



**EXPERIMENTAL RELEASE OF
DELTA SMELT PROJECT
INITIAL STUDY/NEGATIVE DECLARATION
DRAFT AUGUST 10, 2021**



Prepared by: California Department of Fish and Wildlife

Written comments or inquiries regarding this project should be submitted to:

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Fairfield, CA 94534
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This document can be found as an electronic file at: www.wildlife.ca.gov/notices

PROPOSED NEGATIVE DECLARATION

Project: Experimental Release of Delta Smelt Project

Lead Agency: California Department of Fish and Wildlife

PROJECT DESCRIPTION

This Initial Study/Negative Declaration (IS/ND) has been prepared by the California Department of Fish and Wildlife (CDFW) to evaluate the potential environmental effects of CDFW's proposed Experimental Release of Delta Smelt Project (Project) located in various waterways within areas of the legal Sacramento-San Joaquin Delta (Delta) that cross into Contra Costa, Sacramento, Solano, and Yolo counties and, Suisun Bay and Grizzly Bay, collectively hereafter the North Delta Arc (Figure 1). CDFW proposes to conduct planning and consider experimental release of up to 60,000 adult-equivalent¹ cultured Delta Smelt each year into a portion of their range beginning in winter 2021 through 2024. CDFW proposes to use cultured fish from the University of California Davis Fish Conservation and Culture Laboratory (FCCL) for experimental release to fill critical research needs related to the feasibility of potential supplementation of Delta Smelt. The Proposed Project is designed to align with existing and ongoing monitoring, data collection and research efforts conducted by CDFW and other public agencies within the Project Area. This IS/ND conforms to the content requirements under CEQA Guidelines §15071.

FINDINGS

An Initial Study has been prepared to assess the Proposed Project's potential effects on the environment and the significance of those effects. Based on the Initial Study, it has been determined that the project would not have any significant effects on the environment. As a result, a Negative Declaration (ND) is being considered for adoption by CDFW for the Proposed Project. This conclusion is supported by the following findings:

1. The Project would have no impact related to agriculture and forest resources, energy, geology and soils, hydrology and water quality, land use and planning, mineral resources, noise, population and housing, public services, utilities and service systems, and wildfire.

¹ Slater (2017) estimated the proportion of surviving wild Delta Smelt across life stages starting from eggs through adults based on data available from 2015-2016. Using the proportion survival between life stages (eggs, larvae, juvenile, and adult) it is possible to estimate the number of Delta Smelt at each life stage that are equivalent to one surviving adult or "adult equivalent". For example, because survival rates from eggs to adults is cumulatively 0.0875% ($1/1,143 = 0.000875$) then 1,143 eggs could be released and expected to result in one adult surviving to maturity. As a result, we would define 1,143 eggs as one adult equivalent.

2. The Project would have a less-than-significant impact on aesthetics, air quality, biological resources, cultural resources, greenhouse gas emissions, hazards and hazardous materials, recreation, transportation, and tribal cultural resources.

The locations and timing of release sites may vary from year-to-year within the Project Area and release methodology may also vary.

A copy of the Initial Study is attached. Questions or comments regarding this IS/ND may be addressed to:

Melissa Farinha, Environmental Program Manager
California Department of Fish and Wildlife – Bay Delta Region
2825 Cordelia Road, Suite 100
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Pursuant to Section 21082.1 of the California Environmental Quality Act (CEQA), CDFW has independently reviewed and analyzed the Initial Study and Negative Declaration for the Proposed Project and finds that these documents reflect the independent judgment of CDFW. CDFW, as the Lead Agency for this project, also confirms that the Project requirements and ongoing best management practices detailed in these documents are feasible and will be implemented as stated in the Negative Declaration.

Stacy Sherman, Acting Regional Manager
Bay Delta Region

Date

INITIAL STUDY/NEGATIVE DECLARATION

for the

EXPERIMENTAL RELEASE OF DELTA SMELT PROJECT

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CHAPTER 1 **INTRODUCTION**

1.1 INTRODUCTION AND REGULATORY CONTEXT OF THE DOCUMENT

This Initial Study (IS) has been prepared by CDFW to evaluate the potential environmental effects of conducting the proposed Experimental Release of Delta Smelt Project (Proposed Project). CDFW is proposing to carry out the experimental release of cultured Delta Smelt into the environment to examine the feasibility of future supplementation efforts, if pursued in the future. This document has been prepared in accordance with all applicable law, including but not limited to CEQA, Public Resources Code §21000 et seq., and the State CEQA Guidelines, Title 14 of the California Code of Regulations (CCR) §15000 et seq.

Based on the results of the IS, included in this document, CDFW will determine the appropriate CEQA document (mitigated negative declaration or environmental impact report) for the Proposed Project. The overarching goal of CEQA is to protect the physical environment. To achieve this goal, CEQA requires that public agencies identify the environmental consequences of their discretionary actions and consider mitigation measures, if necessary, that could avoid or reduce significant adverse impacts when avoidance or minimization is not feasible. It also gives the public and other public agencies an opportunity to comment on the Proposed Project. If CDFW determines, at any point in the CEQA process, that the appropriate CEQA document is an environmental impact report, then alternatives would also be considered.

1.2 LEAD AGENCY

Pursuant to Public Resources Code, section 21067 and the CEQA Guidelines (Cal. Code Regs., tit. 14, §§ 15051, 15367), CDFW is the lead agency for the Proposed Project because it is the state agency with principal responsibility for carrying out the Proposed Project. CDFW is working in close collaboration with USFWS to lead the effort of planning and evaluating potential experimental release of Delta Smelt beginning in winter of 2021 based on its authorities under the Fish and Game Code and Section 6 of the federal Endangered Species Act. Therefore, CDFW will act as the lead agency for CEQA review of the proposed experimental release of Delta Smelt from winter 2021 through winter 2024.

Questions or comments regarding this IS/ND should be submitted to:

Melissa Farinha, Environmental Program Manager
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Submissions must be in writing and postmarked or received by no later than 30 days after the start of the public review period (August 11, 2021).

1.3 TRUSTEE AND RESPONSIBLE AGENCIES

A “Trustee Agency” is a State agency that has jurisdiction by law over natural resources that are held in trust for the people of the State of California (State CEQA Guidelines Section 15386). Trustee Agencies that may have jurisdiction over resources potentially affected by the Proposed Project are CDFW, Central Valley Flood Protection Board, Delta Stewardship Council, Central Valley Regional Water Quality Control Board, State Department of Parks and Recreation, and the State Lands Commission.

Responsible agencies are public agencies, other than the lead agency, that have discretionary-approval responsibility for reviewing, carrying out, or approving elements of a project. Responsible agencies should participate in the lead agency’s CEQA process, review the lead agency’s CEQA document, and use the document when making a decision on project elements.

1.4 DISCRETIONARY APPROVALS

Other public agencies whose approval may be required (e.g., permits, financing, approval, or participation agreement). Please be advised that this may not be an exhaustive list and that approval may be required from other public agencies not listed here (see Section 2.3.4 Regulatory Context for details on the Regulatory Framework for the Proposed Project):

- United States Fish and Wildlife Service
- National Marine Fisheries Service
- United States Army Corps of Engineers
- Central Valley Regional Water Quality Control Board
- Central Valley Flood Protection Board
- State Lands Commission

1.5 PURPOSE AND ORGANIZATION OF DOCUMENT

The purpose of this document is to evaluate the potential environmental effects of the Proposed Project to conduct planning and experimental release of cultured Delta Smelt over a 3-year period into a portion of their range beginning in winter 2021 through 2024 to fill critical research needs related to the feasibility of potential supplementation of Delta Smelt.

