of one of the Permittees, take authorization will remain in effect for that Covered Activity unless one or more of the permits issued by the Wildlife Agencies to the Permittees are suspended or revoked. In addition, if a local jurisdiction determines that one of its project proponents is in violation of its permit (i.e., in violation of the

conditions in Chapter 6, *Program Participation and Conditions on Covered Activities*), the local jurisdiction will suspend or revoke take coverage extended to the project proponent and report the violation to the PCA. The PCA will report the violation to the Wildlife Agencies immediately.

10.4.5.2 Public Access to Conservation Easements Held by Private Landowners

Public access to private lands included within the Reserve System will not be allowed without the landowner's consent (i.e., access to lands included in the Reserve System by virtue of a conservation easement recorded on the lands rather than acquisition of the lands themselves). Public access to private lands managed under the Plan could conflict with ongoing agricultural or other operations and pose a safety risk to the public. Public access to lands under conservation easements could also pose a risk from unwanted trespass onto adjacent privately held lands. Generally, the PCA will leave decisions regarding public access up to the landowner but will restrict access through the conservation easement where that access may conflict with the conservation goals of the site. All conservation easements will provide for access for PCA biologists to conduct management and biological monitoring necessary for compliance with the Plan's adaptive management and biological monitoring program.

10.5 Modifications to the Plan

The Plan and permits can be modified in accordance with USFWS, NMFS, and CDFW regulations and the terms of the Implementing Agreement. Plan modifications are not anticipated to occur on a regular basis. Modifications can be requested by a Permittee or by the Wildlife Agencies, but modifications may be proposed only for Wildlife Agency approval and/or PCA implementation. Modifications include administrative changes, minor modifications, and amendments, each of which is described below.

10.5.1 Administrative Changes

Administrative changes are internal changes or corrections to the Plan that do not require authorization from the Wildlife Agencies. Administrative changes will be made in writing and documented by the PCA. The Wildlife Agencies will be provided a summary of administrative changes in each annual report. Examples of administrative changes are listed below.

- Corrections of errors in the Plan that do not change the intended meaning or obligations
- Day-to-day implementation decisions, such as modifying irrigation schedules for created/restored habitats on the basis of observed water needs of planted vegetation
- Minor changes to survey or monitoring protocols that are not proposed in response to adaptive management[11]
- Changes to monitoring survey frequency based on new and better information
- Modifications to Plan monitoring protocols to align with Wildlife Agency monitoring protocols, which may be modified in the future

[11] Such changes are subject to federal No Surprises regulations, state assurances, and local assurance provisions found in the Implementing Agreement.

- Adoption of new monitoring protocols that may be promulgated by the Wildlife Agencies in the future
- Automatic adjustments (annually) to the Plan development fee to keep pace with the inflation of land values; periodic assessments are every 5 years
- Changes to the membership of the PCA, the science advisors, or any advisory committees to the PCA

10.5.2 Minor Modifications

Minor modifications are changes that do not affect the impact assessment or conservation strategy described in the Plan and do not affect the ability of the PCA to achieve the biological goals and objectives of the Plan. Minor modifications do not require an amendment to the permits or the Implementing Agreement, but they do require written approval by the Wildlife Agencies before being implemented. Examples of minor modifications are listed below.

- Updates to the land cover map or species occurrence data that are consistent with the predictions and expectations of the Plan
- Modification of monitoring protocols for Plan effectiveness not in response to changes in standardized monitoring protocols from the Wildlife Agencies
- Modification of existing or adoption of additional conservation measures that improve the likelihood of achieving objectives for Covered Species
- Discontinuing implementation of conservation measures if they are ineffective
- Modification of best management practice or low-impact development monitoring protocols so long as the changes are equally effective and protective[12]
- Modification of existing or adoption of new performance indicators or standards if results of monitoring and research, or new information developed by others, indicate that the initial performance indicators or standards are inappropriate measures of success for the applicable conservation measures
- Modification of existing or adoption of additional objectives for Covered Species or natural communities where such changes are consistent with achieving Covered Species, natural community, and overall Plan goals
- Minor changes to the reporting protocol
- Other changes that do not result in adverse effects on Covered Species, beyond those analyzed in the conservation plan and the associated biological opinion, and do not limit the ability of the PCA to achieve the biological goals and objectives of the Plan

Minor and rare changes to the biological goals and objectives in response to new information may be desired during implementation. These may be allowed in collaboration with the Wildlife Agencies and with their written approval. Changes in the land acquisition protection configuration of the Plan (see Section 5.3.1, *Conservation Measure 1: Establish Reserve System*) may be necessary to address changing land use patterns in the Plan Area or a lack of willing sellers in conservation zones (see

[12] *Equally effective and protective* are defined with respect to the applicable Covered Species and natural communities.

Chapter 5, *Conservation Strategy*, Section 5.3.1.3.6, *Conservation Zones*). Changes in land protection requirements within a zone that amount to less than 10 percent of the original acreage are considered minor modifications as long as all three of the conditions listed below are met.

- The overall target protection acreage natural communities and constituent habitats for Covered Species does not change within the Plan Area (i.e., a decrease in land protection on one zone is balanced by an increase in land acquisition in another zone).
- The changes between zones are biologically equivalent or biologically superior to the original Plan.
- The changes do not significantly affect the ability of the PCA to mitigate the impacts on Covered Species, contribute to the recovery of Covered Species, and meet the Plan's biological goals and objectives.

A minor change in land protection configuration may be needed (e.g., to account for small differences in acreages of natural communities and constituent habitat across zones due to parcel boundary changes or overlap between zones). Any change in land protection requirements that exceeds 10 percent of the original acreage requirement or is inconsistent with the criteria above is considered a major amendment.

All minor modifications must first be approved by the PCA. Such modifications are subject to final approval by the Wildlife Agencies. To modify the Plan without amending the permits, the PCA will submit a written description of the proposed change to the Wildlife Agencies as well as an explanation of why its effects are not believed to be significantly different from those described in the original Plan. If the Wildlife Agencies concur with the proposal, they will authorize the modification in writing, and the modification will be considered effective on the date of the Wildlife Agencies' written authorization.

10.5.3 Amendments

An amendment is a change in the Plan that may affect the impact analysis or conservation strategy in the Plan. Amendments to the Plan will also require an amendment to the permits through generally the same formal review process as the original Plan and permits, including National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) review, *Federal Register* notices, an internal Section 7 consultation with USFWS or NMFS (depending on which species are affected), and formal NCCP findings by CDFW. To obtain Wildlife Agency approval of a proposed amendment, the PCA must submit the proposed amendment to the Wildlife Agencies in a report that includes a description of the need for the amendment, an assessment of its impacts, and any alternatives by which the objectives of the proposal might be achieved.

Examples of changes that would require an amendment include, but are not limited to, those listed below.

- Revising the Plan Area boundary
- Adding species to the Covered Species list
- Increasing the allowable take limit for existing Covered Activities or adding new Covered Activities to the Plan
- Modifying any important action or component of the conservation strategy under the Plan, including funding (except annual adjustments and 5-year adjustments), that may substantially

affect levels of authorized take, effects of the Covered Activities, or the nature or scope of the conservation program

- A major change in biological goals and objectives or conservation measures if monitoring or research indicates that they are not attainable because technologies to attain them are either unavailable or infeasible
- Extending the permit term beyond 50 years

10.5.3.1 Amending the Section 10(a)(1)(B) Permits

To amend a Section 10(a)(1)(B) permit, the PCA must submit a formal application to the issuing agency, USFWS or NMFS. This application must include relevant Plan revisions, relevant Implementing Agreement revisions, a permit application form, any required fees, and the required compliance document under NEPA. The appropriate NEPA compliance process and document will depend on the nature of the amendment being proposed. Upon submission of a completed application package, USFWS and/or NMFS will publish a notice of the proposed application in the *Federal Register*, thereby initiating the NEPA and HCP amendment review process. After public comment, USFWS or NMFS will approve or deny the permit amendment application in accordance with the ESA and its implementing regulations.

10.5.3.2 Amending the NCCP Permit

Procedures for amending the NCCP permit will be included in the Implementing Agreement and processed in accordance with applicable NCCP Act requirements. The NCCP permit amendment will be subject to the requirements of CEQA, potentially including a public review period. CDFW will either approve or deny the permit amendment in accordance with the NCCP Act. To approve the permit amendment, CDFW must make appropriate NCCP Act and CEQA findings.

Chapter 11
Alternatives to Take

11.1 Introduction

The federal Endangered Species Act (ESA) requires that Section 10 permit applicants specify in a Habitat Conservation Plan (HCP) what alternative actions to the take of federally listed species were considered and the reasons why those alternatives were not selected. The *Endangered Species Consultation Handbook* (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998) identifies two types of alternatives commonly used in HCPs: (1) an alternative that would reduce take below levels anticipated under the HCP and (2) an alternative that would avoid take and, hence, not require a permit from the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS).[1]

This chapter identifies the alternative measures considered that would reduce or avoid the potential for take of species covered in the Western Placer County HCP and Natural Community Conservation Plan (HCP/NCCP or Plan).

11.2 Description of Take Alternatives

The alternatives to take (i.e., take alternatives) addressed in this chapter are the No Take Alternative, Project-by-Project Permitting Take Alternative, Reduced Number of Covered Species Take Alternative, and Reduced Permit Term Take Alternative. These take alternatives are assessed below in relation to the effects on Covered Species described in Chapter 4, *Effects of Covered Activities*, for the proposed conservation strategy and Covered Activities.

As part of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act process, a wider range of project alternatives has been identified and evaluated in the Plan's Environmental Impact Report/Environmental Impact Statement (EIR/EIS). The analysis of take alternatives in this chapter serves a specific and narrow regulatory purpose, which is separate and apart from the analysis of project alternatives under CEQA and the National Environmental Policy Act. The EIR/EIS for the Plan identifies a reasonable range of project alternatives and evaluates the potential environmental impacts of those alternatives in relation to the no-action or no-project alternative.[2]

11.2.1 No Take Alternative

Under the No Take Alternative, the Permittees would not engage in any activities that would result in take of any Covered Species and, therefore, would not need an Incidental Take Permit (ITP) from USFWS or NMFS (or a take permit from the California Department of Fish and Wildlife [CDFW]).

[1] The California Natural Community and Conservation Planning Act requires that project alternatives be considered in the EIR prepared for the NCCP (Section 2820€) but not in the NCCP itself.

[2] The term *take alternative* refers to take alternatives associated with the Plan; the term *alternative* refers to the project alternatives evaluated in the EIR/EIS.

Chapter 2, *Covered Activities*, describes the Covered Activities, which include activities associated with urban development in the Valley and Foothill Potential Future Growth Areas (PFGs), rural development in the Valley and Foothills Conservation and Rural Development subareas, rural public projects in the Regional Public Programs subarea, in-stream projects in the In-Stream Activities subarea, and the Plan's conservation strategy in the Conservation Programs subarea. These Covered Activities are consistent with the approved City of Lincoln and Placer County General Plans.

The No Take Alternative would have no effects on Covered Species, because take would be avoided. The No Take Alternative would also not provide substantial benefits to Covered Species, because the Plan and its conservation measures would not be implemented. The Plan would not contribute to the recovery of the Covered Species through its comprehensive landscape-level conservation strategy.

The No Take Alternative would be infeasible because it would prevent a significant portion of development under approved general plans and capital improvement plans. Under this alternative, the City of Lincoln and Placer County would not fully implement their approved General Plans and other area-specific plans, Placer County Water Agency would not meet its mandated responsibilities, and the South Placer Regional Transportation Authority would not implement the Regional Transportation and Air Quality Mitigation Fee program to fund specified regional transportation projects. Activities such as residential, commercial, private, and public development; transportation projects; wastewater projects; water supply projects; and flood protection projects would be restricted or would not occur.

For example, the City of Lincoln and Placer County General Plans identify areas where urban and rural growth is expected to occur. In the next 50 years, most growth is expected in the Valley, but is also planned to occur in the Foothills. These PFGs are represented in Figure 2-4. Vernal pool complexes, representing the covered vernal pool species (vernal pool fairy shrimp and vernal pool tadpole shrimp), occur throughout the Plan Area, including the PFGs (see Figure 3-13). In addition, other Covered Species occur throughout the Plan Area at large. Under the No Take Alternative, future development would not occur in areas with Covered Species, including vernal pool complexes. Thus, compared to the proposed Plan, the No Take Alternative would result in less growth throughout the county as a result of avoiding take.

The No Take Alternative was rejected because it would (1) severely constrain the implementation of the County and City General Plans and thus preclude achieving the objectives for planned growth and development, and (2) preclude improvements and maintenance of infrastructure supporting the health, safety, and economy of the Plan Area (e.g., road construction, improvements, and maintenance; wastewater systems improvements and maintenance; solid waste facility operations and maintenance; and flood protection). In addition, because many of the Covered Activities are necessary (e.g., capital improvement projects), take of Covered Species cannot be entirely avoided; it can only be minimized. The Plan provides an integrated way of permitting take of listed (and non-listed) species while allowing the Permittees to implement projects.

11.2.2 Project-by-Project Permitting Take Alternative

Under the Project-by-Project Permitting Take Alternative, proponents of each Covered Activity or project, public or private, would seek their own take authorization as needed to conduct activities that are likely to result in take of a federally listed (and/or state-listed) species. This approach F

Also, this approach would not adequately address the County's requirements for conservation of oak woodland (State CEQA Guidelines Section 21083.4). The Plan enables programmatic permitting,

which further streamlines environmental compliance by providing an alternate mechanism for complying with conservation standards for oak woodlands. To comply with CEQA, project proponents that affect oak woodlands are limited in their mitigation options—no more than half the habitat mitigation requirement can be fulfilled through oak planting. Therefore, other designated mitigation alternatives must be used, which increases the mitigation cost of oak woodland conversions for an individual project. However, an exemption (State CEQA Guidelines Section 21083.4(d)) is provided for projects undertaken pursuant to an approved NCCP that addresses oak conservation.

