

LOWER WALNUT CREEK RESTORATION PROJECT

Habitat Assessment

Prepared for
Contra Costa County Flood Control &
Water Conservation District

July 2019



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SUMMARY

The Lower Walnut Creek Restoration Project (Project), led by the Contra Costa County Flood Control and Water Conservation District (District), proposes to restore and enhance tidal wetlands along the southern shore of Suisun Bay and from Suisun Bay upstream along Walnut Creek and its tributary Pacheco Creek, to provide sustainable flood protection, and to create opportunities for future public access. **Figure 1** shows the habitat assessment study area for the proposed Project, which is located in unincorporated Contra Costa County approximately 3 miles east of the City of Martinez.

The proposed Project, will restore and enhance tidal marsh, and enhance seasonal wetlands and upland areas. The Project will improve habitat quality, diversity, and connectivity along Walnut Creek and Pacheco Creek, and along the southern Suisun Bay shoreline. The Project will breach and lower levees and berms to reintroduce the tides to diked former baylands, construct new setback levees for flood protection, and grade filled areas to create new tidal wetland areas.

In addition to providing improved habitat for fish and wildlife, the Project will provide more sustainable flood protection that avoids significant dredging, and provide potential for a public access trail corridor for future connection of the Iron Horse Trail and Bay Trail extension. The Project is designed to be resilient to 2 feet of sea-level rise and adaptable to up to 5 feet of rise.

The intent and scope of this report is to characterize biological resources in the Study Area, and provide general recommendations to avoid and minimize potential impacts to sensitive resources, when present, in support of future wetland restoration and public access activities.

Several species with potential to occur are identified and described, including salt marsh harvest mouse, California black rail, Ridgway's (California clapper) rail, northern harrier, Suisun song sparrow, Suisun marsh aster, Delta tule pea, and other potentially occurring species.

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CHAPTER 1

Introduction

1.1 Background and Purpose for the Habitat Assessment

This report includes a description of the presence and distribution of common and special-status plant and wildlife species, sensitive natural communities, and potential state- and federally-regulated waters and wetlands at the site and surrounding area of the proposed Lower Walnut Creek Restoration Project (“the Project”).

The intent of this document is to characterize the existing biological resources at the Study Area to support environmental permitting, the District’s CEQA document, and restoration design.

Information used in the preparation of this report was obtained from regional biological studies, reports from the California Natural Diversity Database (CDFW, 2018), California Native Plant Society Electronic Inventory (CNPS, 2018), and U.S. Fish and Wildlife species list (USFWS, 2018), reconnaissance-level field surveys, and other biological literature.

Vegetation types and wildlife habitats were identified using records, field observations, and aerial imagery. Environmental Science Associates (ESA) conducted several reconnaissance-level surveys of portions of the Study Area on August 6 and 27, 2015, September 15, 2015, January 5 and 6, 2017, March 29, 2017, April 28, 2017, November 6 and 7, 2017 to gather information and verify existing data on vegetative communities, wetland extents, wildlife habitats, and habitat use on and surrounding the site. Protocol-level special-status plant surveys were also conducted within portions of the Study Area on May 16, 17, 24, June 8, 2018, October 30, and November 1, 2018 (Wood Biological Consulting and ESA, 2019).

1.2 Description of Study Area

The Study Area is located approximately 3 miles east of the City of Martinez, along the lowest 2.5 miles of Walnut Creek and 1.5 miles of Pacheco Creek. The Study Area consists of the South Reach, located between the BNSF Railroad embankment and the confluence of Pacheco and Walnut creeks; the Middle Reach, located between Pacheco Creek and the Union Pacific Railroad (UPRR) embankment; and the North Reach, located between Waterfront Road and Suisun Bay in the area historically called “Pacheco Marsh” (**Figure 1**).

1.2.1 Regional Setting

The Study Area is located in Contra Costa County along the southern edge of Suisun Bay within the San Francisco Bay Delta. Contra Costa County has a diverse topography and micro-climate, and has an associated high diversity of vegetation, although the rapid pace of development in the region, has resulted in a substantial reduction in land available for native flora and fauna.

San Francisco Bay has lost 80% of its historic tidal wetlands. In the areas immediately adjacent to Walnut Creek, 85% of the historic tidal wetland has been lost (SFEI, 2016). The vast majority of the historic tidal marsh habitat within the lower reaches of Walnut Creek has been diked or filled to support industrial development (SFEI, 2016).

1.2.2 Surrounding Land Uses, Utilities, and Infrastructure

Figure 2 shows existing land use, utilities, and infrastructure within the three reaches and surrounding areas. The Study Area and adjacent lands consist primarily of publicly owned and privately owned open space, with existing and proposed future industrial land uses on adjacent parcels. Known utilities and other infrastructure that exist within the Study Area include:

- Central Contra Costa Sanitary District's (CCCSD) buried Outfall Pipeline (North Reach)
- Contra Costa Water District's (CCWD) buried raw water "Shortcut Pipeline" (South Reach)
- Buried and aboveground petroleum product pipelines operated by TransMontaigne, Andeavor, Kinder Morgan, Calpine, and Shell (South and North Reaches)
- PG&E overhead power lines and associated towers and poles (South and Middle Reaches)

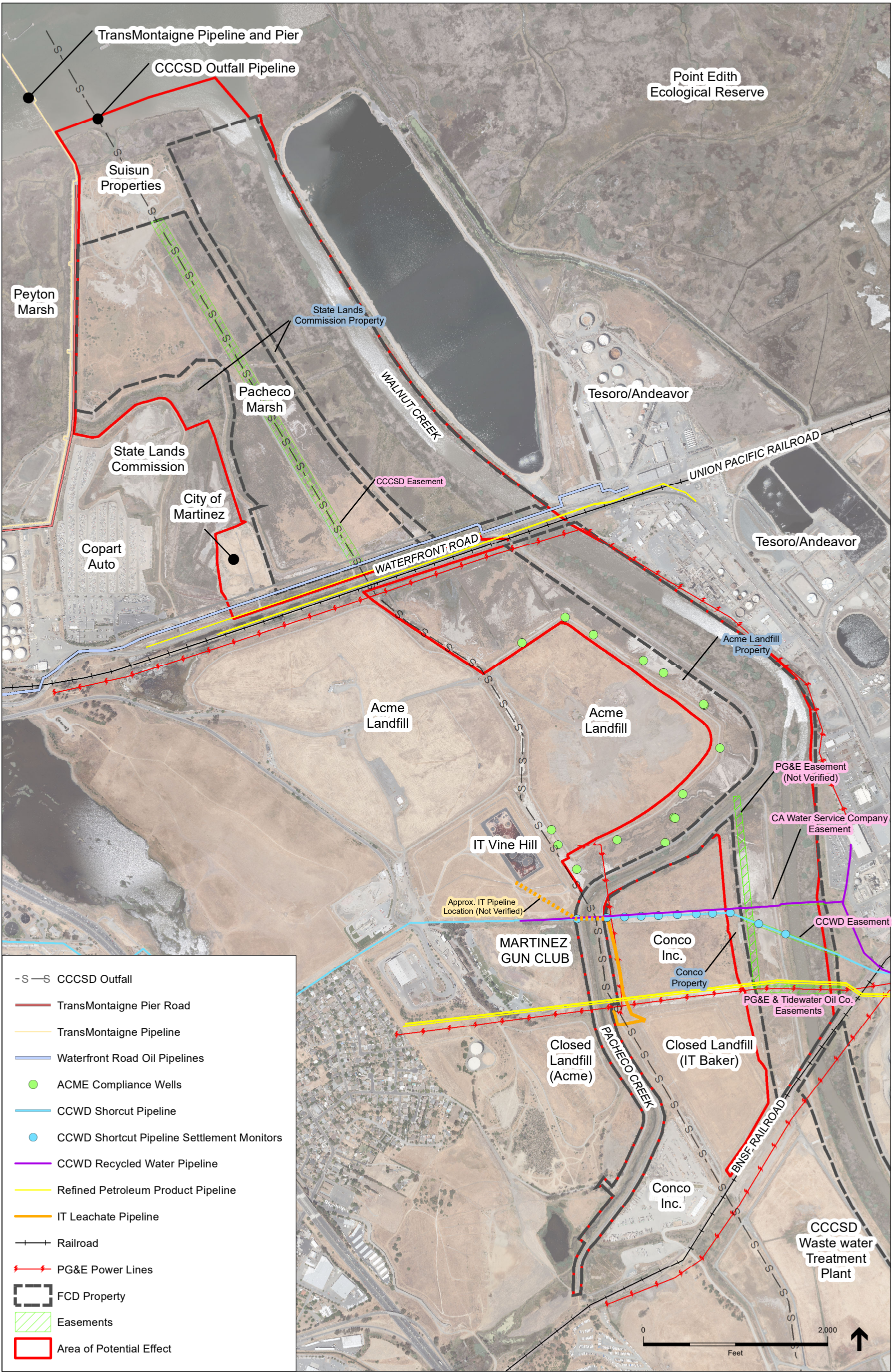
Additional, unmapped subsurface infrastructure is believed to exist within the Study Area, including an underground petroleum pipeline operated by Chevron, located in the South Reach. The Project team continues to coordinate with utilities and other infrastructure operators to identify such unmapped subsurface infrastructure within the Study Area. There are also several transportation corridors passing near the Study Area:

- Waterfront Road - a county road located between the Middle and North Reaches
- UPRR – a single track railroad located between the Middle and North Reaches
- BNSF Railroad – a double track railroad located immediately south of the South Reach

Several parcels adjacent to the Study Area support industrial land uses, including:

- Conco Inc.'s contractor yard (South Reach)
 - Conco Inc. has proposed a future expansion of their yard on the parcels west of the South Reach





NOTES:
Locations of utilities and easements shown are approximate
Waterfront Road Oil Pipelines include buried and above ground pipelines owned by TransMontaigne, Andeavor, and Kinder Morgan.
Imagery Source: Contra Costa County, 2014

Lower Walnut Creek Restoration . D170378.00
Figure 2
Existing Land Use, Utilities and Infrastructure

- These parcels were historically part of the IT hazardous materials treatment facility. Following the closure of this facility, contaminated materials were removed and encapsulated in the adjacent IT Baker Landfill.
- Acme Landfill (Middle Reach)
- Several Closed Landfills (South and Middle Reaches)
 - The closed IT Baker Landfill has leachate management system piping which passes through Conco owned parcels (South Reach) and connects to the Vine Hill hazardous materials processing site (Middle Reach).
 - Acme South landfill, located along the west bank of Pacheco Creek.
- Martinez Gun Club (Middle Reach)
- Tesoro (now Andeavor) Oil Refinery (East bank of Walnut Creek, all reaches)
- Copart Auto Lot (North Reach)
- Central Contra Costa Sanitary District's Waste Water Treatment Plant (South Reach, to the south of the BNSF embankment)
- Plains All-American Products Terminal (adjacent to the North Reach)

1.3 Regulatory Context

Biological resources in the Study Area, including special-status species, wetlands, and sensitive natural communities, may fall under the jurisdiction of various regulatory agencies and be subject to their regulations and permit requirements. Biological resources observed within the Study Area, or with potential to occur in the Study Area, as described in *Section 3: Environmental Setting*, may be subject to the regulations described below. Additionally, some sensitive biological resources described in this report may occur outside of, but adjacent to the Study Area. If affected by Project activities, these resources also could be subject to regulatory considerations.

1.3.1 Federal Regulations

1.3.1.1 Federal Endangered Species Act

Under the Federal Endangered Species Act (FESA), the Secretary of the Interior and the Secretary of Commerce have joint authority to list a species as threatened or endangered. Two federal agencies oversee the FESA: the United States Fish and Wildlife Service (USFWS) has jurisdiction over plants, wildlife, and resident fish, while the National Marine Fisheries Service (NMFS) has jurisdiction over anadromous fish, marine fish, and marine mammals.

Section 7 of FESA requires a federal agency reviewing a project within its jurisdiction to determine whether any federally listed threatened or endangered species may be present in the Study Area and whether the proposed action will have a potentially significant impact on such

species. In addition, the agency is required to determine whether the proposed action is likely to jeopardize the continued existence of any species proposed to be listed under FESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. The USFWS designates critical habitat for threatened or endangered species under FESA. Critical habitat designations are specific areas within the geographic region that are occupied by a listed species that are determined to be critical to its survival and recovery in accordance with FESA. Federal entities issuing permits or acting as a federal agency must show that their actions do not negatively affect the critical habitat to the extent that it impedes the recovery of the species.

1.3.1.2 Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA), administered by the USFWS, is the domestic law that affirms, or implements, a commitment by the United States to four international conventions (with Canada, Mexico, Japan, and Russia) for the protection of a shared migratory bird resource. It generally prohibits the killing, possessing, or trading of migratory birds, bird parts, eggs, and nests, except as provided by the statute. The federal MBTA definition of “take” does not prohibit or penalize the incidental take of migratory birds that results from actions that are conducted without motivation to harm birds.

1.3.1.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act, enforced by the USFWS, makes it illegal to import, export, take (which includes molest or disturb), sell, purchase, or barter any bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*) or parts thereof.

1.3.1.4 Federal Regulation of Waters of the United States including Wetlands

Wetlands and other waters (e.g., rivers, streams, and natural ponds) are a subset of “waters of the U.S.,” and receive protection under Section 404 of the Clean Water Act (CWA). In 2015, the U.S. Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) issued the Clean Water Rule detailing the process for determining CWA jurisdiction over waters of the United States (WOTUS). The rule is currently in effect in California and 21 other states. The 2015 Clean Water Rule includes a detailed process for determining which areas may be subject to jurisdiction under the CWA, and broadly classifies features into three categories: those that are jurisdictional by rule (Category A below), those that excluded by rule (Category C below) and those features that require a “significant nexus test” (Category B below).

The significant nexus test includes consideration of hydrologic and ecologic factors. For circumstances such as those described in Category B below, the significant nexus test would take into account physical indicators of flow (evidence of an ordinary high water mark [OHWM]), if a hydrologic connection to a Traditionally Navigable Water (TNW) exists, and if the aquatic functions of the water body have a significant effect (more than speculative or insubstantial) on the chemical, physical, and biological integrity of a TNW. The USACE and EPA will apply the significant nexus standard to assess the flow characteristics and functions of a potential WOTUS

to determine if it significantly affects the chemical, physical, and biological integrity of the downstream TNW.

2015 Clean Water Rule Key Points Summary

Category A: The USACE and EPA will assert jurisdiction over the following waters (jurisdictional by rule):

- TNWs.
- Interstate waters and wetlands.
- Territorial seas.
- Impoundments of waters (reservoirs, etc.).
- Tributaries with the following attributes:
 - Contributes flow to a TNW.
 - Contain bed, banks, and ordinary high water mark.
 - Can be natural, man-altered, or man-made.
 - Can have constructed breaks (culverts, pipes, etc.) or natural breaks.
- Waters “adjacent” to TNW and their tributaries, including:
 - Waters that are bordering, contiguous, or neighboring a TNW, interstate water, territorial sea, impoundment or tributary. Includes waters separated from other “waters of the United States” by constructed dikes or barriers, natural river berms, beach dunes or similar.
 - Waters within 100 feet of the OHWM of a TNW, interstate water, territorial sea, impoundment or tributary.
 - Waters within the 100-year floodplain and within 1,500 feet of a TNW, interstate water, territorial sea, impoundment or tributary.
 - Waters within 1,500 feet of the high tide line or OHWM of a TNW or territorial sea.

Category B: The USACE and EPA will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a TNW unless excluded by rule (significant nexus test):

- Vernal pools that have a significant nexus to a TNW or territorial sea.
- Waters within the 100-year floodplain of a TNW, interstate water or territorial sea.
- Waters within 4,000 feet of the high tide line or OHWM of a TNW, interstate water, territorial sea, impoundment or tributary.

Category C: The USACE and EPA will not assert jurisdiction over the following features (excluded by rule):

- Waste treatment facilities including basins and percolation ponds.

- Prior converted cropland.
- The following types of ditches:
 - Ephemeral ditches that are not a relocated tributary or excavated in a tributary.
 - Intermittent ditches that are not a relocated tributary, excavated in a tributary, or drain wetlands.
 - Ditches that do not flow, either directly or through another water, into a TNW, interstate waters, territorial sea.
- Artificially irrigated areas that would revert to upland.
- Artificial, constructed lakes and ponds created in dry land such as stock watering ponds, irrigation ponds, settling basins, fields flooded for rice growing, cooling ponds
- Swimming pools or reflecting pools in dry land.
- Small ornamental waters created in dry land.
- Water-filled depressions created in dry land from mining or construction activities including pits for fill, sand, or gravel.
- Erosional features including gullies and rills that are not tributaries, non-wetland swales and constructed grass waterways.
- Puddles.
- Groundwater.
- Stormwater control features created in dry land.
- Wastewater recycling structures created in dry land including detention and retention basins, groundwater recharge basins, percolation ponds and water distributary structures.

The USACE has primary federal responsibility for administering regulations that concern waters of the U.S. In this regard, the USACE acts under two statutory authorities: the Rivers and Harbors Act (Sections 9 and 10), which governs specified activities in “navigable waters,”¹ and the CWA (Section 404), which governs specified activities in waters of the U.S., including wetlands.

The USACE requires a permit if a project proposes placement of structures within navigable waters and/or alteration of waters of the U.S. Some classes of fill activities may be authorized under Regional General or Nationwide permits if specific conditions are met. Nationwide permits do not authorize activities that are likely to jeopardize the existence of a threatened or endangered species (listed or proposed for listing under FESA). The Nationwide permit outlines general conditions and may specify project-specific conditions as required by the USACE during the

¹ Navigable waters are defined as those waters that are subject to the ebb and flow of the tide or that are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Section 404 permitting process. When a project's activities do not meet the conditions for a Nationwide Permit, an Individual Permit may be issued by the USACE.

1.3.2 State Regulations

1.3.2.1 Waters of the State and Porter-Cologne Water Quality Act

Under CWA Section 401, the San Francisco Bay Regional Water Quality Control Board (RWQCB) must certify that actions in the San Francisco Bay region receiving authorization under CWA Section 404 also meet state water quality standards. The RWQCB issue Water Quality Certifications for actions regulated under the CWA in coordination with the USACE.

Under the National Environmental Policy Act (NEPA), federal lead agencies also may endeavor to comply with state water quality regulations. The RWQCB also regulates waters of the state under the Porter-Cologne Water Quality Control Act (Porter-Cologne Act). “waters of the state” are broadly defined as “any surface water or groundwater, including saline waters, within the boundaries of the state”² and include isolated, intrastate, and non-navigable waters and/or wetlands. The Porter-Cologne Act is the principal law governing water quality in California. It establishes a comprehensive program to protect water quality and the beneficial uses of water. Under the Act, the RWQCB must prepare and periodically update its water quality control basin plans (the Basin Plan). Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Projects that affect wetlands or waters of the state must meet RWQCB Waste Discharge Requirements (WDRs), which may be issued in combination with or in addition to a CWA Section 401 water quality certification or waiver.

1.3.2.2 Section 1600-1616 of California Fish and Game Code

Streams and lakes, as habitat for fish and wildlife species, are subject to jurisdiction by California Department of Fish and Wildlife (CDFW) under Sections 1600-1616 of California Fish and Game Code. Alterations to or work within or adjacent to streambeds or lakes generally require a 1602 Lake and Streambed Alteration Agreement. The term “stream”, which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as “a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life... [including] watercourses having a surface or subsurface flow that supports or has supported riparian vegetation” (14 CCR 1.72). In addition, the term “stream” can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream dependent terrestrial wildlife (CDFG, 1994). “Riparian” is defined as “on, or pertaining to, the banks of a stream.” Riparian vegetation is defined as “vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself” (CDFG, 1994).

² California Water Code Section 13050.

Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from CDFW.

1.3.2.3 Section 3503 California Fish and Game Code

Under Section 3503 of the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.5 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes or Strigiformes (birds of prey), or of their nests and eggs.

1.3.2.4 California Fully Protected Species

California law (Fish and Game Code Sections 3511 birds, 4700 mammals, 5050 reptiles and amphibians and 5515 fish) allows the designation of a species as fully protected. This is a greater level of protection than is afforded by the California Endangered Species Act, since such a designation means the listed species cannot be taken at any time. Salt marsh harvest mouse (*Reithrodontomys raviventris*), Ridgway's rail (*Rallus obsoletus*), and California black rail (*Laterallus jamaicensis coturniculus*) are California fully protected species.

1.3.2.5 CEQA Guidelines Section 15380

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines section 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in the FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in the Guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a "candidate species" that has not yet been listed by either the USFWS or CDFW. Thus, CEQA provides an agency with the ability to protect a species from a project's potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

1.3.3 Local Regulations

1.3.1 San Francisco Bay and Shoreline

The San Francisco Bay Conservation and Development Commission (BCDC) has regulatory jurisdiction, as defined by the McAteer-Petris Act, over the Bay and its shoreline, which generally consists of the area between the Bay shoreline and a line 100 feet landward of and parallel to the shoreline. These areas are defined in the McAteer-Petris Act (PRC Section 66610) as:

- San Francisco Bay, being all areas that are subject to tidal action from the south end of the Bay to the Golden Gate (Point Bonita-Point Lobos) and to the Sacramento River line (a line between Stake Point and Simmons Point, extended northeasterly to the mouth of Marshall

Cut), including all sloughs, and specifically, the marshlands lying between mean high tide and five feet above mean sea level; tidelands (land lying between mean high tide and mean low tide); and submerged lands (land lying below mean low tide).

- A shoreline band consisting of all territory located between the shoreline of San Francisco Bay as defined above and a line 100 feet landward of and parallel with that line, but excluding any portions of such territory which are included in other areas of BCDC jurisdiction; provided that the Commission may, by resolution, exclude from its area of jurisdiction any area within the shoreline band that it finds and declares is of no regional importance to the Bay.

1.3.2 Contra Costa County Tree Ordinance

Chapter 816-6 of the Contra Costa County Zoning Code states:

The site plan shall accurately indicate the location, species, tree dripline, and trunk circumference of all trees with a circumference of 20 inches or more, measured 4.5 feet about the ground (or any significant grouping of trees including groves of four or more trees regardless of trunk size) whose tree trunks lie within 50 feet of proposed grading or other proposed improvements, or other proposed development activity...If the proposed development is in proximity to two or more qualifying trees, then each tree shall be assigned a number for identification purposes. This site plan shall also specifically and clearly indicate whether individual trees are proposed to be (1) removed, (2) altered or otherwise affected.

1.3.3 Contra Costa County *Conservation Element* Policies Related to Vegetation and Wildlife

Goal 8-D: To protect ecologically significant lands, wetlands, plant and wildlife habitats.

Goal 8-E: To protect rare, threatened and endangered species of fish, wildlife and plants, significant plant communities, and other resources which stand out as unique because of their scarcity, scientific value, aesthetic quality or cultural significance. Attempt to achieve a significant net increase in wetland values and functions within the County over the life of the General Plan.

Policy 8-6: Significant trees, natural vegetation, and wildlife populations generally shall be preserved.

Policy 8-7: Important wildlife habitats which would be disturbed by major development shall be preserved, and corridors for wildlife migration between undeveloped lands shall be retained.

Policy 8-8: Significant ecological resource areas in the County shall be identified and designated for compatible low-intensity land uses. Setback zones shall be established around the resource areas to assist in their protection.

Policy 8-9: Areas determined to contain significant ecological resources, particularly those containing endangered species, shall be maintained in their natural state and carefully regulated to the maximum legal extent. Acquisition of the most ecologically sensitive properties within the County by appropriate public agencies shall be encouraged.

Policy 8-10: Any development located or proposed within significant ecological resource areas shall ensure that the resource is protected.

Policy 8-11: The County shall utilize performance criteria and standards which seek to regulate uses in and adjacent to significant ecological resource areas.

Policy 8-17: The ecological value of wetland areas, especially the salt marshes and tidelands of the bay and delta, shall be recognized. Existing wetlands in the County shall be identified and regulated. Restoration of degraded wetland areas shall be encouraged and supported whenever possible.

Policy 8-21: The planting of native trees and shrubs shall be encouraged in order to preserve the visual integrity of the landscape, provide habitat conditions suitable for native wildlife, and ensure that a maximum number and variety of well-adapted plants are sustained in urban areas.

Policy 8-22: Applications of toxic pesticides and herbicides shall be kept at a minimum and applied in accordance with the strictest standards designed to conserve all the living resources of the County. The use of biological and other non-toxic controls shall be encouraged.

Policy 8-23: Runoff of pollutants and siltation into marsh and wetland areas from outfalls serving nearby urban development shall be discouraged. Where permitted, development plans shall be designed in such a manner that no such pollutants and siltation will significantly adversely affect the value or function of wetlands. In addition, berms, gutters, or other structures should be required at the outer boundary of the buffer zones to divert runoff to sewer systems for transport out of the area.

Policy 8-25: The County shall protect marshes, wetlands, and riparian corridors from the effects of potential industrial spills.

Policy 8-27: Seasonal wetlands in grassland areas of the County shall be identified and protected.

Policy 8-28: All efforts shall be made to identify and protect the County's mature native oak, bay, and buckeye trees.

CHAPTER 2

Methods

2.1 Study Area

The District owns a large portion of the land within the Study Area and is pursuing opportunities to expand the proposed Project through partnerships with other local landowners.

The use of the term “Study Area” refers to the area generally defined by the potential Project boundary which includes parcels owned by the District, State Lands Commission, City of Martinez, Acme landfill, and Conco Inc. (Figure 1).

Note that although this footprint is generally the starting point to define a biological survey area, in practical terms, biological resources have varied sensitivity to disturbance and a slightly larger Study Area is typically needed for many species including nesting raptors, passerine birds, and many terrestrial species that may be located adjacent to a property.

2.2 Survey Dates and Surveying Personnel

Environmental Science Associates (ESA) wetland restoration ecologist Stephanie Bishop conducted reconnaissance-level plant and wildlife surveys of the majority of the Study Area on August 6 and 27, 2015, September 15, 2015, January 5 and 6, 2017, March 29, 2017, April 28, 2017, and November 6 and 7, 2017. Other ESA botanists and wildlife biologists assisted in each of the reconnaissance-level surveys. The surveys were conducted to observe and characterize vegetation communities in the Study Area and to assess habitat quality and potential for common and special-status wildlife species and verify conditions described in site specific studies. The reconnaissance surveys are intended to identify the presence or absence of suitable habitat for each special-status species known to occur in the vicinity in order to determine its potential to occur in the Study Area. The site visits do not constitute protocol-level surveys and is not intended to determine the actual presence or absence of a species. Habitats within areas that were not surveyed, including the expanded Suisun Properties portion of the North Reach (between the County property and Suisun Bay) and the State Lands Commission property east of Copart Auto, were mapped and assessed using aerial imagery.

LSA (2012) and Salix (2016) also conducted wetland delineations within portions of the Project boundary and this information has been incorporated into the setting information described below.

Wood Biological Consulting conducted protocol-level special-status plant surveys within the majority of the Study Area on May 16, 17, 24, June 8, October 30 and November 1, 2018 (Wood Biological Consulting and ESA, 2019). Areas where plant surveys were not completed include the area west of the access road in the Middle Reach within the Acme landfill property, the expanded Suisun Properties portion of the North Reach, the State Lands Commission property east of Copart Auto, and the very western edge of the South Reach within the Conco property.

2.3 Review of Background Information

Several site specific biological studies and surveys have been performed for the Study Area over the years. These, along with publicly available data and subscription-based biological resource data, were evaluated to provide a foundation of existing biological conditions in this report.

Data sources that assisted in this analysis include:

- Pacheco Marsh Restoration, Contra Costa County Wetland Technical Assessment, H. T. Harvey and Associates, 2003
- Pacheco Marsh Restoration Plan, PWA, 2004
- Data Summary Report for Baseline Surveys of Anadromous Fish Habitat in Lower Walnut Creek, Contra Costa County, California, Jones & Stokes, 2004
- Final Delineation of Waters of the United States, Including Wetlands, for the Lower Walnut Creek Channel Restoration Project, Concord, California, Jones & Stokes, 2005a.
- Botanical Report for the Lower Walnut Creek Channel Restoration Project, Concord, California, Jones & Stokes, 2005b
- Jones & Stokes. 2007. Final Data Summary Report for Chinook Salmon Spawning Escapement and Fry Emergence in Lower Walnut Creek, Contra Costa County, California. September, 2007.
- Lower Walnut Creek Existing Conditions Report, ESA, 2015b
- Resilient Landscape Visions for Walnut Creek – San Francisco Estuary Institute, 2016b
- Lower Walnut Creek Feasibility Study Report, ESA, 2017
- Lower Walnut Creek Wetland Delineation Report, ESA, 2017
- Lower Walnut Creek Project Study Report, ESA, 2018
- Topographic maps
- Historic and current aerial imagery
- USFWS Information for Planning and Conservation (IPaC), USFWS, 2018
- The CDFW California Natural Diversity Database (CNDDB), CDFW, 2018
- The California Native Plant Society (CNPS) online database, CNPS, 2018
- eBird Hotspot Map for Waterfront Rd. wetlands and Pt. Edith Trail, eBird, 2018
- Lower Walnut Creek Restoration Project, Salt Marsh Harvest Mouse Technical Memorandum, H.T. Harvey & Associates, 2018
- Lower Walnut Creek Rare Plant Survey Report, Wood Biological Consulting and ESA, 2019

CHAPTER 3

Environmental Setting

This chapter provides the environmental baseline for vegetation communities and habitats and special-status plant and wildlife species in the Study Area. Habitat types occurring within the Study Area are briefly described below. **Figure 3** shows the distribution of these habitats in the Study Area.

3.1 Natural Communities and Associated Wildlife Habitats

Natural Communities are assemblages of plant species that occur together in the same area and are defined by species composition and relative abundance. The Natural Communities classification presented herein is based on field observations, previous biological studies of the Study Area, and the standard *Preliminary Descriptions of the Terrestrial Natural Communities of California* (CDFG, 1986). Plant communities generally correlate with wildlife habitat types; wildlife habitats were classified and evaluated using the *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer, 1988).