This document is organized as follows:

- Chapter 1 - Introduction.

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This chapter provides an introduction to the Project and describes this document's purpose and organization.

- Chapter 2 - Project Description.

This chapter describes the background of the Project, reasons for the Project, scope of the Project, and Project objectives.

- Chapter 3 - Environmental Setting and Environmental Impacts

This chapter identifies the significance of potential environmental impacts, explains the environmental setting for each environmental issue, and evaluates the potential impacts identified in the CEQA Environmental (IS) Checklist. More specifically, this chapter identifies the potential environmental impacts (by environmental issue) and a brief discussion of each impact resulting from the proposed Project's implementation. When applicable Project requirements and avoidance measures would be incorporated, where appropriate, to avoid potential impacts.

- Chapter 4 - Mandatory Findings of Significance

This chapter identifies and summarizes the overall significance of any potential impacts of the Project to natural and cultural resources, as well as cumulative impacts and impacts to humans, as identified in the IS.

- Chapter 5 - References.

This chapter identifies the references and sources used in the preparation of this IS/ND.

- Chapter 6 - Report Preparation

This chapter provides a list of those involved in the preparation of this document.

1.6 SUMMARY OF FINDINGS

Based on the IS and supporting environmental analysis provided in this document, the Proposed Project will result in less-than-significant impacts for the following issues: aesthetics, air quality, biological resources, cultural resources, greenhouse gases and climate change, hazards and hazardous materials, hydrology and water quality, land use and planning, mineral resources, noise, population and housing, public services, recreation, transportation/traffic, and utilities and service systems.

In accordance with §15070(a) of the CEQA Guidelines, a Negative Declaration shall be prepared if the proposed Project will not have a significant effect on the environment. Based on the available Project information and the environmental analysis presented in this document, there is no substantial evidence that the proposed Project would have a significant effect on the environment. It is proposed that a Negative Declaration be adopted in accordance with the CEQA Guidelines.

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CHAPTER 2 **PROJECT DESCRIPTION**

2.1 PROPOSED PROJECT OVERVIEW

CDFW is working in close collaboration with the U.S. Fish and Wildlife Service (USFWS), California Department of Water Resources (DWR), U.S. Bureau of Reclamation (Reclamation), and University of California, Davis staff to conduct planning and consider experimental release of up to 60,000 adult equivalent² cultured Delta Smelt each year into a portion of their range in the Sacramento-San Joaquin Delta (Delta) and Suisun Marsh, beginning in winter 2021 through 2024 (Proposed Project, described in detail in Section 2.5 below). CDFW proposes to use cultured fish from the FCCL for experimental release to fill critical research needs related to potential supplementation of Delta Smelt.

In collaboration with USFWS, CDFW proposes performing experimental release of the species, and to conduct a series of experiments to develop, evaluate, and refine methods of transport of cultured Delta Smelt from the FCCL in Byron, CA to research vessels moored at various locations in the Delta, and release of fish into the wild. These experiments would be informed by separate and ongoing research at the FCCL regarding pre-release tagging, acclimation, and transport of cultured fish to the Livingston Stone National Fish Hatchery (LSNFH) and ongoing research by DWR to develop and refine experimental enclosure designs and acclimation measures for cultured Delta Smelt.

The research and experimental release activities being planned and considered for implementation are designed to answer high-priority questions to determine the feasibility of releasing cultured Delta Smelt into the wild and how to improve their survival. The results from these experiments would be critical to successful supplementation of the wild Delta Smelt population with cultured fish, if pursued in the future. Future supplementation of the wild Delta Smelt population with fish raised in captivity is a conservation measure proposed by Reclamation and DWR through the Endangered Species Act (ESA) §7(a)(2) consultation with the USFWS that resulted in the USFWS Biological Opinion for the Reinitiation of Consultation on Long-Term Operations of the Central Valley Project and State Water Project (USFWS 2019). CDFW has made no decision about its participation in or the nature of future supplementation, and this environmental review focuses on the independent action of experimental releases in 2021 through 2024, which would provide scientific and management benefits even if future supplementation is not pursued.

² Slater (2017) estimated the proportion of surviving wild Delta Smelt across life stages starting from eggs through adults based on data available from 2015-2016. Using the proportion survival between life stages (eggs, larvae, juvenile, and adult) it is possible to estimate the number of Delta Smelt at each life stage that are equivalent to one surviving adult or “adult equivalent”. For example, because survival rates from eggs to adults is cumulatively 0.0875% ($1/1,143 = 0.000875$) then 1,143 eggs could be released and expected to result in one adult surviving to maturity. As a result, we would define 1,143 eggs as one adult equivalent.

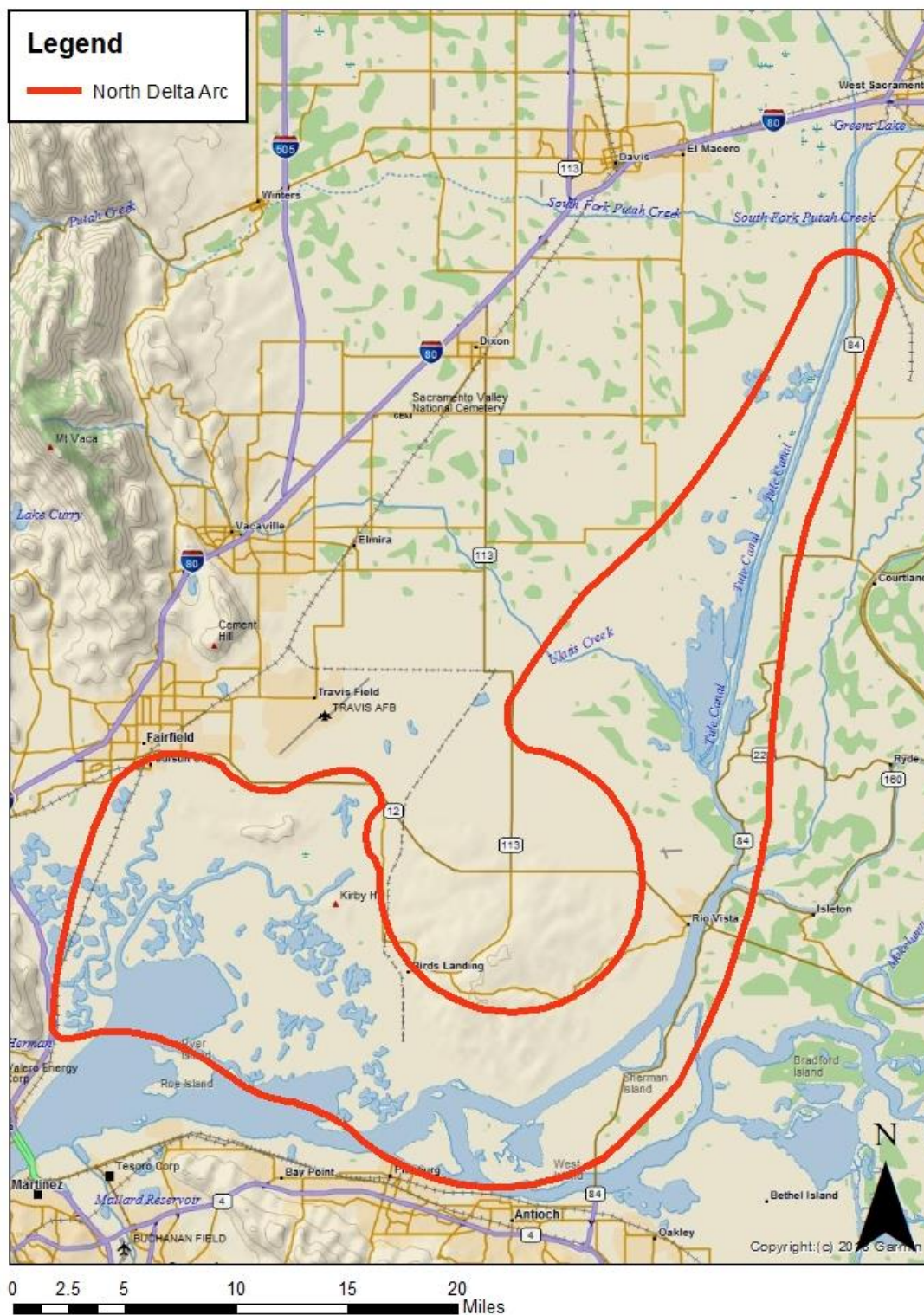
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2.2 PROJECT LOCATION