Under the Project-by-Project Permitting Take Alternative, take of the Covered Species is likely to increase relative to the proposed Plan. By focusing on individual projects one at a time, there is no consideration of a landscape-level conservation strategy that protects large, contiguous blocks of land, including oak woodland (State CEQA Guidelines Section 21083.4), and such a process may lead to more out-of-county mitigation. In the long term, this take alternative could result in small, isolated tracts of protected areas surrounded by development. This fragmented development (as compared to the Plan) would likely result in more take of Covered Species over time. For example, one of the Plan's landscape-level biological goals is to establish a Reserve System with representative natural communities (including oak woodland) along a range of environmental gradients large enough to support ecosystem function, sustain populations of Covered Species, maintain or increase biological diversity of native species, and accommodate changing environmental conditions. The purpose of creating the Reserve System is to protect suitable habitat for the Covered Species and minimize take in the Plan Area by directing where impacts and conservation will occur. Under the Project-by-Project Permitting Take Alternative, a landscape-level reserve system would not be established. Rather, the Plan Area's landscape might end up as a mosaic of small, protected land parcels surrounded by development, with potentially no connectivity between the protected areas. This can lead to a greater effect on listed species and a decrease in a species' viability to recover and thrive.

The Reserve System would provide a means for protecting, managing, and restoring the natural communities and habitats that support the Covered Species. By comparison, the Project-by-Project Permitting Take Alternative lacks large-scale planning and would produce piecemeal mitigation. The proposed Plan's comprehensive regional planning approach would contribute to the preservation and enhancement of functioning habitat blocks and linkages. Comprehensive regional planning also would protect a broader number of species than the Project-by-Project Permitting Take Alternative's approach.

Additionally, the activities described in Chapter 2, *Covered Activities*, make project-by-project permitting logistically challenging for the Permittees. Project-by-project permitting also would increase the burden on USFWS and NMFS (and CDFW, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and Regional Water Quality Control Board) compared with the proposed Plan. The Plan will coordinate and streamline the permitting process by allowing local entities to issue state and federal permits. With this streamlined process, both costs and uncertainties would be reduced substantially, thus ensuring a more efficient use of public dollars.

Finally, the Plan addresses changed circumstances (Chapter 10, *Assurances*) that a project-by-project approach does not cover proactively. In this way, the proposed Plan offers greater operational flexibility, and integrates better planning and budgeting to address rare but foreseeable events (such as wildfires) in the Plan Area.

The Project-by-Project Permitting Take Alternative was rejected because the proposed Plan provides a biologically superior mitigation approach, increases administrative efficiency for the Permittees and the permitting agencies, and provides operational streamlining for changed circumstances.

11.2.3 Reduced Number of Covered Species Take Alternative

The Reduced Number of Covered Species Take Alternative would reduce the range of species on the proposed Covered Species' list to those that are listed as threatened or endangered under ESA or the California Endangered Species Act and eliminate from the list species that are not currently protected under the ESA or California Endangered Species Act. Eliminating non-listed species would result in a Covered Species list of seven wildlife species and one fish species: California red-legged frog, giant garter snake, Swainson's hawk, California black rail, valley elderberry longhorn beetle, Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and Central Valley steelhead. This revised list would not include four wildlife species and one fish species: foothill yellow-legged frog, western pond turtle, western burrowing owl, tricolored blackbird, and Central Valley fall-/late fall-run Chinook salmon.

The Reduced Number of Covered Species Take Alternative would result in the same level of take for the species covered by this alternative. However, for those species not covered under this alternative (i.e., the non-listed species), take is likely to increase compared to the Plan, because, based on their listing status, there are no laws restricting take of these species. By not including the non-listed species in project planning, take of these species is likely to increase because measures to avoid or minimize effects on these species would not be required.

This alternative would provide some benefits to the Permittees in the short term because narrowing the list of Covered Species would reduce the Permittees' obligations to implement avoidance, minimization, mitigation, and conservation measures for these species, thereby reducing costs. However, covering fewer species would result in a biologically inferior program relative to the proposed Plan, and may require additional compliance (if species become listed) during the permit term.

The Reduced Number of Covered Species Take Alternative was rejected because it would result in less protection of and less mitigation for rare and sensitive species. Also, one or more of these rare and sensitive species might be listed in the future; if this were to happen, the Plan would not be authorized for take and any project affecting a newly listed species would be required to go through a separate permit process. In addition, this alternative could result in fewer long-term efficiencies as high-risk, non-listed species become listed over the permit term.

11.2.4 Reduced Permit Term Take Alternative

The Reduced Permit Term Take Alternative includes the issuance of an ITP to authorize incidental take of the Covered Species in association with the Covered Activities discussed in Chapter 2, *Covered Activities*. However, under this alternative, the term of the ITP would be 25 years rather than the 50 years identified under the proposed Plan. Under the Reduced Permit Term Take Alternative, the types of effects on Covered Species resulting from the Covered Activities would be the same as or similar to those under the proposed Plan. Implementing the avoidance and minimization measures listed in Chapter 6, *Program Participation and Conditions on Covered*

Activities, would still minimize the effects. However, authorized take levels for the Covered Species would be less than those under the proposed Plan due to the reduced permit term.

This alternative would provide the Permittees with less flexibility than the proposed Plan during project planning and implementation of the Covered Activities. The proposed Plan provides sufficient time to accomplish the following critical elements of the Plan (as described in Section 1.2.7, *Permit Term*).

- Implementation of current general plans
- Implementation of the Permittees' projects that are covered by the Plan
- Implementation of the Permittees' conservation measures for the longest duration feasible
- Assembly of the Reserve System from willing sellers and partnerships with local agencies and private landowners
- Funding for Plan implementation during the permit term and funding for management of the Plan in perpetuity
- Development of an effective adaptive management program that would be implemented in perpetuity, given the uncertainties about the ecology of Covered Species and appropriate responses to resource management
- Completion of the conservation plan
- Restoration and monitoring

A 50-year permit term provides sufficient incentive for the Permittees to commit the substantial resources necessary to implement and complete the Plan. The longer permit term covers all planned projects and conservation measures, making the large up-front investment in the Plan more cost-effective.

The Reduced Permit Term Take Alternative would be infeasible because it would not provide take coverage for some Covered Activities. For example, the Covered Activity with the longest duration is the projected urban growth identified in the Placer County and City of Lincoln General Plans. The City of Lincoln's General Plan has a 50-year time frame. Reducing the permit term for the Plan to 25 years would not capture the effects that need to be covered as a result of implementation of the General Plan; therefore, the City of Lincoln would require an amendment to obtain additional take coverage. Additionally, most of the initial new land development to accommodate population and employment growth in the Plan Area is expected to occur in areas that are not participating in the Plan (i.e., Rocklin and Roseville). Most of the funding to acquire the Reserve System and implement the conservation strategy depends on fees assessed on new development in unincorporated Placer County and the City of Lincoln, and that development is not expected to be substantial until later in the permit term. There would not be enough funding generated under a shorter permit term to adequately establish the Reserve System and fully implement the conservation strategy.

The Reduced Permit Term Alternative was rejected because it would cover less growth and development, which would result in an inadequate amount of funding for implementation of the Plan and establishment of the Reserve System. Inadequate funding would reduce the amount of land acquired for mitigation and conservation and the amount of habitat and wetlands restored. A 50-year time frame, which would accommodate nearly all of the valley floor urban/suburban residential development plans and the fee revenue they would provide, would ensure that the Plan's goals and objectives can establish a large and interconnected Reserve System.

This Page Intentionally Left Blank

Chapter 12
References

Chapter 1

Atkinson, A. J., P. C. Trenham, R. N. Fisher, S. A. Hathaway, B. S. Johnson, S. G. Torres, and Y. C. Moore. 2004. *Designing Monitoring Programs in an Adaptive Management Context for Multiple Species Conservation Plans*. (U.S. Geological Survey Technical Report.) Sacramento, CA: U.S. Geological Survey Western Ecological Research Center.

Brussard, P., F. Davis, J. Medeiros, B. Pavlik, and D. Sada. 2004. *Report of the Science Advisors for the Placer County Natural Communities Conservation Plan and Habitat Conservation Plan: Planning Principles, Uncertainties, and Management Recommendations*. County of Placer.

California Department of Fish and Game. 2002. *Roles & Responsibilities of Consultants in Developing NCCP/HCPs.*

MIG|TRA. 2015. *Placer County, Community Development Resource Agency, Geographic Information System files.*

Placer County. 2005. Administrative Draft PCCP.

Placer County. 2015. *Draft PCCP Reserve Map.*

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2016. *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, December 21, 2016.

Chapter 2

Bailey, Randy. 2005. *Anadromous Fish Screening and Passage Opportunities in Western Placer County and Southern Sutter County.*

California Department of Fish and Game. 2009. Vegetation Mapping GIS data Northern Sierra Nevada Foothills (currently California Department of Fish and Wildlife)

Circuit Rider Productions. 2004. California Salmonid Stream Habitat Restoration Manual: Part XI, Riparian Habitat Restoration. CDFW. http://www.dfg.ca.gov/fish/resources/habitatmanual.asp.

City of Lincoln. 2008. *City of Lincoln General Plan*. March. Prepared by Mintier & Associates and Matrix Design Group, in association with ESA, EPS, DKS Associates, Civil Solutions, ECO-LOGIC, and Frank Bradham Consulting.

County of Placer. 2002. *Auburn Ravine/Coon Creek Ecosystem Restoration Plan, Coordinated Regional Management Plan Review Draft*.

ECO:LOGIC Engineering. 2005. *Raw and Treated Water Pipelines Corridor Evaluation, Preliminary Report August 2005*.

ECO:LOGIC Engineering. *2010. Raw and Treated Water Pipelines Corridor Evaluation*.

ECORP. 2003. *Public Review Draft: Dry Creek Watershed Coordinated Resource Management Plan*.

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey and B. Collins. 1998. *California Salmonid Stream Habitat Restoration Manual.* 3rd edition. Prepared by California Department of Fish and Game, Sacramento, CA.

Foothill Associates. 2006. *Pleasant Grove and Curry Creek Ecosystem Restoration Plan*.

MIG|TRA. 2012. *PCCP GIS. Placer County, Community Development Resource Agency, Geographic Information System files.*

MIG|TRA. 2015. *Placer County, Community Development Resource Agency, Geographic Information System files.*

Placer County. 2014. Agricultural Commissioner/Sealer of Weights and Measures. *Placer County Agricultural Crop Report*.

Placer County. 1993. Flood Control & Water Conservation District. *Cross Canal Watershed Flood Control Plan (Auburn Ravine, Coon, and Pleasant Grove Creeks Flood Mitigation).*

Placer County. 2010. Flood Control & Water Conservation District. *Dry Creek Watershed Flood Control Plan*.

Placer County. 2002. Transportation Planning Agency. *Placer County Regional Bikeway Plan*.

Placer County. 2000. *Placer Legacy Open Space and Agricultural Conservation Program*.

Placer County. 2003. *Placer County Oak Woodland Management Plan.*

Placer County. 2012. *Placer Legacy Program Summary, Issued September 2012.*

Placer County. 2013. *Placer County General Plan Update May*. Prepared by Placer County, in association with Crawford, Multari & Star, DKS Associates, Psomas and Associates, Jones & Stokes Associates, Recht Hausrath & Associates, and J. Laurence Mintier and Associates.

Sacramento Area Council of Governments. 2016. Metropolitan Transportation Plan/Sustainable Communities Strategy. February. Available: https://www.sacog.org/2016-mtpscs. Accessed: December 21, 2017.

State of California Department of Finance. 2014. E-5 Population and Housing Estimates for Cities, Counties and the State, January 1, 2011 - 2014, with 2010 Benchmark. May.

State of California Employment Development Department. 2014. Annual Average Industry Employment, March 2013 benchmark. September 19.

U.S. Census Bureau. 2010. *2010 United States Census.*

U.S. Census Bureau. 2011. OnTheMap Application and Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics, 2010 and 2011 for Placer County areas.

U.S. Census Bureau. 2012. American Community Survey 2008-2012 and 2010-2012.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook. Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act. March.

Chapter 3

Abatzoglou, J. T., K. T. Redmond, and L. M. Edwards. 2009. Classification of Regional Climate Variability in the State of California. *Journal of Applied Meteorology and Climatology* 48: 1527–1541.

Adams, T. E. J., P. B. Sands, W. H. Weitkamp, and N. McDougald. 1991. Blue and valley oak seedling establishment on California's hardwood rangelands. In R. B. Standford (technical coordinator), *Proceedings of Symposium on Oak Woodlands and Hardwood Rangeland Management*. U.S. Department of Agriculture (USDA) Forest Service.

Ahrens, B. 2003. Rainfall downscaling in an alpine watershed applying a multiresolution approach. *Journal of Geophysical Research* 108 (D8): 13–1 to 13–12.

Allen, B. H., R. R. Evett, B. A. Holzmann, and A. Martin. 1989*. Rangeland Cover Type Descriptions for California Hardwood Rangelands.* A report for California Department of Forestry and Fire Protection. Sacramento, CA.

Amweg, E. L., D. P. Weston, and N. M. Ureda. 2005. Use and toxicity of pyrethroid pesticides in the Central Valley, California, USA. *Environmental Toxicology and Chemistry* 24: 966–972.

Angeler, D. G., B. Sanchez, G. Garcia, and J. M. Moreno. 2006. Community ecotoxicology: Invertebrate emergence from Fire Trol 934 contaminated vernal pool and salt marsh sediments under contrasting photoperiod and temperature regimes. *Aquatic Toxicology* 78: 167–175.

Bailey, Randy. 2003. *Streams of Western Placer County Aquatic Habitat and Biological Resources Resource Assessment.* Prepared for the Placer County Planning Department. Bailey Environmental: Lincoln, CA.

Bailey, Randy. 2005. *Anadromous Fish Screening and Passage Opportunities in Western Placer County and Southern Sutter County.*

Bailey, Randy and J.W. Buell. 2005. *Anadromous Fish Screening and Passage Opportunities in Western Placer County and Southern Sutter County.* Unpublished. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=23751

Baker, G. A., P. W. Rundel, and D. J. Parsons. 1981. Ecological relationships of *Quercus Douglasii*. (Fagaceae) in the foothill zone of Sequoia National Park, California. *Madroño* 28: 1–12.