3.1.1 Upland Plant Communities and Associated Wildlife

Ruderal/Non-native Grassland

The upland areas of the Study Area are dominated by ruderal vegetation and non-native grassland. Ruderal and non-native grassland habitats are most prevalent in areas subject to frequent and often severe vegetation and soil disturbances including disked or fallow fields, construction sites, levees, vehicle parking lots, and railroad or other public utility rights of way. This habitat occurs mostly in the North Reach, but also occurs along the levees in the Middle and South Reach. It is characterized by a dense growth of non-native grass species and ruderal vegetation dominated by non-native forbs.

Plant species that are common to this habitat include annual non-native grasses, perennial pepperweed (*Lepidium latifolium*), black mustard (*Brassica nigra*), short pod mustard (*Hirschfeldia incana*), Italian thistle (*Carduus pycnocephalus*), poison hemlock (*Conium maculatum*), and wild radish (*Raphanus sativus*). Non-native annual grasses dominating this habitat include wild oat (*Avena* sp.), ripgut brome (*Bromus diandrus*), and Italian rye grass (*Festuca perennis*). The ruderal areas contain many other invasive forbs including ice plant (*Carpobrotus edulis*), stinkwort (*Dittrichia graveolens*), and yellow star thistle (*Centaurea solstitialis*).

The areas of undisturbed non-native grasslands habitat could potentially provide suitable foraging habitat for raptors and nest-sites for northern harrier (*Circus cyaneus*). However, in areas disturbed from human and unauthorized dirt bike traffic, wildlife use of these areas is likely limited. Some common wildlife that may use these habitats include western fence lizard (*Sceloporus occidentalis*), black-tailed jackrabbit (*Lepus californicus*), and western meadowlark (*Sturnella neglecta*). This habitat is more important for wildlife that inhabit marshes as refugia habitat in areas directly adjacent to tidal and non-tidal wetlands.

Coastal Scrub

Coastal scrub habitat occurs in small patches in the North Reach. This coastal scrub habitat has developed on disturbed areas and includes native shrubs, primarily coyote brush (*Baccharis pilularis*), but also may include toyon (*Heteromeles arbutifolia*) and non-native tamarisk (*Tamarix* sp.).

The coastal scrub within the Study Area is somewhat disturbed from human and dirt bike traffic, so wildlife use of these areas is likely limited, but may provide foraging, refuge, or nesting habitat for common birds or mammals.

Eucalyptus trees

Two eucalyptus trees (*Eucalyptus* sp.) occur within the Study Area adjacent to the parking area within the City of Martinez park. The understory of these trees is non-native grassland.

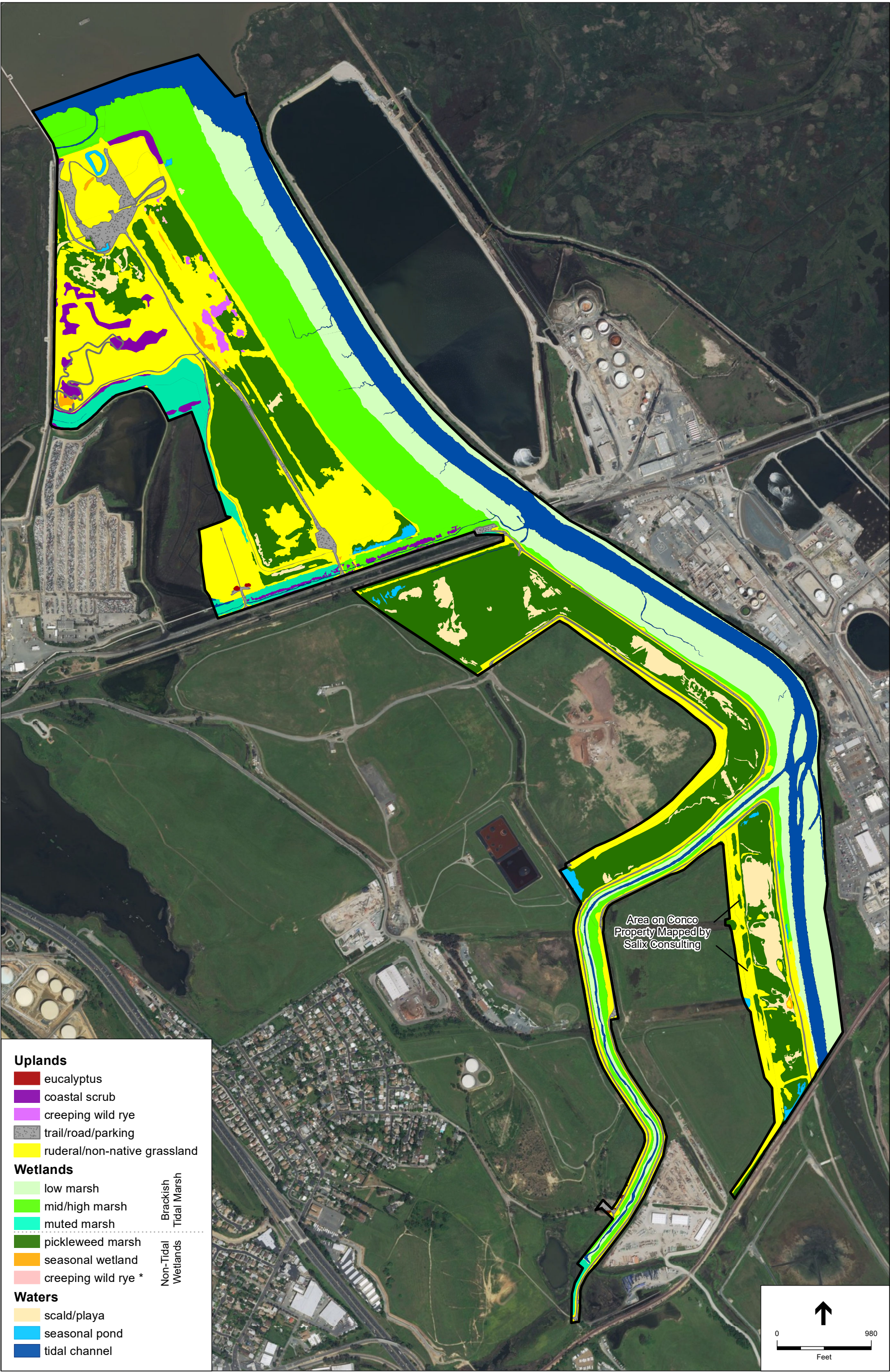
Large trees can generally provide nesting, roosting, and foraging habitat for many species of birds. However, because these trees are near a parking area of a City park and near Waterfront Road, they may only provide nesting opportunities to birds willing to nest near disturbed areas, such as California scrub jay (*Aphelocoma californica*), and mourning dove (*Zenaidura macroura*). These trees could also potential provide habitat for tree roosting bats such as the western red bat (*Lasiurus blossevillii*).

Oak trees

A few oak trees occur at the upstream end of Pacheco Creek within the South Reach. These oak trees are within disturbed areas next to roads and likely provide minimal wildlife habitat, but may provide foraging and nesting habitat for a wide variety of birds.

Creeping Wild Rye

There are also some nearly monotypic stands of native creeping wildrye (*Elymus triticoides*) within the North Reach and South Reach. These areas provide similar wildlife habitat as the surrounding non-native grassland and also may provide important upland refugia habitat for marsh wildlife adjacent to non-tidal wetlands. A mallard (*Anas platyrhynchos*) was observed nesting within the creeping wild rye during one of the reconnaissance surveys.



SOURCE: ESA 2017, 2018; LSA 2012; Salix, 2016; NAIP 2016

Lower Walnut Creek Restoration Project . 170378.00

Figure 3

Existing Habitats

* Wetland creeping wild rye occurs in small areas along the north edge of Pacheco Marsh.

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Road/Trail/Parking

The mostly unpaved trails and roads throughout the Study Area support few biological resources. These areas provide limited wildlife habitat and generally support only generalist, and sometimes non-native wildlife species that are tolerant of human presence and activities, such as house sparrow (*Passer domesticus*) or Virginia opossum (*Didelphis virginiana*).

3.1.2 Aquatic Plant Communities and Associated Wildlife

Tidal Brackish Marsh

Tidal brackish marsh, found throughout all three reaches in the Study Area, is typical of brackish tidal marsh in Suisun Bay and contains low, mid, and high marsh zones. Muted marsh is also present within the North Reach and occurs where the tidal action is minimized due to undersized culverts.

Low Marsh Zone

The low marsh zone consists of the marsh directly adjacent to Lower Walnut Creek. Low marsh generally occurs between elevations 2.1 and 5.5 ft. NAVD, or approximately MLLW +1 ft. to mean high water (MHW), according to typical vegetation elevation zones in Suisun Marsh (USBR, 2013). Typical vegetation within the low marsh zone includes California bulrush (*Schoenoplectus californicus*), common bulrush (*S. acutus*), and broad-leaf cattail (*Typha latifolia*).

Common reed (*Phragmites australis*) has expanded over the years at the Study Area. The invasive form of common reed is assumed present in Suisun and the Delta, identified as a non-native genetic variant which is contributing to the rapid expansion observed in some marshes (Cal-IPC, 2008). Common reed occurs within the mid and upper elevation range in the low marsh.

Mid Marsh Zone

The mid marsh zone is inland of the low marsh zone and occur over a large area from the mouth of Walnut Creek to Waterfront Road. South of Waterfront Road only a narrow band of mid marsh exists.

Mid marsh generally occurs between 5.5 and 6.2 ft. NAVD, or between MHW and mean higher high water (MHHW). Two species that generally occur within the mid marsh, but also occur in low marsh include bulrush (*Bolboschoenus* spp.) and common reed. Native pickleweed (*Salicornia pacifica*) and invasive perennial pepperweed also occur and can be dominant species within the mid marsh zone. Other species co-occur with these dominant species in the mid marsh zone including non-native fat-hen (*Atriplex prostrata*).

High Marsh Zone

The high marsh zone is inland of the mid marsh zone and, similar to the mid marsh zone, occurs over a large area from the mouth of Walnut Creek to Waterfront Road, and as a narrow band south of Waterfront Road.

High marsh generally occurs between elevation 6.2 and 7.2 ft. NAVD, or between MHHW and Extreme HHW. Vegetation within the high marsh zone is dominated by pickleweed and invasive perennial pepperweed. Many other species are found at the upper elevations of the high marsh and at the edge of the transition zone including native salt grass (*Distichlis spicata*), alkali heath (*Frankenia salina*), and gumplant (*Grindelia stricta*). Plant diversity is greater in the mid and high marsh zones than in the low marsh within the Study Area. Some other native species encountered intermittently within the mid and high marsh include western goldenrod (*Euthamia occidentalis*), salt marsh baccharis (*Baccharis glutinosa*), and marsh fleabane (*Pluchea odorata*).

Although the high marsh has a diversity of native species, perennial pepperweed is a highly invasive plant within the mid marsh, high marsh, and transition zones and is known to exclude native species. Perennial pepperweed has been shown to reduce cover of rare endemic plant species in other brackish tidal marshes where they co-occur (Fiedler et al., 2007).

Muted Tidal Marsh

Muted tidal marsh is located within the North Reach and Pacheco Creek. Plant species commonly observed in the muted tidal marsh areas include pickleweed, fat-hen, and bulrush.

Associated Wildlife

Marsh vegetation throughout the Study Area provides nesting and foraging opportunities and cover for water bird species and small mammals, including mallard, green-winged teal (*Anas crecca*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), marsh wren (*Cistothorus palustris*), Suisun song sparrow (*Melospiza melodia maxillaris*), red-winged blackbird (*Agelaius phoeniceus*), salt marsh common yellowthroat (*Geothlypis trichas sinuosa*), raccoon (*Procyon lotor*), and California vole (*Microtus californicus*).

Raptors that are typical of marsh habitats include northern harrier, red-tailed hawk (*Buteo jamaicensis*), white-tailed kite (*Elanus leucurus*), and American kestrel (*Falco sparverius*). Migratory shorebirds that forage in the mudflats along Suisun Bay during low tide, as well as the channel banks, include black-necked stilt (*Himantopus mexicanus*), American avocet (*Recurvirostra americana*), marbled godwit (*Limosa fedoa*), and several sandpiper species. During high tides, ducks that may be found in tidal marsh environments include northern shoveler (*Anas clypeata*), American wigeon (*Anas americana*), northern pintail (*Anas acuta*), gadwall (*Anas strepera*), and canvasback (*Aythya valisineria*).

Special-status wildlife that may occur within tidal marsh habitats includes salt marsh harvest mouse, Ridgway's rail, and California black rail.

Pickleweed Marsh

Non-tidal pickleweed marsh occurs in all three reaches in the Study Area. Pickleweed marsh is dominated by pickleweed and contains varying densities of this plant. With a slight increase in elevation, pickleweed intergrades into areas composed of an assortment of hydrophytic species including, natives saltgrass, alkali heath, and non-natives fat-hen, perennial pepperweed, brass buttons (*Cotula coronopifolia*), and rabbitfoot grass (*Polypogon monspeliensis*).

Similar to tidal brackish marsh, pickleweed marsh can provide nesting, foraging, and refugia habitat for wildlife associated with marsh vegetation. The lower water levels and sparse vegetation can attract foraging and potentially nesting shorebirds such as, sandpiper, black-necked stilt, American avocet, short-billed dowitcher (*Limnodromus griseus*), and killdeer. Northern harrier commonly hunts over open marshes. Pickleweed marsh also provides habitat for small rodents that occur in the tidal brackish marshes and diked wetlands of the region including saltmarsh harvest mouse and Suisun shrew (*Sorex ornatus sinuosus*).

Seasonal Wetland

Only a couple of seasonal wetlands exist in the Study Area and are dominated by invasive perennial pepperweed and stinkwort with other native and non-native vegetation. The seasonal wetlands within the Study Area are somewhat disturbed from human and dirt bike traffic, so wildlife use of these areas is likely limited, but they may provide foraging, refuge, or nesting habitat for common birds or mammals.

Tidal Channel

Lower Walnut Creek, Pacheco Creek, and small channels within the tidal marsh consist of open water, bordered by stands of bulrush, common reed, and other low marsh vegetation. Tidal channels include subtidal habitat and intertidal mudflat. Subtidal habitat occurs in Suisun Bay and within the Lower Walnut Creek and Pacheco Creek channels where elevations are below the tide range and the substrate is, as a result, continuously submerged. Intertidal mudflat includes intertidal areas not continuously submerged. Intertidal mudflat occurs upslope of the subtidal areas and in numerous smaller tidal channels within the Study Area and is generally devoid of vegetation.

Mudflat bordering the channels provides limited foraging opportunities for shorebirds. The deeper waters of the channel provide foraging and resting habitat for grebes, cormorants, and diving ducks; and the shallow waters could provide habitat for dabbling ducks such as mallard, northern shoveler, and gadwall.

Scald/Playa

Scald/playa habitats occur throughout the North, Middle, and South Reaches and contain little or no vegetation, but the scald edges are generally surrounded by pickleweed or other salt tolerant vegetation. Some of the scalds pond seasonally, while others only become saturated during

seasonal rains. The scalds contain sandy substrate and maintain high summer salt concentrations that prevents vegetation growth. Scald/playa habitat can provide foraging habitat to raptors.

Seasonal Pond

Seasonal ponds occur in small quantities in the North, Middle, and South Reaches of the Study Area. The shallow open water of the ponds may provide important foraging and resting habitat for shorebirds, waterfowl, and migrating birds.

3.2 Special-Status Species

A comprehensive list of special-status fish, wildlife and plant species that could occur in the Study Area was compiled to assess the likelihood of species occurrence (see **Appendix A** and **Appendix B**). Some of these receive specific protection defined in federal or state endangered species legislation. Others have been designated as “sensitive” on the basis of adopted policies and expertise of state resource agencies or organizations with acknowledged expertise, or policies adopted by local governmental agencies such as counties, cities, and special districts to meet local conservation objectives. These species are referred to collectively as “special-status species” in this report. Species with a moderate or high potential to occur in the Study Area are described below in greater detail.

3.2.1 Special-Status Plants

Database information indicates that 38 special-status plants have been documented in the vicinity of the Study Area (CDFW, 2018; CNPS, 2018). Of these, thirteen special-status plant species were determined to have moderate or high likelihood to occur within the Study Area. Protocol-level rare plant surveys were completed in May, June, October, and November 2018 within portions of the Study Area to identify whether these special-status plant species occur within the Study Area (Wood Biological Consulting and ESA, 2019). Summaries of each of these thirteen species is provided below. More details from the rare plant surveys can be found in the Rare Plant Survey Report in **Appendix C**. The remaining species were determined unlikely to occur based on lack of suitable specific habitat conditions (i.e., vernal pools), or because the associated habitat communities are not present (i.e., chaparral), or because of lack of suitable soil conditions, or because previous studies not identifying the species near the Study Area.

3.2.1.1 Plants

Soft bird's-beak (*Chloropyron molle* ssp. *molle*) is a federal-listed endangered species, a state-listed rare species, and a California Rare Plant Rank (CRPR) 1B.2 species. Soft bird's-beak is found in the heavy clay soils of coastal salt and brackish marshes of northern San Francisco Bay and occurs at the upper end of tidal zones. It is associated with pickleweed, salt grass, fat hen, and jaumea (*Jaumea carnosa*) and is rarely found in non-tidal conditions. Soft bird's-beak is an annual herb in the broomrape family (Orobanchaceae) that blooms from July to November. It typically occurs on the edge of pannes and in low growing marsh vegetation in coastal salt marsh and coastal brackish marsh at elevations ranging from 0 to 10 feet. Soft bird's-beak is known to

occur less than one mile from the Study Area (CDFW, 2018). This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Potentially suitable habitat exists in tidal marsh habitat in un-surveyed portions of the North Reach.

Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*) is an annual forb in the sunflower family (Asteraceae) and is a CRPR 1B.1 species. It typically occurs in alkaline grassy areas on the edge of brackish marsh in valley and foothill grassland habitat at elevations ranging from 1 to 750 feet. This spiny, erect, yellow flowered, herbaceous annual can bloom from June through November. Leaves are green to gray-green and stems are white. The nearest documented occurrence is directly adjacent to the Study Area (CDFW, 2018). Associated species found in nearby Congdon's tarplant populations include pickleweed, fat-hen, bristly ox-tongue, and Italian rye grass, all of which are common plant species found within the Study Area. This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Potentially suitable habitat exists in the un-surveyed portions of the North, Middle, and South Reach.

Pappose tarplant (*Centromadia parryi* ssp. *parryi*) is an annual forb in the sunflower family (Asteraceae) and is a CRPR 1B.2 species. It typically occurs in chaparral, coastal prairie, meadows and seeps, coastal salt marshes, and valley and foothill grassland in vernal mesic soils at elevations ranging from 0 to 1,380 feet. This yellow-flowered, herbaceous annual can bloom from May through November. The nearest documented occurrence is approximately 7 miles from the Study Area (CDFW, 2018). This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Potentially suitable habitat exists in the un-surveyed portions of the North, Middle, and South Reach.

Bolander's hemlock (*Cicuta maculata* var. *bolanderi*) is a CRPR 2B.1 perennial forb in the carrot family (Apiaceae) that blooms from July to September. It typically occurs in freshwater or brackish marsh and swamp habitat at elevations ranging from 0 to 650 feet. This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Bolander's hemlock has potential to occur within un-surveyed portions of the North Reach because these areas contain potentially suitable tidal marsh habitat. The nearest documented occurrence is 1.4 miles from the Study Area (CDFW, 2018).

San Joaquin spearscale (*Extriplex joaquinana*) is a CRPR 1B.1 species. San Joaquin spearscale is an annual herb in the goosefoot family (Chenopodiaceae) that blooms from April to October. It typically occurs in seasonal alkali sink scrub and wetlands in chenopod scrub, alkali meadow, and valley and foothill grassland habitat at elevations ranging from 0 to 2,740 feet (CDFW, 2018; CNPS, 2018). The nearest documented occurrence is approximately 1.5 miles west of the Study Area and occurs in annual grassland habitat above brackish marsh habitat (CDFW, 2018). This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Potentially suitable habitat exists in the un-surveyed portions of the Middle Reach and South Reach.

Santa Cruz tarplant (*Holocarpha macradenia*) is a federal-listed threatened species, state-listed endangered species, and CRPR 1B.1 species. It is an annual herb belonging to the sunflower family (Asteraceae). This species is restricted to coastal prairie, coastal scrub and valley and foothill grasslands, often on clay or sandy soils, at 10-220 m (33-722 ft) in elevation. Its current range includes marine terraces of the northern Monterey Bay in Monterey and Santa Cruz counties, historically ranging into Alameda and Contra Costa counties. It is known from 37 historic occurrences, 22 of which are believed to be extant in only Solano and Santa Cruz counties (CDFW, 2018). All extant occurrences in Contra Costa County are reintroductions. Marginally suitable and highly disturbed coastal scrub and grassland habitat is present within the Study Area. This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Potentially suitable habitat exists in the un-surveyed portions of the Middle and South Reaches.

Contra Costa goldfields (*Lasthenia conjugens*) is a federal-listed endangered species, and CRPR 1B.1 species. It is a low herbaceous member of the sunflower family (Asteraceae). Contra Costa goldfields inhabits seasonal wetlands, including vernal pools and mesic grasslands with typically clay or alkaline soils, below 700 feet in elevation. It was once distributed from the North Coast, southern Sacramento Valley, and the San Francisco Bay to the south Coast. It is presently restricted to locations near the Sacramento River Delta in Napa, Solano counties and Contra Costa counties, in the south San Francisco Bay area in Alameda County, and in Monterey County. It is presumed to have been extirpated from Santa Barbara, Mendocino and Santa Clara counties. In Contra Costa County, Contra Costa goldfields is known from four occurrences, only one of which is presumed extant. Mesic grassland and playa habitat occur within the study area, but are highly disturbed and offer only marginal habitat for this species. This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Potentially suitable habitat exists in the un-surveyed portions of the Middle and South Reaches.

Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*) is a perennial forb in the pea family (Fabaceae) with a CRPR 1B.2. It typically occurs along slough and channel edges among tall, dense vegetation in freshwater and brackish marsh habitat at elevations ranging from 0 to 15 feet. The tule pea has lavender to reddish-purple flowers and wide wings along the stems. It is indistinguishable to the eye from its upland variety and taxonomic designations are made on the basis of habitat. Loss of natural edges on sloughs and rivers due to levee building and maintenance has resulted in loss of habitat for this species. Delta tule pea has been observed within brackish tidal marsh in the North Reach of the Study Area in 2004 and 2017 (CDFW, 2018; ESA, personal observation). Delta tule pea was observed within the North Reach in the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019) and potentially suitable habitat is available throughout the mid marsh zone, primarily within the North Reach. This species also has potential to occur in un-surveyed portions of the North Reach within tidal marsh habitat.

Mason's lilaeopsis (*Lilaeopsis masonii*), a state-listed rare and CRPR 1B.1 species, is a perennial forb in the carrot family (Apiaceae) that blooms from April to November. Mason's lilaeopsis spreads rhizomatously across the exposed mud at the mid to low tide levels of fresh or brackish

tidal areas of river banks along the Sacramento, San Joaquin and Napa rivers, and along sloughs in the Delta. It typically occurs in areas within the direct tidal or splash zones on mud banks of sloughs and channels at elevations ranging from 0 to 35 feet. Mason's lilaeopsis is threatened by loss of habitat due to levee building and repair in the Delta. The species bears three or four small white flowers in an umbel at the top of a quarter to half inch-tall flower stalk; leaves are hollow linear and reed-like, round in cross section with walls at intervals dividing the interior of the leaves into chambers. Mason's lilaeopsis was documented near the mouth of Lower Walnut Creek along the east bank in 2004 (CDFW, 2018). During a kayak survey in 2015 this population was not observed. The Study Area contains mud flats and plant species associated with Mason's lilaeopsis such as brass button, common bulrush, and rush (*Juncus* sp.). This species was observed along Lower Walnut Creek, outside of the protocol-level plant survey area, and along Pacheco Creek, within the protocol-level plant survey area, during the 2018 protocol-level plant survey (Wood Biological Consulting and ESA, 2019). This species has potential to occur in un-surveyed portions of the North Reach within tidal marsh habitat.

Delta mudwort (*Limosella subulata*), a CRPR 2B.1 species, is a perennial forb in the figwort family (Scrophulariaceae) that blooms from May to August. It typically occurs on mud banks of sloughs and channels in the Delta region in riparian scrub, freshwater marsh, and coastal brackish marsh habitat at elevations ranging from 0 to 10 feet. This mudwort is a tiny-flowered plant that grows across the sandy mudflats by means of underground stems or stolons. The Study Area contains mud flats and plant species associated with Delta mudwort. This species has been documented just over 5 miles from the Study Area (CDFW, 2018). This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Potentially suitable habitat exists in the un-surveyed portions of the North Reach within tidal marsh habitat.

Marin knotweed (*Polygonum marinense*), a CRPR 3.1 species, is an annual forb in the knotweed family (Polygonaceae) that blooms from May to August. It typically occurs in salt and brackish marshes between 0 to 30 feet. This species has been documented 5.6 miles from Study Area on the north side of Suisun Bay. This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Potentially suitable tidal marsh habitat exists in the un-surveyed portions of the North Reach.

Long-styled sand spurrey (*Spergularia macrotheca* var. *longistyla*) is a CRPR 1B.2 species. It is a stout perennial herb that flowers from February to May. Long-styled sand spurrey is known from 22 occurrences, 12 of which are in Contra Costa and Solano counties. Within the Study Area, alkaline scalds and gaps in non-tidal salt marsh provide suitable habitat for long-styled sand spurrey. This species was not observed within the protocol-level plant survey area during 2018 protocol-level surveys (Wood Biological Consulting and ESA, 2019). Potentially suitable habitat exists in the un-surveyed portions of the Middle and South Reaches.

Suisun Marsh aster (*Symphotrichum lentum*), a CRPR 1B.2 species, is a perennial forb in the sunflower family (Asteraceae) that blooms from May to November. It typically occurs along sloughs and channels in dense marsh vegetation in freshwater and coastal brackish marsh habitat at elevations ranging from 0 to 10 feet. The plant is a tall (3 to 6 feet) perennial with fairly large

violet heads having ray flowers 10 to 12 mm (half inch) long. This species has several documented occurrences within the North Reach of the Study Area from 2004 and 2015 (CDFW, 2018; ESA, personal observation). This species was observed in the North Reach within the protocol-level plant survey area during the 2018 protocol-level plant survey (Wood Biological Consulting and ESA, 2019). Potentially suitable habitat is available throughout the mid marsh zone, primarily within the North Reach. Potentially suitable tidal marsh habitat also exists in the un-surveyed portions of the North Reach. Associated species found with the populations within the Study Area include perennial pepperweed, fat-hen, pickleweed, western goldenrod, coyote brush, and gumplant.

3.2.2 Special-Status Fish and Wildlife

Wildlife species that have a moderate to high likelihood to occur within the Study Area are described below.

3.2.2.1 Fish

California Central Valley and Central California Coast steelhead DPSs. The California Central Valley (CCV) and Central California Coast (CCC) steelhead Distinct Population Segments (DPS) are listed as threatened under FESA. Steelhead possess the ability to spawn repeatedly, maintaining the mechanisms to return to the Pacific Ocean after spawning in freshwater. Juvenile steelhead may spend up to four years residing in freshwater prior to migrating to the ocean as smolts. CCV steelhead migrate through Suisun Bay waters in transit between freshwater spawning areas and the Pacific Ocean, and may therefore occur seasonally in the waters of the Study Area. CCC steelhead were historically abundant within the Walnut Creek watershed, however, impassable barriers within the lower watershed have restricted access to all upstream spawning and rearing habitat (Leidy et al., 2005).

Sacramento River winter-run, Central Valley spring-run, and Central Valley fall/late fall-run Chinook Salmon ESUs. The population of Chinook salmon in the San Francisco Bay-Delta is comprised of three distinct races: winter-run, spring-run, and fall/late fall-run. These races are distinguished by the seasonal differences in adult upstream migration, spawning, and juvenile downstream migration. Chinook salmon are anadromous fish, spending three to five years at sea before returning to freshwater to spawn. These fish pass through the San Francisco Bay-Delta waters to reach their upstream spawning grounds. In addition, juvenile salmon migrate through the waters adjacent to the Study Area en route to the Pacific Ocean.

Sacramento River winter-run Chinook salmon, listed as both state and federally endangered, migrate through San Francisco Bay from December through July with a peak in March (Moyle 2002). Spawning is confined to the mainstem Sacramento River and occurs from mid-April through August (Moyle, 2002). Juveniles emerge between July and October, and are resident in their natal stream 5-10 months followed by an indeterminate residency period in estuarine habitats (Moyle, 2002).

The state- and federal-listed threatened Central Valley spring-run Chinook salmon migrate to the Sacramento River from March to September with a peak spawning period between late August and October (Moyle, 2002). Juvenile salmon emerge between November and March, and are resident in streams for a period of 3 to 15 months before migrating to downstream habitats (Moyle, 2002).

The Central Valley fall/late fall-run Chinook salmon is a California species of special concern. These salmon enter the Sacramento and San Joaquin Rivers from June through December and spawn from October through December, with a peak in November.

Adult and juvenile (smolts) winter-run, spring-run, and fall-run Chinook salmon are known to occur in Suisun Bay and the waters adjacent to the Study Area during migrations to upstream freshwater spawning habitat.

Delta smelt, a federally threatened and state-listed endangered species, is a small, slender-bodied fish which is able to tolerate a wide salinity range and is endemic to the Sacramento-San Joaquin estuary. The fish live in schools and primarily feed on planktonic crustaceans, small insect larvae and mysid shrimp (Moyle, 2002). This species, which has a one-year life span, live primarily along the freshwater edge of the saltwater-freshwater interface of the Sacramento-San Joaquin Delta. Prior to spawning, delta smelt migrate upstream from the brackish-water habitat to river channels and tidally influenced backwater sloughs to spawn. Migration and spawning occur between December and June (Moyle, 2002). The species, though the current population has seen a dramatic reduction in numbers, has historically been collected in large quantities in Suisun Bay, San Pablo Bay and at the Pittsburgh and Contra Costa power plants. The delta smelt has no commercial or recreational value, but is considered a key indicator species of the environmental health of the Delta. Though exceedingly rare, delta smelt are known to be present in the region of the Delta adjacent to the Study Area.