The Proposed Project vicinity is shown in Figure 1. The actual Proposed Project location is shown in further detail in Figure 2 and is referred to as the “North Delta Arc”, which ranges from Suisun Bay upstream through the lower Sacramento River and into Cache Slough and Sacramento Deep Water Shipping Channel complex (also see Moyle, Hobbs and Durand 2018). However, the geographic range of Delta Smelt will be used for analyses of potential impacts of the Proposed Project on wild Delta Smelt populations in particular. For the purposes of this section, “Project Area” refers to the area that encompasses the extent of the waterways and intertidal wetlands throughout the North Delta Arc, generally up to levee crests, and “Project Site” refers specifically to those areas where activities associated with carrying out the Project would occur, such as marinas, boating traffic lanes, and waterways.

[illegible]

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Figure 2. Delta smelt experimental release Project Area encompassing the "North Delta Arc".

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2.3 PROJECT BACKGROUND

The following sections provide background information on Delta Smelt culture, research, and monitoring activities that form the context in which the Proposed Project would occur. The ongoing research by FCCL and DWR and Bay-Delta monitoring are undertaken independently of the Proposed Project and would continue to occur even if the Proposed Project were not implemented.

2.3.1 Ongoing Research at UC Davis Fish Conservation and Culture Laboratory

Following the listing of Delta Smelt under ESA and the California Endangered Species Act (CESA), CDFW identified the need for scientific research to support creation of a refuge population of Delta Smelt and for refining hatchery and production techniques (CDFG 1993). Intensive fish culture techniques were initiated and funded by DWR and USFWS in 1993. Through cooperative efforts of several agencies since that time, refinement of these techniques has assisted in development of a captive refugial population as one level of security against species extinction, and provided for maintenance of genetic diversity of the species and a reliable supply of captive-reared fish for research (Fisch et al. 2013; Lindberg et al. 2013). The FCCL operates an intensive, genetically-managed propagation program, and holds an authorization pursuant to Fish and Game Code, section 2081, subdivision (a) from CDFW.

The FCCL in Byron, CA maintains a genetically diverse refuge population that is representative of a once large wild population. Presently the facility rears 34-40 multi-family groups, producing approximately 50,000 adult fish or ~470,000 eggs annually (CASS CPWG 2020). The FCCL has: (1) developed reliable techniques for the capture of Delta Smelt from the wild and for the production of all life stages of Delta Smelt, (2) provided a source of animals for on-site and off-site research, (3) maintained a genetically diverse captive refugial population through genetic management of broodstock, and (4) provided fish for a second refugial population at the LSNFH. Since 2007, up to 100 adult wild Delta Smelt have been incorporated into the FCCL broodstock annually to maintain genetic diversity, slow the rate of domestication, and retain similarity of cultured Delta Smelt to the wild stock. The UCD Genomic Variation Laboratory (GVL) maintains broodstock histories and population pedigrees and conducts microsatellite genotyping for parentage reconstruction and to assess genetic diversity (Fisch et al. 2013). Incorporation of wild broodstock and intensive genetic management by the GVL has resulted in cultured fish that closely resemble the wild stock in terms of co-ancestry and levels of genetic diversity.

In addition to maintaining a genetically diverse refuge population, providing some fish for a second refugial population at LSNFH, and providing fish for research, the FCCL conducts ongoing experiments to develop fish tagging, rearing, and transport methods, including:

Fish tagging: As a part of the ongoing work at the FCCL, UCD staff have been conducting experiments to evaluate the efficacy of different techniques to enable visual identification of cultured Delta Smelt including calcein dye, visible implant elastomer

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(VIE) tagging, and adipose fin clipping (Sandford, Castillo and Hung 2020). VIE tags are colored tags that are injected under skin but remain visible to allow for immediate visual-identification of hatchery-origin fish. Survival of VIE tagged and adipose fin clipped fish is being assessed over time as a part of these ongoing experiments to refine protocol and minimize impacts to cultured fish.

Fish rearing: In addition to ongoing work to refine methods to rear Delta Smelt in captivity FCCL staff have also conducted experiments to begin to evaluate the ability of cultured Delta Smelt to survive in unfiltered water from their native range in the Delta. Results of this research conducted at FCCL indicate that cultured sub-adult Delta Smelt could survive in a semi-natural environment and consume wild prey through spawning and post-spawning life stages (Hung et al. 2019).

Transport: Experimental transport techniques have been developed over the past few years and continue to be examined on an ongoing basis by FCCL, UCD, DWR, and LSNFH staff. Cultured Delta Smelt have been transported between FCCL and UCD to support research for several years. Long-distance transport techniques were developed to facilitate transport of cultured fish to a second refugial population housed at LSNFH. Experiments to transport eggs, larvae, sub-adult and adult life stages have been conducted and FCCL and USFWS staff continue to conduct experiments to refine these techniques to improve survival during transportation between FCCL and LSNFH. Additionally, FCCL and DWR have developed transport techniques to move fish from the FCCL to experimental enclosures in the Delta as a part of DWR's ongoing enclosure studies (see Section 2.3.2 below). Ongoing transportation experiments have been focused on refining logistics and staffing plans and determining which transport methods are feasible, provide optimal conditions for fish safety, and minimize mortality.

2.3.2 Ongoing Research by DWR

Beginning in 2018 DWR staff have collaborated with UCD staff to conduct experiments to determine if holding Delta Smelt in the wild is possible, and to refine enclosure designs to minimize accidental release of cultured fish and maximize survival of caged adult fish. Early experiments focused on refinement of enclosure designs and deployment into the Delta. Subsequently, in the winter and spring of 2019 DWR staff successfully deployed enclosures with adult cultured Delta Smelt into the Sacramento Deep Water Ship Channel and near Rio Vista in the north Delta (Baerwald et al. 2019). These deployments achieved high survival of cultured fish (88-100% across enclosures). Subsequent deployments in the summer and fall 2019, when water temperatures were higher but below lethal levels, achieved average survival rates of approximately 75%.