Balfour, P., and S. Morey. 1999. Prey selection by juvenile bullfrogs in a constructed vernal pool complex. *Transactions of the Western Section of the Wildlife Society* 35: 34–40.

Baltz, D. M., and P. B. Moyle. 1993. Invasion resistance to introduced species by a native assemblage of California stream fishes. *Ecological Applications* 3: 246–255.

Barry, S. J. 1998. Managing the Sacramento Valley Vernal Pool Landscape to Sustain the Native Flora. C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren, and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference.* California Native Plant Society, Sacramento, CA.

Barry, S., S. Larson, and M. George. 2006. California Native Grasslands: A Historical Perspective. *Grasslands* 7: 7–11.

Bartolome, J. W. 1981. *Stipa pulchra*, a survivor from the California prairie. *Fremontia* 9: 3–6.

Bartolome, J. W., M. P. McClaren, B. H. Allen-Diaz, J. Dunne, L. D. Ford, R. B. Standiford, N. K. McDougald, and L. C. Forero. 2002. Effects of fire and browsing on regeneration of blue oak. R. B. Standiford, D. McCreary, and K. L. Purcell, editors. *Proceedings of the Fifth Symposium on Oak Woodlands: Oaks in California's Changing Landscape.* October 22-25, 2001, San Diego, CA. (General Technical Report PSW-GTR-184.) Albany, CA: USDA Forest Service, Pacific Southwest Research Station.

Beedy, E. C., and S. L. Granholm. 1985. *Discovering Sierra Birds*. Yosemite Natural History Association and Sequoia Natural History Association, Yosemite National Park, CA.

Belk, D. 1998. Global status and trends in ephemeral pool invertebrate conservation: implications for Californian fairy shrimp. Pages 147–150 C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren, and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference*. California Native Plant Society, Sacramento, CA.

Borchert, M. I., F. W. Davis, J. Michaelson, and L. D. Oyler. 1989. Interactions of factors affecting seedling recruitment of blue oak (*Quercus douglasii*) in California. *Ecology* 70: 389–404.

Brausch, J., S. Cox, and P. Smith. 2006. Pesticide usage on the southern high plains and acute toxicity of four chemicals to the fairy shrimp *Thamnocephalus platyurus* (Crustacea: Anostraca). *Texas Journal of Science* 58: 309–324.

Brooks, W. H. 1969. *Some Quantitative Aspects of the Grass-Oak Woodland in Sequoia National Park.*

Brussard, P., F. Davis, J. Medeiros, B. Pavlik, and D. Sada. 2004. *Report of the Science Advisors for the Placer County Natural Communities Conservation Plan and Habitat Conservation Plan: Planning Principles, Uncertainties, and Management Recommendations*. County of Placer.

Bureau of Reclamation. 2011. SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water, Report to Congress. Available: http://www.usbr.gov/climate/SECURE/docs/SECUREWaterReport.pdf.

Bureau of Reclamation. 2012. *Colorado River Basin Water Supply and Demand Study*. U.S. Department of the Interior.

Cain, R. H. 1974. Pimple mounds: A new viewpoint. *Ecology* 55: 178–182.

California Department of Fish and Game. 2001. *The Status of Rare, Threatened, and Endangered Animals and Plants of California*. Annual report for 2000. Sacramento, CA.

California Department of Fish and Game. 2009. Vegetation Mapping of Sierra Nevada Foothills.

California Department of Fish and Game. 2010. *List of Vegetation Alliances and Associations. Vegetation Classification and Mapping Program.* Sacramento, CA. September 2010.

California Department of Fish and Game. 2011. California Interagency Wildlife Task Group. CWHR Version 8.2 personal computer program. Sacramento, California.

California Department of Fish and Wildlife. 2016. California Natural Diversity Database. *RareFind 3*. Version 3.1.0. Data Accessed September 2016. Sacramento, CA.

California Department of Forestry and Fire Protection. 2005. *Fire Threat*. Fire Resource and Assessment Program Mapping. Available: http://frap.cdf.ca.gov/data/frapgisdata-sw-firethreat_download.

California Department of Forestry and Fire Protection. 2011. *Unit Strategic Fire Plan: Nevada-Yuba-Placer Unit.* Available: http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf1009.pdf, January 16, 2015. 209 pp.

California Department of Water Resources. 2009. Lidar data. Central Valley Floodplain Evaluation and Delineation.

California Natural Resources Agency. 2009. *California Wetland Information System-Vernal Pool.* http://ceres.ca.gov/wetlands/whats_new/vernal_sjq.html.

California Oak Mortality Task Force. 2015. *Sudden Oak Death*. Available: http://www.suddenoakdeath.org/. Accessed September 2015.

California Wetlands Information System. 2007. http://resources.ca.gov/wetlands/geo_info/vernal_pools.html

Cayan, D., M. Tyree, D. Pierce, and T. Das. 2012. *Climate Change and Sea Level Rise Scenarios for California Vulnerability and Adaptation Assessment.*

cbec, inc., eco engineering and H.T. Harvey Associates. 2017. *Coon Creek Watershed Assessment*. Coon Creek Watershed District.

Center for Natural Lands Management. 2004. *Dove Ridge Annual Work Plan, October 2004–September 2005.* Unpublished report. Prepared for the U.S. Fish and Wildlife Service. August. Fallbrook, California.

Cheatham, N. 1976. Conservation of Vernal Pools. Pages 87–89 S. Jain (ed.), *Vernal Pools, Their Ecology and Conservation.* University of California, Institute of Ecology Publications, Davis, CA.

City of Lincoln. 2008. *City of Lincoln General Plan.* March 2008.

Collins, B. 1975. Range vegetation and Mima mounds in north Texas. *Journal of Range Management* 28: 209–211.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* U.S. Fish and Wildlife Service, Biological Services Program, Washington, DC.

Dettinger, M. D., D. R. Cayan, M. K. Meyer, and A. E. Jeton. 2004. Simulated hydrologic responses to climate variations and change in the Merced, Carson, and American River basins, Sierra Nevada, California, 1900-2099. *Climatic Change* 62:283–317.

Dry Creek Conservancy. 2012. *Dry Creek Conservancy Annual Salmonid Surveys, from 2003–2012.*

eBird. 2015. Online database of bird distribution and abundance (web application). Cornell Lab of Ornithology, Ithaca, New York. Data through September 2015.

ECORP Consulting. 2003. *Dry Creek Watershed Coordinated Resource Management Plan.*

ECORP Consulting, Inc. 2004. *Preliminary Assessment of the Effects of Habitat and Landscape Variables on Vernal Pool Ecosystems*. April 30. Prepared for Placer County.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. *The Birder's Handbook: A Field Guide to the Natural History of North American Birds.* New York: Simon & Schuster, Inc.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. U.S. Army Waterways Experiment Station, Vicksburg, MS.

Eric Beckwitt. 2002. 2002 watershed analysis and supporting GIS data.

Eriksen, C. H., and D. Belk. 1999. *Fairy Shrimps of California's Puddles, Pools, and Playas*. Mad River Press, Eureka, CA.

Faber, P. M. 1982. *Common Wetland Plants of Coastal California*. Pickleweed Press, Mill Valley, CA.

Federal Emergency Management Agency. 2005. Flood Hazard Zones: FEMA Coastal Flood Hazard Analysis and Mapping Guidelines Focused Study Report.

Fenn, M. E. 2009. *Methods for Measuring Atmospheric Nitrogen Deposition Inputs in Arid and Montane Ecosystems of Western North America*. Pages 179–228 Developments in Environmental Science, Volume 9. Elsevier Ltd.

Freckman, D. W., D. A. Duncan, and J. R. Larson. 1979. Nematode density and biomass in an annual grassland ecosystem. *Journal of Range Management* 32: 418–422.

Gaines, D. 1992. *Birds of Yosemite and the East Slope*. Artemisia Press, Lee Vining, CA.

Gallagher, S. P. 1996. Seasonal occurrence and habitat characteristics of some vernal pool branchiopoda in northern California, USA. *Journal of Crustacean Biology* 16:323–329.

Garbelotto, M., D. Barbosa, H. Mehl, and D. M. Rizzo. 2014. First report of the NA2 lineage of *Phytophthora ramorum* from an ornamental rhododendron in the interior of California. *Plant Disease* 98: 849–850.

Garrison, B. 2005. *Spears Ranch 2005 Wildlife Study Results*. California Department of Fish and Game, Rancho Cordova. PowerPoint presentation of survey data.

Gershunov, A., and K. Guirguis. 2012. California heat waves in the present and future. *Geophysical Research Letters* 39.

Gershunov, A., D. Cayan, and S. Iacobellis. 2009. The great 2006 heat wave over California and Nevada: Signal of an increasing trend. *Journal of Climate* 22: 6181–6203.

Giusti, G. A., R. B. Standiford, D. D. McCreary, A. Merenlender, and T. Scott. 2004. *Oak Woodland Conservation in California's Changing Landscape*. University of California, Integrated Hardwood Range Management Program, Berkeley, CA.

Gordon, D. R., and K. J. Rice. 2000. Competitive suppression of *Quercus douglasii* (Fagaceae) seedling emergence and growth. *American Journal of Botany* 87: 986–994.

Greenwood, G. B., R. K. Marose, and J. M Steinbeck. 1993. Extent and ownership of California's hardwood rangelands. Prepared for Strategic Planning Program, California Department of Forestry and Fire Protection, unpublished report.

Gregory, S. V., F. J. Swanson, W. A. McKee, and K. W. Cummins. 1991. An ecosystem perspective of riparian zones. *Bioscience* 41: 540–551.

Griffin, J. R. 1977. Oak woodland. Pages 383–415 M.G. Barbour and J. Major (eds.), *Terrestrial Vegetation of California*. John Wiley and Sons, New York, NY.

Griggs, F. T. 2000. Vina Plains Preserve: eighteen years of adaptive management. *Fremontia* 27:4 and 28:1: 48–51.

Grinnell, J., and A. H. Miller. 1944. The distribution of the birds of California. *Pacific Coast Avifauna* 27.

Hallsworth, E. G., G. K. Robertson, and F. R. Gibbons. 1955. Studies in pedogenesis in New South Wales, VII. The Gilgai soils. *Journal of Soil Science* 6: 1–34.

Hathaway, S. A., D. P. Sheehan, and M. A. Simovich. 1996. Vulnerability of branchiopod cysts to crushing. *Journal of Crustacean Biology* 16: 448–452.

Heady, H. F. 1977. Valley Grassland. Pages 491–514 M.G. Barbour and J. Major (eds.), *Terrestrial Vegetation of California.* John Wiley and Sons, New York, NY.

Helley, E. J., and D. S. Hardwood. 1985. *Geologic Map of the Late Cenozoic Deposits of the Sacramento Valley and Northern Sierra Nevada Foothills, California*. U.S. Geological Survey.

Helm Biological Consulting. 2012. *Federally Listed Large Branchiopod Occurrences in Western Placer County, California*.

Helm, B. P. 1998. Biogeography of Eight Large Branchiopods Endemic to California. In C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren Jr., and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems.* Proceedings from a 1996 conference. California Native Plant Society, Sacramento, CA. Pages 124–139.

Hickey, C., W. D. Shuford, G. W. Page, and S. Warnock. 2003. *The Southern Pacific Shorebird Conservation Plan: A Strategy for Supporting California's Central Valley and Coastal Shorebird Populations.* Version 1.1. PRBO Conservation Science, Stinson Beach, CA.

Holland, D. C. 1991. *A Synopsis of the Ecology and Status of the Western Pond Turtle* (Clemmys marmorata) *in 1991*. Unpublished report prepared for the USDI Fish and Wildlife Service.

Holland, R. F. 1978. *The Geographic and Edaphic Distribution of Vernal Pools in the Great Central Valley, California*. California Native Plant Society Special Publication No. 4.

Holland, R. F. 1983. *Endangerment Status of* Legenere limosa *(Greene) McVaugh in California.* Submitted to the California Natural Diversity Database, Department of Fish and Game. Sacramento, CA.

Holland, R. F. 2009. *California's Great Valley Vernal Pool Habitat Status and Loss: Rephotorevised 2005.* Prepared for Placer Land Trust, Auburn, CA.

Holland, R. F., and S. K. Jain. 1988. Vernal pools. Pages 515–531 M. J. Barbour and J. Major, (eds.), *Terrestrial Vegetation of California*. California Native Plant Society Special Publication No 9.

Holland, R. H. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California.* The Resources Agency, California Department of Fish and Game, Natural Heritage Division, Sacramento, CA.

Holland, V. L. 1976. In defense of blue oaks. *Fremontia* 4: 3–8.

Holland, V. L., and David J. Keil. 1995. *California Vegetation*. Kendall Hunt Publishing Company. 516 pp.

Horne, A. J., and C. R. Goldman. 1994. *Limnology*, second edition. McGraw-Hill, Inc., U.S.A.

Information Center for the Environment. 2016. *Tricolored Blackbird Portal*. Survey provided locations of tricolored blackbirds in the Plan Area. University of California, Davis. Available: http://tricolor.ice.ucdavis.edu/. Last accessed March 24, 2016.

Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: The Physical Science Basis.* Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H. L. Miller (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.

Intergovernmental Panel on Climate Change. 2013. *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Stocker, T. F., D. Qin, G. K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P. M. Midgley (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

Jennings, M. R., and M. P. Hayes. 1994. *Amphibians and Reptile Species of Special Concern in California.* California Department of Fish and Game, Sacramento, CA.

Jokerst, J. D. 1990. Floristic analysis of volcanic mudflow vernal pools. Pages 1–29 D. H. Ikeda and R. A. Schlising (eds.), *Vernal Pool Plants – Their Habitat and Biology*. Studies from the Herbarium, Chico, CA.

Jones & Stokes Associates. 1996. *Summary of* biological surveys *for Teicherts Lincoln* project*, Placer County, California* (JSA 95-093). August. Sacramento, CA. Prepared for Teichert, Inc., Sacramento, CA.