Longfin smelt, a federal candidate for listing, state-listed threatened species, is a small schooling fish that inhabits the freshwater section of the lower Delta and has been observed from south San Francisco Bay to the Delta, with the bulk of the San Francisco Bay population occupying the region between the Carquinez Straight and the Delta. They have been collected in large numbers in Montezuma slough, Suisun Bay and near the Pittsburgh and Contra Costa power plants. In the fall, adults from San Francisco and San Pablo Bays migrate to fresher water in the Delta to spawn. The spawning habits of longfin smelt are similar to the delta smelt and both species are known to school together, though longfin smelt are exceedingly more common in the Bay-Delta. Larval stages are known to inhabit Suisun Bay and move down bay as they grow larger in April and May. The larvae are pelagic and found in the upper layers of the water column. Longfin smelt are harvested commercially and sold in local markets. Longfin smelt are known to be present in the region of Suisun Bay adjacent to the Study Area.

Southern DPS of North American green sturgeon is a federal-listed threatened species. This anadromous fish is the most widely distributed member of the sturgeon family and the most marine-oriented of the sturgeon species. Green sturgeons range in the nearshore waters from Mexico to the Bering Sea and are common occupants of bays and estuaries along the western

coast of the United States (Moyle et al., 1995). Adults in the San Joaquin Delta are reported to feed on benthic invertebrates including shrimp, amphipods and occasionally small fish (Moyle et al., 1995) while juveniles have been reported to feed on opossum shrimp and amphipods. Adult green sturgeons migrate into freshwater beginning in late February with spawning occurring in March through July, with peak activity in April and June. After spawning, juveniles remain in fresh and estuarine waters for 1-4 years and then begin to migrate out to the sea (Moyle et al., 1995). The upper Sacramento River has been identified as the only known spawning habitat for the green sturgeon southern DPS. Although green sturgeon are caught and observed in the lower San Joaquin River, no spawning is known to occur within the river. Green Sturgeon is not expected to use the Study Area as spawning ground; however, they do travel through the adjacent Suisun Bay waters and may utilize the Study Area for feeding.

Sacramento Splittail is a California species of special concern endemic to the San Francisco Bay-Estuary. They are a large, elongate minnow with a blunt head and a slight bump just behind the head. Splittail are adjusted to a wide range of salinities and temperatures and depend on both brackish water for rearing habitat and floodplain/river-edge habitat for spawning (Moyle, 2002). Once abundant throughout the San Francisco Estuary, splittail are now confined to Suisun Bay, Suisun Marsh, and the Napa, Petaluma, and Sacramento River systems. Splittail are known to occur within the lower reaches of Walnut Creek adjacent to the study area (Leidy, 2007).

3.2.2.2 Reptiles

Western pond turtle. Western pond turtle, a California species of special concern, is a thoroughly aquatic turtle found in permanent ponds, rivers, streams, channels, and irrigation ditches with rocky or muddy bottoms, and emergent vegetation. Basking areas used by this species include partially submerged logs, rocks, vegetation mats, and open mud banks. Habitat destruction and stream course degradation are the primary threats to this species. Western pond turtle has been observed in Pacheco Creek at the upstream end of the Study Area.

3.2.2.3 Birds

Ridgway's rail (formerly California clapper rail) is a federally endangered, state endangered, and California fully protected species. Ridgway's rail is the resident rail subspecies of northern and central California, and is currently restricted to the San Francisco Bay Estuary, with the largest populations occurring in remnant salt marshes of south San Francisco Bay. The Ridgway's rail occurs only within salt and brackish marshes. Important Ridgway's rail habitat components are: 1) well-developed tidal sloughs and secondary channels; 2) stands of cordgrass (*Spartina* spp.) in the lower marsh zone; 3) dense salt marsh vegetation for cover; 4) intertidal mudflats, gradually sloping banks of tidal channels, and cordgrass beds for foraging; 5) abundant invertebrate food resources; and 6) transitional vegetation at the marsh edge to serve as a refuge during high tides. In south and central San Francisco Bay, Ridgway's rail typically inhabits salt marshes dominated by pickleweed and cordgrass. Breeding occurs from mid-March through July, with peak activity in late April to late May. Ridgway's rails have been documented near the Study Area in adjacent tidal marshes (CDFW, 2018).

California black rail. Potential breeding habitat for California black rail (state threatened species and California fully protected species) exists in the tidal marsh habitat in the Study Area. This species lives in coastal salt and brackish marshes. Year-round residents, these species stay mainly in the upper to lower zones of coastal marshes that are dominated by pickleweed. Threats to this species include loss and degradation of salt marsh habitat, encroachment of human activities, genetic isolation due to habitat fragmentation, and predation from coyotes, red fox, raptors, possibly river otter, raccoons, and feral cats. Two occurrences of black rails in 2005 and 2016, as documented by CNDDB, occur within the Study Area (CDFW, 2018).

Tricolored blackbird is a state threatened species. Tricolored blackbirds are a colonial species that nest in marsh vegetation such as cattails, tules, and blackberry thickets. This species has been known to forage both along edges of ponds in the immediate vicinity of the nest site and in grasslands and croplands up to four miles from the nest site. Loss of habitat has reduced species nesting sites, and hence species numbers. Because of the ephemeral nature of their habitat, these blackbirds typically nest in different locations from year to year. Brackish marsh vegetation in the Study Area could provide suitable habitat for this species and eBird documents two sightings of individual tricolored blackbirds among a flock of red-winged blackbirds in marshes adjacent to the Study Area (eBird, 2018).

Northern harrier. This species, like other raptors and birds in general, is protected under California Code 3503 and 3503.5, which prohibits the taking or destroying of any bird or nest in the order of Falconiformes (falcons, kites, and hawks) and Strigiformes (owls). It is also a California species of special concern. Northern harrier nest and forage along wet meadows, slough, savanna, prairie, and marshes, feeding on small mammals, such as California vole and mice. The territory for this species is often a minimum of 10-20 acres of foraging area. Destruction of marsh habitat is the primary reason for the decline of this species. Northern harrier was observed foraging within the Study Area during reconnaissance-level surveys and suitable nesting habitat occurs within the Study Area.

Saltmarsh common yellowthroat. The common yellowthroat is a small warbler with a complex of subspecies. The salt marsh subspecies is recognized as a distinct breeding population, with geographic distribution, habitats, and subtle differences in morphological traits that distinguish it from other subspecies. It inhabits tidal salt and brackish marshes in winter, but breeds in freshwater to brackish marshes and riparian woodlands during spring to early summer. Nests are placed on or near the ground in dense emergent vegetation or shrubs. The subspecies is a California species of special concern due to major decline of both habitat and populations in the past decade, but is not currently listed as endangered or threatened. The common yellowthroat is also protected under the Migratory Bird Treaty Act and is a California species of special concern.

Suisun song sparrow is one of three morphologically distinct song sparrow subspecies that occur in the San Francisco Bay region. This particular subspecies is endemic to the marshes bordering Suisun Bay and is a California species of special concern. Intermixed stands of bulrush (*Schoenoplectus* spp.), cattail (*Typha* spp.), and other emergent vegetation provide suitable habitat in brackish marsh habitats. Suisun song sparrows nest in tall bulrush with local

pickleweed. They also frequent tall vegetation along the edges of tidal marshes and forage on mudflats and channel beds exposed at low tide.

3.2.2.4 Mammals

Salt marsh harvest mouse are small, native rodents that are endemic to the salt marshes and adjacent diked wetlands of San Francisco Bay. Salt marsh harvest mice are listed as federally and state endangered species. This species is considered a California fully protected species. Suitable habitat for salt marsh harvest mouse is present in the brackish marshes adjacent to Lower Walnut Creek. In addition, CNDDDB records exist from trapping efforts within the action area in the locality of Shell Marsh, Peyton Slough, and Pacheco Creek. Salt marsh harvest mouse was also trapped in Pt. Edith Wildlife Area, adjacent to action area, throughout the 1970s, 1980s and 1990s; as well as in Avon-Port Chicago Marsh in 1997 (CDFW, 2018). In 2008 four salt marsh harvest mice were captured during trapping efforts in the north part of the South Reach in pickleweed dominated vegetation (Monk & Associates 2008). It is anticipated salt marsh harvest mouse will occupy suitable pickleweed and marsh habitats within the action area. More information on the salt marsh harvest mouse distribution and habitat use can be found in the salt marsh harvest mouse technical memorandum in **Appendix D** (H.T. Harvey and Associates 2018).

The **Suisun shrew** is a California species of special concern with similar habitat characteristics to the salt marsh harvest mouse.

3.2.3 Critical Habitat for Listed Fish and Wildlife Species

Critical habitat is a term defined in the FESA as a specific geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. The FESA requires federal agencies to consult with the USFWS to conserve listed species on their lands and to ensure that any activities or projects they fund, authorize, or carry out will not jeopardize the survival of a threatened or endangered species. In consultation for those species with critical habitat, federal agencies must also ensure that their activities or projects do not adversely modify critical habitat to the point that it will no longer aid in the species' recovery. In many cases, this level of protection is similar to that already provided to species by the FESA jeopardy standard. However, areas that are currently unoccupied by the species but which are needed for the species' recovery are protected by the prohibition against adverse modification of critical habitat.

The National Marine Fisheries Services (NMFS) designated critical habitat for Sacramento winter-run Chinook salmon on June 16, 1993 (NMFS, 1993) and for Central Valley spring-run Chinook salmon and central California coast steelhead, Central Valley steelhead, Central Valley spring-run Chinook salmon on September 2, 2005 (NMFS, 2005) and for green sturgeon on October 9, 2009 (NMFS, 2009). The Study Area does not contain designated fish habitat but the adjacent open waters of Suisun Bay are designated critical habitat for these species.

Critical habitat for delta smelt was designated by the USFWS on December 19, 1994 (USFWS, 1994) and includes the open water portions of Suisun Bay adjacent to the proposed Study Area.

3.2.3.1 Federal Essential Fish Habitat

The Sustainable Fisheries Act of 1996 (Public Law 104-297), amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for Essential Fish Habitat (EFH) descriptions in federal Fisheries Management Plans (FMPs) and to require federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that may adversely affect EFH. The Magnuson-Stevens Act requires all fishery management councils to amend their FMPs to describe and identify EFH for each managed fishery. The Act also requires consultation for all federal agency actions that may adversely affect EFH (i.e., direct versus indirect effects); it does not distinguish between actions in EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside of EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of the activity's location. Under section 305(b)(4) of the Magnuson-Stevens Act, NMFS is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. However, state agencies and private parties are not required to consult with NMFS unless state or private actions require a federal permit or receive federal funding. Although the concept of EFH is similar to that of critical habitat under the FESA, measures recommended to protect EFH by NMFS are advisory, not proscriptive.

The bay waters adjacent to the Study Area fall within EFH for multiple species of commercially important fish managed under three federal fisheries management plans (FMPs):

Coastal Pelagic EFH: The Coastal Pelagic FMP is designed to protect habitat for a variety of fish species that are associated with open coastal waters. Fish managed under this plan include planktivores and their predators. Those commonly found in San Pablo and Suisun Bay include Northern anchovy and Pacific sardine.

Pacific Groundfish EFH: The Pacific Groundfish FMP is designed to protect habitat for more than 90 species of fish, including rockfish, flatfish, roundfish, some sharks and skates, and other species that associate with the underwater substrate. Multiple species are reported in recent years as present in San Pablo and Suisun Bay waters, including English sole and starry flounder.

Pacific Salmon EFH: The Pacific Salmon FMP is designed to protect habitat for commercially important salmonid species. Sacramento Chinook salmon is the only one of these species that may be seasonally present in the Study Area, although historically Coho salmon were once common in San Francisco Bay.

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CHAPTER 4

References and Report Preparation

4.1 References

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4.2 Document Preparation

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Appendix A

Special Status Fish and Wildlife Species with Potential to Occur in the Lower Walnut Creek Restoration Project

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TABLE A
LIST OF SPECIAL STATUS WILDLIFE WITH POTENTIAL
TO OCCUR IN THE LOWER WALNUT CREEK RESTORATION PROJECT

Common Name Scientific Name	Status USFWS/ CDFW/WBWWG	General Habitat	Habitat Suitability & Local Distribution	Potential to Occur
Federal or State Threatened and Endangered Species				
Invertebrates				
Callippe silverspot butterfly <i>Speyeria callippe callippe</i>	FE/--	Host is Johnny jump-up (<i>Viola pedunculata</i>). Associated with grasslands.	Unsuitable habitat within Study Area. Nearest population occurs in the hills between Vallejo and Cordelia north of Suisun Bay and over 6 miles from the Study Area.	Low
Delta green ground beetle <i>Elaphrus viridis</i>	FT/--	Restricted to small region in Solano County. Inhabits vernal pools habitats.	No vernal pool habitat occurs within the Study Area. The nearest CNDDDB occurrence is more than 10 miles from the Study Area.	Low
San Bruno elfin butterfly <i>Callophrys mossii bayensis</i>	FE/--	The San Bruno Elfin Butterfly inhabits rocky outcrops and cliffs in coastal scrub on the San Francisco peninsula.	No suitable habitat within the Study Area. Study Area is outside of the known range of the species.	Low
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	FT/--	Endemic to the Central Valley of California. The beetle is found only in association with its host plant, elderberry (<i>Sambucus</i> spp.).	No known elderberry bushes within the study area. The nearest CNDDDB occurrence is more than 10 miles from the Study Area.	Low
California freshwater shrimp	FE/CE	Small, perennial coastal streams with exposed live roots of trees such as alders and willows along undercut banks. Occurs in Marin, Sonoma, and Napa Counties.	No suitable habitat within the Study Area. Study Area is outside of the known range of the species.	Low
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	FT/--	Occur in vernal pools.	No vernal pool habitat occurs within the Study Area. The nearest CNDDDB occurrence is more than 10 miles from the Study Area.	Low
Fish				
Southern DPS of North American green sturgeon <i>Acipenser medirostris</i>	FT/CSC	Inhabit near-shore marine waters from Mexico to the Bering Sea and are commonly observed in bays and estuaries along the western coast of North America. Southern DPS is only known to spawn in upper Sacramento River.	May enter Lower Walnut Creek to forage. Suisun Bay, Lower Walnut Creek, and the marsh just west of the north reach of the study area are all part of designated critical habitat for the species.	Moderate
Sacramento River winter-run Chinook salmon ESU <i>Oncorhynchus tshawytscha</i>	FE/CE	Spawns and rears in Sacramento River and tributaries where gravelly substrate and shaded riparian habitat occurs.	Migrates within Suisun Bay, so may occasionally stray into Study Area.	Moderate
Central Valley spring-run Chinook salmon ESU <i>Oncorhynchus tshawytscha</i>	FT/CT	Spawns and rears in Sacramento River and tributaries where gravelly substrate and shaded riparian habitat occurs.	Migrates within Suisun Bay, so may occasionally stray into Study Area.	Moderate
Steelhead – California Central Valley DPS <i>Oncorhynchus mykiss</i>	FT/--	Spawns and rears in coastal streams between the Russian River and Aptos Creek, as well as drainages of the SF and San Pablo Bays, where gravelly substrate and shaded riparian habitat occurs.	Migrates through project vicinity. May occasionally stray into Lower Walnut Creek	Moderate

Common Name Scientific Name	Status USFWS/ CDFW/WBWW	General Habitat	Habitat Suitability & Local Distribution	Potential to Occur
Steelhead –Central California Coast DPS <i>Oncorhynchus mykiss</i>	FT/--	Requires cold, freshwater streams with suitable gravel for spawning. Rears in rivers and tributaries to the San Francisco Bay.	Historically present within the watershed, impassable barriers have restricted access to all upstream spawning and rearing habitat.	Low
Longfin smelt <i>Spirinchus thaleichthyes</i>	FC/CT	Occur in the middle or bottom of water column in salt or brackish water portions of the Sacramento/San Joaquin estuary. Concentrated in Suisun, San Pablo, and North SF Bays.	Known to rear in Suisun Bay. May enter Lower Walnut Creek and other Study Area channels.	Moderate
Delta smelt <i>Hypomesus transpacificus</i>	FT/CE	Restricted to the Sacramento-San Joaquin Delta, including Suisun and San Pablo Bays and the Carquinez Strait.	Critical habitat designated in Sacramento-Suisun Bay bordering the Study Area. May stray into Lower Walnut Creek and other Study Area channels.	Low
Amphibians				
California tiger salamander <i>Ambystoma californiense</i>	FT/CT	Seasonal freshwater ponds with little or no emergent vegetation. Utilizes mammal burrows in upland habitat for aestivation during the dry season.	Unsuitable habitat within Study Area.	Low
California red-legged frog <i>Rana aurora draytonii</i>	FT/CSC	Breed in stock ponds, pools, and slow-moving streams with emergent vegetation for escape cover and egg attachment. Where water is seasonal often utilizes mammal burrows in upland habitat for aestivation	Unsuitable habitat within Study Area.	Low
Reptiles				
Alameda whipsnake <i>Masticophis lateralis euryxanthus</i>	FT/CT	Preferred habitat a mosaic of open coastal scrub or chaparral and grassland with rocky outcrops	Unsuitable habitat within Study Area.	Low
Giant garter snake <i>Thamnophis gigas</i>	FT/CT	The most aquatic of California garter snakes, this species prefers freshwater marsh and low-gradient streams, and has adapted to drainage canals and irrigation ditches. Predominantly in the Central Valley.	Suitable habitat may occur within sloughs and channels in the Study Area. However, Study Area is west of species population and recovery units. Nearest CNDDDB occurrence is more than 10 miles from the Study Area.	Low
Birds				
Tricolored blackbird <i>Agelaius tricolor</i>	--/CT	Nest in emergent vegetation within aquatic and riparian habitats.	Marsh cattails and reeds provide suitable breeding habitat. Species was recently documented north of Suisun Bay, 4.3 miles from the Study Area.	Moderate (Breeding)
California black rail <i>Laterallus jamaicensis coturniculus</i>	--/CT&FP	Occurs most commonly in tidal salt marshes dominated by pickleweed or tidal brackish marshes supporting bulrush in association with pickleweed. Nests and forages in tidal emergent wetland.	Suitable marsh habitat within the Study Area and documented occurrences occur within and adjacent to the Study Area.	High
Ridgway's (California clapper) rail <i>Rallus obsoletus</i>	FE/CE&FP	Nests and forages in emergent wetlands with pickleweed, cordgrass, and bulrush	Suitable marsh habitat within Study Area and multiple occurrences in marshes adjacent or nearby the Study Area.	High

Common Name Scientific Name	Status USFWS/ CDFW/WBVG	General Habitat	Habitat Suitability & Local Distribution	Potential to Occur
California least tern <i>Sterna antillarum browni</i>	FE/CE&FP	Colonial breeder on bare or sparsely vegetated flat substrates including sand beaches, alkali flats, landfills, or paved areas	No sandy beaches suitable for nesting colonies within the Study Area.	Low
Mammals				
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	FE/CE&FP	Saline emergent marsh with dense pickleweed. Endemic to San Francisco Bay estuary.	Suitable habitat present with several occurrences recorded within and adjacent to the Study Area. Most recent occurrence within the Study Area was recorded in 2008.	High
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	FE/CT	Annual grasslands or open scrublands with loose textures soils for burrowing and suitable prey base	Unsuitable habitat within Study Area. Not known from the Study Area or vicinity.	Low
State Species of Concern				
Fish				
Central Valley fall/late fall-run Chinook salmon <i>Oncorhynchus tshawytscha</i>	--/CSC	Spawns and rears in Sacramento River and tributaries where gravelly substrate and shaded riparian habitat occurs.	Migrates through project vicinity and spawning is known to occur in Walnut Creek upstream of Study Area.	High
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	--/CSC	Slow moving river sections and dead-end sloughs with flooded vegetation for spawning and foraging for young.	Endemic to California Central Valley and found in Suisun Bay vicinity. One was found during a trawl survey in 2018 within Suisun Bay near the mouth of Lower Walnut Creek. May occasionally stray into Study Area.	Moderate
Reptiles				
Northern California legless lizard <i>Aniella pulchra pulchra</i>	--/CSC	Occurs in moist warm loose soil with plant cover. Occurs in sparsely vegetated areas of beach dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces. Leaf litter under trees and bushes in sunny areas and dunes stabilized with bush lupine and mock heather often indicate suitable habitat.	Study Area is northwest of known current range of the species. Nearest CNDDDB occurrence is from 1936 and is 8.7 miles from the Study Area.	Low
Western pond turtle <i>Actinemys marmorata</i>	--/CSC	Freshwater ponds and slow streams, marshes, rivers, and irrigation ditches with upland sandy soils for laying eggs.	Suitable aquatic habitat within channels but limited basking areas. CNDDDB occurrence in Pacheco Creek at the upstream end of the Study Area. Two other CNDDDB occurrences just over a mile from the upstream extent of the Study Area in tributaries to Walnut Creek.	Moderate
California horned lizard <i>Phrynosoma blainvillii</i>	--/CSC	Inhabits a variety of habitats including scrub, chaparral, grasslands and woodlands. Typically found in open sandy area often near ant hills.	Study area contains marginal scrub and grassland habitat. Nearest CNDDDB occurrence 8.5 miles from the Study Area within chaparral habitat.	Low
Birds				

Common Name Scientific Name	Status USFWS/ CDFW/WBWW	General Habitat	Habitat Suitability & Local Distribution	Potential to Occur
Cooper's hawk <i>Accipiter cooperii</i>	--/WL	Dense stands of live oak, riparian deciduous, or other forest habitats near water used most frequently.	No suitable nesting habitat within the Study Area. Nearest CNDDDB occurrence 7.5 miles from the Study Area within woodlands.	Low (Breeding)
Golden eagle <i>Aquila chrysaetos</i>	--/FP	Rolling foothills with open grasslands, scattered trees, and cliff-walled canyons. Nests constructed on steep cliffs or in large trees.	There is no suitable nesting habitat within the Study Area.	Low (Breeding)
Short-eared owl <i>Asio flammeus</i>	--/CSC	Open country that supports concentrations of rodents and herbaceous cover sufficient to conceal their ground nests from predators. Suitable habitats may include salt- and freshwater marshes, irrigated alfalfa or grain fields, and ungrazed grasslands and old pastures.	Marsh habitat provides suitable breeding and foraging habitat. Study area is outside of the current breeding range. Nearest CNDDDB occurrence is 8 miles from the Study Area north of Suisun Bay.	Low (Breeding)
Burrowing owl <i>Athene cunicularia hypugea</i>	--/CSC	Nests in mammal burrows in open, sloping grasslands and valley bottoms and foothills with low vegetation.	No suitable burrows observed on site. Several CNDDDB occurrences within 10 miles of the Study Area that occur in annual grasslands with an abundance of small mammal burrows.	Low (Breeding)
Ferruginous hawk <i>Buteo regalis</i>	--/WL	Winters in open grasslands, sagebrush flats, desert scrub, and low foothills. Preys primarily on mammals. Does not nest in the region.	Study Area is outside of species nesting range. There is potentially suitable foraging habitat, however, species is not common to area.	Low (Breeding)
Northern harrier <i>Circus cyaneus</i>	--/CSC	Mostly nests in emergent vegetation, wet meadows or near rivers and lakes, but may nest in grasslands away from water.	Suitable marsh and grassland nesting habitat available. Observed foraging within the Study Area.	High (Breeding)
Yellow rail <i>Coturnicops noveboracensis</i>	--/CSC	Densely vegetated marshes.	Suitable marsh nesting habitat available within the Study Area. Only one historic occurrence along the south shore of Suisun Bay. Two recent occurrences north of Suisun Bay within 10 miles of the Study Area. Does not breed in California, except a limited area near the Oregon border.	Unlikely (Breeding) Moderate (Non-breeding)
White-tailed kite <i>Elanus leucurus</i>	--/FP	Commonly associated with agriculture areas. Generally, occur in low-elevation grassland, wetland, oak woodland, low shrub, open woodlands, or savannah habitats. Typically nest in dense tree stands in riparian areas adjacent to open space areas.	Suitable nesting habitat not present within the Study Area.	Low (Breeding)
American peregrine falcon <i>Falco peregrinus anatum</i>	--/FP	Open habitats for foraging, including tundra, marshes, coasts, savannahs, grasslands, meadows, open woodlands, and agricultural areas. Often nest on cliffs often located near rivers or lakes. Riparian areas, as well as coastal and inland wetlands, are also important habitats year-round for this species.	Suitable nesting habitat not present within the Study Area.	Low (Breeding)

Common Name Scientific Name	Status USFWS/ CDFW/WBWW	General Habitat	Habitat Suitability & Local Distribution	Potential to Occur
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	--/CSC	Saline and freshwater marshes. Foraging habitat requires thick, continuous cover down to water surface. Nesting habitat includes tall grasses, tule patches, or willows.	Several CNDDDB occurrences are present adjacent to and within 5 miles of the Study Area. However, unclear if the subspecies observed around Suisun Bay is this subspecies.	Moderate (Breeding)
Suisun song sparrow <i>Melospiza melodia maxillaris</i>	--/CSC	Brackish water marshes and sloughs with cattails, tules, and pickleweed	Song sparrows observed during field reconnaissance survey could be this subspecies. Suitable nesting habitat present.	High (Breeding)
San Pablo song sparrow <i>Melospiza melodia samuelis</i>	--/CSC	Tidal marshes in San Pablo Bay. Dense vegetation required for nesting.	Study Area outside of range of this subspecies.	Low (Breeding)
Osprey <i>Pandion haliaetus</i>	--/WL	Elevated nest sites near fish-filled waters. Fishing grounds must have fish near the water surface.	Could potential nest nearby Study Area if proper nesting platforms exist. However, no known properly elevated nesting sites occur within the Study Area.	Low (Breeding)
Mammals				
Pallid bat <i>Antrozous pallidus</i>	--/CSC/High Priority	A wide variety of habitats is occupied, including grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forests. Most commonly found in open and dry habitat with rocky areas for roosting. Roosts in foliage of riparian forests and other broadleaf woodlands associated with creeks and drainages. Also roosts in buildings, caves, tree hollows, crevices, mines, and bridges.	Study Area may provide suitable roosting habitat under Lower Walnut Creek bridges. May forage in Study Area. Nearest CNDDDB occurrence is 5.2 miles from the Study Area.	Moderate
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	--/CSC/High Priority	Found in all habitats except subalpine and alpine habitats, and may be found at any season throughout its range. Highly associated with caves and cave-like habitats including abandoned mines. Roost in caves, mines, and tunnels with minimal disturbance but can also be found in abandoned open buildings or other human made structures.	Suitable roosting habitat may occur under bridges within the Study Area. May forage within Study Area. Nearest CNDDDB occurrence is 6.9 miles from the Study Area.	Moderate
Western red bat <i>Lasiurus blossevillei</i>	--/CSC/High Priority	Habitats include forests and woodlands from sea level up through mixed conifer forests. Feeds over a wide variety of habitats including grasslands, shrublands, open woodlands and forests, and croplands. Solitary rooster in tree foliage. May hibernate in leaf litter. Found under tree bark of Eucalyptus trees and also found roosting in leaf litter of Eucalyptus woodlands.	Suitable roosting habitat may occur in eucalyptus trees within the Study Area. May forage within Study Area. Nearest CNDDDB occurrence is 9.8 miles from the Study Area.	Moderate
Hoary bat <i>Lasiurus cinereus</i>	--/--/Medium Priority	Solitary rooster in tree foliage. Habitats include woodlands, forests, and riparian habitats with dense foliage. Winters along the coast and in southern California, breeding inland and north of the winter range. During migration can be found throughout California.	Suitable roosting habitat may occur in eucalyptus trees within the Study Area. May forage within Study Area. Nearest CNDDDB occurrence is 3.8 miles from the Study Area.	Moderate

Common Name Scientific Name	Status USFWS/ CDFW/WBWW	General Habitat	Habitat Suitability & Local Distribution	Potential to Occur
San Francisco dusky-footed woodrat <i>Neotoma fuscipes annectens</i>	--/CSC	Found in forest habitats with moderate canopy, a brushy understory, and suitable nestbuilding materials.	Suitable habitat not present within the Study Area.	Low
Big free-tailed bat <i>Nyctinomops macrotis</i>	--/CSC/ Medium-High Priority	Prefer habitats with rugged, rocky terrain up to 8,000 feet elevation. Roosts in rock crevices.	Study Area does not provide suitable roosting habitat, but may occasional forage in Study Area. Nearest CNDDB occurrence is 2.4 miles from the Study Area.	Low (Roosting)
Suisun shrew <i>Sorex ornatus sinuosus</i>	--/CSC	Tidal marshes, require dense low cover above the mean tide line for nesting and foraging.	Suitable habitat within Study Area but known occurrences restricted to north Suisun Bay.	Moderate

Status Codes:

FEDERAL: (U.S. Fish and Wildlife Service)
 FE = Listed as Endangered (in danger of extinction) by the Federal Government.
 FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
 FP = Proposed for Listing as Endangered or Threatened.
 FC = Listed as Federal Candidate species.