Experiments conducted in 2019 spurred the development of a 2020 Delta Smelt Enclosures Study Plan which was focused on deploying cultured Delta Smelt in enclosures in the Delta to address longstanding research questions regarding the ability of Delta Smelt to survive under a range of environmental conditions, the relationship between genetic background and survival rates in the field, and the effect of fish density on survival in the wild (Baerwald and Schreier 2020). These deployments were planned

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to test the utility of the enclosures for evaluating the effectiveness of tidal wetland restoration efforts and operation of the Suisun Marsh Salinity Control Gates in the summer-fall time period to benefit Delta Smelt. Due to Covid-19 staff safety concerns the only planned experiment conducted in 2020 was focused on understanding the relationship between genetic background and survival rates. As a continuation of its ongoing work to develop and refine enclosure designs and aspects of acclimating cultured Delta Smelt to in-Delta conditions, DWR plans to conduct additional research in 2021 and 2022. DWR's research plan focuses on comparing the survival and health of two groups of cultured fish placed in experimental enclosures in the North Delta Arc, one exposed to live prey at the FCCL and one maintained on a dry feed diet prior to transfer to field conditions in experimental mesocosms. DWR researchers also plan to continue to test logistics and technology associated with anchoring and deploying enclosures in the field. DWR was permitted to conduct previous experiments through an authorization pursuant to Fish and Game Code, section 2081, subdivision (a) from CDFW and a section 10(a)(1)(A) permit under the ESA from USFWS and plans to apply for authorizations for planned future work.

2.3.3 Ongoing Bay-Delta Monitoring: Interagency Ecological Program

The Interagency Ecological Program (IEP) is a consortium of nine member agencies: three State departments and six federal agencies. IEP also has several key partners. The IEP member agencies have been conducting cooperative ecological studies in the Bay-Delta since the 1970s. The IEP relies upon these multidisciplinary teams as well as academic, non-governmental organizations, and other scientists to accomplish its mission.

CDFW conducts multiple IEP monitoring efforts (i.e. Smelt Larval Survey, 20-mm survey, Summer Towntnet, Fall Midwater Trawl (FMWT), and Spring Kodiak Trawl) that target various life stages of Delta Smelt to provide abundance and distribution data used to inform the USFWS Delta Smelt Life Cycle Model, genetics models, and a suite of State and Federal compliance monitoring objectives. The Proposed Project would rely on ongoing implementation of these monitoring studies for sampling of wild Delta Smelt and cultured Delta Smelt released in the Delta. Field surveys would also inform environmental conditions and suitability for Proposed Project releases. IEP monitoring will include ongoing collections of zooplankton and other fishes that could help assess success of the Proposed Project (e.g., food availability, competition, etc.).

The USFWS's Enhanced Delta Smelt Monitoring Program (EDSM) is an IEP study that collects data that yields life-stage specific estimates of abundance, distribution, and survival in a way that maximizes precision and minimizes selection bias. The EDSM conducts region-specific Delta Smelt sampling in three phases throughout the year with a generalized random tessellation stratified (GRTS) sampling design that includes multiple crews trawling concurrently at multiple sites across the range of Delta Smelt within the San Francisco Estuary. The high-frequency sampling is stratified by regions that are based on geographic and habitat boundaries. Other existing IEP monitoring efforts (i.e., CDFW San Francisco Bay Study, USFWS Delta Juvenile Fish Monitoring Program, UC Davis Suisun Marsh Fish Monitoring Program, DWR Yolo Bypass Fish

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Monitoring Program, and State and Federal fish salvage facilities) could also retain Delta Smelt caught during routine efforts that could contribute samples to genetic analyses. As a part of the Proposed Project, CDFW would request that all IEP monitoring efforts retain and preserve all juvenile and adult Delta Smelt caught in ethanol or liquid nitrogen to ensure that genetic analyses to establish the parentage (wild, hatchery, or hybrid) can be conducted by the GVL, CDFW, or Abernathy laboratories. Additionally, data on Delta Smelt vital rates including length, weight, condition, growth, diet, fecundity, genetics, and others would be collected and shared with other participating IEP agencies for analyses.

2.3.4 Regulatory Context

Federal - The purpose of the federal ESA (16 USC § 1531 et seq.) is to protect and recover endangered and threatened species and the ecosystems upon which they depend. Delta Smelt was listed as threatened under ESA in 1993 (58 Fed. Reg. 12854 (March 5, 1993)) and its critical habitat was designated in 1994 (59 Fed. Reg. 65256 (December 19, 1994)). In 2010, USFWS completed a 12-month finding on a petition to reclassify Delta Smelt as endangered under the ESA and concluded that reclassifying the species was warranted but precluded by other higher priority listing actions (75 Fed. Reg. 17667 (April 7, 2010)).

2019 ESA Section 7 Consultation: Supplementation of the wild Delta Smelt population with fish raised in captivity is a conservation measure proposed by Reclamation and DWR through the ESA §7(a)(2) consultation with USFWS on the Coordinated Operations of the Central Valley Project and State Water Project (2019 Biological Assessment (BA); Reclamation 2019). Reclamation's and DWR's goal in proposing this conservation measure was to minimize the effects of long-term water operations and address the downward trend in abundance and distribution of Delta Smelt. The Service's October 21, 2019 Biological Opinion (2019 BiOp; Service 2019) includes an analysis of the effects of this conservation measure. Reclamation and DWR have committed to producing approximately 125,000 Delta Smelt annually within three years of the issuance of the 2019 BiOp (2019 BA, 2019 BiOp). Experimental release efforts would serve to fill critical knowledge gaps and inform consideration of future federal supplementation efforts.

Section 6: Section 6 of the Endangered Species Act of 1973, as amended, directs the USFWS to cooperate with the states "to the maximum extent practicable" for the purpose of conservation of listed species and their habitat. It has been determined that the State of California, through CDFW, implements a program under CESA for the conservation of endangered, threatened and candidate fish, wildlife, and plants in harmony with the terms and spirit of the ESA. CDFW and USFWS cooperate on conservation activities such as land management and federal financial assistance for land acquisition and conservation programs, such as monitoring. In recognition of this conservation program, in 2015, CDFW and USFWS entered into a Cooperative Agreement pursuant to section 6(c) of the ESA, which outlines the authorities, regulations, and understandings of how the agencies cooperate to administer and further the goals of the conservation program.

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State – The mission of CDFW is to “manage California’s diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public.” To further this mission CDFW is responsible for implementing sections of California Fish and Game Code, California Code of Regulations, and other statutes and regulations.

CDFW as Trustee for Fish and Wildlife Resources: CDFW is California’s trustee for fish and wildlife resources, and holds those resources in trust by statute for all the people of the State (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (*Id.*, § 1802). Under Fish and Game Code section 1001, CDFW has authority to take³ fish and other animal or plant life for scientific, propagation, and other purposes. CESA also sets forth a state policy for state agencies to seek to conserve endangered and threatened species, which may include propagation and transplantation (*Id.*, §§ 2055, 2061).

USFWS Limited Authority Cooperative Agreement: On March 18, 2015, CDFW and USFWS entered into a Limited Authority Cooperative Agreement (“Cooperative Agreement,” Appendix 1) pursuant to Section 6 of the ESA. This Cooperative Agreement provides CDFW the authority to carry out activities identified in the ESA for the benefit of the endangered, threatened and candidate fish, wildlife, and plants which are resident in the State of California, and recognizes CDFW’s authority to conserve resident fish, wildlife, and plants determined to be endangered or threatened and to conduct investigations to determine the status and requirements for survival of resident fish, wildlife and plants. In that same timeframe CDFW and USFWS entered into a Memorandum of Agreement (Appendix 2) to facilitate joint participation, communication, coordination, and collaboration between the two agencies on implementation of ESA and CESA under the Cooperative Agreement. USFWS and CDFW are currently developing an agreement to formalize the authority of CDFW pursuant to Section 6 of the ESA to conduct experimental release of cultured Delta Smelt for the benefit of Delta Smelt, a species listed as threatened under the ESA and endangered under CESA.