Jones & Stokes Associates. 2002. *Wet*-season surveys *for* freshwater invertebrates *and* spring surveys *for* rare plants *for the Placer County* habitat conservation plan. July. J&S 02-134, Sacramento, CA.

Jones & Stokes Associates. 2003. *Important Migrant and Wintering Bird Concentration Areas of Western Placer County.* (J&S 02-552.) Prepared for Placer County Planning Department, Auburn, CA.

Jones & Stokes Associates. 2004. *Placer County Natural Resources Report, A Scientific Assessment of Watershed, Ecosystems, and Species of the Phase I Planning Area.* Prepared for the Placer County Planning Department: Auburn, CA.

Jones & Stokes Associates. 2005. *Assessment of Habitat Conditions for Chinook Salmon and Steelhead in Western Placer County, California.* Prepared for the Placer County Planning Department.

Kattelmann, R. 1996. Hydrology and water resources. In *Sierra Nevada Ecosystem Project: Final Report to Congress*. University of California, Centers for Water and Wildland Resources, Davis, CA.

Keddy, P. A. 2000. *Wetland Ecology: Principles and Conservation*. Cambridge University Press, Cambridge, UK.

King, J. L., M. A. Simovich, and R. C. Brusca. 1996. Species richness, endemism and ecology of crustacean assemblages in northern California vernal pools. *Hydrobiologia* 328: 85–116.

Knowles, N., and D. Cayan. 2004. Elevational dependence of projected hydrologic changes in the San Francisco estuary and watershed. *Climatic Change* 62: 319–336.

Kuchler, A. W. 1977. The map of natural vegetation of California. Pages 909–938 M. G. Barbour and J. Major, editors. *Terrestrial Vegetation of California*. Wiley-Interscience, reprinted by the California Native Plant Society, Sacramento, CA.

Lee, G. F. 2007. *Role of Nutrients as a Cause of Oxygen Demand and Sediment Toxicity*. A. Jones-Lee, editor. Stormwater runoff water quality newsletter devoted to urban/rural stormwater runoff, water quality management issues: 10. June 22, 2007.

Leibowitz, S. G. 2003. Isolated Wetlands and Their Functions: An Ecological Perspective. *Wetlands* 23.

Leidy, R. A., and E. White. 1996. Toward an Ecosystem Approach to Vernal Pool Compensation and Conservation. Pages 263–273 C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren, and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference.* California Native Plant Society, Sacramento, CA.

Lincoln, R., G. Boxshall, and P. Clark. 1998. *A Dictionary of Ecology, Evolution and Systematics.* Second Edition. Cambridge University Press, Cambridge, UK.

Luers, A., D. Cayan, G. Franco, M. Hanemann, and B. Croes. 2006. *Our Changing Climate: Assessing the Risks to California*. A Summary Report from the California Climate Change Center.

Marty, J. 2005. Effects of cattle grazing on diversity in ephemeral wetlands. *Conservation Biology* 19: 1626–1632.

Mason, H. L., and R. Bacigalupi. 1954. A new Gratiola from Bogg's Lake, Lake County, California. *Madroño* 12: 150–152.

Mayer, K. E., and W. F. Laudenslayer, Jr., editors. 1988. *A Guide to Wildlife Habitats of California.* State of California Resources Agency, Department of Fish and Game, Sacramento, CA.

Meehan, W. R. 1991*. Influences of forest and rangeland management on salmonid fishes and their habitats.* American Fisheries Society, Bethesda, MD.

Meentemeyer, R. K., N. J. Cunniffe, A. R. Cook, J. A. N. Filipe, and R. D. Hunter. 2011. Epidemiological modeling of invasion in heterogeneous landscapes: spread of sudden oak death in California (1990–2030). *Ecosphere* 2: 1–24.

Melillo, J. M., T. C. Richmond, and G. W. Yohe, editors. 2014. *Climate Change Impacts in the United States: The Third National Climate Assessment.* U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2.

Moser, S., G. Franco, W. Pittiglio, W. Chou, and D. Cayan. 2009. *The Future Is Now: An Update on Climate Change Science Impacts and Response Options for California.* California Climate Change Center Draft Report. March.

Moser, S., J. Ekstrom, and G. Franco. 2012. Our Changing Climate 2012: Vulnerability and Adaptation to the Increasing Risks from Climate Change in California. A Summary Report on the Third Assessment from the California Climate Change Center. CEC-500-2012-007. Available: http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf.

Moyle, P. B. 1973. Effects of introduced bullfrogs, Rana catesbeiana, on the native frogs of the San Joaquin Valley, *California* 1973: 18–22.

Moyle, P.B. 1993. Saving California's salmon: The legacy of Ishi. Trout, Summer 1993: 14-17.

Moyle, P. B. 1996. Potential aquatic diversity management areas. Pages 1493–1503. In *Sierra Nevada Ecosystem Project: Final report to Congress*, Vol. II, assessments, commissioned reports, and background information. Davis: University of California, Centers for Water and Wildland Resources.

Moyle, P. B. 2002. *Inland fishes of California* (second edition). University of California Press, Davis, CA.

Moyle, P. B., and T. Light. 1996. Fish invasions in California: do abiotic factors determine success. *Ecology* 77: 1666–1670.

Moyle, P. B., R. Kattelmann, R. Zomer, and P. Randall. 1996. *Management of Riparian Areas in the Sierra Nevada.* Sierra Nevada ecosystem project: final report to Congress*.* Volume III, Chapter 1. University of California, Centers for Water and Wildland Resources, Davis, CA.

National Marine Fisheries Service. 2001. *Guidelines for Salmonid Passage at Stream Crossings*. Southwest Region, Long Beach, CA.

National Marine Fisheries Service. 2006. Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for 10 Distinct Population Segments of West Coast Steelhead. *Federal Register* 71 FR 834, 5 January 2006.

National Marine Fisheries Service. 2014. *Recovery Plan for the Evolutionary Significant Units of Sacramento River Winter-Run Chinook Salmon and Central Valley Spring-Run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead*.

National Research Council. 2010. *Advancing the Science of Climate Change*. The National Academic Press. Washington, D.C.

Navicky, James. 2008. *Summary of 2004 and 2005 Fish Community Surveys in Auburn Ravine and Coon Creek (Placer County).* Memorandum to Fish Files. California Department of Fish and Game, Region II Office: Rancho Cordova, CA.

North Fork Associates. 2009. *Land Cover and Vernal Pool Mapping for the PCCP Valley Plan Area.*

Office of Environmental Health Hazard Assessment. 2015. *Dry Creek Watershed Assessment and Indicator Report.* http://oehha.ca.gov/ecotox/drycreek/DryCreekWatershed.html. Accessed September 15, 2015.

Ornduff, R. 1974. *An Introduction to California Plant Life*. University of California Press, Berkeley, CA.

Pavlik, B. M., P. C. Muick, S. G. Johnson, and M. Popper. 1991. *Oaks of California*. Cachuma Press, Los Olivos, CA.

Pearse, I. S., W. D. Koenig, and J. M. H. Knops. 2014. Cues versus proximate drivers: testing the mechanism behind masting behavior. *Oikos* 123: 179–184.

Placer County GIS. Placer County Assessor's Parcel Database.

Placer County. 1999. Planning Department. *Draft Environmental Impact Report, Teichert Aggregate Facility, Placer County, California.* State Clearinghouse Number 96112029. March. Auburn, CA. Prepared with assistance from Jones & Stokes Associates, Sacramento, CA. (JSA 96-310).

Placer County. 2002. *Auburn Ravine/Coon Creek Ecosystem Restoration Plan, CRMP Review Draft.*

Placer County. 2003. *Placer County Oak Woodland Management Plan.*

Placer County. 2007. *Final Environmental Impact Report: Patterson Sand and Gravel Mine Expansion Project.* Prepared by Resource Design Technology, Inc., El Dorado Hills, CA.

Placer County 2012. Department of Agriculture. County of Placer Agriculture Weights and Measures: 2011 Crop Report. Auburn CA.

Placer County. 2013. *Placer County General Plan Update May*. Prepared by Placer County, in association with Crawford, Multari & Star, DKS Associates, Psomas and Associates, Jones & Stokes Associates, Recht Hausrath & Associates, and J. Laurence Mintier and Associates.

Placer County. 2015. Department of Agriculture. *Placer County Agricultural Crop Report 2015*. Auburn, CA.

Rains, M. C., G. E. Fogg, T. Harter, R. A. Dahlgren, and R. J. Williamson. 2006. The role of perched aquifers in hydrological connectivity and biogeochemical processes in vernal pool landscapes. *Hydrological Processes* 20:1157–1175.

Rech, C. 2005. *Spears Ranch – Western Pond Turtle Reconnaissance Surveys*. September. California Department of Fish and Game, Sacramento, CA.

Reed, S., and R. Amundson. 2007. Sediment, gophers and time: a model for the origin and persistence of mima mound—vernal pool topography in the Great Central Valley. Pages 15–27 R. A. Schlising and D. G. Alexander (Editors), *Vernal Pool Landscapes*. California State University, Chico, Chico, CA.

Restoration Resources. 2005. *Redwing Preserve, Habitat Conservation Development Plan.*

Restoration Resources. 2010. *Silvergate Mitigation Bank Listed Vernal Pool Branchiopod Wet Season Survey 90-day Report.*

Restoration Resources. 2011. *Redwing Preserve Listed Vernal Pool Branchiopod Wet-Season Survey 90-day Report.*

Richmond, O. M., J. Tecklin, and S. R. Beissinger. 2008. Distribution of California Black Rails in the Sierra Nevada foothills. *Journal of Field Ornithology* 79: 381–390.

Rizzo, D. M., M. Garbelotto, J. M. Davidson, G. W. Slaughter, and S. Koike. 2002. Phytophthora ramorum as the cause of extensive mortality of Quercus spp. and Lithocarpus densiflorus in California. *Plant Disease* 86: 205–214.

Rogers, C. D. 1998. Aquatic Macroinvertebrate Occurrences and Population Trends in Constructed and Natural Vernal Pools in Folsom, California. Pages 224–235 C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren, and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference.*

Rogers, J. H. 1980. *Soil Survey of Placer County, California, Western Part*. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of California Agricultural Experiment Station, Washington, DC.

Rosenstock, T. S., D. Liptzin, J. Six, and T. P. Tomich. 2013. Nitrogen fertilizer use in California: Assessing the data, trends and a way forward. *California Agriculture* 67: 68–79.

Rothstein, S. I., J. Verner, and E. Stevens. 1984. Radio-tracking reveals a unique diurnal pattern of spatial occurrence in the parasitic brown-headed cowbird. *Ecology* 65:77–88.

Sacchi, C. F., and P. W. Price. 1992. The relative roles of abiotic and biotic factors in seedling demography of arroyo willow, Salix lasiolepis. *American Journal of Botany* 79:395–405.

Salix. 2012. *Characterization of Density and Disturbance for Vernal Pool Grassland Complexes in the Valley.*

Sawyer, J. O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society, Sacramento, CA.

Shanfield, A. N. 1984. Alder, cottonwood, and sycamore distribution and regeneration along the Nacimiento River, California. Pages 196–209 Warner, Richard E., and Hendrix, Kathleen M., editors. *California Riparian Systems*. University of California Press, Berkeley, CA.

Silveria, J. G. 1998. Avian uses of vernal pools and implications for conservation practice. Pages 92–106 C. W. Witham, E. Bauder, D. Belk, W. Ferren, and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference*. California Native Plant Society, Sacramento, CA.

Smith, D. W., and W. L. Verril. 1998. Vernal pool-soil-landform relationships in the Central Valley, California. Pages 15–23 C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren, and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference.* California Native Plant Society, Sacramento, CA.

Sweitzer, R.A. and D. Ban Vuren. 2002. Rooting and foraging effects of wild pigs on tree regeneration and acorn survival in California's oak woodland ecosystem. SUDA Forest Service General Technical Report PSW-GTR-184. pp. 531-543.

The Nature Conservancy. 1999. *Sierra Nevada Ecoregional Plan*. San Francisco, CA.

Tyler, C. M., B. E. Mahall, F. W. Davis, and M. Hall. 2002. Factors limiting recruitment in valley and coast live oak. in R. B. Standiford, D. McCreary, and K. L. Purcell, editors. *Proceedings of the Fifth Symposium on Oak Woodlands: Oaks in California's Changing Landscape.* October 22-25, 2001, San Diego, CA. (General Technical Report PSW-GTR-184.) Albany, CA: USDA Forest Service, Pacific Southwest Research Station.

U.S. Department of Agriculture. 1980. Soil Conservation Service. *Soil Survey of Placer County, California, Western Part.* July, 1980.

U.S. Department of Agriculture. 2014. Economic Research Service. *Major Land Uses Report*. Accessed online at http://www.ers.usda.gov/data-products/major-land-uses.aspx.

U.S. Department of Transportation, Federal Highway Administration, and the California Department of Transportation. 2006. *Final Environmental Impact Statement/Report, Lincoln Bypass, Placer County, State Route 65*. Accessed: June 2012.

U.S. Fish and Wildlife Service. 1994. *Endangered and Threatened Wildlife and Plants.* Determination of Endangered Status for the Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, and Vernal Pool Tadpole Shrimp and Threatened Status for the Vernal Pool Fairy Shrimp. *Federal Register* Volume 59, No. 180, pp. 48136–48153.

U.S. Fish and Wildlife Service. 1999. *Draft Recovery Plan for the Giant Garter Snake* (Thamnophis gigas). Portland, OR.

U.S. Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants. Final Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants in California and Southern Oregon. Final rule, 50 CFR Part 17, *Federal Register,* Volume 68, No. 151, pp. 46684–46867.

U.S. Fish and Wildlife Service. 2005. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*. Portland, Oregon. xxvi + 606 pages.

U.S. Fish and Wildlife Service. 2007. *Vernal Pool Fairy Shrimp* (Branchinecta lynchi) *Five-Year Review: Summary and Evaluation.* U.S. Fish and Wildlife Service, Sacramento, CA.

Weiss, S. B. 2006. *Impacts of Nitrogen Deposition on California Ecosystems and Biodiversity. California Energy Commission.* PIER Energy-Related Environmental Research. CEC-500-2005-165.