STATE: (California Department of Fish and Game)
 CE = Listed as Endangered by the State of California
 CT = Listed as Threatened by the State of California
 CC = Candidate for Listing by State of California
 CR = Listed as Rare by the State of California (plants only)
 CSC = Species of Special Concern
 FP = Fully Protected Species
 WL = Watch List species

SOURCES: CDFW 2018; CDFW 2018b; Jones & Stokes 2004, and 2007; Papenfuss and Parham 2013, Shuford and Gardali 2008; USFWS 2017; USFWS 2018

Appendix B

Special Status Plant Species with Potential to Occur in the Lower Walnut Creek Restoration Project

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TABLE B
LIST OF SPECIAL STATUS PLANTS WITH POTENTIAL
TO OCCUR IN THE LOWER WALNUT CREEK RESTORATION PROJECT

Common Name Scientific Name	Status USFWS/ CDFW/CNPS	Habitat and Distribution Information	Flowering Phenology/Life Form	Habitat Suitability & Local Distribution	Potential to Occur
Bent-flowered fiddleneck <i>Amsinckia lunaris</i>	--/--/1B.2	Occurs in coastal bluff scrub, cismontane woodland, valley and foothill grassland between 3-500 meters. Known from ALA, CCA, COL, LAK, MRN, NAP, SBT, SCL, SCR, SMT, SON, SUT, and YOL counties.	March-June annual herb	Highly disturbed grasslands on Study Area offer only marginal habitat for this species. Nearest CNDDDB occurrence 5.1 miles from the Study Area.	Low
Slender silver moss <i>Anomobryum julaceum</i>	--/--/4.2	Occurs in damp rock and soil outcrops, usually on roadcuts in broadleaved upland forest, lower montane coniferous forest, and North Coast coniferous forest between 100-1000 meters. Known from BUT, CCA, HUM, LAX, MPA, SBA, SCR, SHA, and SON counties.	N/A moss	No suitable habitat within the Study Area.	Low
Mt. Diablo manzanita <i>Arctostaphylos auriculata</i>	--/--/1B.3	Occurs in chaparral on sandstone substrate, and in cismontane woodland between 135-650 meters. Known to only be in Contra Costa County. Known from fewer than 20 occurrences.	January-March perennial evergreen shrub	No suitable habitat within the Study Area.	Not present
Contra Costa manzanita <i>Arctostaphylos manzanita</i> ssp. <i>laevigata</i>	--/--/1B.2	Occurs in chaparral on rocky substrate between 420-1100 meters. Known from CCA county.	January-March (April) perennial evergreen shrub	No suitable habitat within the Study Area.	Not present
Big tarplant <i>Blepharizonia plumosa</i>	--/--/1B.1	Occurs in valley and foothill grassland (usually clay) between 30-505 meters. Known from ALA, CCA, SJQ, SOL, and STA counties.	July-October annual herb	Highly disturbed grasslands on Study Area offer only marginal habitat for this species. Study Area is outside of elevation range of the species. Nearest CNDDDB occurrence is 4.7 miles from Study Area.	Low

Common Name Scientific Name	Status USFWS/ CDFW/CNPS	Habitat and Distribution Information	Flowering Phenology/Life Form	Habitat Suitability & Local Distribution	Potential to Occur
Mt. Diablo fairy lantern <i>Calochortus pulchellus</i>	--/--/1B.2	Occurs in chaparral, cismontane woodland, riparian woodland, valley and foothill grassland between 30-840 meters. Known from ALA, CCA, and SOL counties.	April-Jun perennial bulbiferous herb	Highly disturbed grasslands on Study Area offer only marginal habitat for this species. Study Area is outside of elevation range of the species. Nearest CNDDDB occurrence is 3.8 miles from Study Area.	Low
Congdon's tarplant <i>Centromadia parryi</i> ssp. <i>congonii</i>	--/--/1B.1	Occurs in alkaline areas in valley and foothill grassland between 0-230 meters. Known from ALA, CCA, MNT, SCL, SCR, SLO, SMT, and SOL counties.	May-October (November) annual herb	The Study Area contains habitat that may support this species. There are three nearby CNDDDB occurrences found within annual grassland habitat near adjacent marsh habitat. Nearest CNDDDB occurrence is 0.04 miles from Study Area found with plant associates that are present within the Study Area.	High
Pappose tarplant <i>Centromadia parryi</i> ssp. <i>parryi</i>	--/--/1B.2	Occurs in chaparral, coastal prairie, meadows and seeps, coastal salt marshes and swamps, and valley and foothill grassland in vernal mesic soils between 0-420 meters. Known from BUT, COL, GLE, LAK, NAP, SMT, SOL, and SON counties.	May-November annual herb	The Study Area contains coastal marsh that may support this species. Nearest CNDDDB occurrence is 6.8 miles from Study Area north of Suisun Bay.	Moderate
Soft bird's-beak <i>Chloropyron molle</i> ssp. <i>molle</i>	FE/CR/1B.2	Occurs in coastal salt marsh and swamp between 0-3 meters. Known from CCA, MRN, NAP, SAC, SOL and SON counties.	June-November annual herb (hemiparasitic)	The Study Area contains coastal marsh that may support this species. Nearest CNDDDB occurrence is 0.7 miles from Study Area.	High
Bolander's water hemlock <i>Cicuta maculata</i> var. <i>bolanderi</i>	--/--/2B.1	Occurs in coastal marshes and swamps, and fresh or brackish water between 0-200 meters. Known from CCA, MRN, SAC, SBA and SOL counties.	July-September perennial herb	The Study Area contains coastal marsh that may support this species. Nearest CNDDDB occurrence is 1.4 miles from Study Area.	High

Common Name Scientific Name	Status USFWS/ CDFW/CNPS	Habitat and Distribution Information	Flowering Phenology/Life Form	Habitat Suitability & Local Distribution	Potential to Occur
Hospital Canyon larkspur <i>Delphinium californicum</i> ssp. <i>interius</i>	--/--/1B.2	Occurs in openings in chaparral, on mesic soils in cismontane woodland (mesic), and coastal scrub between 195-1095 meters. Known from ALA, CCA, MER, MNT, SBT, SCL SJQ, and STA counties.	April-June perennial herb	The Study Area contains marginal and disturbed coastal scrub habitat, but the Study Area is lower in elevation than this species is known to occur at. Nearest known occurrence is 7.1 miles from Study Area.	Low
Western leatherwood <i>Dirca occidentalis</i>	--/--/1B.2	Occurs in mesic soils in broadleaf upland forest, closed-coned coniferous forest, chaparral, cismontane woodland, north coast coniferous forest, riparian forest, and riparian woodland between 25-425 meters. Known from ALA, CCA, MRN, SCL, SMT, and SON counties.	January-March (April) perennial deciduous shrub	No suitable habitat within the Study Area.	Low
Lime ridge eriastrum <i>Eriastrum erterae</i>	--/--/1B.1	Occurs on alkaline or semi-alkaline and sandy soils in openings or edges of chaparral between 200-290 meters. Known from CCA county.	June-July annual herb	No suitable habitat within the Study Area. Study Area outside of elevation range of species.	Low
Mt. Diablo buckwheat <i>Eriogonum truncatum</i>	--/--/1B.1	Occurs on sandy soils in chaparral, coastal scrub, and valley and foothill grassland between 2-350 meters. Known from ALA, CCA, and SOL counties.	April-September (November-December) annual herb	The Study Area contains marginal and disturbed coastal scrub and non-native grassland on disturbed sandy fill soils. Nearest known CNDDDB occurrence is 8.3 miles from Study Area, from 1936, and occurs near Mt. Diablo. Also discovered in Antioch at Black Diamond Mines in 2016.	Low
Jepson's coyote thistle <i>Eryngium jepsonii</i>	--/--/1B.2	Occurs on clay soils in valley and foothill grassland, and vernal pools between 3-300 meters. Known from ALA, AMA, CAL, CCA, FRE, NAP, SMT, SOL, STA, TUO, and YOL counties.	April-August perennial herb	Highly disturbed grasslands on Study Area offer only marginal habitat for this species. Nearest CNDDDB occurrence is 3.4 miles away from Study Area.	Low
Contra Costa Wallflower <i>Erysimum capitatum</i> var. <i>angustatum</i>	FE/CE/1B.1	Known only from the Antioch Dunes in CCA county with an elevation between 3-20 meters.	March-July	Highly unlikely that suitable habitat is present within Study Area. Sandy area in the North Reach is highly disturbed and was not historically sand dunes. Antioch Dunes approximately 16 miles from the Study Area.	Low
San Joaquin spearscale <i>Extriplex joaquiniana</i>	--/--/1B.1	Occurs on alkaline soils in chenopod scrub, meadows, playas, valley and foothill grassland between 1-835 meters. Known from ALA, CCA, COL, FRE, GLE, MER, MNT, NAP, SBT, SCL, SJQ, SLO, SOL, TUL, and YOL counties.	April-October annual herb	The Study Area contains disturbed playa and grassland habitat and marsh habitat that may support this species. Nearest CNDDDB occurrence is 1.5 miles from the Study Area and occurs in annual grassland habitat above brackish freshwater marsh habitat.	Moderate

Common Name Scientific Name	Status USFWS/ CDFW/CNPS	Habitat and Distribution Information	Flowering Phenology/Life Form	Habitat Suitability & Local Distribution	Potential to Occur
Fragrant fritillary <i>Fritillaria liliacea</i>	--/--/1B.2	Occurs often on serpentinite soils in coastal scrub, valley and foothill grassland, coastal prairie; on heavy clay soils, often on ultramafic soils between 3-410 meters. Known from ALA, CCA, MNT, MRN, SBT, SCL, SFO, SMT, SOL, and SON counties.	February-April perennial bulbiferous herb	Highly disturbed grasslands on Study Area offer only marginal habitat for this species. Nearest CNDDDB occurrence is 9.3 miles away from Study Area.	Low
Diablo helianthella <i>Helianthella castanea</i>	--/--/1B.2	Occurs usually on rocky, axonal soils; often in partial shade in broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland between 60-1300 meters. Known from ALA, CCA MRN, SFO, and SMT counties.	March-June perennial herb	The Study area contains marginal and disturbed coastal scrub and annual grassland habitat. Study Area does not occur within the elevation range of this species. Nearest CNDDDB occurrence is 2.8 miles away from Study Area. Many CNDDDB occurrences within 10 miles of the Study Area, most of which occur at the interface of oak woodlands and scrub or grassland habitat.	Low
Brewer's western flax <i>Hesperolinon breweri</i>	--/--/1B.2	Occurs often on serpentinite soils in chaparral, valley and foothill grasslands, and cismontane woodland between 30-945 meters. Known from CCA, NAP, and SOL counties.	May-July annual herb	Study Area is lower in elevation than the elevation range of this species. Study Area does not contain serpentinite soils. Nearest CNDDDB occurrence is 9.7 miles away from Study Area.	Low
Santa Cruz tarplant <i>Holocarpha macradenia</i>	FT/CE/1B.1	Occurs often on clay or sandy soils in coastal prairie, coastal scrub, and valley and foothill grassland between 10-220 meters. Known from ALA, CCA, MNT, MRN, SCR, and SOL counties.	June-October annual herb	The Study Area contains marginal and highly disturbed coastal scrub and grassland habitat at elevations below 10 meters. Nearest CNDDDB occurrence is 9.8 miles from Study Area where species was introduced, but is thought to be extirpated.	Moderate
Carquinez goldenbush <i>Isocoma arguta</i>	--/--/1B.1	Occurs in valley and foothill grassland on alkaline soils between 1-20 meters. Known from SOL county.	August-December perennial shrub	Highly disturbed grasslands on Study Area offer only marginal habitat for this species. Historic occurrence along Carquinez Straits shoreline, exact location unknown.	Low
Northern California black walnut <i>Juglans hindsii</i>	--/--/1B.1	Occurs in riparian forest and woodland from 0-440 meters. Known from CCA, LAK, NAP, SAC, SOL, and YOL counties.	April-May perennial deciduous tree	No suitable habitat within the Study Area.	Low
Contra Costa goldfields <i>Lasthenia conjugens</i>	FE/--/1B.1	Occurs on mesic soils in cismontane woodland, valley and foothill grasslands, and vernal pools; in playas on alkaline soils between 0-470 meters. Known from ALA, CCA, MEN, MNT, MRN, NAP, SBA, SCL, SOL and SON counties.	March-June annual herb	Mesic grassland and playa habitat occur within the Study Area, but are highly disturbed and offer only marginal habitat for this species. Nearest CNDDDB occurrence is 2.6 miles away from Study Area.	Moderate

Common Name Scientific Name	Status USFWS/ CDFW/CNPS	Habitat and Distribution Information	Flowering Phenology/Life Form	Habitat Suitability & Local Distribution	Potential to Occur
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	--/--/1B.2	Occurs in freshwater and brackish marshes and swamps, usually on marsh and slough edges between 0-5 meters. Known from CCA, NAP, SJQ, SOL, SON, and YOL counties.	May-July perennial herb	Suitable marsh habitat present within the Study Area. Observed on site in 2017 and 2018.	High
Mason's lilaeopsis <i>Lilaeopsis masonii</i>	--/CR/1B.1	Occurs in brackish or freshwater marshes and swamps, and riparian scrub between 0-10 meters. Many populations ephemeral, exploiting newly deposited or exposed sediments (CNPS, 2016). Known from ALA, CCA, MRN, NAP, SAC, SJQ, AOL, and YOL counties.	April-November perennial rhizomatous herb	Suitable marsh habitat present within the Study Area. Documented location adjacent to the Study Area in 2004. Observed within the Study Area in 2018.	High
Delta mudwort <i>Limosella australis</i>	--/--/2B.1	Occurs usually on mud banks in freshwater and brackish marshes and swamps, and riparian scrub between 0-3 meters. Known from CCA, SAC, SJQ, and SOL counties.	May-August perennial stoloniferous herb	Suitable habitat occurs along tidal channels and sloughs within the marshes of the Study Area. Nearest CNDDDB occurrence is 5.4 miles away from Study Area.	Moderate
Hall's bush mallow <i>Malacothamnus hallii</i>	--/--/1B.2	Occurs in chaparral and coastal scrub between 10-760 meters. Known from CCA, MER, SCL, SMT, and STA counties.	(April) May-September (October) perennial evergreen shrub	Study area contains marginal and disturbed coastal scrub habitat below the elevation range of this species. Nearest CNDDDB occurrence is 7.1 miles away from Study Area.	Low
Lime Ridge navarretia <i>Navarretia gowenii</i>	--/--/1B.1	Occurs in chaparral between 180-305 meters. Known from CCA and STA counties.	May-June annual herb	Suitable habitat not present within Study Area.	Low
Antioch dunes evening-primrose <i>Oenothera deltoides</i> ssp. <i>howellii</i>	FE/CE/1B.1	Occurs in inland dunes from 0-30 meters. Known from CCA and SAC counties.	March-September perennial herb	Highly unlikely that suitable habitat is present within Study Area. Sandy area in the North Reach is highly disturbed and was not historically inland dune habitat. Nearest CNDDDB occurrence is 7.5 miles away from the Study Area	Low
Bearded popcorn-flower <i>Plagiobothrys hystriculus</i>	--/--/1B.1	Occurs on mesic soils in valley and foothill grassland, in vernal pool margins and often in vernal swales between 0-274 meters. Known from NAP, SOL, and YOL counties.	April- May annual herb	Highly disturbed grassland habitat occurs in the Study Area, but no vernal pools or vernal swales occur. Nearest CNDDDB occurrence is 7.8 miles away from Study Area in vernal swales and pools in annual grassland.	Low
Marin knotweed <i>Polygonum marinense</i>	--/--/3.1	Occurs in coastal salt or brackish marshes and swamps between 0-10 meters. Known from ALA, HUM, MRN, NAP, SOL and SON counties.	(April) May-August (October) annual herb	Suitable marsh habitat present within the Study Area that may support this species. Nearest CNDDDB occurrence is 5.6 miles away from Study Area from 1998 on the north side of Suisun Bay.	Moderate

Common Name Scientific Name	Status USFWS/ CDFW/CNPS	Habitat and Distribution Information	Flowering Phenology/Life Form	Habitat Suitability & Local Distribution	Potential to Occur
Chaparral ragwort <i>Senecio aphanactis</i>	--/--/2B.2	Occurs on alkaline soils in coastal scrub, chaparral, and cismontane woodland between 15-800 meters. Known from ALA, CCA, FRE, LAX, MER, MNT, ORA, RIV, SBA, SBD, SBT, SCL, SCR, SCT, SCZ, SDG, SFO, SLO, SMT, SOL, SRO, TUL, and VEN counties.	January-April (May) annual herb	Suitable habitat and elevations not present on Study Area.	Low
Long-styled sand-spurrey <i>Spergularia macrotheca</i> var. <i>longistyla</i>	--/--/1B.2	Occurs on alkaline soils in meadows and seeps, and marshes and swamps between 0-255 meters. Known from ALA, CCA, NAP, and SOL counties.	February-May perennial herb	Study Area contains alkaline scalds and gaps in non-tidal salt marsh that provide suitable habitat. Only CNDDDB occurrence within 10 miles of the Study Area is a historic occurrence from 1900 1.4 miles away.	Moderate
Slender-leaved pondweed <i>Stuckenia filiformis</i> ssp. <i>alpina</i>	--/--/2B.2	Occurs in marshes and swamps located in shallow, clear water of lakes and drainage channels between 300-2150 meters. Known from ALA, BUT, CCA, ELD, LAS, MER, MNO, MOD, MPA, NEV, PLA, SCL, SHA, SIE, SMT, SOL, and SON counties.	May-July perennial rhizomatous herb (aquatic)	Suitable habitat and elevations not present on Study Area.	Low
Suisun Marsh aster <i>Symphyotrichum lentum</i>	--/--/1B.2	Occurs in marshes and swamps (brackish and freshwater) most often seen along sloughs with common reed, tule, blackberry, and cattail between 0-3 meters. Known from CCA, NAP, SAC, SJQ, SOL, and YOL counties.	(April) May-November perennial rhizomatous herb	Coastal brackish marsh with associated species that may support the Suisun Marsh aster occur within the Study Area. Identified on site in 2004, 2015, and 2018.	High
Saline clover <i>Trifolium hydrophilum</i>	--/--/1B.2	Occurs in marshes and swamps, vernal pools, and valley and foothill grassland (on mesic or alkaline soils) between 0-300 meters. Known from ALA, CCA, COL, LAK, MNT, NAP, SAC, SBT, SCL, SCR, SJQ, SLO, SMT, SOL, SON, and YOL counties.	April-June annual herb	Study Area contains marsh and highly disturbed grassland habitats that may support this species, however most CNDDDB occurrences occur within alkali grassland or vernal pool grassland. There are no CNDDDB occurrences on the south shore of Suisun Bay. Two CNDDDB occurrences within 10 miles of the Study Area north of Suisun Bay.	Low
Caper-fruited tropidocarpum <i>Tropidocarpum capparideum</i>	--/--/1B.1	Occurs in valley and foothill grasslands (alkaline hills) between 1-455 meters. Known from ALA, CCA, FRE, GLE, MNT, SCL, SJQ, and SLO counties.	May-April annual herb	Highly disturbed grasslands on Study Area offer only marginal habitat for this species. Nearest occurrence is 7.9 miles away from Study Area.	Low
Oval-leaved viburnum <i>Viburnum ellipticum</i>	--/--/2B.3	Occurs in chaparral, cismontane woodland, and lower montane coniferous forest between 215-1400 meters.	May-June perennial deciduous herb	Suitable habitat not present on Study Area.	Not present
	Sensitive Plant Communities				

Common Name Scientific Name	Status USFWS/ CDFW/CNPS	Habitat and Distribution Information	Flowering Phenology/Life Form	Habitat Suitability & Local Distribution	Potential to Occur
Name	Global Rank	State Rank		Potential to Occur	
Coastal brackish marsh	G2	S2.1		Present	
Northern coastal salt marsh	G3	S3.2		Low	
Northern maritime chaparral	G1	S1.2		Absent	

Status Codes:FEDERAL: (U.S. Fish and Wildlife Service)

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FC = Listed as Federal Candidate species.

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CC = Candidate for Listing by State of California

CR = Listed as Rare by the State of California (plants only)

CSC = Species of Special Concern

FP = Fully Protected Species

WL = Watch List species

California Rare Plant Rank

Rank 1A= Plants presumed extinct in California

Rank 1B= Plants rare, Threatened, or Endangered in California and elsewhere

Rank 2= Plants rare, Threatened, or Endangered in California but more common elsewhere

Rank 3= Plants about which more information is needed

Rank 4= Plants of limited distribution

0.1 = Plants seriously endangered in California

0.2 = Plants fairly endangered in California

0.3 = Not very Endangered in California

County Abbreviations:

ALA Alameda

ALP Alpine

AMA Amador

BUT Butte

CAL Calaveras

COL Colusa

CCA Contra Costa

DNT Del Norte

ELD El Dorado

FRE Fresno

GLE Glenn

HUM Humboldt

IMP Imperial

INY Inyo

KRN Kern

LAK Lake

LAS Lassen

LAX Los Angeles

MAD Madera

MRN Marin

MPA Mariposa

MEN Mendocino

MER Merced

MOD Modoc

MNO Mono

MNT Monterey

NAP Napa

NEV Nevada

ORA Orange

PLA Placer

PLU Plumas

RIV Riverside

SAC Sacramento

SBT San Benito

SBD San Bernardino

SDG San Diego

SFO San Francisco

SJQ San Joaquin

San Luis Obispo

SMT San Mateo

SBA Santa Barbara

SCL Santa Clara

SCR Santa Cruz

SCT Santa Catalina Island

SCZ Santa Cruz Island

SRO Santa Rosa Island

SHA Shasta

SIE Sierra

SIS Siskiyou

SOL Solano

SON Sonoma

STA Stanislaus

SUT Sutter

TEH Tehama

TRI Trinity

TUL Tulare

TUO Tuolumne

VEN Ventura

YOL Yolo

YUB Yuba

SOURCES: CDFW 2018; USFWS 2018; CNPS 2018, ESA 2017

Appendix C

Lower Walnut Creek Restoration Project, Rare Plant Survey Report

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LOWER WALNUT CREEK RESTORATION PROJECT

Rare Plant Survey Report

Prepared by Wood Biological Consulting
for ESA and Contra Costa County Flood
Control District

July 2019



LOWER WALNUT CREEK RESTORATION PROJECT

Rare Plant Survey Report

Prepared by Wood Biological Consulting
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Cover photo: Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*)

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Lower Walnut Creek Restoration Project Rare Plant Survey Report

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SECTION 1

Summary

This report describes the results of surveys that were conducted for special-status plant species with the potential to occur in the Lower Walnut Creek Restoration Project area, near Martinez, California. It is intended to assist the project proponent in planning and designing the project in a manner that avoids, minimizes, and/or mitigates potentially significant adverse impacts to special-status plant species. The report provides background and site-specific information pertaining to special-status plant species and sensitive natural communities which may present constraints to the proposed activity.

The project site encompasses approximately 162 ha (400 ac) of undeveloped land and open water associated with the lower reaches of Walnut Creek and Pacheco Creek, situated east of Interstate 680 and south of Suisun Bay. The proposed project would include channel excavation, fill removal, levee construction, and habitat restoration.

Plant communities within the study area include tidal brackish marsh*, non-tidal pickleweed marsh*, creeping wild rye turf*, non-native annual grassland, seasonal wetland, scald/playa, seasonal ponds, and submerged aquatic vegetation*. Four of these plant communities (indicated by an asterisk) are sensitive natural communities.

A total of 87 special-status plant species have been recorded from the nine 7.5-minute USGS quadrangles including and surrounding the study area. Of these, 63 plant species are considered to have no potential for occurrence at the project site due to a lack of suitable habitat, lack of suitable soils, or geographic location of the study area relative to known occurrences. Habitat exists for 24 species, although some are considered to have low potential to occur due to only marginal habitat suitability within the study area. Surveys occurred during the flowering or identification period for all 13 species with moderate or high potential to occur. Three special-status species were observed in the study area: Mason's lilaeopsis, Delta tule pea, and Suisun Marsh aster. Project implementation could result in impacts to one or more of these species.

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SECTION 2

Introduction

This report presents the results of a focused floristic survey for the Lower Walnut Creek Restoration Project (the project) located near Martinez, Contra Costa County, California (**Figure 2-1**). Contra Costa County Flood Control & Water Conservation District (the District) proposes to restore and enhance tidal wetlands along the southern shore of Suisun Bay and from Suisun Bay upstream along Walnut Creek and its tributary Pacheco Creek, to provide sustainable flood protection, and to create opportunities for future public access through the project area. This section includes an overview of the proposed project, a discussion of the purpose and need of this rare plant survey, and a summary of the special-status plant species and their habitat that have potential to occur within the project vicinity. For the purposes of this report, the “project area” refers to the extent of any potential project activities. The “study area” (**Figure 2-2**) refers to a subset of the project area that includes lands under District ownership, or where access was otherwise made available for field surveys. The project “work limit” refers to a subset of the project area where any ground disturbance is currently proposed during project construction. Some portions of the project area within the work limit were not accessible at the time of this survey. This includes areas under separate ownership within the North, Middle, and South Reaches as shown in Figure 2-2.

This report is intended to assist the District to identify constraints imposed by the presence of special-status plant species and to enable it to avoid, minimize, or mitigate potential impacts. This analysis is also intended to assist the District in completing an analysis of environmental effects pursuant to the California Environmental Quality Act (CEQA) and to obtain regulatory permits.

2.1 Project Location

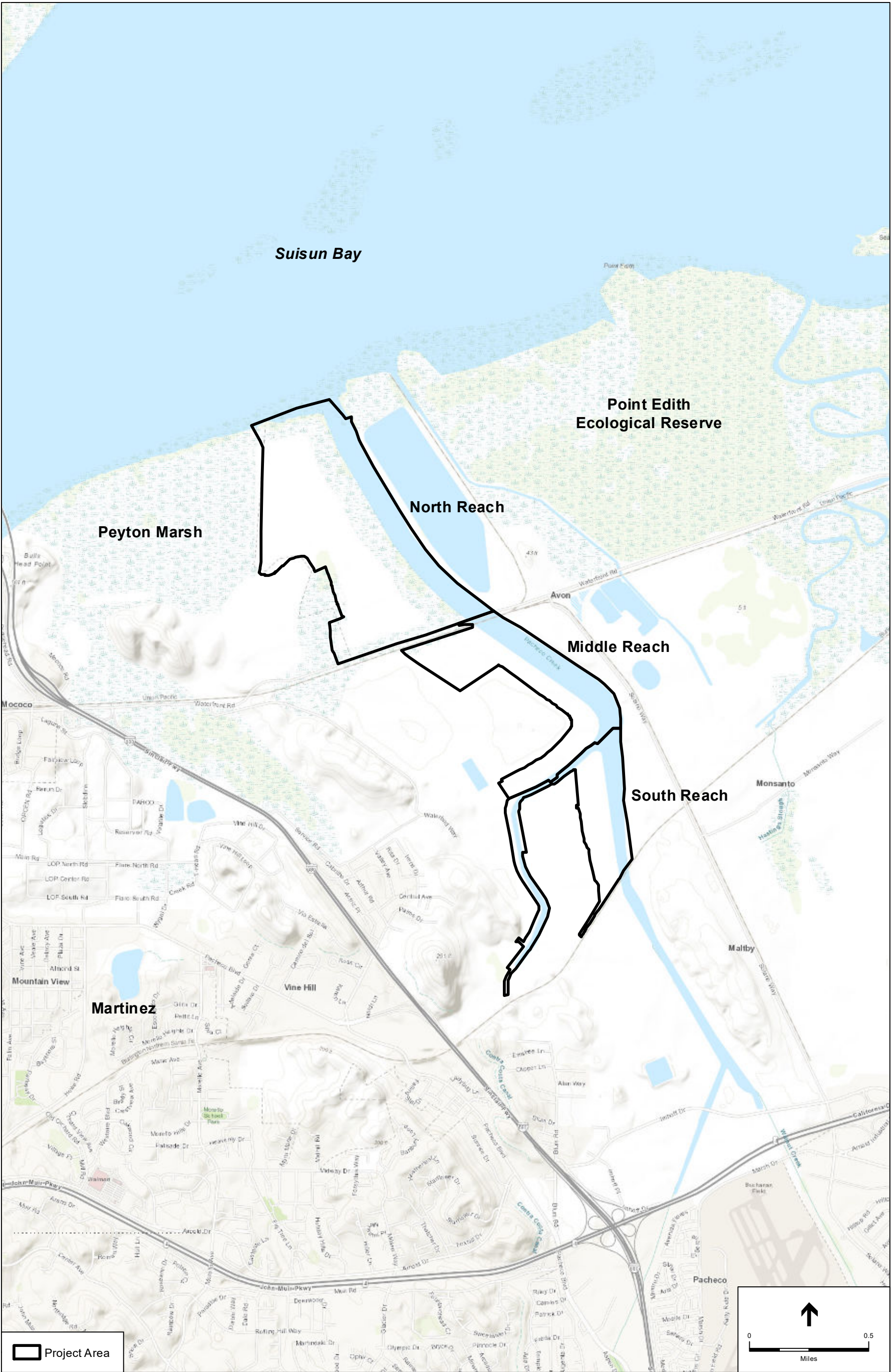
The Lower Walnut Creek Project area is located in the Walnut Creek watershed in unincorporated Contra Costa County approximately three miles east of the City of Martinez (Figure 2-1). The Walnut Creek watershed is the largest watershed in Contra Costa County, and one of the largest in the Bay Area, draining approximately 150 square miles. Land use within the project area is primarily publically and privately owned open space, with existing and proposed future industrial land use on adjacent properties. The project area extends along the lower 2.5 miles of Walnut Creek and along 1.5 miles of Pacheco Creek upstream of its confluence with Walnut Creek. The project area consists of the South Reach, located between the Burlington Northern Santa Fe (BNSF) Railroad embankment and the confluence of Pacheco and Walnut creeks; the Middle Reach, located between Pacheco Creek and the Union Pacific Railroad (UPRR) embankment; and the North Reach, located between Waterfront Road and Suisun Bay in the area historically called “Pacheco Marsh.”

2.2 Project Background

The proposed Project, will restore and enhance tidal marsh, and enhance seasonal wetlands and upland areas. The project will improve habitat quality, diversity, and connectivity along Walnut Creek and Pacheco Creek, and along the southern Suisun Bay shoreline. The project will breach and lower levees and berms to reintroduce the tides to diked former baylands, construct new setback levees for flood protection, and grade filled areas to create new tidal wetland areas. The project will provide habitat for native and special-status species such as salt marsh harvest mouse, Ridgway's rail, California black rail, and salmonids. The project will restore important tidal marsh habitat for the State-listed Mason's lilacopsis, Delta tule pea, and Suisun Marsh aster (observed in the study area).