California Endangered Species Act: CESA is an environmental law enacted in 1970 and amended in 1984 and 1997 that conserves and protects plant and animal species at the risk of extinction. Delta Smelt was listed as threatened under CESA in 1993 following the federal listing under ESA. In 2009 the California Fish and Game Commission elevated the status of Delta Smelt from threatened to endangered under CESA (Cal. Code Regs., tit. 14, § 670.5, subd. (a)(2)(O)). CESA prohibits any person or public entity from taking a species listed as threatened or endangered under the statute. (Fish & G. Code, § 2080). CDFW works with agencies, organizations, and other interested persons to study, protect, and preserve CESA-listed species, and may issue authorizations for the take of listed species pursuant to various statutory provisions.

³ “Take” means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish & G. Code, § 86.)

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State Water Project CESA Permitting: In March 2020 CDFW issued an incidental take permit to DWR, pursuant to Fish and Game Code, section 2081, subdivision (b), authorizing DWR's take of Delta Smelt, Longfin Smelt, Winter- and Spring-run Chinook Salmon as a result of long-term operations of the State Water Project (SWP ITP; ITP No. 2081-2019-066-00). The Project authorized by the SWP ITP includes water diversion facilities in the North Delta Arc and south Delta, including the Barker Slough Pumping Plant and the south Delta export facilities (Clifton Court Forebay, Skinner Delta Fish Protective Facility, and Banks Pumping Plant). The SWP ITP contains Conditions of Approval intended to minimize take of Delta Smelt as a result of SWP operations at both the south Delta export facilities and the Barker Slough Pumping Plant (BSPP). Export restrictions may be initiated in response to assessments of the risk of entrainment of Delta Smelt into the central and south Delta conducted by real-time operations teams or observations of Delta Smelt in surveys or salvage in the south Delta.

The SWP ITP established the Smelt Monitoring Team (SmMT) and the Water Operations Management Team (WOMT) as a real-time operations technical and management teams intended to minimize take of Delta Smelt. The SmMT is responsible for considering survey data, salvage data, and other pertinent biological and abiotic factors to assess the risk of entrainment of Delta Smelt into the central and south Delta, the south Delta export facilities, and the BSPP (SWP ITP, Conditions of Approval 8.1.1, 8.1.5.2, and 8.12). Risk assessments and operations advice developed by the SmMT is evaluated and implemented according to the collaborative approach to real-time risk assessment and decision-making described in the SWP ITP (Condition of Approval 8.1.4).

Observations of Delta Smelt in salvage at the SWP Skinner Fish Facility and the Central Valley Project (CVP) Tracy Fish Collection Facility, or at Station #716 near the BSPP, for the Smelt Larval Survey (SLS) and 20-mm Survey could initiate SWP export restrictions to minimize take of Delta Smelt. SWP ITP Condition of Approval 8.5.2, Larval and Juvenile Delta Smelt Protection, includes quantitative criteria that could initiate export restrictions at SWP south Delta facilities in response to observations of juvenile Delta Smelt at the SWP and CVP salvage facilities. When the five-day cumulative salvage of juvenile Delta Smelt exceeds one plus the average of the prior three years' Fall Mid Water Trawl (FMWT) Delta Smelt Index, Condition of Approval 8.5.2 requires the SWP to promptly cease any exports being conducted to capture excess flows in the Delta and convene the SmMT to conduct an assessment of the risk of entrainment of Delta Smelt into the central and south Delta. Additionally, when expanded salvage of juvenile Delta Smelt exceeds 11 within a three-day period the SWP is required to meet its proportional share of a seven-day average flow requirement in the south Delta. Between March 1 and June 30 of dry and critically dry years (Sacramento Valley Index), Condition of Approval 8.12 (Barker Slough Pumping Plant Longfin Smelt and Delta Smelt Protection) prohibits exports greater than 60 cfs when larval Delta Smelt are detected by the 20-mm or Smelt Larval Survey at Station # 716.

To better understand the potential for cultured Delta Smelt released as a part of the Proposed Project to affect operations of SWP facilities, CDFW evaluated recent historic Delta Smelt population indices, salvage data, and survey data.

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- *Recent Historic Delta Smelt Survey and Salvage Data* - Observations of Delta Smelt in monitoring surveys and in salvage at SWP and CVP have declined substantially over the past twenty years. The last time the cumulative three-day salvage of juvenile Delta Smelt at the SWP and CVP facilities in the south Delta exceeded 11 (salvage threshold in SWP ITP Condition of Approval 8.5.2) was April 29, 2015, which occurred following a three-year average FMWT Index of 23. Similarly, 2015 was the last time larval Delta Smelt were observed after March 1 at Station #716 of the Smelt Larval Survey and 20-mm Survey. Since 2016, no juvenile Delta Smelt have been observed in salvage at the SWP and CVP, and since 2015 no larval Delta Smelt have been observed in catch data for the 20-mm Survey at Station #716. Additionally, FMWT Indices have declined to historic lows, remaining at zero since 2018.

In the following subsection we use monthly survival ratios calculated from wild Delta Smelt abundance indices to provide an approximation for the number of larvae that could be produced by cultured Delta Smelt released as a part of the Proposed Project and compare that to recent historic population indices.

- *Link Between Proposed Project and Recent Historic Delta Smelt Abundance:* Without having experimentally released cultured Delta Smelt into the wild and obtained estimates of survival and reproduction, it is not possible to precisely estimate the percentage of cultured fish released into the North Delta Arc that would survive post-release and successfully reproduce. The survival of cultured fish released into the Delta is currently unknown, and learning this information is one objective of the Proposed Project. However, we can apply previously calculated wild Delta Smelt monthly survival rates to approximate the number of larvae that may be produced assuming, (1) cultured fish survive at a similar rate to wild Delta Smelt, (2) cultured fish produce a similar number of eggs to wild Delta Smelt and (3) eggs produced by cultured fish result in a similar number of larvae as wild fish that would survive and be caught in the 20-mm Survey.

For this analysis CDFW assumed that 30,000 adult cultured Delta Smelt would be released in December and 30,000 in January of a given year as a part of the Proposed Project. Using survey data from 2002-2016, Slater (2017) quantified wild Delta Smelt life stage-specific survival at monthly time-steps, such that a percentage of fish present in the beginning of a month are expected to survive to the following month, and eventually to reproductive maturity (see Table 1 for estimated % monthly survival from Slater 2017). To determine reproductive potential of cultured Delta Smelt, CDFW assumed that (1) half of the individuals released as a part of the Proposed Project are female, (2) each adult female will produce an average of 1,730 eggs per clutch based on length-fecundity estimates published by Damon et al (2016)⁴ and applied in Slater (2017), and (3) each female will undergo two reproductive cycles within the spawning season. Monthly survival estimates from Slater (2017) were multiplied by the number of

⁴ Length-fecundity estimates were compared among wild and cultured Delta Smelt by Damon and Adib-Samii (2013) and shown to be comparable.

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released fish as a part of the Proposed Project to generate a high-end estimate of the number of cultured Delta Smelt present in the North Delta Arc post-release (Table 1). Using Slater (2017) estimates of the survival rate from eggs to larvae, CDFW calculated the number of larvae that could be produced from experimentally released cultured fish (Table 2).

Table 1. Estimated monthly survival model for Delta Smelt produced in culture and released in staggered groups of 30,000 adults in December 2020 and 30,000 adults in January 2021. The February through May timeframe (highlighted in green) is assumed to be the spawning period for the subset of cultured Delta Smelt that survive and are able to reproduce.