Wells, M. L., S. A. Hathaway, and M. A. Simovich. 1997. Resilience of anostracan cysts to fire. *Hydrobiologia* 359: 199–202.

Westerling, A. L., B. P. Bryant, H. K. Preisler, H. G. Hidalgo, and T. Das. 2009. *Climate Change, Growth, and California Wildfire*. California Climate Change Center Draft Report. Page 43. March.

Westerling, A. L., H. Hidalgo, D. R. Cayan, and T. Swetnam. 2006. Warming and Earlier Spring Increases Western U.S. Forest Wildfire Activity. *Science* 313: 940–943.

Western Regional Climate Center. 2013. *Recent Climate in the West*. Available: http://www.wrcc.dri.edu/.

Weston, D. P., R. W. Holmes, J. You, and M. J. Lydy. 2005. Aquatic toxicity due to residential use of pyrethroid insecticides. *Environmental Science and Technology* 39: 9778–9784.

Whigham, D. F., and T. E. Jordan. 2003. Isolated Wetlands and Water Quality. *Wetlands* 23.

White, K. L. 1966. Structure and composition of foothill woodland in central coastal California. *Ecology* 47: 229–237.

Wildlands. 2008. *Vernal Pool Branchiopod Survey 2008 Annual Report.*

Wildlands. 2009. *Vernal Pool Branchiopod Survey 2009 Annual Report.*

Wildlands. 2010. *Vernal Pool Branchiopod Survey 2010 Annual Report.*

Wildlands. 2011. *Vernal Pool Branchiopod Survey 2011 Annual Report.*

Wildlands. 2012. *Vernal Pool Branchiopod Survey 2012 Annual Report.*

Wildlands. 2013. *Vernal Pool Branchiopod Survey 2013 Annual Report.*

Williamson, R. J., G. E. Fogg, M. C. Rains, and T. H. Hater. 2005. *Hydrology of Vernal Pools at Three Sites, Southern Sacramento Valley*. Final Technical Report Submitted to the California Department of Transportation for Project F 2001 IR 20.

Winter, T. C., D. O. Rosenberry, D. C. Buso, and D. A. Merk. 2001. Water Source to Four U.S. Wetlands: Implications for Wetland Management. *Wetlands* 21: 462–473.

Zavaleta, E. S., K. B. Hulvey, and B. Fulfrost. 2007. Regional Patterns of Recruitment Success and Failure in Two Endemic California Oaks. *Diversity and Distributions* 13: 735–745.

Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, editors. 1990. *California's Wildlife.* Volume II: Birds. California Statewide Wildlife Habitat Relationships System. California Department of Fish and Game, Sacramento, CA.

Personal Communication

Glazner, J. October 29, 2014—Phone call with Tom Reid regarding PCCP plan effect methodology.

Hooper, Stacy. CWHR Program Lead. Biogeographic Data Branch. California Department of Fish and Wildlife. Sacramento, CA. August 20, 2013 – e-mail correspondence.

Martz, C. 2006. California Department of Fish and Game, Region 1. Provided information on the status, threats to, and protection of Orcuttia tenuis occurrences in the Redding, Stillwater and Millville Plains vernal pool areas. September 26, 2006.

McCreary, D. Integrated Range Management Hardwood Program. 1999 – Telephone conversation.

McKenzie, G. July 15, 2011—Email regarding vernal pool GIS data for Redwing property (Restoration Resources) in Placer County.

Miller, M. U.S. Biological Service. Personal communication regarding bird distribution.

Snow, Christina. Senior planner, Placer County. March 10, 2009—Memorandum regarding PCCP File: Vernal Pool Mapping Assumptions.

Wages, Justin. Placer Land Trust staff. 2013–2015: Emails regarding burrowing owls on Placer Land Trust properties.

Chapter 4

Balfour, P., and S. Morey. 1999. Prey Selection by Juvenile Bullfrogs in a Constructed Vernal Pool Complex. *Transactions of the Western Section of the Wildlife Society* 35:34–40.

Barber, J. R., K. R. Crooks, and K. M. Fristrup. 2009. The Costs of Chronic Noise Exposure for Terrestrial Organisms. *Trends in Ecology and Evolution* 25:180–189.

Bechard, M. J., C. S. Houston, J. H. Sarasola and A. S. England. 2010. "Swainson's Hawk (*Buteo swainsoni*)." The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/265. Beedy, E. C., and Hayworth, A. 1992. Tricolored Blackbird nesting failures in the Central Valley of California: General trends or isolated phenomena?, in Endangered and sensitive species of the San Joaquin Valley, California (D. F. Williams, S. Byrne, and T. A. Rado, eds.), pp. 33–46. Calif. Energy Commission, Sacramento. Center for Watershed Protection. 2003. *Impacts of Impervious Cover on Aquatic Systems.*

Bury, R.B. and Germano, D.J. 2008. *Actinemys marmorata* (Baird and Girard 1852) – western pond turtle, Pacific pond turtle. In: Rhodin, A.G.J., Pritchard, P.C.H., van Dijk, P.P., Saumure, R.A., Buhlmann, K.A., and Iverson, J.B. (Eds.). Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chelonian Research Monographs No. 5, pp. 001.1-001.9, doi: 10.3854/ crm.5.001.marmorata.v1.2008, http://www.iucn-tftsg.org/cbftt.

Collinge, S. K., M. Holyoak, C. B. Barr, and J. T. Marty. 2001. Riparian Habitat Fragmentation and Population Persistence of the Threatened Valley Elderberry Longhorn Beetle in Central California. *Biological Conservation* 100:103–111.

Dudek Consulting. 2014. *Evaluation of Potentially Suitable Habitat and Recommended Future Survey Locations for Selected Rare Species within the Placer County Conservation Plan/Natural Community Conservation Plan Area.*

Eddleman, W. R., R. E. Flores, and M. Legare. 1994. Black Rail (*Laterallus jamaicensis*). *The Birds of North America Online* (A. Poole, ed.). Ithaca: Cornell Lab of Ornithology.

Griffin, L. E. 1938. Experiments on the Tolerance of Young Trout and Salmon for Suspended Sediment in Water. *Bulletin of the Oregon Department of Geology* 10, Appendix B: 28–31.

Harris, R. R. 2009. *Estimating Habitat Losses in Placer County Oak Woodlands*. Placer County.

Hathaway, S. A., D. P. Sheehan, and M. A. Simovich. 1996. Vulnerability of Branchiopod Cysts to Crushing. *Journal of Crustacean Biology* 16:448–452.

Hayes, D. W., K. R. McAllister, S. A. Richardson, and D. W. Stinson. 1999. *Washington State Recovery Plan for the Western Pond Turtle.* Washington Department of Fish and Wildlife, Olympia, WA.

Helm, B. P. 1998. Biogeography of Eight Large Branchiopods Endemic to California. In C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren Jr., and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems.* Proceedings from a 1996 conference. California Native Plant Society, Sacramento, CA. Pages 124–139.

Holland, R. F. 2009. *California's Great Valley Vernal Pool Habitat Status and Loss*. Prepared for Placer Land Trust, Auburn, CA.

Hosea, R. C. 1986. A population census of the Tricolored Blackbird, Agelaius tricolor (Audubon), in four counties in the northern Central Valley of California. Master's thesis, Calif. State Univ., Sacramento.

Huxel, G. R. 2000. The effect of the Argentine Ant on the Threatened Valley Elderberry Longhorn Beetle. *Biological Invasions* 2:81–85.

Jennings, M. R., and M. P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California.* California Department of Fish and Game, Inland Fisheries Division.

Lohse, K. A., D. A. Newburn, J. J. Opperman, and A. Merenlender. 2008. Forecasting Relative Impacts of Land Use on Anadromous Fish Habitat to Guide Conservation Planning. *Ecological Applications* 18:467–482.

McClure, C. J. W., H. E. Ware, J. Carlisle, G. Kaltenecker, and J. R. Barber. 2013. An Experimental Investigation into the Effects of Traffic Noise on Distributions of Birds: Avoiding the Phantom Road. *Proceedings of the Royal Society of London* B. 280.

Moyle, P. B. 2002. *Inland Fishes of California*. Second edition. University of California Press, Davis, CA.

National Marine Fisheries Service. 2014. *Recovery Plan for the Evolutionary Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead*.

Newcomb, T. W., and T. A. Flagg. 1983. Some Effects of Mount St. Helens Ash on Soil Erosion and Water Quality. *Marine Fisheries Review* 45:8–12.

Placer County. 2000. *Placer County Legacy Open Space and Agricultural Conservation Program.* Placer County.

Placer County. 2013. *Placer County General Plan Update May*. Prepared by Placer County, in association with Crawford, Multari & Star, DKS Associates, Psomas and Associates, Jones & Stokes Associates, Recht Hausrath & Associates, and J. Laurence Mintier and Associates.Placer County Water Agency (PCWA). 2006. *Integrated Water Resources Plan*.

Rathbun, G. B., N. J. Scott, and T. G. Murphey. 2002. Terrestrial Habitat Use by Pacific Pond Turtles in a Mediterranean Climate. *Southwestern Naturalist* 47:225–235.

Richmond, O. M., J. Tecklin, and S. R. Beissinger. 2008. Distribution of California Black Rails in the Sierra Nevada Foothills. *Journal of Field Ornithology* 79:381–390.

Richmond OM, Chen SK, Risk BB, Tecklin J, Beissinger SR. 2010. California black rails depend on irrigation-fed wetlands in the Sierra Nevada foothills. Calif Agric 64:85–93

Rogers, C. 2014. Anostracan (Crustacea: Branchiopoda) Zoogeography II. Relating Distribution to Geochemical Substrate Properties in the USA. *Zootaxa* 3856:1–49.

Rogers, C. D. 1998. Aquatic Macroinvertebrate Occurrences and Population Trends in Constructed and Natural Vernal Pools in Folsom, California. C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren, and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems*. Proceedings from a 1996 conference. Pages 224–235.

South Placer Regional Transportation Authority, California Department of Transportation, and Federal Highway Administration. 2007. Draft Placer Parkway Corridor Preservation, Tier 1 Environmental Impact Statement/Program Environmental Impact Report. June 29, 2007. Available: http://www.pctpa.net/placerparkway/library/Draft_Tier1_EIR_EIS/contents.htm.

Stebbins, R. C. 1954. *Amphibians and Reptiles of Western North America.* McGraw-Hill, NY.

Stralberg, D., and B. Williams. 2002. *Effects of Residential Development and Landscape Composition on Breeding Birds of Placer County's Foothill Oak Woodlands*. Placer County.

Stralberg, D., and R. Burnett. 2007. *Avian Monitoring in the Lassen Foothill Oak Woodlands: Final Report to the Nature Conservancy*. Point Reyes Bird Observatory Conservation Science Contribution No. 1592, Petaluma, CA.

Tecklin, J. 1999. *Distribution and Abundance of the California Black Rail* (Laterallus jamaicensis coturniculus) *in the Sacramento Valley Region, with Accounts of Ecology and Call Behavior of the subspecies*. Draft report for the California Department of Fish and Game, Contract Nos. FG6154WM and FG6154-1WM.

U.S. Fish and Wildlife Service (USFWS). 1996. *Programmatic Formal Endangered Species Act Consultation on Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans within the Jurisdiction of the Sacramento Field Office, California*. Sacramento, CA. Available: https://www.fws.gov/sacramento/es/Consultation/Programmatic-Consultations/Documents/vp_programatic.pdf

U.S. Fish and Wildlife Service (USFWS). 1999. *Draft Recovery Plan for the Giant Garter Snake* (Thamnopsis gigas). Portland OR. ix + 192 pp.

U.S. Fish and Wildlife Service (USFWS). 2005. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*. Portland, OR xxvi + 606 pp.

U.S. Fish and Wildlife Service (USFWS). 2006. *Giant Garter Snake* (Thamnophis gigas) *Five-Year Review: Summary and Evaluation.* Sacramento Fish and Wildlife Office, Sacramento, CA.

U.S. Fish and Wildlife Service (USFWS). 2007. *Vernal Pool Tadpole Shrimp* (Lepidurus packardi) *Five-Year Review: Summary and Evaluation.* Sacramento, CA.

Chapter 5

Aigner, P.E., J. Tecklin, and C.E. Koehler. 1995. Probable Breeding Population of the Black Rail in Yuba County, California. *Western Birds* 26:157–160.

Babcock, Keith. W. 1995. Home Range and Habitat Use of Breeding Swainson's Hawk in the Sacramento Valley of California. *Journal of Raptor Research*. 29(3): 193-197.

Bailey, Randy and J.W. Buell. 2005. *Anadromous Fish Screening and Passage Opportunities in Western Placer County and Southern Sutter County.* Unpublished. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=23751

Bailey, Randy. 2003. *Streams of Western Placer County Aquatic Habitat and Biological Resources Resource Assessment.* Prepared for the Placer County Planning Department. Bailey Environmental: Lincoln, CA.

Bailey, Randy. 2005. *Anadromous Fish Screening and Passage Opportunities in Western Placer County and Southern Sutter County.*

Barclay, J. H. 2007. Burrowing Owl management at Mineta San Jose International Airport. Pages 146–154 in J. H. Barclay, K. Hunting, J. L. Lincer, J. Linthicum, and T. A. Roberts [EDS.], Proceedings of the California Burrowing Owl symposium, November 2003. Bird Populations Monographs No. 1. The Institute for Bird Populations and Albion Environmental, Inc., Point Reyes Station, CA U.S.A.

Barclay, J. H. 2008. A simple artificial burrow design for burrowing owls. *Journal of Raptor Research*. 42:53–57.

Barclay, J. H., K. W. Hunting, J. L. Lincer, J. Lithicum, and T. A. Roberts (Eds.). 2007. Proceeding of the California Burrowing Owl Symposium, November 2003. Bird Populations Monographs No. 1. The Institute for Bird Populations and Albion Environmental, Inc., Point Reyes Station, CA vii+ 197 pp.

Barclay, J.H., N.M. Korfanta, and M.J. Kauffman. 2011. Long-term population dynamics of a managed Burrowing Owl colony. *Journal of Wildlife Management*. 75:1295–1306.