2.3 Project Purpose

The project proposes to restore and enhance tidal wetlands along the southern shore of Suisun Bay and from Suisun Bay upstream along Walnut Creek and its tributary Pacheco Creek, to provide sustainable flood protection, and to create opportunities for future public access through the project area. The project will restore and enhance wetlands and associated habitats in Lower Walnut Creek and provide sustainable flood management, while allowing opportunities for public access and recreation.



SOURCE: Project Area (ESA 2018); Topo Map (ESRI) Lower Walnut Creek Restoration Project . 170378.00
Figure 2-1
Project Location



SOURCE: boundaries (ESA 2018); aerial (ESRI)

Lower Walnut Creek Restoration Project . 170378.00

Figure 2-2
Botanical Survey Area

SECTION 3

Methods

3.1 Background Research

The following project boundaries were used to evaluate habitat suitability and on-site biological resources.

- Project Area** The project area is the extent of any potential project activities (see Figure 2-1). Construction-related activities that may occur within the project area include access, staging and storage of project related materials, vegetation clearing, excavation, grading, soil stabilization, and construction of permanent and temporary facilities.
- Study Area** The study area (Figure 2-2) refers to a subset of the project area where field surveys were completed. The study area includes lands under District ownership, or where access was otherwise made available.
- Work Limit** The work limit is based on project plans provided by ESA and depicts the anticipated extent of any ground disturbance within the Project Area. The work limit is shown in Figure 2-2.

Prior to conducting field surveys, standard databases were queried to develop a list of special-status plant species with potential to occur in the study area. Occurrence information was obtained from Calflora (2018), CNDDDB (2018), CNPS (2018), and USFWS (2018). The lists of potentially occurring plant species includes those reported from the Vine Hill, Walnut Creek, Briones Valley, Denverton, Honker Bay, Clayton, Fairfield South, Cordelia, and Benicia 7.5-minute USGS quadrangles; the lists are provided in **Appendix A**.

Botanical taxonomy and nomenclature conforms to *The Jepson Manual: Vascular Plants of California (Second Edition)* (Baldwin et al., 2012). Common names of plant species¹ are derived from Calflora (2018). Plant habitat affinities and local distribution information was obtained from CNPS (2018), CNDDDB (2018), and Calflora (2018). Nomenclature for special-status plant species conforms to the California Department of Fish and Wildlife (CDFW 2018c, d). Special-status plant community designations conform to the CDFW (2018e). Other sources of information consulted include previous botanical surveys (Jones & Stokes, 2005a), a Biological Assessment, a Habitat Assessment, and wetland delineations prepared for the project (ESA, 2019a, b, c; Jones & Stokes, 2005b).

¹ For purposes of this discussion, the term “species” implies all recognized taxa at the species or sub-specific level.

3.2 Reference Population Site Visits

Prior to conducting surveys of the study area for the 13 special-status plant species with moderate or high potential to occur, known populations of these species were visited, where accessible. The purpose of these site visits was to (a) become familiar with the species in field conditions and reinforce sight recognition, and (b) ensure that the timing of the surveys corresponded with the species' flowering period or other phenological characteristics that would aid in identification. The ten target species are summarized in **Table 3-1**.

TABLE 3-1
REFERENCE POPULATIONS OF SPECIAL-STATUS PLANTS

Species	Flowering period	Date of site visit	Reference Site	Notes
Congdon's tarplant (<i>Centromadia parryi</i> ssp. <i>congdonii</i>)	May-Oct		Waterbird Park, Martinez (CNDDDB Occ. #73)	Not observed, not accessible
Pappose tarplant (<i>Centromadia parryi</i> ssp. <i>parryi</i>)	Mar-Nov			Not observed
Soft bird's beak (<i>Chloropyron molle</i> ssp. <i>molle</i>)	June-Nov	May 16, 2018	Southampton Marsh, Benicia (CNDDDB Occ. #9)	Observed
Bolander's water hemlock (<i>Cicuta bolanderi</i>)	July-Sep	June 2, 2018	Rush Ranch, Solano Co. (CNDDDB Occ. #66)	Observed
San Joaquin spearscale (<i>Extriplex joaquiniana</i>)	Apr-Oct			Not observed
Santa Cruz tarplant (<i>Holocarpha macradenia</i>)	June-Oct			Not observed
Contra Costa goldfields (<i>Lasthenia conjugens</i>)	Mar-June			Not observed
Delta tule pea (<i>Lathyrus jepsonii</i> var. <i>jepsonii</i>)	May-July	May 16, 2018	Lower Walnut Creek	Observed during survey
Mason's lilaeopsis (<i>Lilaeopsis masonii</i>)	Apr-Nov	June 2, 2018	Bay Point, Pittsburg Rush Ranch, Solano Co.	Observed
Delta mudwort (<i>Limosella australis</i>)	May-Aug			Not observed
Marin knotweed (<i>Polygonum marinense</i>)	Apr-Oct	May 16, 2018	Southampton Marsh, Benicia (CNDDDB Occ. #19)	Not observed
Long-styled sand spurrey (<i>Spergularia macrotheca</i> var. <i>longistyla</i>)	Feb- May			Not observed
Suisun marsh aster (<i>Symphyotrichum lentum</i>)	Apr-Nov	April 24, 2018; May 16, 2018	New York Slough, Pittsburg (new occurrence); Lower Walnut Creek	Observed

3.3 Field Survey

The rare plant survey was floristic in nature, meaning that all plant species encountered were identified to the lowest taxonomic level possible to determine their rarity status. The survey methods used conform to the protocols specified by the CDFW (2018e), CNPS (2001), and USFWS (2000). An inventory of all plant species recorded within the study area is provided in **Appendix C**.

Focused surveys were conducted by botanists Chris Rogers and Joe Sanders on May 16, 17, and 24 and June 8, 2018, and repeated by Chris Rogers on October 30 and November 1, 2018. The timing of the surveys corresponded to the flowering season of all species with at least moderate potential to occur in the study area. With one exception, all surveys were conducted on foot by walking systematic or meandering transects affording complete visual coverage of the study area. The exception was the survey on June 8, 2018, which was conducted from a kayak which provided visual access to the intertidal shorelines of Walnut Creek, Pacheco Creek and small slough channels within the study area. Additional botanical observations were made by biologists Stephanie Bishop and David Rodriguez on August 6 and 27, 2015, and September 15, 2015, and as part of vegetation mapping studies conducted as part of the project.

The presence or potential for occurrence of special-status plant species within the study area is based on direct observation or an evaluation of the suitability of existing habitats occurring within the study area. Habitat suitability is based on familiarity with the specific habitat requirements (i.e., elevation, geology, soil chemistry and type, vegetation communities, microhabitats), geographic distribution, local occurrence records, and the degree of habitat disturbance or alteration. The criteria for assessing the potential for occurrence of special-status species are summarized below.

None	Applied to plant species for which suitable habitat is lacking, which are not known to occur locally, or which are thought to be locally extirpated.
Absent	Applied to plant species for which suitable habitat is present but which would have been detectable at the time surveys were conducted.
Possible	Applied to plant species for which suitable habitat or key habitat elements are present within the study area. The occurrence of these species is either considered likely, or, at the least, their presence cannot be ruled out based on the present survey.
Present	Applied to plant species that were observed directly.

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SECTION 4

Setting

4.1 Special-Status Plants

Special-status plant species include all plant species that meet one or more of the following criteria:²

- Listed or proposed for listing as Threatened or Endangered under the federal Endangered Species Act (FESA) or candidates for possible future listing as Threatened or Endangered under the FESA.³
- Listed or candidates for listing by the State of California as Threatened or Endangered under the California Endangered Species Act (CESA).⁴ A species, subspecies, or variety of plant is **endangered** when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors.⁵ A plant is **threatened** when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures.⁶
- Listed as Rare under the California Native Plant Protection Act (CNPPA).⁷ A plant is **Rare** when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.⁸
- Meet the definition of Rare or Endangered under CEQA.⁹ Species that may meet the definition of Rare or Endangered include the following:
 - Species considered by the CNPS to be “rare, threatened or endangered in California” (California Rare Plant Rank [CRPR] 1A, 1B and 2);
 - Species that may warrant consideration on the basis of local significance or recent biological information;

² This definition is provided in CDFG (2009).

³ 50 CFR §17.12

⁴ CFGC § 2050 et seq.

⁵ CFGC § 2062

⁶ CFGC § 2067

⁷ CFGC § 1900, et seq.

⁸ CFGC § 1901

⁹ CEQA § 15380[b] and [d]

- Some species included on the California Natural Diversity Database’s (CNDDDB) *Special Plants, Bryophytes, and Lichens List*.
- **Locally significant species** are not rare from a statewide perspective but are rare or uncommon locally, such as within a county or region,¹⁰ or is designated in local or regional plans, policies, or ordinances (CEQA Guidelines¹¹). Examples include a species at the limits of its known range or a species occurring on an uncommon soil type.

In addition, plant species have been assigned global and State rarity rankings (for a definition of these rankings, see **Appendix B**). Species ranked as S1, S2, or S3 are considered to be critically imperiled, imperiled or vulnerable to extinction within the boundaries of the State (CDFW, 2018a). These species may be considered to meet the criteria for listing as endangered, threatened or rare under CESA.¹² Species ranked as S4 or S5 are generally considered common enough to be secure and not at risk of extinction. Impacts on special-status plants species, as thusly defined, would be regarded as significant pursuant to CEQA¹³ and must be addressed in environmental review documents.¹⁴

A total of 87 special-status plant species (including a moss and a lichen) have been recorded from the nine 7.5-minute USGS quadrangles including and surrounding the study area (CNPS, 2018, CNDDDB, 2018). The potential for occurrence of 63 of the target species was ruled out due to a lack of suitable habitat, lack of suitable soils, or geographic location of the study area relative to known occurrences. Twenty-four species were considered to have some potential to occur in the study area. Thirteen were considered to have at least moderate or high potential to occur, and were the subject of the focused surveys.

Four federally-listed species were evaluated in the Biological Assessment prepared for the proposed project (ESA, 2019). Of these, only soft bird’s beak is considered to have more than low potential to occur in the study area.

- Soft bird’s beak (*Chloropyron molle* ssp. *molle*) – Endangered
- Santa Cruz tarplant (*Holocarpha macradenia*) – Threatened
- Contra Costa goldfields (*Lasthenia conjugens*) – Endangered
- Antioch dunes evening primrose (*Oenothera deltoides* ssp. *howellii*) – Endangered

In addition, two species are listed under CESA:

- Mason’s lilaeopsis (*Lilaeopsis masonii*) – Rare
- Antioch dunes evening primrose (*Oenothera deltoides* ssp. *howellii*) – Endangered

¹⁰ CEQA § 15125 (c)

¹¹ CEQA Guidelines Appendix G

¹² CEQA § 15380(d)

¹³ CEQA § 15065

¹⁴ CEQA § 15125

Of these two, only Mason's lilaeopsis was considered to have more than low potential to occur in the study area based on prior observations (and was subsequently confirmed at several locations).

A description of each of the 13 species with moderate or low potential to occur is provided below. Lists of all special-status species evaluated as part of this analysis is in Appendix A. An explanation of all rarity status codes is provided in Appendix B. A complete inventory of all plant species recorded within the study area is provided in Appendix C. Representative photos are in Appendix D.

Congdon's tarplant

Status

FESA: none; CESA: none; CRPR: 1B.1; Global/State rarity ranking: G3T2/S2; Critical Habitat has not been designated for the species.

Description

Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*) is an herbaceous annual member of the sunflower family (Asteraceae). It is prostrate to erect, with ascending to horizontal branches, and ranges in height from 10-71 cm (4-28 in). Leaves and bracts are rigidly spine-tipped. Lower leaves are from 5-20 cm (2-8 in) long, soft-hairy or bristly, deeply divided, and usually lost by the time of flowering. Upper leaves are generally much reduced, entire or few-toothed, and often with axillary leaf clusters. The inflorescence may be open to dense, with heads generally about one-quarter inch wide and often over-topped by the subtending bracts. Ray flowers have yellow ligules and number from 9 to 30 or more, and the numerous disc flowers have yellow anthers. The subspecies differs from pappose tarplant (*C. p.* ssp. *parryi*) by the general absence of glandular herbage, especially on the involucre bracts. Another similar species, the common Fitch's spikeweed, is distinguishable by the presence of obtuse chaff scales with long soft hairs and which are not resinous-thickened.

Habitat Suitability and Potential Occurrence

Congdon's tarplant is generally found in grasslands of low-lying areas, often alkaline fields, in heavy clay soil, and occasionally in somewhat disturbed conditions. It is known from 93 records from Alameda, Contra Costa, Monterey, Santa Clara, San Mateo, and San Luis Obispo counties (CNDDB, 2018); it is presumed extirpated from Santa Cruz and Solano counties. The nearest known occurrences (Occ. #73) include multiple patches located within 1.0 km (0.6 mi) west of the study area at Waterbird Regional Preserve, and a small population (Occ. #101) 2.7 km (1.7 mi) to the east. Suitable habitat for Congdon's tarplant is present in grasslands and within the study area.

Potential Project-Related Effects

Surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this annual species. Congdon's tarplant was not observed, and is presumed not to occur in the study area. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat exists in the un-surveyed portions

of the North, Middle, and South Reaches, and its presence there cannot be ruled out. Additional surveys are warranted when these areas become accessible.

Pappose tarplant

Status

FESA: none; CESA: none; CRPR: 1B.2; Global/State rarity ranking: G3T2/S2; Critical Habitat has not been designated for the species.

Description

Pappose tarplant (*Centromadia parryi* ssp. *parryii*) is an herbaceous annual member of the sunflower family (Asteraceae). It is prostrate to erect, with ascending to horizontal branches, and ranges in height from 4 to 28 inches. Leaves and bracts are rigidly spine-tipped. Lower leaves are from 2 to 8 inches long, soft-hairy or bristly, deeply divided, and usually lost by the time of flowering. Upper leaves are generally much reduced, entire or few-toothed, and often with axillary leaf clusters. The inflorescence may be open to dense, with heads generally about one-quarter inch wide and often over-topped by the subtending bracts. Ray flowers have yellow ligules and number from 9 to 30 or more, and the numerous disc flowers have yellow anthers. Flowering occurs May through November. The subspecies differs from the closely related Congdon's tarplant (*C. p.* ssp. *congdonii*) by the presence of glandular herbage, especially on the involucre bracts.

Habitat Suitability and Potential Occurrence

Pappose tarplant has been recorded growing in chaparral, coastal prairie, meadows and seeps, coastal salt marshes, and valley and foothill grasslands in vernal mesic, often alkaline sites. It is not reported from Contra Costa County, but occurs in about 20 locations in Solano County. The nearest occurrence is north of Carquinez Strait along Highway 680, 8.9 km (5.5 mi) north of the study area. Suitable grassland habitat for pappose tarplant is present within the study area.

Potential Project-Related Effects

Surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this annual species. Pappose tarplant was not observed, and is presumed not to occur in the study area. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat exists in the un-surveyed portions of the North, Middle, and South Reaches, and its presence there cannot be ruled out. Additional surveys are warranted when these areas become accessible.

Soft bird's beak

Status

FESA: Endangered; CESA: Rare; CRPR: 1B.2; Global/State rarity ranking: G2T1/S1

Critical Habitat has been designated for soft bird's beak in Contra Costa and Solano counties. The nearest Critical Habitat is at Southampton Marsh in Benicia State Park (Unit #5), 9.5 km (5.9 mi)

west-northwest of the study area. A small Critical Habitat unit also is located at Point Pinole Regional Shoreline (Unit #3), 22.9 km (14.2 mi) west of the study area.

Description

Soft bird's-beak (*Chloropyron molle* ssp. *molle*) is an annual hemiparasite belonging to the broomrape family (Orobanchaceae). It produces few to many gray-green, glandular pubescent stems reaching four to 16 inches in height. Flowers are whitish and are produced July through November.

Habitat Suitability and Potential Occurrence

Soft bird's beak occurs in coastal salt marshes in Contra Costa, Napa, and Solano counties; it is believed to be extinct in Sonoma and Marin counties. Soft bird's beak is known from six occurrences in Contra Costa County; the nearest (Occ. # 14) is 2.9 km (1.8 mi) east of the study area on the Concord Naval Weapon Station. The nearest population in Solano County is at Southampton Marsh in Benicia State Park (Occ. #9), 9.5 km (5.9 mi) west-northwest of the study area. An historic occurrence from the 1800's from the Martinez shoreline (Occ. #4) is presumed extinct.

Although soft bird's-beak was not detected during the present survey and is expected to have been recognizable, it is considered to have a moderate potential for occurrence onsite due to the presence of abundant suitable habitat and because it has been recorded from Point Pinole approximately nine miles to the north.

Potential Project-Related Effects

Surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this annual species. Soft bird's beak was not observed, and is presumed not to occur in the study area. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat exists in tidal marsh areas within the unsurveyed portions of the North Reach, and its presence there cannot be ruled out. Additional surveys are warranted in these areas.

Bolander's water hemlock

Status

FESA: none; CESA: none; CRPR: 2B.1; Global/State rarity ranking: G5T4/S2; Critical Habitat has not been designated for the species.

Description

Bolander's water hemlock (*Cicuta maculata* var. *bolanderi*) is a perennial member of the carrot family (Apiaceae). It produces erect hollow stems with pinnately compound leaves and serrate leaflets. Inflorescences are umbellate, with clusters of small white flowers. Flowering occurs July through September.

Habitat Suitability and Potential Occurrence

Bolander's water hemlock occurs in coastal salt and freshwater marshes. It has been recorded from coastal regions of Contra Costa, Marin, Sacramento, Santa Barbara, and Solano counties. It is known from six occurrences in Contra Costa County and Solano County, although those nearest to the study area in Martinez and Benicia (Occs. # 2 and 4) are relatively dated observations. It was observed flowering in 2017 at Rush Ranch in Solano County approximately 18.8 km (11.7 mi) north-northeast of the study area (C. Rogers, pers. obs.). Suitable habitat for Bolander's water hemlock is present in marshes within the study area.

Potential Project-Related Effects

Protocol surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this species. At maturity, Bolander's water hemlock is a large and conspicuous plant, and easily recognized in its marsh habitat. Surveys within the study area were negative. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat exists in tidal marsh areas within the un-surveyed portions of the North Reach, and its presence there cannot be ruled out. Additional surveys are warranted in these areas.

San Joaquin spearscale

Status

FESA: none; CESA: none; CRPR: 1B.2; Global/State rarity ranking: S2/G2; Critical habitat has not been designated for this species.

Description

San Joaquin spearscale (*Exriplex joaquiniana*) is a low herbaceous annual in the saltbush family (Chenopodiaceae). It is erect, growing 4-40 inches in height, with striate, sparsely scaly stems. Leaves are ovate to triangular, finely gray-scaly to green above, one quarter to 3 inches long. It is distinguished by its striated stem and fruiting bracts that are triangular, ribbed, and free. Flowers develop April through September.

San Joaquin spearscale occurs in chenopod scrub, valley grassland and alkali meadows on highly alkaline soils and is distributed throughout the southern Sacramento Valley, the San Joaquin Valley, and the eastern side of the North Coast Range.

Habitat Suitability and Potential Occurrence

There are 45 records of San Joaquin spearscale from Contra Costa County (CNDDDB, 2018). The nearest population (Occ. #113) is 2.7 km (1.7 mi) east of the study area, on the Concord Naval Weapons Station. Additional populations are over 29 km (18 mi) to the east, near Brentwood, or north and east of Suisun Marsh. Suitable habitat for San Joaquin spearscale is present in the study area in alkali soils supporting non-tidal pickleweed marsh, gaps within grassland, and in scalds.

Potential Project-Related Effects

Protocol surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this species. Although its flowers are not conspicuous, the flowering plants are readily apparent in grassland vegetation. All potential habitats within the study area were systematically covered. Surveys within the study area were negative. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat for San Joaquin spearscale exists in the un-surveyed portions of the Middle and South Reaches, and its presence there cannot be ruled out. Additional surveys are warranted when these areas become accessible.

Santa Cruz tarplant

Status

FESA: threatened; CESA: endangered; CRPR: 1B.1; Global/State rarity ranking: G1/S1.

Critical Habitat has been designated for Santa Cruz tarplant in Santa Cruz, Monterey and Contra Costa County. A single area in Contra Costa County has been designated as Critical Habitat for the species. The Mezue unit (East Bay Area Unit A) is located in Wildcat Regional Park, approximately 20 km (12.5 mi) west-southwest of the study area.

Description

Santa Cruz tarplant (*Holocarpha macradenia*) is an annual herb belonging to the sunflower family (Asteraceae). It develops from a basal rosette of leaves, 2-10 cm (0.8-3.9 in) long with minutely toothed margins. Plants are strongly scented and densely glandular. Axillary leaf clusters are tipped with yellow tack-shaped glands that exude a sticky tar-like liquid. Flower heads are clustered and spherical, 10–14 mm in diameter, with 8–16 ray flowers 40–90 disk flowers, which have black anthers. Flowering occurs June through October.

Santa Cruz tarplant is restricted to coastal prairie, coastal scrub and valley and foothill grasslands, often on clay or sandy soils, at 10-220 m (33-722 ft) in elevation. Its current range includes marine terraces of the northern Monterey Bay in Monterey and Santa Cruz counties, historically ranging into Alameda and Contra Costa counties. It is known from 37 historic occurrences, 22 of which are believed to be extant in only Solano and Santa Cruz counties (CNDDDB, 2018). All extant occurrences in Contra Costa County are reintroductions.

Primary constituent elements of Critical Habitat for Santa Cruz tarplant include a) soils associated with coastal terrace prairies, including the Watsonville, Tierra, Elkhorn, Santa Inez, and Pinto series; b) plant communities that support associated species, including native grasses such as needlegrass and CA oatgrass; native herbaceous species such as other tarplants, Gairdner's yampah, San Francisco popcorn flower, and Santa Cruz clover; and c) physical processes, particularly soils and hydrologic processes, that maintain the soil structure and hydrology that produce the seasonally saturated soils characteristic of Santa Cruz tarplant habitat.

Habitat Suitability and Potential Occurrence

In Contra Costa County, Santa Cruz tarplant is known from 13 occurrences, nine of which are presumed extirpated. The nearest records for Santa Cruz tarplant (Occ. #42 and #43) consist of two populations that were introduced in 1987 between San Pablo Reservoir and Briones Reservoir approximately 15.8 km (9.8 mi) to the west-southwest; both of these populations are presumed extirpated. Marginally suitable and highly disturbed coastal scrub and grassland habitat is present within the study area.

Potential Project-Related Effects

Surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this annual species. Santa Cruz tarplant was not observed, and is presumed not to occur in the study area. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat for Santa Cruz tarplant exists in the un-surveyed portions of the Middle and South Reaches, and its presence there cannot be ruled out. Additional surveys are warranted when these areas become accessible.

Contra Costa goldfields

Status

FESA: endangered; CESA: none; CRPR: 1B.1; Global/State rarity ranking: S1/G1.

Critical Habitat has been designated for Contra Costa goldfields in Contra Costa, Solano and Napa counties. The nearest Critical Habitat is located in Franklin Canyon, near Hercules in Franklin Canyon near Hercules (Unit #6), 13.4 km (8.3 mi) east of the study area.

Description

Contra Costa goldfields (*Lasthenia conjugens*) is a low herbaceous member of the sunflower family (Asteraceae). It is a slender, erect annual with one to several stems from the base reaching 4-12 inches in height. Leaves are linear, 1-3 inches long, entire to pinnately lobes and glabrous. Inflorescences consists of hairy, obconic involucre, with 12-18 fused phyllaries. Inflorescences contain 6-13 yellow ray flowers, which develop from March through June.

Habitat Suitability and Potential Occurrence

Contra Costa goldfields inhabits seasonal wetlands, including vernal pools and mesic grasslands with typically clay or alkaline soils, below 700 feet in elevation. It was once distributed from the North Coast, southern Sacramento Valley, and the San Francisco Bay to the south Coast. It is presently restricted to locations near the Sacramento River Delta in Napa, Solano counties and Contra Costa counties, in the south San Francisco Bay area in Alameda County, and in Monterey County. It is presumed to have been extirpated from Santa Barbara, Mendocino and Santa Clara counties.

In Contra Costa County, Contra Costa goldfields is known from four occurrences, only one of which is presumed extant. The remaining population (Occ. #23) occurs 13.4 km (8.3 mi) east of the study area, in Franklin Canyon near Hercules. The majority of extant populations are in Solano County near Cordelia, Fairfield and Travis AFB, over 19 km (12 mi) north of the study

area. Mesic grassland and playa habitat occur within the study area, but are highly disturbed and offer only marginal habitat for this species.

Potential Project-Related Effects

Protocol surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this species. No goldfields were observed. Surveys within the study area were negative, therefore Contra Costa goldfields is presumed not to occur in the study area. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat exists in the un-surveyed portions of the Middle and South Reaches, and its presence there cannot be ruled out. Additional surveys are warranted when these areas become accessible.

Delta tule pea

Status

FESA: none; CESA: none; CRPR: 1B.2; Global/State rarity ranking: G5T2/S2; Critical Habitat has not been designated for this species.

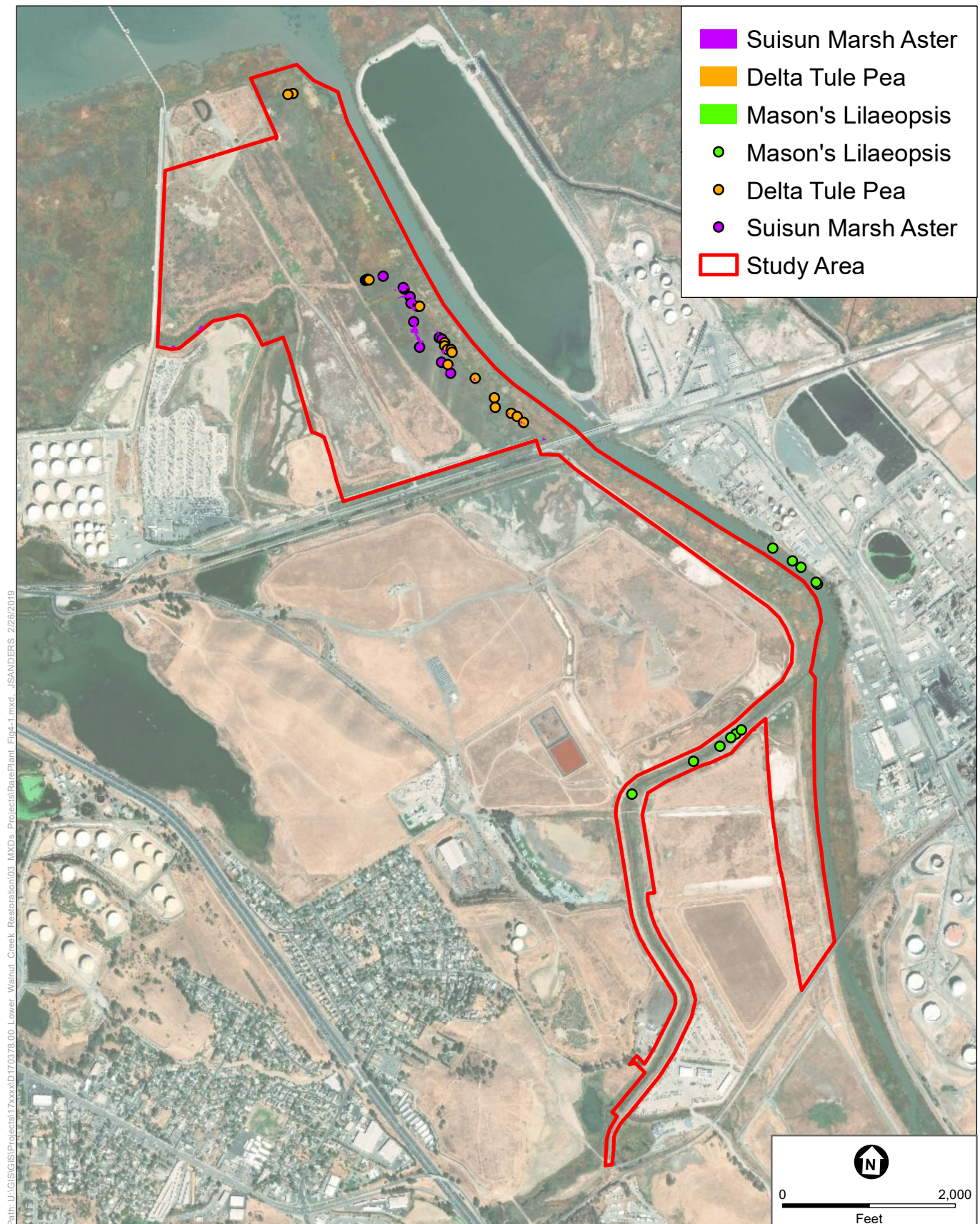
Description

Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*) is a robust perennial vine belonging to the pea family. It has winged stems reaching 2.4 m (8 ft) in length and climbs by tendrils located at the tips of the leaves. The leaves are 2.5-5 cm (1-2 in) long and have 10-16 leaflets. Flowers are bright pink to purple, to 2.5 cm (1 in) long, and are produced May through June.

Habitat Suitability and Potential Occurrence

Delta tule pea is a native species endemic to California and found only in Contra Costa, Napa, Sacramento, San Joaquin Solano, Sonoma and Yolo counties. It is associated with in freshwater and brackish marshes around Suisun Bay, growing from sea level to 4 m (0-13 ft) in elevation.