Month	Monthly Survival	Estimated # surviving cultured Delta Smelt		
		Release group #1	Release Group #2	Total
December	71.0%	30,000		30,000
January	73.0%	21,903	30,000	51,903
February	74.7%	16,369	22,420	38,789
March	76.3%	12,481	17,095	29,577
April	77.6%	9,685	13,266	22,951
May	78.8%	7,632	10,453	18,085
June	79.9%	6,097	8,350	14,447

Table 2. Potential egg production by adult female cultured Delta Smelt based on abundance estimate of 38,789 adult Delta Smelt in February. Half of the cultured Delta Smelt released are assumed to be female, each female is assumed to have a mean fecundity of 1,730 eggs per spawn, and to spawn twice in their lifetime for a total of 3,460 eggs per female.

February Abundance	February Females	Females * mean fecundity	# of Spawns	Potential # Eggs produced
38,789	19,394	33,552,420	2	67,104,840

In this analysis, the calculated number of eggs produced was 67,104,840 (Table 2). We then used the linear regression equation describing the response of the 20mm survey index of larval abundance to egg abundance (Figure 3, copied from FLOAT-MAST 2020) to estimate the 20-mm survey index that could be expected given the abundance of eggs produced by cultured fish. The potential

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addition of 60,000 adult cultured Delta Smelt would be expected to produce ~67 million eggs, resulting in a 20-mm Survey abundance index of ~1.3, which is in the range of low indices observed since 2014 (Figure 3).

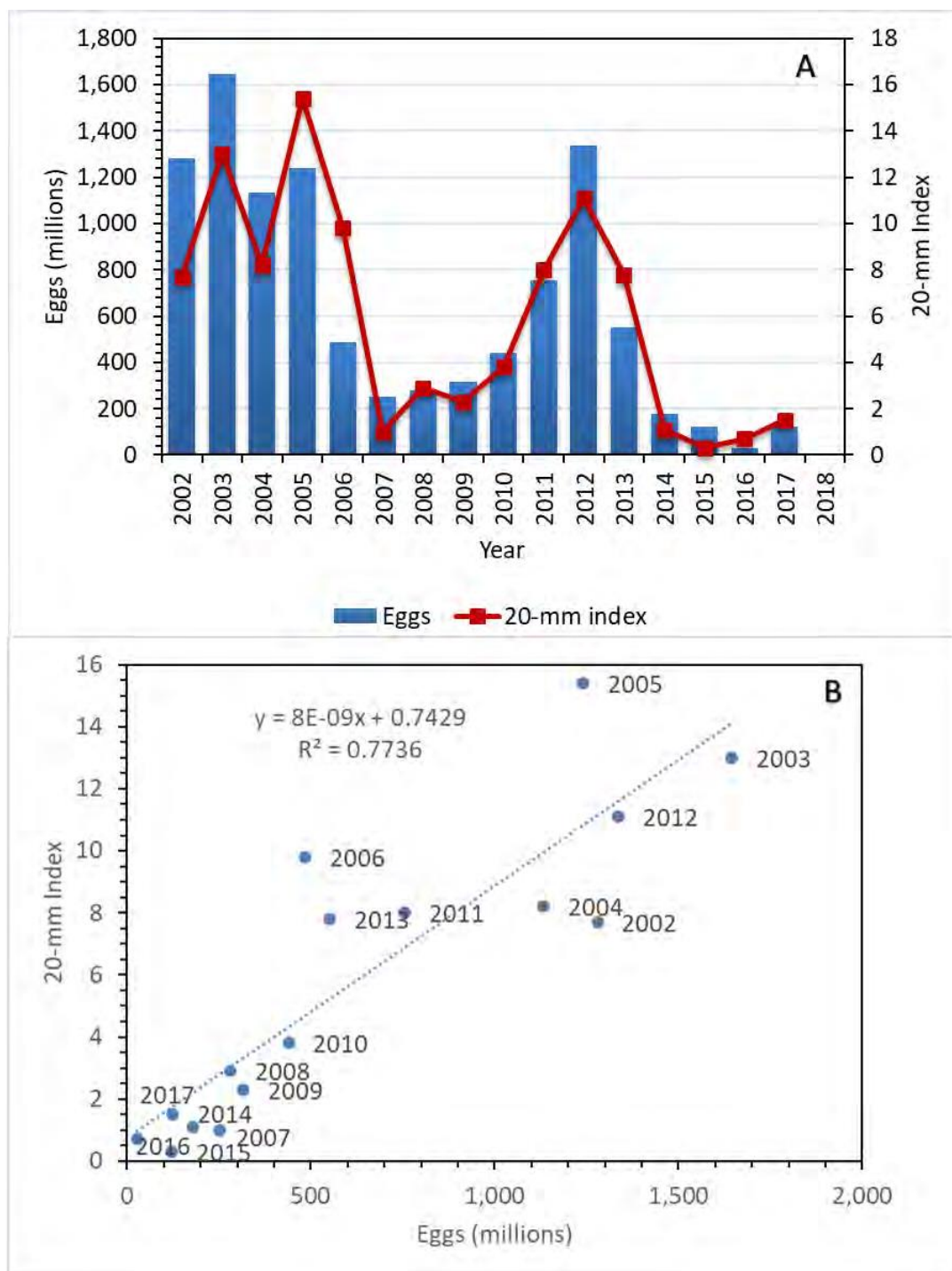


Figure 3. Figure 110 from the Interagency Ecological Program FLOAT- MAST (2020) report, “Relationship between potential population fecundity (number of

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eggs) from adult Delta Smelt population estimates and CDFW 20-mm Survey Delta Smelt annual indices for young for the period 2002-2017 with A) bar chart of eggs and line for the 20-mm index by year and B) least squares linear regression between 20-mm index and number of eggs.”

As stated previously, this analysis provides a simple approximation for the reproductive potential of cultured Delta Smelt released as a part of the Proposed Project. It is important to consider some of the assumptions that we made to produce this analysis. First, we applied empirical calculations of wild Delta Smelt survival generated using data from the 2002-2016 timeframe, assuming cultured fish would exhibit similar survival rates; however, we could also assume that cultured fish, which do not experience predation would have lower survival rates, resulting in a much lower reproductive potential. Conversely, cultured fish are well fed, and have been shown to switch to wild feed shortly after introduction to wild prey and/or placed into cages in the wild, thus cultured fish may have higher survival rates than wild Delta Smelt over the time frame analyzed. Second, the estimate for the number of eggs per female used to extrapolate a maximum number of eggs that could be produced by cultured Delta Smelt is high. The estimate here is based on egg counts in Slater (2017), applying the length-fecundity relationship published by Damon et al. (2016) but did not account for the fact that not all eggs produced by a female are viable at spawning.

During this series of experiments while release methods are tested and refined, it is not certain how many, if any, cultured fish would survive. This first-order approximation of survival and reproduction of cultured Delta Smelt released as described in the Proposed Project demonstrates that even conservative estimates of survival and reproduction of cultured Delta Smelt released as described in the Proposed Project are not expected to result in a subsequent increase in the overall Delta Smelt population size to a level that is similar to population sizes when detections of larval Delta Smelt at Station #716 and juvenile Delta Smelt at the south Delta salvage facilities last occurred.

The analyses above demonstrate the attenuated connection between the Proposed Project and any subsequent change to SWP operations. Specifically, while survival and spawning of the released cultured Delta Smelt is highly uncertain, we based our analyses on conservative assumptions that survival and spawning rates of the released cultured Delta Smelt would be equivalent to wild Delta Smelt. The discussion of recent historical abundance levels and analysis of potential cultured Delta Smelt survival show that the Proposed Project is not likely to result in an increase in the overall Delta Smelt population size to levels that were observed in 2015, the last time larval Delta Smelt were detected at Station #716 or juvenile Delta Smelt exceeded a three-day cumulative salvage greater than 11 at salvage facilities in the south Delta. In addition, it should be noted that the analyses above focus on the cultured Delta Smelt alone, without considering other potential restrictions that could control operations of the SWP including presence of and risk assessments for other species, physical constraints, or any other factors separate from the Proposed Project that have the potential to affect SWP operations even in the absence of released cultured Delta Smelt or their progeny.