Bates, C. 2006. Burrowing Owl (*Athene cunicularia*). *In* The Draft Desert Bird Conservation Plan: a strategy for reversing the decline of desert-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/desert.html

Bechard, M. J. 1982. Effect of vegetative cover on foraging site selection by Swainson's Hawk. *Condor* 84:153-159.

Beedy, E. C. and W. J. Hamilton. 1997. *Tricolored Blackbird Status Update and Management Guidelines*. (Jones & Stokes Associates, Inc. 97-099.) Sacramento, CA. Prepared for U.S. Fish and Wildlife Service, Portland, OR and California Department of Fish and Game, Sacramento, CA

Beedy, E. C. and W. J. Hamilton. 1999. Tricolored Blackbird (*Agelaius tricolor*). *The birds of North America*, No. 423. American Ornithologists' Union. 24pp

Brouder, Sylvie M., and J. E. Hill. 1995. Conjunctive Use of Farmlands Adds Value: Winter Flooding of Ricelands Provides Waterfowl Habitat. *California Agriculture* 49(6):58–64, DIE: 10.3733/ca.v049n06p58. November-December.

Brussard, P., F. Davis, J. Medeiros, B. Pavlik, and D. Sada. 2004. *Report of the Science Advisors for the Placer County Natural Communities Conservation Plan and Habitat Conservation Plan: Planning Principles, Uncertainties, and Management Recommendations*. County of Placer.

California Department of Fish and Game. 1995. Staff Report Regarding Mitigation for Impacts to Swainson's Hawk (*Buteo swainsoni*) in the Central Valley of California. Novemenber 8.

California Department of Fish and Wildlife. 2016. California Natural Diversity Database. California Department of Fish and Wildlife, Biogeographic Data Branch, Sacramento, CA.

California Partners in Flight. 2000. Version 1.0. The draft grassland bird conservation plan: a strategy for protecting and managing grassland habitats and associated birds in California (S. Zack, lead author). Point Reyes Bird Observatory, Stinson Beach, CA. http://www.prbo.org/calpif/plans.html

California Partners in Flight. 2002. Version 2.0. A strategy for protecting and managing oak woodland habitats and associated birds in California (B. Allen, lead author). Point Reyes Bird Observatory, Stinson Beach, CA. http://www.prbo.org/calpif/pdfs/oak.v-2.0.pdf.

cbec, inc., eco engineering and H.T. Harvey & Associates. 2017. Coon Creek Watershed Assessment. Final Report. Prepared for County of Placer.

Circuit Rider Productions 2004. California Salmonid Stream Habitat Restoration Manual: Part XI, Riparian Habitat Restoration. CDFW. http://www.dfg.ca.gov/fish/resources/habitatmanual.asp.

City of Rocklin 2009. Managed Grassland. https://www.rocklin.ca.us/civica/filebank/blobdload.asp?BlobID=13873.

Clark, W. R. and K. F. Reeder. 2007. Agricultural buffers and wildlife conservation: a summary about linear practices. *The Wildlife Society.* Technical Review 07-1. September. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_012880.pdf

Cook, L. F. 1996. Nesting adaptations of Tricolored Blackbirds (Agelaius tricolor). Master's thesis, Univ. Calif., Davis.

Dudek Consulting. 2014. *Evaluation of Potentially Suitable Habitat and Recommended Future Survey Locations for Selected Rare Species within the Placer County Conservation Plan/Natural Community Conservation Plan Area.*

ECORP Consulting, Inc. 2003. Dry *Creek Watershed Coordinated Resource Management Plan*. Available at: http://www.drycreekconservancy.org/.

Eddleman, W., R. Flores, and M. Legare. 1994. Black Rail (*Laterallus jamaicensis*). In *The Birds of North America*, No. 123 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA and The American Ornithologists' Union, Washington, D.C.

Estep, J. A. 1989. Biology, movements, and habitat relationships of the Swainson's hawk in the Central Valley of California. California Department of Fish and Game, Wildlife Management Division. Sacramento, CA.

Evens, J., G. W. Page, S. A. Layman and R. W. Stallcup. 1991. Distribution, relative abundance and status of the California black rail in western North America. Condor 93: 952-966.

Fitzner, R. E. 1978. Behavioral ecology of the Swainson's Hawk (Buteo swainsoni) in southeastern Washington. Ph.D. diss., Washington State Univ., Pullman, Washington.

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey and B. Collins. 1998. *California Salmonid Stream Habitat Restoration Manual.* 1998. 3rd edition. Prepared by California Department of Fish and Game, Sacramento, CA.

Fry, D. L. 2008. Prescribed fire effects on deciduous oak woodland stand structure, North Diablo Range, California. *Rangeland Ecol Manage.* 61:294-301. May 2008.

Garrett, K., and J. Dunn. 1981. Birds of southern California. Los Angeles Audubon Soc. 408 pp.

Germano, D. J., and R. B. Bury. 2001. Western pond turtles (*Clemmys marmorata*) in the Central Valley of California: Status and population structure. Transactions of the Western Section of the Wildlife Society 37:22–36.

Good, T. P., R. S. Waples, and P. Adams (editors). 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-SWFSC-66, 598 p.

Grinnell, J., and A. H. Miller. 1944. The distribution of the birds of California. *Pacific Coast Avifauna* 27.

Hamilton, W. J., III, Cook, L., and Grey, R. 1995. Tri-colored Blackbird project 1994. Unpublished report for U.S. Fish & Wildlife Service, Portland, OR.

Hamilton III, W. J., and R. J. Meese. 2006. *Habitat and population characteristics of tricolored blackbird colonies in California*. Sacramento, CA, California Department of Fish and Game.

Hamilton, William J., III. 2004. *Tricolored Blackbird Management Recommendations and 2005 Survey Priorities.* Prepared for California Resource Management Institute, Sacramento, CA. Available: http://www.calresources.org/internal.asp?pid=5&spid=7.

Harris, R. R. 2013. *Oak Woodland Restoration Potential: Placer County Conservation Plan*. Placer County.

Haug, E. A., B. A. Millsap, and M. S. Martell. 1993. Burrowing Owl (*Speotyto cunicularia*). In: *The Birds of North America, No. 61.* A. Poole and F. Gill (eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologist's Union.

Hayes, D. W., K. R. McAllister, S. A. Richardson, and D. W. Stinson. 1999. Washington state recovery plan for the western pond turtle. Olympia, WA: Washington Department of Fish and Wildlife

Hayes, M. P. and D. M. Krempels. 1986. Vocal sac variation among frogs of the genus *Rana* from western North America. *Copeia*, 1986(4):927–936.

Healey, M. C. 1991. The life history of chinook salmon (Oncorhynchus tshawytscha). In C. Groot and L. Margolis (eds), Life history of Pacific salmon, p. 311–393. Univ. BC Press, Vancouver, BC.

Helm Biological Consulting. 2012. *Federally Listed Large Branchiopod Occurrences in Western Placer County, California*.

Helm, B. P. 1998. Biogeography of Eight Large Branchiopods Endemic to California. In C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren Jr., and R. Ornduff (eds.), *Ecology, Conservation, and Management of Vernal Pool Ecosystems.* Proceedings from a 1996 conference. California Native Plant Society, Sacramento, CA. Pages 124–139.

Holland, D. C. 1991. *A Synopsis of the Ecology and Status of the Western Pond Turtle* (Clemmys marmorata) *in 1991*. Unpublished report prepared for the USDI Fish and Wildlife Service.

Holland, R. H. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California.* The Resources Agency, California Department of Fish and Game, Natural Heritage Division, Sacramento, CA.

Information Center for the Environment. 2016. *Tricolored Blackbird Portal*. Survey provided locations of tricolored blackbirds in the Plan Area. University of California, Davis. Available: http://tricolor.ice.ucdavis.edu/. Last accessed March 24, 2016.

Jennings, M. R. and M. P. Hayes. 1985. Pre-1900 overharvest of California red-legged frogs (Rana aurora draytonii): The inducement for bullfrog (*Rana catesbeiana*) introduction. *Herpetological Review* 32(1):94-103.

Jennings, M. R. and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. Report prepared for the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA.

Jones & Stokes Associates. 2004. Salmonid spawning habitat surveys for Placer County streams. Prepared for Placer County Planning Department. (J&S 03-113). March. Sacramento, CA. file:///C:/Users/20200/Downloads/FinalSpawningGravelReport%20pdf.pdf

Jones & Stokes Associates. 2005. Assessment of habitat conditions for Chinook salmon and steelhead in Western Placer County, California. May. Prepared for Placer County Planning Department (J&S 03-113) Sacramento, CA.

Kelsey, R. 2008. Results of the tricolored blackbird 2008 census. Report submitted to the U.S. Fish & Wildlife Service, Portland, OR.

Kyle K. 2011. Results of the 2011 Tricolored Blackbird Statewide Survey. Audubon California, Sacramento (CA). 27 pp. http://tricolor.ice.ucdavis.edu/

Lincolnshire Biodiversity Action Plan. 2003. *Habitat Action Plan*. Hedgerows and Hedgerow Trees.

Linsley, E. G. and J. A. Chemsak. 1972. Cerambycidae of North America, Part VI, No.1. *Taxonomy and Classification of the Subfamily Lepturinae*. University of California Publications in Entomology 69:1-138.

Long, R. F. and J. A. Anderson. 2010. Establishing Hedgerows on Farms in California. *University of California Agriculture and Natural Resources*, Publication 8390. April.

Manolis, T. D. 1978. Status of the Black Rail in central California. *W. Birds* 9:151- 158.

Marty, J. 2005. Effects of cattle grazing on diversity in ephemeral wetlands. *Conservation Biology* 19:1626–1632.

Mayer, K. E. and W. F. Laudenslayer, Jr. 1988. A Guide to the Wildlife Habitats of California. California Department of Forestry and Fire Protection, Sacramento.

McCreary, D. D. 2001. Regenerating Rangeland Oaks in California. University of California Agriculture and Natural Resources Communication Services Publication #21601. 62 pp.

Meese, Robert J. 2014. *Results of the 2014 Statewide Tricolored Blackbird Survey*. University of California, Davis. July 31.

Mensik, J. G. 1990. Managing "emergent cover." *California Waterfowl* 17 (Summer):30–31.

Moyle, P. B. 1973. Effects of introduced bullfrogs, *Rana catesbeiana*, on the native frogs of the San Joaquin Valley, California. *Copeia* 5:18–22.

Naeem, S., F. S. Chapin III, R. Costanza, P. R. Ehrlich, F. B. Golley, D. U. Hooper, J. H. Lawton, R. V. O'Neill, H. A. Mooney, O. E. Sala, A. J. Symstad, and D. Tilman. 1999. Biodiversity and ecosystem functioning: maintaining natural life support processes. *Issues in Ecology*. Ecological Society of America, Washington, D. C., USA.

National Marine Fisheries Service. 2005 Designation of Critical Habitat for seven Evolutionarily Significant Units of Pacific salmon and steelhead in California; Final Rule. Federal Register Vol. 70, No. 170, Friday September 2, 2005, pp 5248–5262.

National Marine Fisheries Service. 2009. *Public Draft Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead.*

National Marine Fisheries Service. 2014. *Recovery Plan for the Evolutionary Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead.*

National Marine Fisheries Service. 2016. 5-Year Review: Summary and Evaluation of California Central Valley Steelhead Distinct Population Segment. U.S. Department of Commerce.

National Research Council. 2001. Compensating for Wetland Losses under the Clean Water Act.

Neff, J. 1937. Nesting distribution of the tricolor-colored redwing. Condor 39(2):61–81.

Nogeire, T. M, F. W Davis, K. R. Crooks, B. H. McRae, L. M. Lyren, and E. E. Boydston. 2015. Can Orchards Help Connect Mediterranean Ecosystems? Animal Movement Data Alter Conservation Priorities. *The American Midland Naturalist,* 174(1):105–116.

North Fork Associates. 2009. Restoration Opportunites in the Placer County Conservation Plan Area.

Placer County. 2002. *Auburn Ravine/Coon Creek Ecosystem Restoration Plan, Review Draft.* Placer County, CA.

Placer County. 2004. Report of the Science Advisors for the Placer County Natural Communities Conservation Plan: Planning Principles, Uncertainties, and Management Recommendations. January 8.

Placer County. 2008a. Placer County Oak Woodland Management Plan.

Placer County. 2008b. *Interim County Guidelines for Evaluating Development Impacts on Oak Woodlands*. Placer County, CA.

Placer County. 2009. Auburn Tunnel Outlet Modification Project. Initial Study/Mitigated Negative Declaration. Prepared by HDR/SWRI.

Pyke, C. R. and J. Marty. 2005. Cattle grazing mediates climate change impacts on ephemeral wetlands. *Conservation Biology.* 19(5): 1619–1625. October.

Richmond, O. M., S. K. Chen, B. B. Risk, J. Tecklin, and S. Beissinger. 2010. California black rails depend on irrigation-fed wetlands in the Sierra Nevada foothills. *California Agriculture* 64(2):85–93.

Richmond, O. M., J. Tecklin, S. R. Beissinger. 2008. SR. Distribution of California black rails in the Sierra Nevada foothills. J Field Ornithology 79:381–390.

Riparian Habitat Joint Venture. 2004. Version 2.0. The riparian bird conservation plan: a strategy for reversing the decline of riparian associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/pdfs/riparian.v-2.pdf.

Rogers, D. C. 1998. Aquatic macroinvertebrate occurrences and population trends in constructed and natural vernal pools in Folsom, California. Pp. 224–235 In: Witham, C. W., E. T. Bauder, D. Belk, W. R. Ferrin Jr., & R. Orduff (eds.). *Ecology, conservation, and management of vernal pool ecosystems – proceedings from a 1996 conference*. California Native Plant Society, Sacramento, CA.

Rogers, D.C. 2001. Revision of the North American Lepidurus (Notostraca: Crustacea) with a description of a new species previously confused with two other species. *Journal of Crustacean Biology* 21:991–1006.

Rogers, D.C. 2014. Placer County vernal pool functionality assessment method. Prepared for TRA Environmental Services, Inc., and Placer County Community Development Resource Agency.