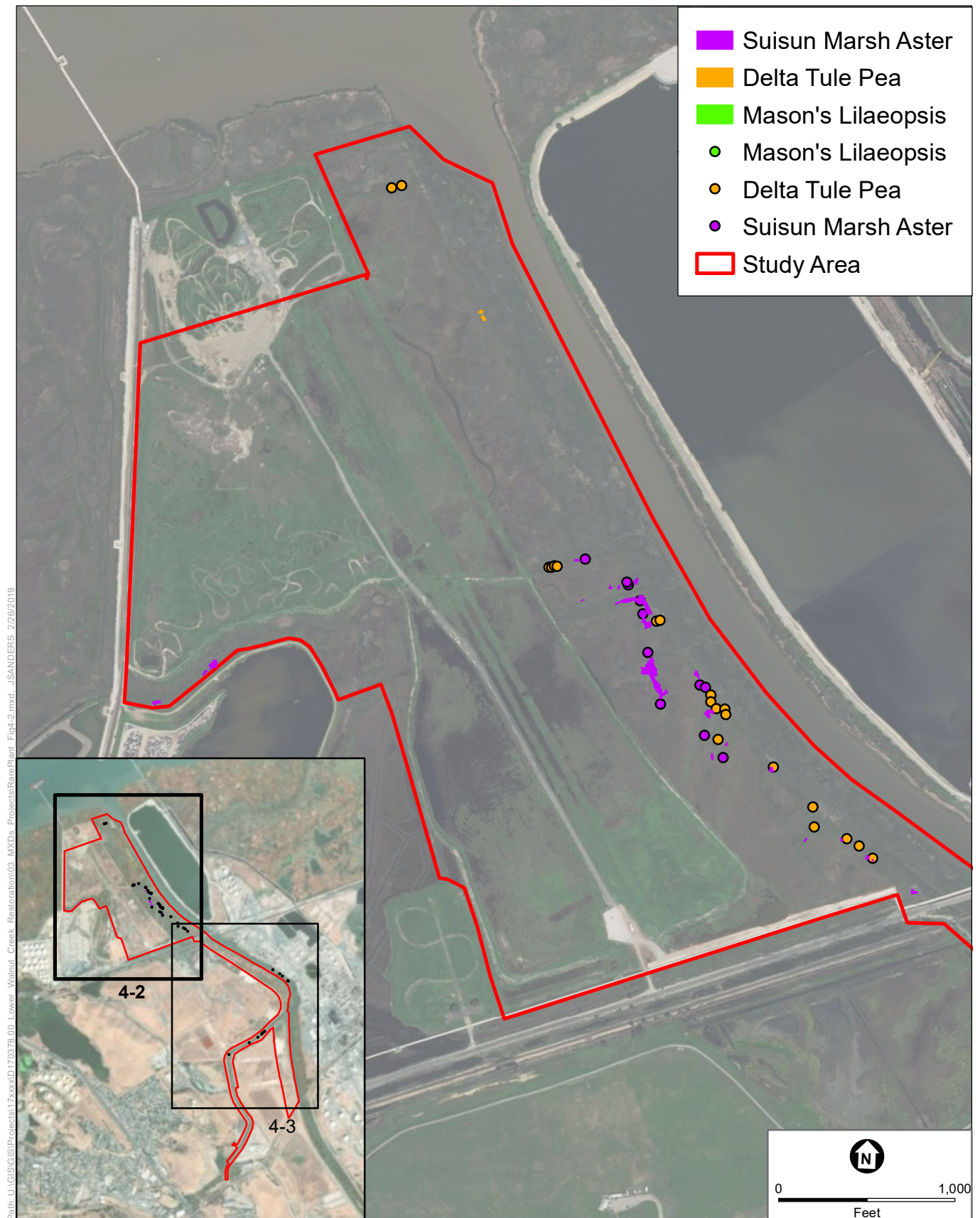
Delta tule pea is known from 85 occurrences in Contra Costa and Solano counties throughout the lower parts of the Sacramento and San Joaquin and Napa rivers. Prior surveys in Lower Walnut Creek recorded observations from the west side of the creek (Occ. #136); from Pt. Edith (Occ. #128), 0.8 km (0.5 mi) to the east of the study area; near the Martinez marina (Occ. #5), 4.0 km (2.5 mi) west-southwest of the study area. The locations within the study area were revisited and remapped (**Figures 4-1, 4-2 and 4-3**). Many additional patches of the species also were located, ranging from one to a few individuals, and two stands covering a total of 109 m² (1,174 sf). Twenty-two separate points and polygons were mapped. It was most abundant in the mid marsh zone of the North Reach. It was frequently seen just outboard of the low marsh – mid marsh boundary with narrow-leaf cattail (*Typha angustifolia*), alkali bulrush (*Bolboschoenus maritimus*), hardstem bulrush (*Schoenoplectus acutus*), and western goldenrod (*Euthamia occidentalis*). It is most abundant toward the lower elevations of the mid marsh zone, where it is most reliably found in association with stands of coyote brush, which, as a climbing vine, it uses for support. It was not observed on the State Lands parcel on the western edge of the study area, or in the Middle or South Reaches, or in portions of the study area not subject to tides.



SOURCE: ESA and Wood Biological Consulting 2018

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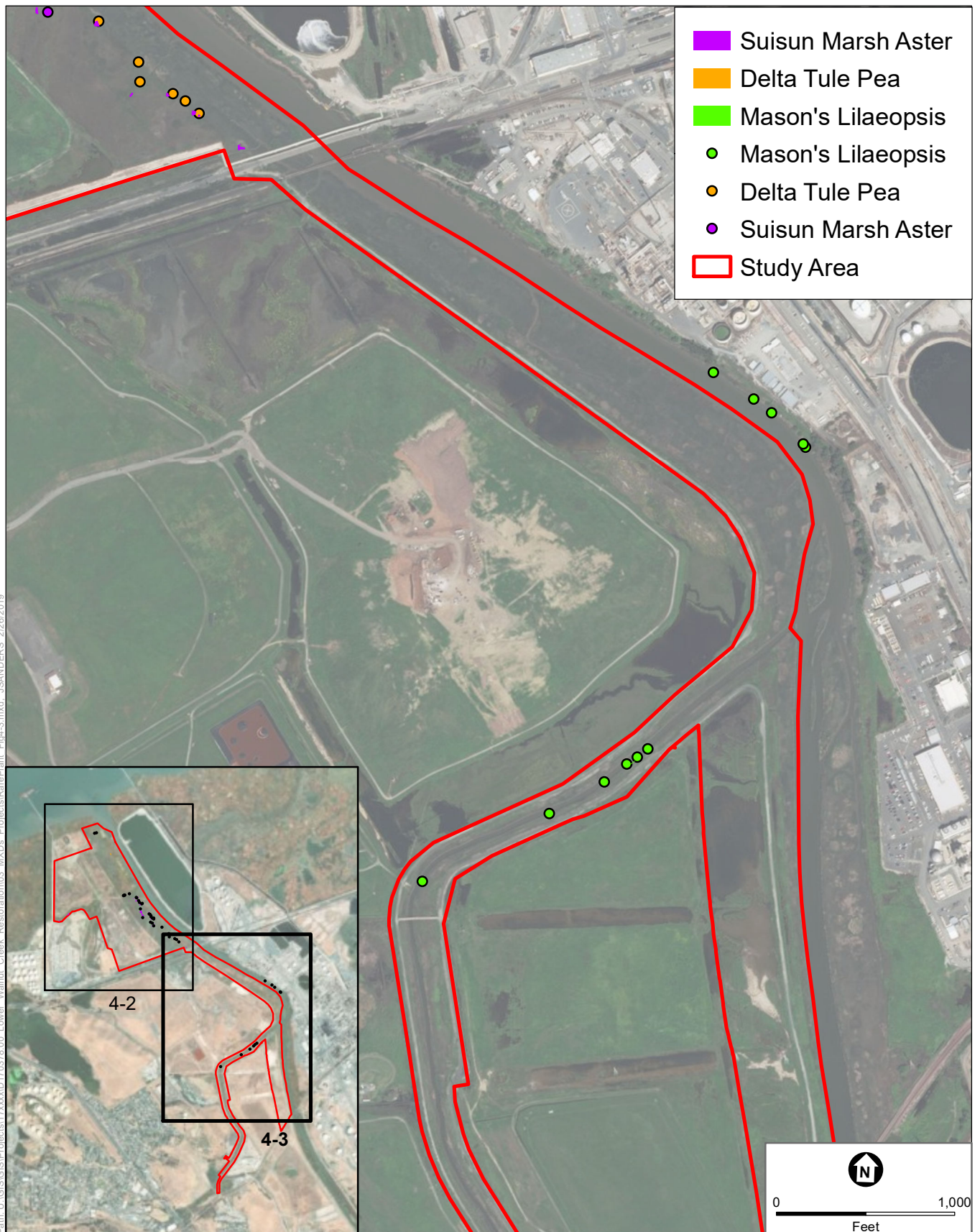
Figure 4-1
Rare Plant Locations



SOURCE: ESA and Wood Biological Consulting 2018

Lower Walnut Creek Restoration Project. 170378.00

Figure 4-2
Rare Plant Locations (North)



SOURCE: ESA and Wood Biological Consulting 2018

Lower Walnut Creek Restoration Project. 170378.00

Figure 4-3
Rare Plant Locations (South)

Potential Project-Related Effects

Delta tule pea is present within the study area, and potentially suitable habitat is available throughout the mid marsh zone, primarily along the North Reach. As a perennial species, its spatial extent may be expected to remain relatively stable from year to year, though there is some indication from differences in field mapping between 2015 and 2018 that changes in distribution and abundance may occur. Implementation of the project, specifically components that require excavation of new tidal channels to connect the creek channel with currently non-tidal parts of the flood plain, could result in direct impacts to existing populations. Excavation of new tidal channels within the existing tidal marsh could indirectly reduce or increase suitable mid marsh habitat for Suisun Marsh aster, depending on microhabitat features, thus potentially decreasing or increasing its abundance. Expansion of tidal marsh within existing non-tidal areas could provide habitat for new populations of Delta tule pea to establish.

If it is determined that project implementation would impact the species, impact avoidance, minimization or mitigation measures may be warranted, including re-surveying direct impact areas if project construction begins more than several years following the present survey.

The un-surveyed portion of tidal marsh within the North Reach provide suitable habitat for Delta tule pea, and its presence cannot be ruled out in these locations. Additional surveys are warranted in these areas.

Mason's Lilaeopsis

Status

FESA: none; CESA: Rare; CRPR: 1B.1; Global/State rarity ranking: G2/S2; Critical Habitat has not been designated for this species.

Description

Mason's lilaeopsis (*Lilaeopsis masonii*) is a diminutive member of the carrot family (Apiaceae). It is a prostrate perennial producing rhizomes and linear, cylindric to flattened leaves 1.3-7.6 cm (0.5-3 in) long. Flowers are white to maroon, 1 mm (0.04 in) long at the end of basal peduncles 2-20 mm (0.08-0.8 in) long. Flowering occurs June through August.

Habitat Suitability and Potential Occurrence

Mason's lilaeopsis is a native species endemic to California and is found only in Alameda, Contra Costa, Marin, Napa, Sacramento, San Joaquin, Solano and Yolo counties. It forms dense to sparse colonies on exposed muddy streambanks and levees within the intertidal zone. It is associated with freshwater marshes of the Napa, Sacramento and San Joaquin rivers, growing from sea level to 10 m (0-33 ft) in elevation.

Mason's lilaeopsis is known from 121 occurrences throughout the lower parts of the Sacramento and San Joaquin and Napa rivers on shorelines of larger channels, small sloughs, and delta islands. Prior surveys in Lower Walnut Creek recorded observations from the east side of the mouth of the creek (Occ. #102), from just upstream of the Waterfront Road Bridge (C. Rogers, pers. obs.). These locations were revisited and found to be absent of Mason's lilaeopsis, and no

longer provided the microhabitat elements that most reliably support the species. However, the species was observed within the study area at six locations on the south bank of Pacheco Creek, upstream of the confluence with Walnut Creek (see Figures 4-1, 4-2, and 4-3, and photographs in Appendix B). It also was observed at five more locations on the east bank of Walnut Creek adjacent to the Tesoro Refinery, though these are outside of the study area. In all cases, Mason's lilaeopsis was found at the edge of the vegetated terrace just above high tide, in poorly consolidated mud soils with relatively low cover and competition from larger marsh plants, such as narrow-leaf cattail (*Typha angustifolia*), perennial pepperweed (*Lepidium latifolium*), green dock (*Rumex conglomeratus*), alkali bulrush (*Bolboschoenus robustus*), and common bulrush (*Schoenoplectus acutus*).

Potential Project-Related Effects

Mason's lilaeopsis is present within the study area, and additional potentially suitable habitat is available along portions of Walnut Creek and Pacheco Creek. The microsite preferences of this species are fairly specific with regard to tidal range, soil exposure, and reduced density of tall marsh vegetation, as described above, so not all areas bordering channels are presently suitable. Based on changes in the distribution of occupied sites in the Lower Walnut Creek area since it was first detected in 1992, it appears that over time, previously occupied sites become less hospitable to Mason's lilaeopsis and no longer support the species, while other sites become suitable and are occupied. Small-scale disturbances (i.e., bank slumping from either natural processes or from wake-generated waves) that affect the density of marsh vegetation and expose soils along the cut-bank within the intertidal zone may play a role in making available new sites for chance establishment of this species. Therefore, locations mapped as part of this survey should be considered temporary, particularly if project implementation does not occur for several years. Implementation of the project, specifically components that require excavation of new tidal channels to connect the creek channel with currently non-tidal parts of the flood plain, could result in impacts to new populations that may establish in the future.

If it is determined that project implementation would impact the species, impact avoidance, minimization or mitigation measures may be warranted, including re-surveying direct impact areas if project construction begins more than several years following the present survey.

Potentially suitable habitat exists in tidal marsh and mudflat areas within the un-surveyed portions of the North Reach, and its presence there cannot be ruled out. Additional surveys are warranted in these areas.

Delta mudwort

Status

FESA: none; CESA: none; CRPR: 2B.1; Global/State rarity ranking: G4G5/S2; Critical Habitat has not been designated for this species.

Description

Delta mudwort (*Limosella australis*) is a tufted stoloniferous annual belonging to the figwort family (Scrophulariaceae). It produces green, linear awl-like to cylindrical leaves cm (0.5-1.5 in) long. Flowers are white to lavender-blue, 3 mm (0.12 in) long and develop May through August.

Habitat Suitability and Potential Occurrence

Delta mudwort has been regarded as a rare native species in California, although recent treatments indicate that it may actually have been accidentally imported in the ballast of ships from the east coast of North America. It is found in the San Joaquin-Sacramento River Delta, occurring in Contra Costa, Sacramento, San Joaquin, and Solano counties. It has also been recorded from Marin County (Abbot's Lagoon). It is found on exposed muddy or sandy intertidal flats and brackish marshes, growing from sea level to 3 m (0-10 ft) in elevation.

Delta mudwort is known from 25 occurrences in the Sacramento and San Joaquin River delta of Contra Costa County and Solano counties. The nearest population (Occ. #58) 8.7 km (5.4 mi) northeast of the study area, on Ryer Island. Suitable habitat for Delta mudwort occurs along tidal channels and sloughs within the marshes of the Study Area.

Potential Project-Related Effects

Protocol surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this species. Surveys within the study area were negative, therefore Delta mudwort is presumed not to occur in the study area. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat exists in tidal marsh and mudflat areas within the un-surveyed portions of the North Reach, and its presence there cannot be ruled out. Additional surveys are warranted in these areas.

Marin knotweed

Status

FESA: none; CESA: none; CRPR: 3.1; Global/State rarity ranking: G2Q/S2; Critical Habitat has not been designated for this species.

Description

Marin knotweed (*Polygonum marinense*) is a suberect, much-branched perennial herb with somewhat succulent stems to 0.6 m (2 ft) long. Leaves are oblanceolate to elliptic, sessile, and 1.3-3.8 cm (0.5-1.5 in) long. Flowers are green with a white margin and about 0.3 cm (0.13 in) long. The blooming period is April through October. A distinguishing feature of the species is its olive brown fruits; fruits are required for positive identification.

Habitat Suitability and Potential Occurrence

Marin knotweed occurs infrequently in coastal salt marshes in the San Francisco Bay region. It has been recorded from Alameda, Humboldt, Marin, Napa, Sacramento, Solano and Sonoma counties. The greatest number of records by far is from Marin County.

Marin knotweed is known from 32 occurrences, including one at Southampton Marsh in Benicia State Park (Occ. #19), 9.5 km (5.9 mi) west-northwest of the study area, and one population (Occ. #15) on the Napa River near American Canyon, 19.2 km (11.9 mi) northwest of the study area. Suitable habitat for Marin knotweed occurs within the marshes of the Study Area.

Potential Project-Related Effects

Protocol surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this species. Surveys within the study area were negative, therefore Marin knotweed is presumed not to occur in the study area. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat exists in tidal marsh areas within the un-surveyed portions of the North Reach, and its presence there cannot be ruled out. Additional surveys are warranted in these areas.

Long-styled sand spurrey

Status

FESA: none; CESA: none; CRPR: 1B.2; Global/State rarity ranking: G5T2/S2; Critical Habitat has not been designated for this species

Description

Long-styled sand spurrey (*Spergularia macrotheca* var. *longistyla*) is a stout perennial herb. Fleshy leaves are in axillary clusters, with conspicuous narrowly triangular stipules. Flowers are glandular-hairy inflorescences, with fused sepals and white or pink to rosy or blue petals. Seeds are red-brown, generally winged, smooth or tubercled or otherwise sculptured. Flowering occurs from February to May.

Habitat Suitability and Potential Occurrence

Long-styled sand spurrey is known from 22 occurrences, 12 of which are in Contra Costa and Solano counties. The nearest populations are a historic record (Occ. #16) from the Martinez shoreline where it has not been observed since, and an unconfirmed observation (Occ. #15) in Wildcat Marsh, (27.7km) (17.2 mi) west of the study area. Most recent records of extant populations are situated near Clifton Court Forebay and the Byron Airport area, over 45 km (28 mi) southeast of the study area.

Within the study area, alkaline scalds and gaps in non-tidal salt marsh provide suitable habitat for long-styled sand spurrey.

Potential Project-Related Effects

Protocol surveys for special-status plants with potential to occur in the study area were performed during the flowering period of this species, and during the period when distinctive seeds used to distinguish species of the genus were mature. Only the common annual salt marsh sand spurry (*Spergularia marina*) was observed. Therefore, surveys for long-styled sand spurrey were negative, and it is presumed not to occur in the study area. Impact avoidance, minimization or mitigation measures are not warranted for the study area. Potentially suitable habitat exists in the

un-surveyed portions of the Middle and South Reaches, and its presence there cannot be ruled out. Additional surveys are warranted when these areas become accessible.

Suisun Marsh aster

Status

FESA: none; CESA: none; CRPR: 1B.2; Global/State rarity ranking: G2/S2; Critical Habitat has not been designated for this species.

Description

Suisun Marsh aster (*Symphyotrichum lentum*¹⁵) is a perennial, rhizomatous herb belonging to the sunflower family (Asteraceae). It produces stems up to 16 m (5 ft) tall, with sessile basal and cauline leaves up to 15 cm (6 in) long. Flowers are violet and occur in heads at the tips of branches. Flowering occurs May through November. Suisun marsh aster is a native species endemic to California and found only in Contra Costa, Napa, Sacramento, San Joaquin and Solano counties. It is associated with in freshwater and brackish marshes around Suisun Bay, growing from sea level to 3 m (0-10 ft) in elevation.

Habitat Suitability and Potential Occurrence

Suisun marsh aster is a native species endemic to California and found only in Contra Costa, Napa, Sacramento, San Joaquin and Solano counties. It is associated with in freshwater and brackish marshes around Suisun Bay, growing from sea level to 3 m (0-10 ft) in elevation.

Suisun Marsh aster is known from 104 occurrences in Contra Costa and Solano counties throughout the lower parts of the Sacramento and San Joaquin and Napa rivers. Prior surveys in Lower Walnut Creek recorded observations from the west side of the creek (Occ. #134); from Pt. Edith (Occ. #202), 2.3 km (1.4 mi) to the east of the study area; and at Southampton Marsh in Benicia State Park (Occ. #17), 9.5 km (5.9 mi) west-northwest of the study area. The locations within the study area were revisited and remapped. Many additional patches of the species also were located, ranging from a few individuals to stands covering several hundred square meters (up to ten thousand square feet), and comprised of thousands of flowering stems. Thirty-three separate points and polygons were mapped, totaling 0.28 ha (0.69 ac). It was most abundant in the mid marsh zone of the North Reach (see Figure 4-2, and photographs in Appendix B). It was frequently seen just outboard of the low marsh – mid marsh boundary with narrow-leaf cattail (*Typha angustifolia*), alkali bulrush (*Bolboschoenus maritimus*), hardstem bulrush (*Schoenoplectus acutus*), and western goldenrod (*Euthamia occidentalis*). It is most abundant toward the lower elevations of the mid marsh zone, where it is associated with pickleweed, fat hen (*Atriplex prostrata*), coyote brush, and perennial pepperweed. It was also observed on the State Lands parcel on the western edge of the study area in coastal scrub along the edge of a muted tidal channel. No Suisun marsh aster was observed in the Middle or South Reaches where the width of the flood plain above the low marsh zone is narrower, or in portions of the study area not subject to tides.

¹⁵ Formerly known as *Aster lentus*.

Potential Project-Related Effects

Suisun marsh aster is present within the study area, and potentially suitable habitat is available throughout the mid marsh zone, primarily along the North Reach. As a perennial rhizomatous species, its spatial extent is not expected change dramatically from year to year. Therefore, the locations mapped as part of this survey should provide a valid baseline for its distribution for several years. Implementation of the project, specifically components that require excavation of new tidal channels to connect the creek channel with currently non-tidal parts of the flood plain, could result in direct impacts to existing populations. Excavation of new tidal channels within the existing tidal marsh could indirectly reduce or increase suitable mid marsh habitat for Suisun Marsh aster, depending on microhabitat features, thus potentially decreasing or increasing its abundance. Expansion of tidal marsh within existing non-tidal areas could provide habitat for new populations of Suisun Marsh aster to establish.

If it is determined that project implementation would impact the species, impact avoidance, minimization or mitigation measures may be warranted, including re-surveying direct impact areas if project construction begins more than several years following the present survey.

Potentially suitable habitat exists in tidal marsh areas within the un-surveyed portions of the North Reach, and its presence there cannot be ruled out. Additional surveys are warranted in these areas.

4.2 Plant Communities

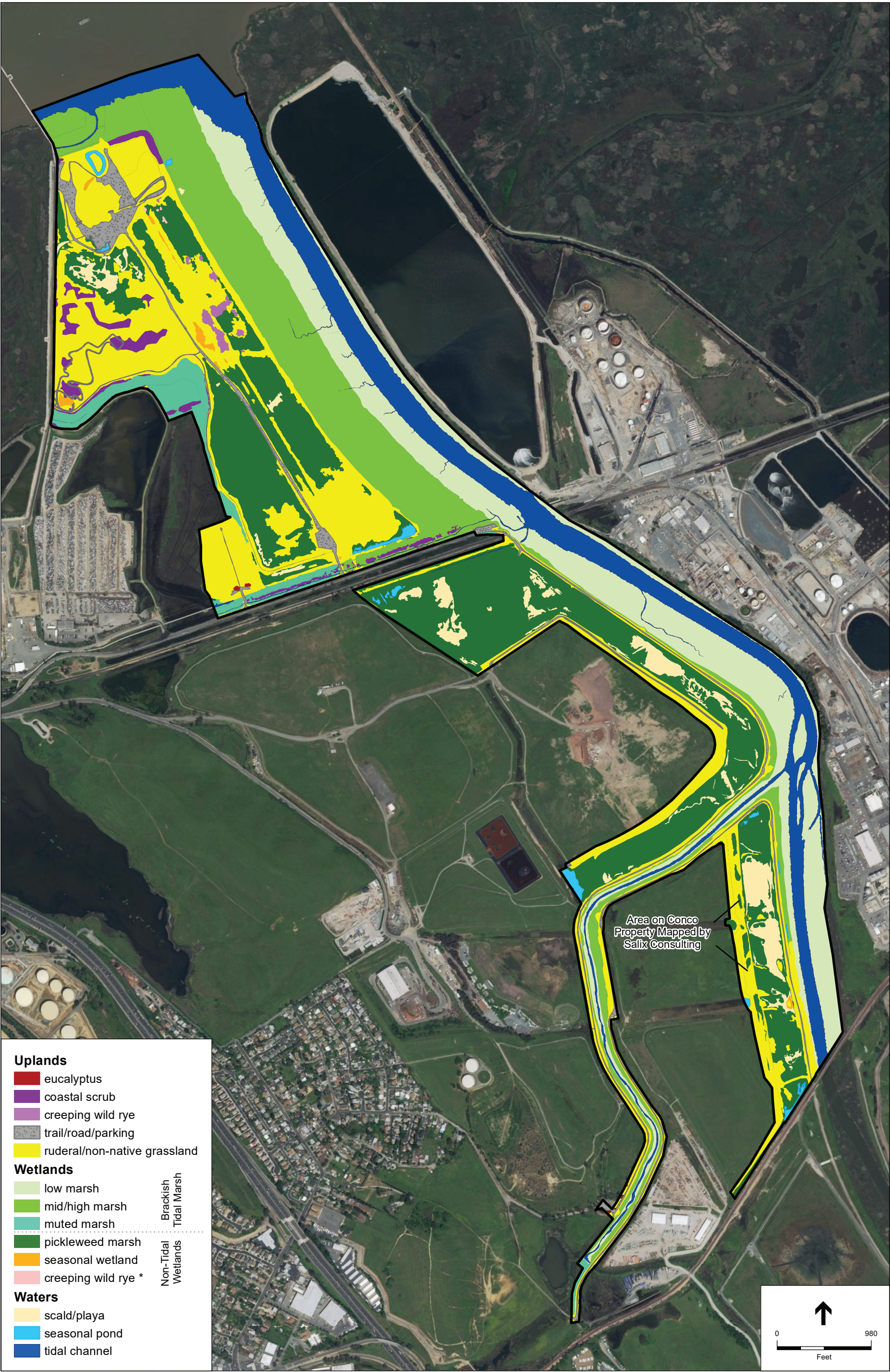
Plant communities in the study area have been mapped and described in detail in a separate report (ESA, 2019), and are summarized below. Plant community classification generally follows Sawyer *et al* (2009) and CDFW (2018a). The study area supports upland, aquatic and non-tidal wetland plant communities. Four of these are considered sensitive natural communities: tidal brackish marsh, pickleweed marsh, creeping wild rye turf, and submerged aquatic vegetation (CDFW, 2018b). Plant communities are depicted in **Figure 4-4**.

4.2.1 Upland Plant Communities

Ruderal/Non-native Grassland

The upland areas of the Study Area are dominated by ruderal vegetation and non-native grassland. Ruderal and non-native grassland habitats are most prevalent in areas subject to frequent and often severe vegetation and soil disturbances including disked or fallow fields, construction sites, levees, vehicle parking lots, and railroad or other public utility rights of way. This habitat occurs mostly in the North Reach, but also occurs along the levees in the Middle and South Reach. It is characterized by a dense growth of non-native grass species and ruderal vegetation dominated by non-native forbs.

Plant species that are common to this habitat include annual non-native grasses, perennial pepperweed (*Lepidium latifolium*), black mustard (*Brassica nigra*), short pod mustard (*Hirschfeldia incana*), Italian thistle (*Carduus pycnocephalus*), poison hemlock (*Conium maculatum*), and wild radish (*Raphanus sativus*). Non-native annual grasses dominating this



SOURCE: ESA 2017, 2018; LSA 2012; Salix, 2016; NAIP 2016

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Figure 4-4

Existing Habitats

* Wetland creeping wild rye occurs in small areas along the north edge of Pacheco Marsh.

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habitat include slender oat (*Avena barbata*), ripgut brome (*Bromus diandrus*), and Italian rye grass (*Festuca perennis*). The ruderal areas contain many other invasive forbs including ice plant (*Carpobrotus edulis*), stinkwort (*Dittrichia graveolens*), and yellow star thistle (*Centaurea solstitialis*).

Coastal Scrub

Coastal scrub habitat occurs in small patches in the North Reach. This coastal scrub habitat has developed on disturbed areas and includes native shrubs, primarily coyote brush (*Baccharis pilularis*), but also may include toyon (*Heteromeles arbutifolia*) and non-native tamarisk (*Tamarix* sp.).

Creeping Wild Rye Turf

There are also some nearly monotypic stands of native creeping wildrye (*Elymus triticoides*) within the North Reach and South Reach. These areas conform to the *Leymus triticoides*¹⁶ (creeping rye grass turfs) alliance, which is considered a sensitive natural community (CDFW, 2018b).

4.2.2 Aquatic Plant Communities

Tidal Brackish Marsh

Tidal brackish marsh, found throughout all three reaches in the Study Area, is typical of brackish tidal marsh in Suisun Bay and contains low, mid, and high marsh zones.

Low Marsh Zone

The low marsh zone consists of the marsh directly adjacent to Lower Walnut Creek. Low marsh generally occurs between elevations 2.1 and 5.5 ft. NAVD, or approximately MLLW +1 ft. to mean high water (MHW), according to typical vegetation elevation zones in Suisun Marsh (USBR, 2013). Typical vegetation within the low marsh zone includes California bulrush (*Schoenoplectus californicus*), common bulrush (*S. acutus*), and broad-leaf cattail (*Typha latifolia*).

These areas conform to the several vegetation alliances (hardstem and California bulrush marshes) which are considered sensitive natural communities where they do not also contain invasive common reed (*Phragmites australis*) (CDFW, 2018b).

Mid Marsh Zone

The mid marsh zone is inland of the low marsh zone and occur over a large area from the mouth of Walnut Creek to Waterfront Road. South of Waterfront Road only a narrow band of mid marsh exists.

Mid marsh generally occurs between 5.5 and 6.2 ft. NAVD, or between MHW and mean higher high water (MHHW). Two species that generally occur within the mid marsh, but also occur in

¹⁶ *Leymus triticoides* is now treated as *Elymus triticoides* (Baldwin, et al, 2012).

low marsh include salt marsh bulrush (*Bolboschoenus maritimus*) and common reed. Native pickleweed (*Salicornia pacifica*) and invasive perennial pepperweed also occur and can be dominant species within the mid marsh zone. Other species co-occur with these dominant species in the mid marsh zone including non-native fat-hen (*Atriplex prostrata*).