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Based on these attenuating and intervening factors, the potential for the Proposed Project in and of itself to directly or indirectly cause changes in SWP operations appears to be low. The potential for the Proposed Project in and of itself to cause subsequent responsive water supply management actions resulting in environmental impacts is even lower and less certain.

2.4 NEED FOR THE PROJECT AND PROJECT OBJECTIVES

The purpose of the Proposed Project is to benefit conservation efforts for Delta Smelt through experimental release of cultured Delta Smelt into a portion of its current range. The planned research and experimental release activities will be designed and implemented to answer several high-priority questions about methods to: (1) physically mark cultured fish for experimental release, (2) transport cultured fish from the FCCL to the field, (3) acclimate cultured fish in the field, prior to release, (4) release cultured fish into the wild, and (5) field survey tools to assess the survival of released fish over a 3-year timeframe. The results will be used to determine how to improve survival of physically tagged, hatchery origin Delta Smelt after release into favorable locations in the Delta and fill critical knowledge gaps to increase the likelihood of success of future supplementation strategies, if pursued. The Proposed Project would measure differences between a small range of transportation and release methodologies as it relates to logistics and overall released Delta Smelt survival. Ultimately, an objective of the Proposed Project is that all recaptured cultured fish will be immediately visually identifiable as to origin. As a part of this Proposed Project two efforts would be undertaken to understand survival of cultured Delta smelt using existing monitoring efforts: (1) an effort to maximize the number of released cultured Delta Smelt that are physically marked and (2) genetic sampling of all Delta Smelt (except larvae) caught by monitoring surveys. Such information would be used in the inter-agency evaluation of the Proposed Project.

The Proposed Project will leverage insights gained through ongoing research conducted at the FCCL focused on tagging and fin clipping cultured Delta Smelt, acclimation measures within the hatchery and transport methods to LSNFH, and ongoing work led by DWR staff to develop and test field enclosures for cultured Delta Smelt.

2.4.1 Delta Smelt Status and Trends

Delta Smelt (*Hypomesus transpacificus*) is a small euryhaline member of the family Osmeridae that is endemic to the San Francisco Bay-Delta (Moyle 2002). It exhibits a predominantly one-year life history (Moyle 2002) though few adults may survive after spawning (Baxter 1999) and may contribute to subsequent spawning periods (Bennett 2005).

Delta Smelt abundance exhibited a step decline in the early 1980s and subsequently dropped sharply again in the early 2000s. Since then, its abundance has dropped to historic lows (Hobbs et al. 2017). Ongoing long-term surveys conducted by CDFW have continued to document record low indices of adult and larval Delta Smelt life stages in recent years. The 2020 Delta Smelt FMWT Index was estimated to be zero based on

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zero catch of adult Delta Smelt in FMWT surveys from September through December of that year. These estimates continue a pattern of low (<10) FMWT indices from 2015 - 2017 and FMWT indices of zero in 2018 and 2019 (CDFW 2020). CDFW was unable to estimate a 20-mm Survey index in 2018 due to low catch numbers and the 2019 20-mm Survey Delta Smelt index was estimated to be 0.1, the lowest calculated index on record for this survey (CDFW 2019). Although no Delta Smelt were caught in the FMWT and 20-mm Survey in recent years, they have been consistently caught at very low numbers in other surveys designed to target Delta Smelt including the EDSM survey. These observations indicate that the species persists in the wild at very low numbers, below the effective detection threshold by most sampling methods (CDFW 2020 and CDFW 2020b).

In 2018-2019, FCCL was only able to collect 28 of the 100 adults needed to serve as broodstock to maintain genetic diversity in the refugial population (Chase et al. 2020). Since November 2019, a total of 93 wild Delta Smelt have been collected, 82 of which survived transportation back to the FCCL (Chase et al. 2020). This number includes - as of March 1, 2021 - a total of two wild Delta Smelt collected for broodstock during coordinated USFWS-FCCL sampling (Chase et al. 2021) and, separately, two wild Delta Smelt collected (not for broodstock) by the USFWS EDSM. Despite the decline of Delta Smelt in the wild, the FCCL currently maintains a genetically diverse refugial population that is representative of a once large wild population. After internal 2021 production targets are met, the FCCL is expected to have an excess of approximately 46,000 adult Delta Smelt (CASS CPWG 2020).

2.5 PROJECT DESCRIPTION OF EXPERIMENTAL RELEASE ACTIVITIES

CDFW proposes to use cultured fish for experimental release to fill critical research needs working in collaboration with USFWS. CDFW proposes that it would perform experimental release of the species, and in collaboration with USFWS to develop, evaluate, and refine the methods and techniques related to transport from the FCCL to the field, release, and monitoring, to improve survival of released fish.

Fish Selection: In December 2021 the FCCL expects to have approximately 46,000 adult Delta Smelt beyond what is needed to maintain a genetically diverse refuge population available for experimental release. In subsequent years, the FCCL plans to continue to increase production of cultured Delta Smelt available for experimental release (CASS CPWG 2020). In the second and third years of the Proposed Project, the number of cultured Delta Smelt released will be based on results from the first year and may be more or less than 46,000 adults, but will not exceed 60,000 adult equivalents.

The Proposed Project would select for release broodstock pair crosses among fertilized eggs and adult fish to maintain high levels of genetic diversity and minimize the risk of swamping wild population alleles with hatchery alleles or a genotype-environment mismatch (Waples and Do 1994; Tringali and Bert 1998; Lynch and O'Hely 2001; George et al. 2009; Evans et al. 2019). Assays of genetic diversity among fish slated for experimental release would be conducted prior to release. FCCL staff would collect tissue samples from a representative subset of each release group and provide them to

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the GVL, CDFW, or Abernathy Fish Tech Center for analysis. The exact timing of genetic assays will vary depending on the life stages planned for release (eggs, juvenile, sub-adults or adults).

Fish Health Assays: CDFW maintains the Fish Health Lab (FHL), a comprehensive fish health monitoring program utilizing a professional staff of pathologists and veterinarians. In parallel, the USFWS maintains a fish health monitoring program, the Fish Health Center (FHC). Beginning in 2005, the FHC has assayed over 1,500 Delta Smelt for viral and bacterial pathogens. During implementation of the Proposed Project, the FHL and FHC would work in collaboration to conduct fish health inspection and monitoring to preclude the movement of fish with significant pathogens that would negatively affect fish at another facility or in the watershed (Appendix 3).

During implementation of the Proposed Project FCCL staff would immediately contact the FHC if three-day cumulative mortality at FCCL exceeds 2% within a rearing unit population of Delta Smelt destined for release within 45 days of a planned release. FCCL staff would also contact FHC staff immediately if they observe fish health conditions that are abnormal or unexpected at any time during normal operations at the FCCL. FHC will provide a diagnostic response to determine the cause of mortality in collaboration with the FHL. FCCL would suspend any transmittal of Delta Smelt to CDFW and USFWS for the Proposed Project if a significant pathogen is detected by FHC or mortality rates continue without a diagnosis of cause. Minor changes to these methods may be implemented based on ongoing data collection.

Physical marking: The proportion of cultured Delta Smelt released as a part of the Proposed Project that are physically marked using VIE tags, adipose fin clips, or calcein dye will be maximized each year. In the first year of the Proposed Project, subsets of fish slated for experimental release will be marked using VIE tags and/or adipose fin clips. While it is the goal to physically mark all fish released, some fish may remain unmarked prior to release as physical marking, transport, release, and production methods continue to be refined and improved. In subsequent years physical marking methods, and the proportion of released fish that are marked using each method, will be evaluated and refined based on observations of survival of cultured fish before release and post-release.