Silveira, J G. 2007. "Managing Vernal Pools and Associated Habitats at Sacramento National Wildlife Refuge Complex." In *Vernal Pool Landscapes*, edited by R A Schlising and D G Alexander, 187–209. Studies from the Herbarium, Number 14. California State University, Chico.

Spencer, W. D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration.

Standiford, R. B. 2014. Valley oak conservation. University of California, Davis. http://ucanr.edu/sites/oak_range/Oak_Articles_On_Line/Oak_Woodland_Ecology_and_Monitoring/Valley_Oak_Conservation/.

Standiford R. B., and P. Tinnin. 1996. Guidelines for managing California's hardwood rangelands. University of California Division of Agriculture and Natural Resources Leaflet no. 3368, 180 pp

Storer, T. I. 1925. A Synopsis of the amphibia of California. University of California Publications in Zoology 27: 1–342

Stromberg, M. R., C. M. D'Antonio, T. P. Truman, J. Wirka, and P. R. Kephart. 2007. California grassland restoration. In *California Grasslands, Ecology and Management.* M. Stromberg, J. Corbin, and C.M. D'Antonio (eds). University of California Press.

Sullivan, B. L., C. L. Wood, M. J. Iliff, R. E. Bonney, D. Fink, and S. Kelling. 2009. eBird: a citizen-based bird observation network in the biological sciences. *Biological Conservation* 142:2282–2292.

Sweitzer and Loggins. 2001. *Wild Pig Management Plan for Henry W. Coe State Park.* Submitted to California Department of Parks and Recreation, Four Rivers District.

Sweitzer, R. A. and D. Ban Vuren. 2002. Rooting and foraging effects of wild pigs on tree regeneration and acorn survival in California's oak woodland ecosystem. SUDA Forest Service General Technical Report PSW-GTR-184. pp. 531–543.

Tecklin and Beedy 2014 as cited in Dudek Consulting *Evaluation of Potentially Suitable Habitat and Recommended Future Survey Locations for Selected Rare Species within the Placer County Conservation Plan/Natural Community Conservation Plan Area.*

Tricolored Blackbird Working Group. 2009. Conservation Plan for the Tricolored Blackbird (*Agelaius tricolor*). 2.0 Update. Susan Kester (ed.). Sustainable Conservation. San Francisco, CA.

Tu, M., C. Hurd, and J .M. Randall, 2001. Weed Control Methods Handbook, The Nature Conservancy, http://tncweeds.ucdavis.edu, Version: April 2001.

Tyler, C. M., B. Kuhn, and F. W. Davis. 2006. Demography and recruitment limitations of three oak species in California. Q. Rev. Biol. 81, 127–152

U.S. Army Corps of Engineers. 2008. Compensatory mitigation for losses of aquatic resources; final rule. 40 CFR Part 230. *Federal Register*, Vol. 73, No. 70. April 10, 2008. 19594–19705.

U.S. Fish and Wildlife Service. 1984. *Recovery Plan for the Valley Elderberry Longhorn Beetle.*

U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; determination of Endangered Status for the Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, and the Vernal Pool Tadpole Shrimp; and Threatened Status for the Vernal Pool Fairy Shrimp. 59 FR 48136 – 48153, September 19, 1994.

U.S. Fish and Wildlife Service. 1999a. *Draft Recovery Plan for the Giant Garter Snake* (Thamnophis gigas).

U.S. Fish and Wildlife Service. 1999b. Conservation Guidelines for the Valley Elderberry Longhorn Beetle. Sacramento Fish and Wildlife Office, CA. July 9. http://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/Documents/velb_conservation.pdf.

U.S. Fish and Wildlife Service. 2001. Final determination of critical habitat for the California red-legged frog. *Federal Register* 66(49):14626–14758.

U.S. Fish and Wildlife Service. 2002. *California Red-Legged Frog Recovery Plan.*

U.S. Fish and Wildlife Service. 2005. Managing invasive plants: concepts, principles, and practice. http://www.fws.gov/invasives/staffTrainingModule/index.html.

U.S. Fish and Wildlife Service. 2005. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon.*

U.S. Fish and Wildlife Service. 2006. Federal Register Final Rule; Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants, Final Rule. Federal Register 71(28): 7118–7316.

U.S. Fish and Wildlife Service. 2007a. *National Bald Eagle Management Guidelines.*

U.S. Fish and Wildlife Service. 2007b. Conservancy fairy shrimp (*Branchinecta conservatio*). 5-year review: summary and evaluation. Sacramento Fish and Wildlife Office, Sacramento, CA.

U.S. Fish and Wildlife Service. 2007c. Vernal pool tadpole shrimp (*Lepidurus packardi*). 5-year review: summary and evaluation. Sacramento Fish and Wildlife Office, Sacramento, CA.

U.S. Fish and Wildlife Service. 2012. "Giant Garter Snake (Thamnophis Gigas) 5-Year Review: Summary and Evaluation." U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California.

U.S. Fish and Wildlife Service. 2015. Survey Guidelines for Listed Large Branchiopods. Sacramento Fish and Wildlife Office, CA. May 31. http://www.fws.gov/cno/es/FinalSurveyGuidelinesforListedLargeBranchiopods.pdf.

Yoshiyama, R. M., E. R. Gerstung, F. W. Fisher, and P. B. Moyle. 1996. Historical and present distribution of chinook salmon in the Central Valley drainage of California. Pages 309–362 in Sierra Nevada Ecosystem Project: Final report to Congress , Vol. III, assessments, commissioned reports, and background information. Davis: University of California, Centers for Water and Wildland Resources.

Yoshiyama, R. M., E. R. Gerstung, F. W. Fisher, and P. B. Moyle. 2001. Historical and present distribution of chinook salmon in the Central Valley. Pages 71–176 in R. Brown, ed. Contributions to the biology of Central Valley salmonids. CDFG Fish Bulletin 179.

Personal Communication

Airola, Dan. Airola Environmental Consulting. Local bird expert and member of the Central Valley Bird Club: Editor and Chair of Club Bulletin. September 2015 – email exchange with Aaron Gabbe, MIG.

Marty, Jaymee. The Nature Conservancy. March 2011. Email exchange with Jessica Shors, TRA Environmental Sciences.

Pandolfino, Ed. Local bird expert, member of the Central Valley Bird Club, and Central Valley Bird Club Bulletin Editorial Board member. June 2014 – email exchange with Aaron Gabbe, TRA Environmental Sciences.

Wages, Justin. Placer Land Trust staff. 2013–2015 – emails exchange with Aaron Gabbe, TRA Environmental Sciences regarding burrowing owls on Placer Land Trust properties.

Weiss, Stuart. Chief Scientist. Creekside Center for Earth Observation. March 2011. Email exchange with Jessica Shors, TRA Environmental Sciences.

Chapter 6

Avian Power Line Interaction Committee. 2012. *Reducing Collisions with Power Lines: The State of the Art in 2012*. Edison Electric Institute and Avian Power Line Action Committee. Washington, D.C.

California Department of Fish and Game. 1994. *Staff Report: Recommended Mitigation Strategies for the Swainson's Hawk* (Buteo swainsoni) *within the California Breeding Range.* Available: http://www.dfg.ca.gov/wildlife/nongame/survey_monitor.html.

California Department of Fish and Game. 2011. *California Salmonid Stream Habitat Restoration Manual.*

California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. State of California Natural Resources Agency. CDFW. http://www.dfg.ca.gov/wildlife/nongame/survey_monitor.html

Jones & Stokes Associates. 2006. *East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan*. Prepared for the East Contra Costa County Habitat Conservation Planning Association, Martinez, CA. October.

Kelsey, R. 2008. *Results of the Tricolored Blackbird 2008 Survey*. Audubon California, Winters, CA. http://ca.audubon.org/pdf/Tricolored-Blackbird-2008-Status-Report.pdf.

National Marine Fisheries Service. 2001. *Guidelines for Salmonid Passage at Stream Crossings.* National Oceanic and Atmospheric Administration. http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fish_passage_at_stream_crossings_guidance.pdf

National Marine Fisheries Service. 2014. *Recovery Plan for the Evolutionary Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead.*

Placer County. 2013. Placer County Landscape Design Guidelines. Placer County Planning Services Division, Placer County, CA. Adopted May 7.

Richmond, O. M., J. Tecklin, and S. R. Beissinger. 2008. Distribution of California Black Rails in the Sierra Nevada foothills. *Journal of Field Ornithology* 79: 381–390.

Swainson's Hawk Technical Advisory Committee. 2000. Recommended timing and methodology for Swainson's hawk nesting surveys in California's Central Valley. May 31.

U.S. Fish and Wildlife Service. 1999a. *Standard Avoidance and Minimization Measures during Construction Activities in Giant Garter Snake Habitat*. Appendix C to the Programmatic Consultation with the U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California. 1-1-F-97-149. Available: http://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/Documents/GGS%20Appendix%20C.pdf.

U.S. Fish and Wildlife Service. 1999b. *Conservation Guidelines for the Valley Elderberry Longhorn Beetle.* Sacramento Fish and Wildlife Office, CA. July 9. Available: http://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/Documents/velb_conservation.pdf.

U.S. Fish and Wildlife Service. 2005. *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged frog.* August. http://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/Documents/crf_survey_guidance_aug2005.pdf.

U.S. Fish and Wildlife Service. 2015. Survey Guidelines for Listed Large Branchiopods. Sacramento Fish and Wildlife Office, CA. May 31. Available: http://www.fws.gov/cno/es/FinalSurveyGuidelinesforListedLargeBranchiopods.pdf.

Chapter 7

Atkinson, A. J., P. C. Trenham, R. N. Fisher, S. A. Hathaway, B. S. Johnson, S. G. Torres, and Y. C. Moore. 2004. *Designing Monitoring Programs in an Adaptive Management Context for Multiple Species Conservation Plans*. (U.S. Geological Survey Technical Report.) Sacramento, CA: U.S. Geological Survey Western Ecological Research Center.

Barkhurst, C. B., Bury, S., Kohlmann, L., Todd, S. Wray, G. Sieglitz, and N. Sisk. 1997. *Western Pond Turtle Survey and Monitoring Plan*. (DRAFT). Western Pond Turtle Working Group. 41 pp.

Bartolome, J. W., M. P. McClaren, B. H. Allen-Diaz, J. Dunne, L. D. Ford, R. B. Standiford, N. K. McDougald, and L. C. Forero. 2002. Effects of Fire and Browsing on Regeneration of Blue Oak. In R. B. Standiford, D. McCreary, and K. L. Purcell (technical coordinators), *Proceedings of the Fifth Symposium on Oak Woodlands: Oaks in California's Changing Landscape*, October 22–25, 2001, San Diego, CA. (General Technical Report PSW-GTR-184.) Albany, CA: USDA Forest Service, Pacific Southwest Research Station.

Beedy, Edward C., and William J. Hamilton III. 1999. *Tricolored Blackbird: Agelaius Tricolor.* Birds of North America, Incorporated.

Borchert, M. I., F. W. Davis, J. Michaelsen, and L. D. Oyler. 1989. Interactions of factors affecting seedling recruitment of blue oak (Quercus douglasii) in California. Ecology, pp. 389–404.

Bury, R. B. et al. 2001. Western pond turtle: survey protocol and monitoring plan. Final Draft. Interagency Western Pond Turtle Working Group.

California Department of Fish and Wildlife. 2015. Evaluation of the Petition from the Centre of Biological Diversity to List the Tricolored Blackbird as Endangered Under the California Endangered Species Act. Sacramento CA.

California Native Plant Society and California Department of Fish and Wildlife. 2016. *Protocol for Combined Vegetation Rapid Assessment and Relevé Sampling Field Form*. April 28.

California Wetlands Monitoring Workgroup. 2013. California Rapid Assessment Method (CRAM) for Wetlands, Version 6.1. Individual Vernal Pools Field Book.

Carignan, V., and M. A. Villard. 2002. Selecting Indicator Species to Monitor Ecological Integrity: A Review. *Environmental Monitoring and Assessment* 78:45–61.

Carignan, V., and M. A. Villard. 2004*. Indicator species in environmental monitoring programs: conceptual and operational considerations*. Pages 567–582 in Wiersma, G. B. (rédacteur). Environmental Monitoring. CRC Press, Boca Raton, FL.

Caro, T. M. and G. O'Doherty. 1999*. On the Use of Surrogate Species in Conservation Biology. Conservation Biology* . 13(4):805–814

Chase, J. M., M. A. Leibold, A .L. Downing, and J. B. Shurin. 2000. The Effects of Productivity, Herbivory, and Plant Species Turnover in Grassland Food Webs. *Ecology* 81:2485–2497.

Christensen, N. L. et al. 1996. The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management. *Ecological Applications* 6:665–667.

Cowling R. W., Benis Egoh, Andrew T. Knight, Patrick J. O'Farrell, Belinda Reyers, Mathieu Rouget, Dirk J. Roux, Adam Welz, and Angelika Wilhelm-Rechman. 2008. An Operational Model for Mainstreaming Ecosystem Services for Implementation. *Proc Natl Acad Sci USA.* 105:9483–9488.

Daily, G. C., and Pamela A. Matson. 2008. Ecosystem Services: From Theory to Implementation. *Proceedings from the National Academy of Science.* Vol. 105. No. 28. 9455–9456.

Dudek Consulting. 2014. *Evaluation of Potentially Suitable Habitat and Recommended Future Survey Locations for Selected Rare Species within the Placer County Conservation Plan/Natural Community Conservation Plan Area.*

Evens, J. G., G. W. Page. S. A. Laymon, and R. W. Stallcup. 1991. Distribution, Status, and Relative Abundance of California Black Rail in western North America. *Condor* 93:952–966.

Fleishman, E., J. R. Thomson, R. Mac Nally, D. D. Murphy, and J. P. Fay. 2005. Using indicator species to predict species richness of multiple taxonomic groups. *Conservation Biology*, 19(4), 1125–1137.

Gibbs, James P., Howard L. Snell, and Charlotte E. Causton. 1999. *Effective Monitoring for Adaptive Wildlife Management: Lessons from the Galápagos Islands*. The Journal of Wildlife Management. Vol. 63, No. 4 (Oct., 1999), pp. 1055–1065.