This vegetation zone conforms to the *Bolboschoenus maritimus-Sarcocornia pacifica*¹⁷ (salt marsh bulrush marshes) vegetation alliance, and is considered a sensitive natural community (CDFW, 2018b).

High Marsh Zone

The high marsh zone is inland of the mid marsh zone and, similar to the mid marsh zone, occurs over a large area from the mouth of Walnut Creek to Waterfront Road and as a narrow band south of Waterfront Road.

High marsh generally occurs between elevation 6.2 and 7.2 ft. NAVD, or between MHHW and Extreme HHW. Vegetation within the high marsh zone is dominated by pickleweed and invasive perennial pepperweed. Many other species are found at the upper elevations of the high marsh and at the edge of the transition zone including native salt grass (*Distichlis spicata*), alkali heath (*Frankenia salina*), fleshy jaumea (*Jaumea carnosa*), and gumplant (*Grindelia stricta*). Plant diversity is greater in the mid and high marsh zones than in the low marsh within the Study Area. Some other native species encountered intermittently within the mid and high marsh include western goldenrod (*Euthamia occidentalis*), salt marsh baccharis (*Baccharis glutinosa*), and marsh fleabane (*Pluchea odorata*).

This vegetation zone conforms to various *Sarcocornia pacifica* vegetation alliances (pickleweed mats), all of which are considered sensitive natural communities (CDFW, 2018b).

Pickleweed Marsh

Non-tidal pickleweed marsh occurs in all three reaches in the Study Area. Pickleweed marsh is dominated by pickleweed and contains varying densities of this plant. With a slight increase in elevation, pickleweed intergrades into areas composed of an assortment of hydrophytic species including, natives saltgrass, alkali heath, and non-natives fat-hen, perennial pepperweed, brass buttons (*Cotula coronopifolia*), and rabbitfoot grass (*Polypogon monspeliensis*).

This vegetation zone conforms to various *Sarcocornia pacifica* vegetation alliances (pickleweed mats), all of which are considered sensitive natural communities (CDFW, 2018b).

Seasonal Wetland

Only a couple of seasonal wetlands exist in the Study Area and are dominated by invasive perennial pepperweed and stinkwort with other native and non-native vegetation. The seasonal wetlands within the Study Area are somewhat disturbed from human and dirt bike traffic, so

¹⁷ *Sarcocornia pacifica* is now treated as *Salicornia pacifica* (Baldwin, et al, 2012).

wildlife use of these areas is likely limited, but they may provide foraging, refuge, or nesting habitat for common birds or mammals.

Scald/Playa

Scald/playa habitats occur throughout the North, Middle, and South Reaches and contain little or no vegetation, but the scald edges are generally surrounded by pickleweed or other salt tolerant vegetation. Some of the scalds pond seasonally, while others only become saturated during seasonal rains. The scalds contain sandy substrate and maintain high summer salt concentrations that prevent vegetation growth.

Seasonal Pond

Seasonal ponds occur in small quantities in the North, Middle, and South Reaches of the Study Area. Vegetation is typically absent or limited to a few emergent species, such as alkali bulrush and pickleweed.

Submerged Aquatic Vegetation

The perennially open water channels within the study area (i.e. below the intertidal zone) support Submerged Aquatic Vegetation (SAV), ranging from small isolated patches to extensive underwater “meadows”. Near the mouth of Walnut Creek and in Pacheco Creek, Sago pondweed (*Stuckenia pectinata*) was observed. This plant community conforms to the *Stuckenia pectinata* (pondweed mats) alliance and is considered a sensitive natural community (CDFW, 2018b). SAV also is a *vegetated shallows*, which is among the set of “special aquatic sites” that are covered under the Clean Water Act Section 404 guidelines.¹⁸

¹⁸ Code of Federal Regulations 230.43 (see <https://www.law.cornell.edu/cfr/text/40/part-230/subpart-E>).

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SECTION 5

Conclusions

Three special-status plant species were observed during multiple appropriately-timed site surveys following CDFW, CNPS and USFWS survey guidelines. Populations of two of these species, delta tule pea and Suisun Marsh aster, are concentrated in the North Reach of the study area. Additional stands of Suisun Marsh aster are located on the muted tidal portion of the State Lands parcel. Mason's lilaeopsis was observed at several locations within the study area along Pacheco Creek, and additional sites just outside of the study area on the east bank of Walnut Creek. Project implementation has the potential of directly or indirectly impacting portions of existing populations of these species through habitat loss, hydrological modification and redistribution of vegetation associated with tidal channels. Project implementation also is expected to create new tidal marsh areas which will become potential habitat for these species.

Ten additional special-status plant species with moderate or high potential to occur in the study area were not observed during the protocol surveys. These species are presumed absent from the study area.

A portion of the project footprint was not surveyed due to access limitations. Based on appearance from District lands and from aerial imagery, potentially suitable habitat for several of these species is present in the un-surveyed portions of the North, Middle, and South Reaches. Presence of special-status plants cannot be ruled out of these un-surveyed areas.

Four sensitive natural communities also were observed as part of these and other biological resources surveys conducted for the project: tidal brackish marsh, pickleweed marsh, creeping wild rye turf, and submerged aquatic vegetation.

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SECTION 6

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Appendix A

Special-status Species

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Selected Elements by Scientific Name
California Department of Fish and Wildlife
California Natural Diversity Database



Query Criteria: Vine Hill, Walnut Creek, Briones Valley, Denverton, Honker Bay, Clayton, Fairfield South, Cordelia, and Benicia 7.5-minute USGS quadrangles.

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Amsinckia lunaris</i> bent-flowered fiddleneck	PDBOR01070	None	None	G3	S3	1B.2
<i>Anomobryum julaceum</i> slender silver moss	NBMUS80010	None	None	G5?	S2	4.2
<i>Arctostaphylos auriculata</i> Mt. Diablo manzanita	PDERI04040	None	None	G2	S2	1B.3
<i>Arctostaphylos manzanita ssp. laevigata</i> Contra Costa manzanita	PDERI04273	None	None	G5T2	S2	1B.2
<i>Arctostaphylos pallida</i> pallid manzanita	PDERI04110	Threatened	Endangered	G1	S1	1B.1
<i>Astragalus tener var. tener</i> alkali milk-vetch	PDFAB0F8R1	None	None	G2T1	S1	1B.2
<i>Atriplex cordulata var. cordulata</i> heartscale	PDCHE040B0	None	None	G3T2	S2	1B.2
<i>Atriplex depressa</i> brittlescale	PDCHE042L0	None	None	G2	S2	1B.2
<i>Atriplex persistens</i> vernal pool smallscale	PDCHE042P0	None	None	G2	S2	1B.2
<i>Balsamorhiza macrolepis</i> big-scale balsamroot	PDAST11061	None	None	G2	S2	1B.2
<i>Blepharizonia plumosa</i> big tarplant	PDAST1C011	None	None	G1G2	S1S2	1B.1
<i>Calochortus pulchellus</i> Mt. Diablo fairy-lantern	PMLIL0D160	None	None	G2	S2	1B.2
<i>Campanula exigua</i> chaparral harebell	PDCAM020A0	None	None	G2	S2	1B.2
<i>Castilleja affinis var. neglecta</i> Tiburon paintbrush	PDSCR0D013	Endangered	Threatened	G4G5T1T2	S1S2	1B.2
<i>Centromadia parryi ssp. congdonii</i> Congdon's tarplant	PDAST4R0P1	None	None	G3T2	S2	1B.1
<i>Centromadia parryi ssp. parryi</i> pappose tarplant	PDAST4R0P2	None	None	G3T2	S2	1B.2
<i>Chloropyron molle ssp. hispidum</i> hispid salty bird's-beak	PDSCR0J0D1	None	None	G2T1	S1	1B.1
<i>Chloropyron molle ssp. molle</i> soft salty bird's-beak	PDSCR0J0D2	Endangered	Rare	G2T1	S1	1B.2



Selected Elements by Scientific Name
California Department of Fish and Wildlife
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Cicuta maculata</i> var. <i>bolanderi</i> Bolander's water-hemlock	PDAP10M051	None	None	G5T4	S2	2B.1
<i>Cirsium andrewsii</i> Franciscan thistle	PDAST2E050	None	None	G3	S3	1B.2
<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i> Suisun thistle	PDAST2E1G1	Endangered	None	G2T1	S1	1B.1
<i>Cordylanthus nidularius</i> Mt. Diablo bird's-beak	PDSCR0J0F0	None	Rare	G1	S1	1B.1
<i>Delphinium californicum</i> ssp. <i>interius</i> Hospital Canyon larkspur	PDRAN0B0A2	None	None	G3T3	S3	1B.2
<i>Dirca occidentalis</i> western leatherwood	PDTHY03010	None	None	G2	S2	1B.2
<i>Downingia pusilla</i> dwarf downingia	PDCAM060C0	None	None	GU	S2	2B.2
<i>Eriastrum ertterae</i> Lime Ridge eriastrum	PDPLM030F0	None	None	G1	S1	1B.1
<i>Eriogonum truncatum</i> Mt. Diablo buckwheat	PDPGN085Z0	None	None	G1	S1	1B.1
<i>Eryngium jepsonii</i> Jepson's coyote-thistle	PDAP10Z130	None	None	G2	S2	1B.2
<i>Erysimum capitatum</i> var. <i>angustatum</i> Contra Costa wallflower	PDBRA16052	Endangered	Endangered	G5T1	S1	1B.1
<i>Extriplex joaquinana</i> San Joaquin spearscale	PDCHE041F3	None	None	G2	S2	1B.2
<i>Fissidens pauperculus</i> minute pocket moss	NBMUS2W0U0	None	None	G3?	S2	1B.2
<i>Fritillaria liliacea</i> fragrant fritillary	PMLIL0V0C0	None	None	G2	S2	1B.2
<i>Grimmia torenii</i> Toren's grimmia	NBMUS32330	None	None	G2	S2	1B.3
<i>Helianthella castanea</i> Diablo helianthella	PDAST4M020	None	None	G2	S2	1B.2
<i>Hesperolinon breweri</i> Brewer's western flax	PDLIN01030	None	None	G2	S2	1B.2
<i>Holocarpha macradenia</i> Santa Cruz tarplant	PDAST4X020	Threatened	Endangered	G1	S1	1B.1
<i>Isocoma arguta</i> Carquinez goldenbush	PDAST57050	None	None	G1	S1	1B.1
<i>Lasthenia conjugens</i> Contra Costa goldfields	PDAST5L040	Endangered	None	G1	S1	1B.1
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i> Delta tule pea	PDFAB250D2	None	None	G5T2	S2	1B.2



Selected Elements by Scientific Name
California Department of Fish and Wildlife
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Legenere limosa</i> legenere	PDCAM0C010	None	None	G2	S2	1B.1
<i>Lilaeopsis masonii</i> Mason's lilaeopsis	PDAP119030	None	Rare	G2	S2	1B.1
<i>Limosella australis</i> Delta mudwort	PDSCR10030	None	None	G4G5	S2	2B.1
<i>Madia radiata</i> showy golden madia	PDAST650E0	None	None	G3	S3	1B.1
<i>Malacothamnus hallii</i> Hall's bush-mallow	PDMAL0Q0F0	None	None	G2	S2	1B.2
<i>Meconella oregana</i> Oregon meconella	PDPAP0G030	None	None	G2G3	S2	1B.1
<i>Microseris paludosa</i> marsh microseris	PDAST6E0D0	None	None	G2	S2	1B.2
<i>Monolopia gracilens</i> woodland woollythreads	PDAST6G010	None	None	G3	S3	1B.2
<i>Navarretia gowenii</i> Lime Ridge navarretia	PDPLM0C120	None	None	G1	S1	1B.1
<i>Navarretia leucocephala ssp. bakeri</i> Baker's navarretia	PDPLM0C0E1	None	None	G4T2	S2	1B.1
<i>Oenothera deltooides ssp. howellii</i> Antioch Dunes evening-primrose	PDONA0C0B4	Endangered	Endangered	G5T1	S1	1B.1
<i>Phacelia phacelioides</i> Mt. Diablo phacelia	PDHYD0C3Q0	None	None	G2	S2	1B.2
<i>Plagiobothrys hystriculus</i> bearded popcornflower	PDBOR0V0H0	None	None	G2	S2	1B.1
<i>Polygonum marinense</i> Marin knotweed	PDPGN0L1C0	None	None	G2Q	S2	3.1
<i>Puccinellia simplex</i> California alkali grass	PMPOA53110	None	None	G3	S2	1B.2
<i>Sanicula saxatilis</i> rock sanicle	PDAP11Z0H0	None	Rare	G2	S2	1B.2
<i>Senecio aphanactis</i> chaparral ragwort	PDAST8H060	None	None	G3	S2	2B.2
<i>Sidalcea keckii</i> Keck's checkerbloom	PDMAL110D0	Endangered	None	G2	S2	1B.1
<i>Spergularia macrotheca var. longistyla</i> long-styled sand-spurrey	PDCAR0W062	None	None	G5T2	S2	1B.2
<i>Streptanthus albidus ssp. peramoenus</i> most beautiful jewelflower	PDBRA2G012	None	None	G2T2	S2	1B.2
<i>Streptanthus hispidus</i> Mt. Diablo jewelflower	PDBRA2G0M0	None	None	G2	S2	1B.3



Selected Elements by Scientific Name
California Department of Fish and Wildlife
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Stuckenia filiformis ssp. alpina</i> slender-leaved pondweed	PMPOT03091	None	None	G5T5	S2S3	2B.2
<i>Symphotrichum lentum</i> Suisun Marsh aster	PDASTE8470	None	None	G2	S2	1B.2
<i>Trifolium amoenum</i> two-fork clover	PDFAB40040	Endangered	None	G1	S1	1B.1
<i>Trifolium hydrophilum</i> saline clover	PDFAB400R5	None	None	G2	S2	1B.2
<i>Triquetrella californica</i> coastal triquetrella	NBMUS7S010	None	None	G2	S2	1B.2
<i>Tropidocarpum capparideum</i> caper-fruited tropidocarpum	PDBRA2R010	None	None	G1	S1	1B.1
<i>Viburnum ellipticum</i> oval-leaved viburnum	PDCPR07080	None	None	G4G5	S3?	2B.3

Record Count: 67

Plant List

Inventory of Rare and Endangered Plants

84 matches found. [Click on scientific name for details](#)

Search Criteria

Found in Quads 3812222, 3812221, 3812128, 3812212, 3812211, 3812118, 3712282 3712281 and 3712188;

[Modify Search Criteria](#)
[Export to Excel](#)
[Modify Columns](#)
[Modify Sort](#)
[Display Photos](#)

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	annual herb	Mar-Jun	1B.2	S3	G3
Androsace elongata ssp. acuta	California androsace	Primulaceae	annual herb	Mar-Jun	4.2	S3S4	G5?T3T4
Anomobryum julaceum	slender silver moss	Bryaceae	moss		4.2	S2	G5?
Arabis blepharophylla	coast rockcress	Brassicaceae	perennial herb	Feb-May	4.3	S4	G4
Arctostaphylos auriculata	Mt. Diablo manzanita	Ericaceae	perennial evergreen shrub	Jan-Mar	1B.3	S2	G2
Arctostaphylos manzanita ssp. laevigata	Contra Costa manzanita	Ericaceae	perennial evergreen shrub	Jan-Mar(Apr)	1B.2	S2	G5T2
Arctostaphylos pallida	pallid manzanita	Ericaceae	perennial evergreen shrub	Dec-Mar	1B.1	S1	G1
Astragalus tener var. tener	alkali milk-vetch	Fabaceae	annual herb	Mar-Jun	1B.2	S2	G2T2
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G3T2
Atriplex coronata var. coronata	crownscale	Chenopodiaceae	annual herb	Mar-Oct	4.2	S3	G4T3
Atriplex depressa	brittscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
Atriplex persistens	vernal pool smallscale	Chenopodiaceae	annual herb	Jun,Aug,Sep,Oct	1B.2	S2	G2
Balsamorhiza macrolepis	big-scale balsamroot	Asteraceae	perennial herb	Mar-Jun	1B.2	S2	G2
Blepharizonia plumosa	big tarplant	Asteraceae	annual herb	Jul-Oct	1B.1	S1S2	G1G2
Calandrinia breweri	Brewer's calandrinia	Montiaceae	annual herb	(Jan)Mar-Jun	4.2	S4	G4
Calochortus pulchellus	Mt. Diablo fairy- lantern	Liliaceae	perennial bulbiferous herb	Apr-Jun	1B.2	S2	G2
Calochortus umbellatus	Oakland star-tulip	Liliaceae	perennial bulbiferous herb	Mar-May	4.2	S3?	G3?
Campanula exigua	chaparral harebell	Campanulaceae	annual herb	May-Jun	1B.2	S2	G2

<u>Castilleja affinis var. neglecta</u>	Tiburon paintbrush	Orobanchaceae	perennial herb (hemiparasitic)	Apr-Jun	1B.2	S1S2	G4G5T1T2
<u>Castilleja ambigua var. ambigua</u>	johnny-nip	Orobanchaceae	annual herb (hemiparasitic)	Mar-Aug	4.2	S4	G4T5
<u>Ceanothus purpureus</u>	holly-leaved ceanothus	Rhamnaceae	perennial evergreen shrub	Feb-Jun	1B.2	S2	G2
<u>Centromadia parryi ssp. congdonii</u>	Congdon's tarplant	Asteraceae	annual herb	May-Oct(Nov)	1B.1	S2	G3T2
<u>Centromadia parryi ssp. parryi</u>	pappose tarplant	Asteraceae	annual herb	May-Nov	1B.2	S2	G3T2
<u>Centromadia parryi ssp. rudis</u>	Parry's rough tarplant	Asteraceae	annual herb	May-Oct	4.2	S3	G3T3
<u>Chloropyron molle ssp. hispidum</u>	hispid bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Sep	1B.1	S1	G2T1
<u>Chloropyron molle ssp. molle</u>	soft bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Nov	1B.2	S1	G2T1
<u>Cicuta maculata var. bolanderi</u>	Bolander's water-hemlock	Apiaceae	perennial herb	Jul-Sep	2B.1	S2	G5T4
<u>Cirsium andrewsii</u>	Franciscan thistle	Asteraceae	perennial herb	Mar-Jul	1B.2	S3	G3
<u>Cirsium hydrophilum var. hydrophilum</u>	Suisun thistle	Asteraceae	perennial herb	Jun-Sep	1B.1	S1	G2T1
<u>Collomia diversifolia</u>	serpentine collomia	Polemoniaceae	annual herb	May-Jun	4.3	S4	G4
<u>Cordylanthus nidularius</u>	Mt. Diablo bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Aug	1B.1	S1	G1
<u>Delphinium californicum ssp. interius</u>	Hospital Canyon larkspur	Ranunculaceae	perennial herb	Apr-Jun	1B.2	S3	G3T3
<u>Dirca occidentalis</u>	western leatherwood	Thymelaeaceae	perennial deciduous shrub	Jan-Mar(Apr)	1B.2	S2	G2
<u>Downingia pusilla</u>	dwarf downingia	Campanulaceae	annual herb	Mar-May	2B.2	S2	GU
<u>Eleocharis parvula</u>	small spikerush	Cyperaceae	perennial herb	(Apr)Jun-Aug(Sep)	4.3	S3	G5
<u>Eriastrum ertterae</u>	Lime Ridge eriastrum	Polemoniaceae	annual herb	Jun-Jul	1B.1	S1	G1
<u>Erigeron biolettii</u>	streamside daisy	Asteraceae	perennial herb	Jun-Oct	3	S3?	G3?
<u>Eriogonum luteolum var. caninum</u>	Tiburon buckwheat	Polygonaceae	annual herb	May-Sep	1B.2	S2	G5T2
<u>Eriogonum truncatum</u>	Mt. Diablo buckwheat	Polygonaceae	annual herb	Apr-Sep(Nov-Dec)	1B.1	S1	G1
<u>Eriophyllum jepsonii</u>	Jepson's woolly sunflower	Asteraceae	perennial herb	Apr-Jun	4.3	S3	G3
<u>Eryngium jepsonii</u>	Jepson's coyote thistle	Apiaceae	perennial herb	Apr-Aug	1B.2	S2?	G2?
<u>Erysimum capitatum var. angustatum</u>	Contra Costa wallflower	Brassicaceae	perennial herb	Mar-Jul	1B.1	S1	G5T1
<u>Extriplex joaquinana</u>	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
<u>Fissidens pauperculus</u>	minute pocket moss	Fissidentaceae	moss		1B.2	S2	G3?

<u>Fritillaria liliacea</u>	fragrant fritillary	Liliaceae	perennial bulbiferous herb	Feb-Apr	1B.2	S2	G2
<u>Grimmia torenii</u>	Toren's grimmia	Grimmiaceae	moss		1B.3	S2	G2
<u>Helianthella castanea</u>	Diablo helianthella	Asteraceae	perennial herb	Mar-Jun	1B.2	S2	G2
<u>Hesperolinon breweri</u>	Brewer's western flax	Linaceae	annual herb	May-Jul	1B.2	S2	G2
<u>Holocarpha macradenia</u>	Santa Cruz tarplant	Asteraceae	annual herb	Jun-Oct	1B.1	S1	G1
<u>Iris longipetala</u>	coast iris	Iridaceae	perennial rhizomatous herb	Mar-May	4.2	S3	G3
<u>Isocoma arguta</u>	Carquinez goldenbush	Asteraceae	perennial shrub	Aug-Dec	1B.1	S1	G1
<u>Lasthenia conjugens</u>	Contra Costa goldfields	Asteraceae	annual herb	Mar-Jun	1B.1	S1	G1
<u>Lasthenia ferrisiae</u>	Ferris' goldfields	Asteraceae	annual herb	Feb-May	4.2	S3	G3
<u>Lathyrus jepsonii var. jepsonii</u>	Delta tule pea	Fabaceae	perennial herb	May-Jul(Aug- Sep)	1B.2	S2	G5T2
<u>Legenere limosa</u>	legenere	Campanulaceae	annual herb	Apr-Jun	1B.1	S2	G2
<u>Lessingia hololeuca</u>	woolly-headed lessingia	Asteraceae	annual herb	Jun-Oct	3	S3?	G3?
<u>Lilaeopsis masonii</u>	Mason's lilaeopsis	Apiaceae	perennial rhizomatous herb	Apr-Nov	1B.1	S2	G2
<u>Limosella australis</u>	Delta mudwort	Scrophulariaceae	perennial stoloniferous herb	May-Aug	2B.1	S2	G4G5
<u>Malacothamnus hallii</u>	Hall's bush-mallow	Malvaceae	perennial evergreen shrub	(Apr)May- Sep(Oct)	1B.2	S2	G2
<u>Meconella oregana</u>	Oregon meconella	Papaveraceae	annual herb	Mar-Apr	1B.1	S2	G2G3
<u>Micropus amphibolus</u>	Mt. Diablo cottonweed	Asteraceae	annual herb	Mar-May	3.2	S3S4	G3G4
<u>Microseris paludosa</u>	marsh microseris	Asteraceae	perennial herb	Apr-Jun(Jul)	1B.2	S2	G2
<u>Monardella antonina ssp. antonina</u>	San Antonio Hills monardella	Lamiaceae	perennial rhizomatous herb	Jun-Aug	3	S1S3	G4T1T3Q
<u>Monolopia gracilens</u>	woodland woolythreads	Asteraceae	annual herb	(Feb)Mar-Jul	1B.2	S3	G3
<u>Myosurus minimus ssp. apus</u>	little mouseltail	Ranunculaceae	annual herb	Mar-Jun	3.1	S2	G5T2Q
<u>Navarretia gowenii</u>	Lime Ridge navarretia	Polemoniaceae	annual herb	May-Jun	1B.1	S1	G1
<u>Navarretia leucocephala ssp. bakeri</u>	Baker's navarretia	Polemoniaceae	annual herb	Apr-Jul	1B.1	S2	G4T2
<u>Oenothera deltoides ssp. howellii</u>	Antioch Dunes evening-primrose	Onagraceae	perennial herb	Mar-Sep	1B.1	S1	G5T1
<u>Phacelia phacelioides</u>	Mt. Diablo phacelia	Hydrophyllaceae	annual herb	Apr-May	1B.2	S2	G2
<u>Plagiobothrys hystriculus</u>	bearded popcornflower	Boraginaceae	annual herb	Apr-May	1B.1	S2	G2
<u>Polygonum marinense</u>	Marin knotweed	Polygonaceae	annual herb	(Apr)May- Aug(Oct)	3.1	S2	G2Q
<u>Puccinellia simplex</u>	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3

<u>Ranunculus lobbii</u>	Lobb's aquatic buttercup	Ranunculaceae	annual herb (aquatic)	Feb-May	4.2	S3	G4
<u>Sanicula saxatilis</u>	rock sanicle	Apiaceae	perennial herb	Apr-May	1B.2	S2	G2
<u>Senecio aphanactis</u>	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	2B.2	S2	G3
<u>Spergularia macrotheca var. longistyla</u>	long-styled sand-spurrey	Caryophyllaceae	perennial herb	Feb-May	1B.2	S2	G5T2
<u>Streptanthus albidus ssp. peramoenus</u>	most beautiful jewelflower	Brassicaceae	annual herb	(Mar)Apr-Sep(Oct)	1B.2	S2	G2T2
<u>Streptanthus hispidus</u>	Mt. Diablo jewelflower	Brassicaceae	annual herb	Mar-Jun	1B.3	S2	G2
<u>Stuckenia filiformis ssp. alpina</u>	slender-leaved pondweed	Potamogetonaceae	perennial rhizomatous herb (aquatic)	May-Jul	2B.2	S2S3	G5T5
<u>Symphotrichum lentum</u>	Suisun Marsh aster	Asteraceae	perennial rhizomatous herb	(Apr)May-Nov	1B.2	S2	G2
<u>Trifolium hydrophilum</u>	saline clover	Fabaceae	annual herb	Apr-Jun	1B.2	S2	G2
<u>Triquetrella californica</u>	coastal triquetrella	Pottiaceae	moss		1B.2	S2	G2
<u>Tropidocarpum capparideum</u>	caper-fruited tropidocarpum	Brassicaceae	annual herb	Mar-Apr	1B.1	S1	G1
<u>Viburnum ellipticum</u>	oval-leaved viburnum	Adoxaceae	perennial deciduous shrub	May-Jun	2B.3	S3?	G4G5

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Questions and Comments

rareplants@cnps.org

Appendix B

Rarity Codes

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EXPLANATION OF SENSITIVITY STATUS CODES

ENDANGERED SPECIES ACT (ESA) LISTING CODES

- FE = federally listed as Endangered
FT = federally listed as Threatened
FPE = federally proposed for listing as Endangered
FPT = federally proposed for listing as Threatened
FPD = federally proposed for delisting
FC = federal candidate; former Category 1 candidates
FSC = federal species of concern; receives no legal protection. Use of the term does not necessarily mean that a species will eventually be proposed for listing.

CALIFORNIA ENDANGERED SPECIES ACT (CESA) LISTING CODES

- SE = state-listed as Endangered
ST = state-listed as Threatened
SR = state-listed as Rare
SCE = state candidate for listing as Endangered
SCT = state candidate for listing as Threatened

CALIFORNIA NATIVE PLANT SOCIETY DESIGNATIONS (CNPS)

- List 1: Plants of highest priority
List 1A: Plants presumed extinct in California
List 1B: Plants rare and endangered in California and elsewhere
List 2: Plants rare and endangered in California but more common elsewhere
List 3: Plants about which additional data are needed
List 4: Plants of limited distribution

CNPS R-E-D Codes

R (Rarity)

- 1 = Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction or extirpation is low at this time.
2 = Occurrence confined to several populations or to one extended population.
3 = Occurrence limited to one or a few highly restricted populations, or present in such low numbers that it is seldom reported.
? = More data are needed

E (Endangerment)

- 1 = Not endangered
2 = Endangered in a portion of its range
3 = Endangered throughout its range
? = More data are needed

CNPS R-E-D Codes (continued)

D (Distribution)

- 1 = More or less widespread outside California
2 = Rare outside California
3 = Endemic to California
? = More data are needed

OTHER CODES

AFS: American Fisheries Society categories of risk for marine, estuarine and diadromous fish stocks.

Audubon: Watch List: Bird species facing population declines and/or threats such as loss of breeding and wintering grounds, or species with limited geographic ranges.

BLM: Sensitive: Bureau of Land Management. Includes species under review by FWS or NMFS, species whose numbers are declining so rapidly that federal listing may become necessary, species with small and widely dispersed populations, or species inhabiting refugia or other unique habitats.

CDF: Sensitive: California Department of Forestry and Fire Protection. Includes species that warrant special protection during timber operations.

DFG: CSC: California species of Special Concern.

DFG: Special Animal: Species included by the Department of Fish and Game in their special species lists.

DFG: Fully Protected: Species protected under Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code.

FS: Sensitive: USDA Forest Service. Species identified by a regional forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or in habitat capability that would reduce a species' existing distribution.

FWS: BCC: Birds of Conservation Concern: migratory and non-migratory bird species (beyond listed species) that represent the FWS's highest conservation priorities.

FWS: MNBMC: US Fish and Wildlife Service: Migratory Nongame Birds of Management Concern. Species considered to be of concern in the U.S. due to documented or apparent population declines, small or restricted populations, or dependence on restricted or vulnerable habitats.

USMC Watch List: US Bird Conservation Watch List.

WBWB: High Priority: The Western Bat Working Group. Species imperiled or at high risk of imperilment based on available information on distribution, status, ecology, and known threats.