Gordon, D. R., and K. J. Rice. 2000. Competitive suppression of Quercus douglasii seedling emergence and growth. *American Journal of Botany* 87(7):986–994.

Griffin, J. R. 1977. Oak woodland. Pages 383–415 In M. G. Barbour and J. Major, eds. *Terrestrial vegetation of California*. John Wiley and Sons, New York.

Hobbs, R. J. and D. A. Norton. 1996. Towards a conceptual framework for restoration ecology. *Restoration Ecology*, 4(2):93–110.

Holyoak, M. and M. Koch-Munz. 2008. The effects of site conditions and mitigation practices on success of establishing the valley elderberry longhorn beetle and its host plant, blue elderberry. *Environmental Management*, 42(3):444–457.

Horn, R. B. 2001. *Umpqua River Basin Oregon, 2000 pilot study for western pond turtle survey and monitoring*. Unpublished report. Bureau of Land Management. Portland, Oregon.

Hurlbert, Stuart H. 1984. Pseudoreplication and the design of ecological field experiments. *Ecological Monographs* (Ecological Society of America) 54 (2):187–211. doi:10.2307/1942661. JSTOR 1942661

Huxel, G. R. 2000. The effect of the Argentine ant on the threatened valley elderberry longhorn beetle. Biological Invasions, 2(1), pp. 81–85.

Information Center for the Environment. 2016. *Tricolored Blackbird Portal*. Survey provided locations of tricolored blackbirds in the Plan Area. University of California, Davis. Available: http://tricolor.ice.ucdavis.edu/. Accessed March 24, 2016.

Jack, B. K., Caroline Kousky, and Katherine R. E. Simms. 2008. Designing Payments for Ecosystem Services: Lessons from Previous Experience and Incentive Based Mechanisms. *Proceedings from the National Academy of Science*. 105 (28) 9465–9470.

Jones & Stokes Associates. 2004. Placer County natural resources report. Edward C. Beedy, Principal-in-charge. Prepared for Placer County Planning Department, Auburn, California. Jones & Stokes, Sacramento, California

Kati, V. et al. 2004. Hotspots, complementarity, or represenativeness? Designing optimal small-scale reserves for conservation. *Biological Conservation* 120:471–480.

Lancia, R. A., J. D. Nichols, and K. H. Pollock. 1994. *Estimating the Number of Animals in Wildlife Populations*. Pages 215–253 in T. Bookhout, editor. Research and management techniques for wildlife and habitats. The Wildlife Society, Bethesda, Maryland, USA.

Landres, P. B., J. Verner, and J. W. Thomas. 1988. Ecological uses of vertebrate indicator species: a critique. *Conservation Biology*, 2(4):316–328.

Lindenmayer, D. B., C. R. Margules, and D. B. Botkin. 2000. Indicators of Biodiversity for Ecologically Sustainable Forest Management. *Conservation Biology*, 14:941–950. doi: 10.1046/j.1523-1739.2000.98533.x

Martin, J., W. M. Kitchen, and E. H. James. 2007. Importance of Well-designed Monitoring Programs for the Conservation of Endangered Species: Case Study of the Snail Kite. *Conservation Biology*, 21(2):472–481.

Marty, J., 2004. Managing for diversity in California vernal pool grasslands. Presentation Abstracts. Ecology and Management of California Grasslands.

Marty, J. T. 2005. Effects of Cattle Grazing on Diversity in Ephemeral Wetlands. *Conservation Biology* 19:1626–1632.

Mayer, K. E. and W. F. Laudenslayer. 1988. *A guide to wildlife habitats of California*.

Meese, R. J. 2010. *Detection, Monitoring, and Fates of Tricolored Blackbird Colonies in 2010 in the Central Valley of California*. Final Report. Submitted to California Department of Fish and Game, Wildlife Branch. Sacramento, CA.

Meese, Robert J., Edward C. Beedy, and William J. Hamilton, III. 2014. Tricolored Blackbird (*Agelaius tricolor*). *The Birds of North America* (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/triblaDOI: 10.2173/bna.423.

National Research Council. 2000. Ecological Indicators for the Nation. Washington, DC: National Academy Press. Available: http://www.nap.edu/openbook.php?isbn=0309068452.

Noss, R. F. 1999. Assessing and monitoring forest biodiversity: a suggested framework and indicators. *Forest Ecology and Management*, 115(2):135–146.

Noss, R. F., M. A. O'Connell, and D. D. Murphy. 1997. The Science of Conservation Planning: Habitat Conservation Planning under the Endangered Species Act. Covelo, CA: Island Press.

Placer County Water Agency. 2009. *Placer County Water Agency Natural Resources Management Plan*. Placer County.

Pollock, K. H., J. D. Nichols, T. R. Simons, G. L. Farnsworth, L. L. Bailey, and J. R. Sauer. 2002. Large scale wildlife monitoring studies: statistical methods for design and analysis. *Environmetrics*, 13(2):105–119.

Pyke, C.R. and J. Marty. 2005. Cattle Grazing Mediates Climate Change Impacts on Ephemeral Wetlands. *Conservation Biology* 19(5):1619–1625.

Reese, Devin A. 1996. Comparative Demography and Habitat Use of Western Pond Turtles in Northern California: The Effects of Damming and Related Alterations. Unpublished PhD Dissertation: University of California at Berkeley. 253 pp.

Richmond, O. M., J. Tecklin, and S. R. Beissinger. 2008. Distribution of California black rails in the Sierra Nevada foothills. *Journal of Field Ornithology*, 79(4):381–390.

Richmond, O. M., S. K. Chen, B. B. Risk, J. Tecklin, and S. Beissinger. 2010. California black rails depend on irrigation-fed wetlands in the Sierra Nevada foothills. *California Agriculture* 64(2):85–93.

Rosenberg, D., J. Gervais, D. Vesely, S. Barnes, L. Holts, R. Horn, R. Swift, L. Todd, and C. Yee. 2009. *Conservation assessment of the Western Pond Turtle in Oregon* (Actinemys marmorata). USDI Bureau of Land Management and Fish and Wildlife Service, USDA Forest Service Region, 6.

Scheiner, S. M., and J. Gurevitch. 1993. *The Design and Analysis of Ecological Experiments*. Chapman & Hall, New York. 445 ISBN o-412-0356 1-8.

Seltenrich, C. P. and A. C. Pool. 2002. *A standardized approach for habitat assessments and visual encounter surveys for the foothill yellow-legged frog* (Rana boylii). Pacific Gas and Electric Company.

Skurka Darin, Gina M., Steve Schoenig, Jacob N. Barney, F. Dane Panetta, and Joseph M. DiTomaso. 2011. WHIPPET: A novel tool for prioritizing invasive plant populations for regional eradication. *Journal of Environmental Management* 92, no. 1:131–139.

Stitt, E.W., P. S. Balfour, T. Luckau, and T. E. Edwards. 2005. *The southern watersnake* (Nerodia fasciata) *in Folsom, California: history, population attributes, and relation to other introduced watersnake in North America*. Final report to US Fish and Wildlife Service. ECORP Consulting Inc

Sweitzer, R. A. and D. Ban Vuren. 2002. *Rooting and foraging effects of wild pigs on tree regeneration and acorn survival in California's oak woodland ecosystem*. USDA Forest Service General Technical Report PSW-GTR-184. pp. 531–543.

Talley, T. S., M. Holyoak, and D. A. Piechnik. 2006. The effects of dust on the federally threatened Valley elderberry longhorn beetle. *Environmental Management*, 37(5):647–658.

Tyler, C. M., B. E. Mahall, F. W. Davis, and M. Hall. 2002. *Factors limiting recruitment in valley and coast live oak*.

U.S. Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; determination of threatened status for giant garter snake. 58 *Federal Register* 54053–5406.

U.S. Fish and Wildlife Service. 1999. *Mitigation guidelines for the valley elderberry longhorn beetle*. Sacramento, CA.

U.S. Fish and Wildlife Service. 2000. Final Addendum to the Handbook for Habitat Conservation Planning and Incidental Take Permitting Process.

U.S. Fish and Wildlife Service. 2005. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon.*

U.S. Fish and Wildlife Service. 2006. *Giant Garter Snake* (Thamnophis gigas) *5-year review: summary and evaluation*. Sacramento, CA.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2016. *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, December 21, 2016.

U.S. Geological Survey. No date. *Giant Garter Snake Studies*. Western Ecological Research Center. Available: http://www.werc.usgs.gov/ProjectSubWebPage.aspx?SubWebPageID=10&ProjectID=89.

University of California, Davis. No date. *Tricolored Blackbird Portal*. Information Center for the Environment. Available: http://tricolor.ice.ucdavis.edu/.

Western Placer County. 2016. Western Placer County Aquatic Resources Program (CARP).

Williams, B. K., C. Szaro, and D. Shapiro. 2007. *Adaptive Management: The U.S. Department of the Interior Technical Guide.* Adaptive Management Working Group, U.S. Washington, DC: Department of the Interior.

Yoccoz, N. G., J. D. Nichols, and T. Boulinier. 2001. Monitoring of Biological Diversity in Space and Time. Trends in Ecology and Evolution 16:446–453.

Personal Communication

Paquin, Melanie. Biologist. U.S. Fish and Wildlife Service. E-mail and phone conversation. July 23, 2009.

Tecklin, Jerry. Black Rail researcher in the Sierra Foothills. 1998 – 2011. Field visits and conversations

Chapter 8

No references in chapter.

Chapter 9

California Department of Parks and Recreation. 2017. Land and Water Conservation Fund. https://www.parks.ca.gov/pages/1008/files/LWCF_Application_Guide_for_Local_Agencies_10.3.17_Draft_Update_10.9.2017.pdf. Accessed: January 17, 2018.

Natural Resources Conservation Service. 2014. Environmental Quality Incentives Program. https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/. Accessed: January 17, 2018.

U.S. Bureau of Reclamation. 2018. Central Valley Project Conservation Program and CVPIA Habitat Restoration Program. https://www.usbr.gov/mp/cvpcp/. Accessed: January 17, 2018.

U.S. Fish and Wildlife Service. 2017. North American Wetlands Conservation Act: The U.S. Standard Grant Program. Fact Sheet. Sept. 2017. Falls Church, VA. https://www.fws.gov/migratorybirds/pdf/grants/nawca-us-standard.pdf.

Personal Communication

Jarrette, David. licensed real estate appraiser and member of HCP/NCCP Finance Committee, personal communication, June 13, 2013.

Chapter 10

Cayan, D., M. Tyree, D. Pierce, and T. Das (Scripps Institution of Oceanography). 2012. Climate Change and Sea Level Rise Scenarios for California Vulnerability and Adaptation Assessment. California Energy Commission. Publication number: CEC-500-2012-008. Available: http://www.energy.ca.gov/2012publications/CEC-500-2012-008/CEC-500-2012-008.pdf.

Dettinger, M. D., D. R. Cayan, M. K. Meyer, and A. E. Jeton. 2004. Simulated hydrologic responses to climate variations and changes in the Merced, Carson, and American River basins, Sierra Nevada, California, 1900–2099. *Climate Change* 62:283–317.

Hayhoe, K., D. Cayan, C. B. Field, P. C. Frumhoff, E. P. Maurer, N. L. Miller, S. C. Moser, S. H. Schneider, K. N. Cahill, E. E. Cleland, L. Dale, R. Drapek, R. M. Hanemann, L. S. Kalkstein, J. Lenihan, C. K. Lunch, R. P. Neilson, S. C. Sheridan, and J. H. Verville. 2004. Emissions Pathways, Climate Change, and Impacts on California. *Proceedings of the National Academy of Sciences* 101:12422–12427.

Intergovernmental Panel on Climate Change. 2013. Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Stocker, T. F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P. M. Midgley (eds.). Cambridge, UK and New York, NY: Cambridge University Press. Available: http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf.

Kim, J. 2005. A projection of the effects of the climate change induced by increased CO_2 on extreme hydrologic events in the Western U.S. *Climatic Change* 68:153–168.

Kiparsky, M., and P. H. Gleick. 2003. Climate Change and California Water Resources: A Survey and Summary of the Literature. Pacific Institute for Studies in Development, Environment, and Security. Oakland, CA. July.

Luers, A., D. Cayan, G. Franco, M. Hanemann, and B. Croes. 2006. Our Changing Climate: Assessing the Risks to California. A Summary Report from the California Climate Change Center. CEC–500–2006–077. Available: http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF.

Melillo, J. M., T. C. Richmond, and G. W. Yohe (eds). 2014. Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2.

Murphy, D. D., and S. B. Weiss. 1992. Effects of climate change on biological diversity in Western North America: species losses and mechanisms. Pages 355–368 in R. L. Peters and T. E. Lovejoy (eds.), *Global Warming and Biological Diversity*. Castleton, NY: Hamilton Printing.

National Oceanic and Atmospheric Administration. 2015a. *Historical Palmer Drought Indices*. Climate Division 2 (Sacramento Drainage). Available: http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/.

National Oceanic and Atmospheric Administration. 2015b. National Centers for Environmental Information Summary of Monthly Normals, 1981 to 2010. U.S. Department of Commerce. Available: https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/climate-normals/1981-2010-normals-data.

National Research Council. 2010. America's Climate Choices: Panel on Advancing the Science of Climate Change. National Research Council. Available: http://www.nap.edu/catalog.php?record_id=12782.

Skinner, C. N., and C.-R. Chang. 1996. Fire Regimes, Past and Present. Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options. Davis: University of California, Centers for Water and Wildland Resources.

Westerling A. L., B. P. Bryant, H. K. Preisler, H. G. Hidalgo, and T. Das. 2009. Climate Change, Growth, and California Wildfire. California Climate Change Center. CEC-500-2009-046-F. Available: http://www.energy.ca.gov/2009publications/CEC-500-2009-046/CEC-500-2009-046-D.PDF.

Western Regional Climate Center. 2016. Recent Climate in the West. Available: http://www.wrcc.dri.edu/.

Chapter 11

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. *Endangered Species Consultation Handbook*. Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act. March.

This Page Intentionally Left Blank