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Appendix C

Inventory of Plant Species

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Plant List For Lower Walnut Creek

Jan 24, 2019

Sort By : Family

Scientific Name	Common Name	Note
Adoxaceae		
<i>Sambucus nigra ssp. caerulea</i>	blue elderberry	
Aizoaceae - Fig-Marigold Family		
<i>Carpobrotus edulis</i>	Hottentot fig	•
<i>Mesembryanthemum nodiflorum</i>	little ice plant	•
<i>Sesuvium verrucosum</i>	sea-purslane	
Anacardiaceae - Sumac Family		
<i>Toxicodendron diversilobum</i>	poison oak	
Apiaceae - Carrot Family		
<i>Apium graveolens</i>	celery	•
<i>Conium maculatum</i>	poison-hemlock	•
<i>Foeniculum vulgare</i>	sweet fennel	•
<i>Lilaeopsis masonii</i>	Mason's lilaeopsis	1
<i>Oenanthse sarmentosa</i>	Pacific oenanthse	
Apocynaceae - Dogbane Family		
<i>Vinca major</i>	big periwinkle	•
Arecaceae - Palm Family		
<i>Washingtonia filifera</i>	Washington fan palm	•
Asteraceae - Sunflower Family		
<i>Achillea millefolium</i>	yarrow	
<i>Artemisia douglasiana</i>	mugwort	
<i>Baccharis glutinosa</i>	marsh baccharis	
<i>Baccharis pilularis</i>	coyote brush	
<i>Carduus pycnocephalus</i>	Italian thistle	•

Footnotes:

1 = federal or State listed Species
3 = CALIPC Listed Invasive Species

2 = other special-status species
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AG = agricultural species
HORT = horticultural species



Plant List For Lower Walnut Creek

Jan 24, 2019

Sort By : Family

Scientific Name	Common Name	Note
<i>Centaurea melitensis</i>	tocalote	•
<i>Centaurea solstitialis</i>	yellow starthistle	•
<i>Cotula coronopifolia</i>	brassbuttons	•
<i>Cynara cardunculus</i>	artichoke thistle	•
<i>Dittrichia graveolens</i>	stinkwort	
<i>Erigeron canadensis</i>	horseweed	•
<i>Euthamia occidentalis</i>	western goldenrod	
<i>Grindelia stricta</i> var. <i>angustifolia</i>	marsh gumplant	
<i>Helenium puberulum</i>	sneezeweed	
<i>Helminthotheca echioides</i>	bristly ox-tongue	•
<i>Jaumea carnosa</i>	jaumea	
<i>Lactuca serriola</i>	prickly lettuce	•
<i>Pluchea odorata</i>	salt marsh fleabane	
<i>Pseudognaphalium luteoalbum</i>	cudweed	•
<i>Silybum marianum</i>	milkthistle	•
<i>Sonchus asper</i> ssp. <i>asper</i>	prickly sowthistle	
<i>Sonchus oleraceus</i>	common sowthistle	•
<i>Symphyotrichum lentum</i>	Suisun Marsh aster	2
<i>Tragopogon porrifolius</i>	purple salsify	•
Boraginaceae - Borage Family		
<i>Heliotropium curassavicum</i>	salt heliotrope	
Brassicaceae - Mustard Family		
<i>Hirschfeldia incana</i>	shortpod mustard	•

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Plant List For Lower Walnut Creek

Jan 24, 2019

Sort By : Family

Scientific Name	Common Name	Note
<i>Lepidium latifolium</i>	perennial pepperweed	•
<i>Raphanus sativus</i>	wild radish	•
Caryophyllaceae - Pink Family		
<i>Spergularia marina</i>	salt-marsh sand-spurry	•
Chenopodiaceae - Goosefoot Family		
<i>Atriplex lentiformis</i>	big saltbush	
<i>Atriplex prostrata</i>	fat-hen	
<i>Atriplex semibaccata</i>	Australian saltbush	•
<i>Salicornia pacifica</i>	pickleweed	
<i>Salsola soda</i>	oppositeleaf Russian thistle	•
Convolvulaceae - Morning-glory Family		
<i>Convolvulus arvensis</i>	field bindweed	•
<i>Cressa truxillensis</i>	alkali weed	
<i>Cuscuta salina</i>	saltmarsh dodder	
Crassulaceae - Stonecrop Family		
<i>Crassula connata</i>	pygmyweed	
Cyperaceae - Sedge Family		
<i>Isolepis cernua</i>	low bulrush	
<i>Schoenoplectus acutus</i>	common tule	
<i>Schoenoplectus americanus</i>	three-square	
<i>Schoenoplectus californicus</i>	California bulrush	
Dipsacaceae - Teasel Family		
<i>Dipsacus fullonum</i>	common teasel	•

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Plant List For Lower Walnut Creek

Jan 24, 2019

Sort By : Family

Scientific Name	Common Name	Note
Fabaceae - Legume Family		
<i>Acemispom americanus</i> var. <i>americanus</i>	Spanish clover	
<i>Acemispom glaber</i>	California broom	
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	Delta tule pea	2
<i>Lotus corniculatus</i>	broadleaf bird's-foot trefoil	•
<i>Medicago polymorpha</i>	burclover	•
<i>Melilotus indicus</i>	sourclover	•
<i>Vicia villosa</i> ssp. <i>villosa</i>	hairy vetch	•
Fagaceae - Oak Family		
<i>Quercus agrifolia</i>	coast live oak	
<i>Quercus lobata</i>	valley oak	
Frankeniaceae - Frankenia Family		
<i>Frankenia salina</i>	alkali heath	
Geraniaceae - Geranium Family		
<i>Erodium cicutarium</i>	red-stemmed filaree	•
<i>Geranium dissectum</i>	cut-leaved geranium	•
Hydrocharitaceae - Waterweed Family		
<i>Elodea</i> sp.	waterweed	
Iridaceae - Iris Family		
<i>Iris pseudacorus</i>	yellowflag iris	
Juncaceae - Rush Family		
<i>Juncus balticus</i>	wire rush	
<i>Juncus bufonius</i> var. <i>bufonius</i>	toad rush	
<i>Juncus effusus</i> var. <i>pacificus</i>	Pacific bog rush	

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Plant List For Lower Walnut Creek

Jan 24, 2019

Sort By : Family

Scientific Name	Common Name	Note
<i>Juncus xiphioides</i>	iris-leaved rush	
Lamiaceae - Mint Family		
<i>Mentha aquatica</i>	water mint	
<i>Stachys albens</i>	white hedge nettle	
<i>Trichostema lanceolatum</i>	vinegar weed	
Liliaceae - Lily Family		
<i>Asparagus officinalis</i> ssp. <i>officinalis</i>	cultivated asparagus	AG
Lythraceae - Loosesstrife Family		
<i>Lythrum californicum</i>	common loosestrife	
<i>Lythrum salicaria</i>	purple loosestrife	
Malvaceae - Mallow Family		
<i>Malva nicaeensis</i>	bull mallow	•
<i>Malvella leprosa</i>	alkali mallow	
Myrsinaceae - Myrsine family		
<i>Lysimachia arvensis</i>	scarlet pimpernel	•
Myrtaceae - Myrtle Family		
<i>Eucalyptus globulus</i>	Tasmanian blue gum	•
Onagraceae - Evening Primrose Family		
<i>Epilobium ciliatum</i>	northern willowherb	
<i>Oenothera elata</i> ssp. <i>hookeri</i>	Hooker's evening-primrose	
Plantaginaceae - Plantain Family		
<i>Plantago coronopus</i>	cut-leaved plantain	•
Poaceae - Grass Family		
<i>Agrostis avenacea</i>	hairy-flower bentgrass	•

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Plant List For Lower Walnut Creek

Jan 24, 2019

Sort By : Family

Scientific Name	Common Name	Note
<i>Arundo donax</i>	giant reed	•
<i>Avena barbata</i>	slender wild oats	•
<i>Bromus hordeaceus</i>	soft chess	•
<i>Bromus madritensis ssp. rubens</i>	red brome	•
<i>Cynodon dactylon</i>	Bermudagrass	•
<i>Distichlis spicata</i>	saltgrass	
<i>Elymus glaucus</i>	blue wildrye	
<i>Elymus triticoides</i>	creeping wildrye	
<i>Festuca myuros</i>	rattail fescue	•
<i>Festuca perennis</i>	perennial ryegrass	•
<i>Hordeum marinum ssp. gussoneanum</i>	Mediterranean barley	•
<i>Hordeum murinum ssp. leporinum</i>	foxtail barley	•
<i>Parapholis incurva</i>	sickle grass	•
<i>Phragmites australis</i>	common reed	
<i>Polypogon monspeliensis</i>	annual rabbitsfoot grass	•
<i>Sorghum halepense</i>	Johnsongrass	•
Polygonaceae - Buckwheat Family		
<i>Persicaria lapathifolium</i>	willow weed	
<i>Polygonum aviculare ssp. depressum</i>	common knotweed	•
<i>Rumex conglomeratus</i>	whorled dock	•
<i>Rumex crispus</i>	curly dock	•
Potamogetonaceae - Pondweed Family		
<i>Ruppia maritima</i>	ditch-grass	

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Plant List For Lower Walnut Creek

Jan 24, 2019

Sort By : Family

Scientific Name	Common Name	Note
<i>Stuckenia pectinata</i>	fennel-leaved pondweed	
Rosaceae - Rose Family		
<i>Heteromeles arbutifolia</i>	toyon	
<i>Potentilla anserina</i> ssp. <i>pacifica</i>	silverweed	
<i>Rosa californica</i>	California rose	
<i>Rubus armeniacus</i>	Himalayan blackberry	•
<i>Rubus ulmifolius</i> var. <i>inermis</i>	evergreen thornless blackberry	
<i>Rubus ursinus</i>	California blackberry	
Rubiaceae - Madder Family		
<i>Galium aparine</i>	goose grass	
Scrophulariaceae - Figwort Family		
<i>Scrophularia californica</i>	California figwort	
Tamaricaceae - Tamarisk Family		
<i>Tamarix ramosissima</i>	saltcedar	
Typhaceae - Cattail Family		
<i>Typha latifolia</i>	broadleaf cattail	
Urticaceae - Nettle Family		
<i>Urtica dioica</i>	stinging nettle	

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Appendix D

Representative Photographs

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1. Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*). Photo taken May 17, 2018.



2. Delta tule pea climbing on coyote brush. Photo taken May 17, 2018.



3. Mason's Lilaeopsis (*Lilaeopsis masonii*) growing in small dense patch at edge of Pacheco Creek terrace. Photo taken June 8, 2018.



4. Mason's lilaeopsis leaves and small white flowers. Photo taken June 8, 2018.



5. Suisun marsh aster (*Symphyotrichum lentum*) in Lower Walnut Creek marsh. Photo taken October 20, 2018.



6. Suisun marsh aster growing in coyote brush thicket. Photo taken October 20, 2018.



7. Suisun marsh aster (*Symphyotrichum lentum*) with common reed (*Phragmites australis*). Photo taken November 1, 2018.



8. Submerged aquatic vegetation consisting of Sago or pondweed (*Stuckenia pectinata*) at mouth of Walnut Creek. Photo taken June 8, 2018.



9. Low marsh along Pacheco Creek. Photo taken May 24, 2018.



10. Narrow tidal slough channel off main stem of Lower Walnut Creek, in dense low marsh of hardstem bulrush (*Schoenoplectus acutus*).



11. Interface between low marsh (background) and mid-marsh (foreground). Photo taken May 17, 2018.



12. Extensive non-tidal pickleweed (*Salicornia pacifica*) marsh in Pacheco Marsh. Photo taken May 17, 2018.



13. Creeping wild rye turf, (*Elymus triticoides*). Photo taken May 17, 2018.



14. Upland non-native grassland with ripgut brome (*Bromus diandrus*), hairy vetch (*Vicia villosa*), and black mustard (*Brassica nigra*) in background. Photo taken May 17, 2018.

Appendix D

Lower Walnut Creek Restoration Project, Salt Marsh Harvest Mouse Technical Memorandum

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Memorandum

Project #4207-01

To: Michelle Orr, ESA

From: Ron Duke
October 25, 2018

Subject: Lower Walnut Creek Restoration Project, Salt Marsh Harvest Mouse Technical Memorandum

Background

Purpose

The Contra Costa County Flood Control and Water Conservation District is proposing the Lower Walnut Creek Restoration Project (LWC project) to: (1) restore and enhance tidal wetlands along the southern shore of Suisun Bay; and (2) provide sustainable flood protection that extends upstream from Suisun Bay along Walnut Creek and its tributary Pacheco Creek (ESA 2017). The purposes of this technical memorandum are to update the existing science on salt marsh harvest mouse (*Reithrodontomys raviventris halicoetes*) (SMHM) habitat use and to apply the current science to predict the project's impacts and benefits to the SMHM.

Distribution

The SMHM is found only in saline and brackish wetlands of the San Francisco Bay and its tributaries. The southern subspecies (*R. r. raviventris*) is primarily restricted to the area along both sides of San Francisco Bay, from San Mateo County and Alameda County south to Santa Clara County. The historical range of the species included tidal marshes within the San Francisco and San Pablo Bays, east to the Collinsville-Antioch area. Agriculture and urbanization has claimed much of the former historical tidal marshes, resulting in a 79% reduction in the amount of tidal marshes in these areas (Goals Project 1999). At present, the northern subspecies (*R. r. halicoetes*) occurs along Suisun and San Pablo Bays north of Point Pinole in Contra Costa County, and in Point Pedro in Marin County. The southern subspecies is found in marshes in Corte Madera, Richmond, and South Bay (primarily south of the San Mateo–Hayward Bridge on State Route 92).

Habitat and Biology

The SMHM has evolved to a life in tidal marshes and the associated upland transitional zones of San Francisco Bay. This species has adapted well to the managed marshes surrounding the bay, especially in the diked marshes of Suisun Bay. Specifically, it has evolved to depend mainly on dense pickleweed (*Salicornia* spp.) as its primary cover and food source but also uses other vegetation (e.g., saltgrass [*Distichlis spicata*], bulrush [*Schoenoplectus* spp. and *Bolboschoenus* spp.]) typically found in the salt and brackish marshes of this region. In natural systems, SMHM can be found in the middle tidal marsh and upland transitional zones, as well as in managed marshes. Upland refugia during high tide events and vegetation structure (i.e., room to climb above the tides or managed flooding) are essential habitat components for the SMHM.

Although its primary habitat (especially in the South Bay) was thought to consist of pickleweed-dominated areas in the upper regions of tidal marshes, the SMHM is also found in diked and muted tidal marshes comprised mainly of pickleweed. More recently, this species has been found in dense vegetation within brackish marshes in the South Bay, specifically tri-corner bulrush (*Schoenoplectus americanus*) marshes that are mature and have a thick, well-developed layer of thatch (H. T. Harvey & Associates 2006, 2010). As discussed below, recent work on the northern subspecies (*R. r. halucoetes*) shows substantially less or no preference for pickleweed-dominated areas.

Threats

Historically, the marshes in San Francisco Bay were a complex mosaic of vegetation zones, generally consisting of low marsh adjacent to mudflats dominated by cordgrass (*Spartina foliosa*), high marsh plains dominated by pickleweed, and broad transitions of peripheral halophytes (i.e., salt-tolerant plants that cannot endure as much tidal inundation) into upland habitats, with narrower transitional zones on natural levees along larger channels within the marshes. Most of the tidal marshes around San Francisco Bay, and especially in the South Bay, were eliminated; the remaining marshes have lost the upper portion of their pickleweed zones as well as the higher zone of peripheral halophytes (Shellhammer 1982, Shellhammer and Duke 2004). Most of the tidal marshes in the South Bay are small, isolated swaths along the backshores of levees or other hardened structures that promote predation, inhibit further high marsh development, and are threatened by sea level rise (Shellhammer 1989). Similarly, most of the tidal marshes do not contain higher order tidal channels and therefore lack a configuration of natural levees supporting shrubs (e.g., gum plant [*Grindelia* spp.] and other peripheral halophytes) that could provide escape cover for SMHM. Shellhammer and Duke (2004) note that most of the marshes of the South Bay are de facto corridors; they are likely not wide enough to support viable populations but are broad enough to function as dispersal corridors.

A database of all SMHM studies was compiled by H. Shellhammer at H. T. Harvey & Associates (Shellhammer and Duke 2004). Trapping records from permits issued by the U.S. Fish and Wildlife Service and California Department of Fish and Game (now California Department of Fish and Wildlife [CDFW]) were reviewed and compiled. The database, which includes 198 trapping projects (estimated 95% of all such projects and studies) representing 134,204 trap nights (TN) completed through 2003, shows that 37% of all trapping projects (i.e., 73 of 198 projects, or 49,481 of 134,204 TN) captured no SMHM. The average capture efficiency (C.E., or total

effort in TN divided by the number of mice captured) of all trapping projects was 0.013. In terms of unit effort, it took an average of 79 TN to capture one harvest mouse. For projects in which at least one SMHM was captured, approximately 64% (153 of 198) had a C.E. equal to or less than 0.019; it took 77 TN to capture a single SMHM. There were few projects where numerous harvest mice were captured (i.e., only 8 projects had a C.E. of 0.06 or more).

Despite the species' apparently low populations, the SMHM is known to rapidly colonize restored areas. Multiple trapping reports in the database indicated that this species quickly moves into areas of appropriate habitat from nearby inhabited areas. Restored habitats at the Concord Naval Weapons Station were recolonized within 2 years (H. T. Harvey & Associates 1996). More extensive work in the Suisun Marsh over the last 10 years has shown that the diked and tidal marshes of the Suisun Bay support a robust SMHM population; this research is described below.

Current Science on SMHM Habitat Use

Distribution of the SMHM in the Vicinity of the Lower Walnut Creek Restoration Site

The tidal and non-tidal marshes of Suisun Bay have been known to support SMHM for more than a century (Dixon 1908). Trapping efforts in the tidal marshes in the vicinity have historically been infrequent, and generally related to evaluation of impacts and potential damage to these marshes. Figure 1 depicts the distribution of most of the trapping efforts that were conducted in the area, as compiled from public records (Shellhammer and Duke 2004, Shellhammer 2005). An extensive trapping effort was undertaken after the 1988 Shell Oil Spill as part of an extensive study of the spill's effects implemented under the Shell Oil Spill Assessment and Recovery Monitoring Environmental Effects Program (Shell Oil program) (H. T. Harvey & Associates 1989a). Those trapping efforts detected SMHM in the Peyton Slough Marsh to the west of the LWC project area. The SMHM was detected in numerous locations, including along trap lines in areas abutting the northwest quadrant of the North Reach of the LWC project area, and near the remnant channel where the culverts will be improved to expand tidal connection to the western quadrants (Figure 2). The Shell Oil program trapping also detected SMHM in the Point Edith Ecological Reserve immediately east of the LWC project (Figure 3), as well as in the Hastings Slough Marsh slightly farther to the east (Figure 1). Additionally, SMHM was found in several other locations along the edges and islands of the Suisun Bay. The vegetation in these brackish tidal marshes consists of a mixture of bulrushes, pickleweed, and other marsh plants. The Shell Oil program trapping also detected SMHM along the fringes of what was previously known as McNabney or Shell Marsh and is now referred to as the Waterbird Regional Reserve (Figure 1). This marsh was the most substantially affected by the 1988 oil spill and subsequent clean-up efforts; however, Lower Walnut Creek was also heavily oiled by the spill. Although there have been no recent studies in the vicinity, the brackish marshes to the east and west of the North Reach of the LWC project have long supported robust SMHM populations. Fisler's landmark work on the species (Fisler 1965) included collecting numerous specimens from an area referred to as Martinez Marsh, which was 2 miles west of Martinez and coincides with the current location of Peyton Slough Marsh.



Figure 1. Salt Marsh Harvest Mouse Trapping Records
Lower Walnut Creek Restoration (4207-01)
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The area between the North and Middle Reaches of the LWC project area has been trapped occasionally with mixed results. The drainage ditches to the south of Waterfront Road were trapped as part of an investigation related to an oil spill from the Kinder Morgan Energy Partners pipeline on Dec. 12, 2000 (H. T. Harvey & Associates 2001) (Figure 1). No SMHM were discovered, although some harvest mice that were trapped had intermediate traits and were therefore not assigned to species; Dr. Howard Shellhammer determined that none of these individuals were SMHM. The seasonal wetland between Waterfront Road and the Acme Landfill was trapped in the late 1980s and a few SMHM were present (H. T. Harvey & Associates 1989b) (Figure 1). West of the Tosco oil refinery, SMHM were also found in the marshes along Waterfront Road (H. T. Harvey & Associates 1997a) (Figure 1). Farther east, SMHM are known from the brackish marshes of the Concord Naval Weapons Station, including those near Middle Point (H. T. Harvey & Associates 1992, 1997b).

Extensive SMHM trapping has been undertaken recently in the Suisun Marsh across Suisun Bay from the project site. That trapping, conducted by CDFW and researchers from the University of California, Davis, has revealed a robust population of SMHM in both tidal and managed brackish marshes (Smith et al. 2017, 2018). Diked managed marshes in the Suisun Marsh provide high-quality habitat, with densities of SMHM that are comparable to the tidal marshes, and habitat use is similar between the diked and tidal marshes. Within these Suisun Marsh areas, there are tall pickleweed areas intermixed with bulrushes, fat hen (*Atriplex prostrata*), Baltic rush (*Juncus balticus* ssp. *ater*), and alkali heath (*Frankenia salina*) (Goals Project 1999, as cited in Smith et al. 2018).

Distribution and Habitat Use of SMHM in the Suisun Bay Marsh

As described above, there have been extensive trapping efforts in the tidal marshes and managed wetlands of Suisun Marsh in recent years. Smith et al. (2014) conducted extensive trapping and radio-telemetry work, which focused on the movements of SMHM during high tide events and compared the species' movements in tidal versus non-tidal wetlands of the Suisun Marsh. Individual SMHM tended to stay within their home ranges, and mostly moved vertically within the vegetation in response to high tides and/or managed flooding of diked marshes.

Moreover, there seems to be little preference for pickleweed-dominated habitats within SMHM populations occupying the Suisun Marsh. This observation is based on both habitat occupation (i.e., little or no preference for pickleweed over more brackish marsh species), and on dietary preferences. Food preference tests conducted by Smith showed that SMHM ate a wide variety of plants and seeds, rarely showing preference, but consumed what was available (Smith 2014, 2017). Thus the brackish marshes of the Suisun Bay, including the vast diked marshes, provide extensive high quality habitat for the SMHM. Smith reported annual average densities of 31.5 to 35 individuals per hectare in managed and tidal marshes, respectively, which indicated a population of approximately 750,000 individuals in the Suisun Marsh (Smith 2017).

Earlier work at the Concord Naval Weapons Station (H. T. Harvey & Associates 1992) had also demonstrated that the SMHM was widespread in brackish marshes and showed some preference for pickleweed-dominated habitats; however, they were widespread in areas with relatively high cover values for salt grass, invasive perennial

pepperweed (*Lepidium latifolium*), and Baltic rush. The 1992 study also noted that other habitat components, including vegetative cover and structure, were important to SMHM.

The subsequent, extensive work of Smith et al. (2017) was far more definitive, combining radio-telemetry with food studies and involving approximately 10,000 hours of effort.

This radio-telemetry work also allowed for the detection of numerous SMHM nests in a variety of settings, including those constructed up in vegetation, on the ground, and in cracks in dry mud or soil. There was little preference for vegetation type detected in the choice of nesting locations (Smith 2017). There were areas that seemed to be avoided by SMHM. These areas contained sparse pickleweed and other low vegetation and/or consisted primarily of bare ground or scalds.

Additionally, by using radio-telemetry, it became clear that bare areas, including levees, were crossed consistently and regularly as were areas of open water (e.g., sloughs) thus really did not present barriers for SMHM movement. While the width and constitution of the barriers were not necessarily compared, it is clear that SMHM move more readily throughout the marsh environments than previously thought.

Proposed Project's Effects on the SMHM

Potential SMHM Use of Existing Habitats within the Project Area

The existing diked habitats within the South Reach of the LWC project are comparatively poor for the SMHM. While mapped as wetlands, the area is a mixture of sparse, low pickleweed, grasses, and barren, seasonally-ponded areas. The lack of vegetative cover for most of the diked habitats in the South Reach limits their SMHM habitat value. The adjoining tidal marsh along Walnut Creek and Pacheco Creek in the South Reach is a mixture of freshwater and brackish marsh plant species, which possibly could support small numbers of SMHM, especially those that may move into the area from more suitable habitat downstream.

The Middle Reach is similar to the South Reach; in the diked areas there is a mixture of sparse, low pickleweed, grasses, and barren, seasonally-ponded areas. Diked sections along Pacheco Creek are similar to those of the South Reach. Diked sections along Lower Walnut Creek, while still marginal habitat, show some improvement in habitat quality toward the north end of the Middle Reach. Patches of pickleweed are larger and denser, and the overall vegetative cover is higher and more continuous, which are factors that improve the SMHM habitat quality. The habitat quality of the adjoining tidal marshes along Pacheco Creek and Lower Walnut Creek similarly improves in the downstream direction; the marsh conditions transition from predominantly freshwater to more brackish. These brackish areas have a higher likelihood of supporting SMHM. Near the north end of the Middle Reach, the habitat improves somewhat in the adjacent Acme Landfill seasonal wetland where SMHM were trapped in the late 1980s. However, anecdotally the habitat in that area may have declined due to repeated flooding and lack of drainage.

Portions of the North Reach provide much better habitat for the SMHM. Specifically, there are currently deep, dense stands of pickleweed within the southeast and southwest quadrants of the North Reach. Although these

areas are somewhat isolated from each other by the current access road and are subject to flooding during heavy rainfall years, they provide some of the best potential habitat for SMHM on the LWC project site. Other areas within the northeast quadrant also provide suitable habitat, including patches of pickleweed, grasses, and other species providing relatively dense cover. The areas of the northwest quadrant proposed for restoration have no habitat value for the SMHM, except perhaps for occasional dispersal or grassland foraging. Lower Walnut Creek on the east side of the North Reach provides suitable brackish marsh habitat for the species; it is similar to the tidal marshes to the east and west of the site but may be slightly less brackish due to freshwater discharges from the Walnut Creek watershed.

The brackish tidal marshes along Lower Walnut Creek, especially in the Middle and North Reaches of the project area, likely support good populations of SMHM on the basis of the species being reported in similar brackish marshes on both sides of Suisun Bay.

Projected Habitats and Habitat Values Post-restoration

Within the South Reach, the newly created tidal marsh will have vegetation similar to that of the outboard tidal marshes along Lower Walnut Creek (i.e., transitioning from freshwater to brackish marsh). Lowering and breaching the outboard levee, creating a set-back levee, and preserving and enhancing the existing seasonal wetlands at the south end of the reach will create habitats more likely to support SMHM. In particular, the upper edges of the marsh, which will be at somewhat higher elevations from grading onto the new levee side slopes, should provide a border of brackish/salt marsh vegetation that will provide more continuous potential habitat for SMHM. The created marshes should provide dense vegetative cover (where it is currently sparse) and sufficient structure to support use by the SMHM. Although freshwater portions of the habitat may not be used as extensively as more brackish areas, there will be an overall enhancement of the habitat.

Conditions for the SMHM in the Middle Reach will also improve, albeit less so for the more freshwater areas upstream along Pacheco Creek compared to the downstream areas along Lower Walnut Creek. As with the South Reach, marshes in the Middle Reach will be a combination of tidal brackish-freshwater dominated habitats, with fringes of pickleweed and brackish marsh plant species at higher elevations. Similar to the South Reach, there will be an overall enhancement of habitat, with dense tidal marshes replacing sparsely-vegetated, non-tidal marshes.

The tidal marsh to upland ecotones (transitional zones) in the North Reach and the value of these transitions to SMHM is somewhat more complex, but will provide the best overall improvements of the habitats for the mouse. While the southern portions of the North Reach currently provide good habitat within the large patches of diked pickleweed marsh, these areas are currently subject to uncontrolled flooding during high-rainfall years. Opening these areas to the tides will introduce brackish flows comprised of freshwater outfall from Lower Walnut Creek and incoming bay waters. However, the elevation range in the southeast quadrant is high enough relative to the tidal elevations of the site (i.e., roughly the mean high water elevation and above) so that much of the existing pickleweed marsh is expected to be maintained and will be mixed with brackish marsh habitat similar to that within existing tidal marshes. These conditions will provide quality habitat for the SMHM, especially when combined with the planned expansion of the transitional zones. The southeastern quadrant is even more likely to remain dominated by pickleweed, as the muted tidal regime should help the pickleweed flourish, and lowering

the levees on the west side of the site should provide additional tidal flooding and better drainage. The new tidal marsh habitats created in the northwest quadrant will create quality SMHM habitat where there is currently none.

Projected SMHM Use of Restored Habitats

The proposed restoration will increase the habitat value of the site for the SMHM, as well as expanding the overall acreage of suitable and high-quality habitat. The existing relatively low-quality habitat within the diked wetlands of the South and Middle Reaches will be converted to tidal brackish marshes of the type known to support SMHM. Some habitats within the South Reach will likely be more freshwater due to the incoming flows from Lower Walnut and Pacheco Creeks; however, these areas will likely mix with the brackish conditions in the existing tidal marshes adjoining the restoration site.

The restoration at the Pacheco Marsh sites is expected to expand brackish tidal marshes along the two creeks, but given the tidal elevations of existing pickleweed habitats in the diked areas, the brackish marshes will likely continue to intersperse with the pickleweed-dominated areas that are found in the tidal marshes to the east and west of the Pacheco Marsh. The muted tidal areas on the west side of the site (fed by the remnant Walnut Creek) will likely support a mixture of habitats somewhat more saline and will also be suitable for the mouse. Moreover, lowering levees along the site and excavating for new marsh habitat in the northwest quadrant will expand the total acreage of suitable marsh for SMHM and create additional connectivity with the SMHM-occupied marshes to the east and west.

Resiliency of the Project to Sea-level Rise

The planned creation and enhancement of transitional zone habitats that adjoin the tidal marshes throughout most of the restoration zones will provide high-tide refugia for the SMHM during extreme tides and/or high flows, and room for the marshes to migrate upslope with sea-level rise. Although SMHM can move up in vegetation in response to flooding and/or tidal events, these transitional zones are still considered important for the mouse, especially in extreme events (Shellhammer 1989). Additionally, they are recommended in the *Recovery Plan for Tidal Marshes* (U.S. Fish and Wildlife Service 2013) and the updated *Baylands Wetlands Ecosystem Goals* (Goals Project 2015).

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