Transport from the FCCL to Boats: All transportation of cultured Delta Smelt from the FCCL to boats would occur on existing roadways and at existing boat launches and marinas. No ground disturbance would occur as a result of the Proposed Project.

- *Egg Life Stage* – Experimental release may require the transport of fertilized eggs, embryos, or larvae to release sites. Experiments will be conducted to assess survival and feasibility of transportation methods using a range of densities informed by previous trials conducted by the FCCL and LSNFH staff. Two transport methods have been evaluated previously by FCCL: (1) in plastic containers filled with FCCL water with no supplemental oxygen and (2) in wetted hatching boxes and transported within the boxes. The method, frequency, and

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timing of egg transportation would be varied as a part of experiments to identify techniques that minimize mortality of eggs.

- *Juvenile, Sub-adult, and Adult Life Stages* - Experimental release will require transport of Delta Smelt from FCCL to release sites. The overall process will entail: (1) moving fish from culture tanks into containers and onto a transport truck at FCCL, (2) driving to boat ramps/marinas to transfer fish into boats, (3) transferring containers with Delta Smelt into boats, and (4) transporting fish to release site by boat. An alternative might be release at boat ramp/marina, either directly into the water or following a period in which they are held in an enclosure at the release location. To evaluate potential transportation effects on Delta Smelt, experiments will be conducted to evaluate a range of juvenile, sub-adult, and adult fish densities using an established carboy transport method developed by FCCL, an experimental transport tank, and control treatments. Transportation experiments will evaluate the relationship between several elements of the transport process including container technology, fish density, transport time in trucks and boats, and methods to move containers between the FCCL, trucks and boats. Several parameters will be evaluated to assess impacts of each treatment on cultured Delta Smelt including water quality, physiological stress, and mortality rates. Results from experiments will be used to inform and refine transportation planning in subsequent years.

Experimental Release: All transportation of cultured Delta Smelt on boats would occur from existing boat launches and marinas and no ground disturbance would occur as a result of the Proposed Project.

- *Numbers of Fish, Timing, and Location Selection* - The Proposed Project includes up to 6 releases of approximately 12,000 adult Delta Smelt each from December 2021 through April 2022, not exceeding 46,000 total adult Delta Smelt. Release locations and timing of releases would be based upon real-time environmental conditions (e.g., currents, weather, temperature, turbidity, food availability, etc.). Release locations would be chosen to avoid the entrainment footprint of the SWP, CVP, or other existing diversions to the extent possible while also ensuring that fish are released into suitable habitat. Enclosures, if used, would be placed in a manner to avoid conflicts with existing boating traffic lanes. In subsequent years experimental releases may occur within the October – April time frame, depending on fish availability, conditions at field release sites, and life stages planned for release.
- *Release Methods – Juvenile, Sub-adult, and Adult Fish* - The Proposed Project would evaluate both “direct” and “indirect” release methods. In any given year both methods, or just one, may be evaluated. Indirect release methods, (i.e., holding fish in an enclosure at the release site) allow for predator-free acclimatization to the wild habitat prior to liberation. Benefits of indirect release methodologies have been well documented in cultured fish and include improved fitness, growth, survival, and reduced stress (Linley 2001, Brown and Day 2002; Brennan et al. 2006; Billman and Belk 2009; Bice et al. 2013). Conversely, direct

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release methods (i.e., releasing fish directly from boats or from shore at identified release locations) do not allow cultured fish to acclimate to field conditions (e.g., school formation and physiological acclimation) prior to release; therefore, they have the benefit of minimizing potential predation as compared to indirect release locations.

The Proposed Project would conduct experiments at the indirect release sites to evaluate potential differences in survival (among methods, locations, conditions, and times) of cultured Delta Smelt. Enclosures designed specifically for Delta Smelt would be deployed at indirect release sites. The density of Delta Smelt (fish/enclosure) and the length of time they are held in enclosures would be varied as a part of indirect release experiments to identify the range of hours/days and densities that optimize survival. At the end of each acclimation period, the enclosure would be opened and the fish would be allowed to swim out. Other aspects of the experimental release such as time of day, proximity to specific physical habitat (for example restoration sites), abiotic habitat conditions (e.g., current, weather, turbidity, temperature, and salinity), and biotic habitat conditions (for example food availability, predator density and composition), would also be measured to identify release conditions that maximize survival.

Adaptive Resolution Imaging SONAR (ARIS) “cameras” would be deployed for both direct and indirect releases to assess predator densities in the vicinity of releases pre- and post-release. Analyses of camera imagery would be used to better understand predation risks for cultured fish released through indirect methods and inform subsequent releases to minimize predation risk for cultured Delta Smelt. Additionally, experiments would be conducted to develop a method for physically sampling predator communities in the vicinity of release sites that avoids or minimizes take of wild and cultured Delta Smelt. Both indirect release enclosures and ARIS cameras deployed will have a navigation light and signs installed to notify the public of their presence and ensure no disruption to boat traffic in the area.

As a part of the Proposed Project no experimental enclosures, or other equipment requiring navigational lights or reflective materials, would be placed in locations that are visible from residences or other inhabited structures (ex. hotels). Individual experimental enclosures would be placed in the waterways for a variable amount of time, depending on the experiment being conducted, but no more than 3 weeks total.

- *Release Methods – Eggs:* The Proposed Project would evaluate methods to facilitate release of fertilized Delta Smelt eggs. Two approaches to release fertilized eggs may be evaluated: (1) eggs would be fertilized in the FCCL, transported on the same day to the release site(s), and deployed on hatching frames in hatching boxes, and (2) eggs and milt may be stored for varying numbers of days in the FCCL, transported to the release site(s), fertilized in the field, and immediately deployed on hatching frames in hatching boxes. The

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method, frequency and timing of fertilized egg release would be varied as a part of experiments to identify techniques that minimize mortality of fertilized eggs.

Hazardous Materials Best Practices: The Proposed Project would include CDFW's routine ongoing best management practices that require that hazardous materials to be properly managed during the conduct of the Project activities. These include the following:

- No fuels or lubricants or other chemicals would be stockpiled or stored where they could spill into watercourses.
- Equipment and materials for cleanup of spills would always be made available on boats. All spills and leaks would be cleaned up immediately and disposed of in accordance with all regulatory requirements.
- All equipment used in the Project Site would be inspected for leaks each day prior to initiation of work and action taken to repair leaks prior to use.
- No equipment would be serviced from within the Project Site unless equipment stationed in these locations cannot be readily relocated.
- Implementation of the practices listed above would minimize the potential for release of hazardous materials such that the Proposed Project would not cause a significant hazard to the environment or the public.

Tools to Assess Survival During and Post-Release: To improve understanding of survival of cultured Delta Smelt post-release, three types of data would be collected: (1) estimates of survival within indirect release enclosures at the time of release, (2) subsamples of live and dead fish within indirect release enclosures taken prior to release for subsequent genetic analysis, and (3) all Delta Smelt (not including larval fish) caught in ongoing long-term monitoring programs (including FMWT, EDSM, Summer Towntnet, and Spring Kodiak Trawl) would be preserved in a manner suitable for subsequent genetic analysis. Samples of each Delta Smelt caught would be sent to GVL, CDFW, or Abernathy laboratories for analysis to determine the origin of fish (wild, cultured, or hybrid origins). Following the start of experimental release, juvenile, subadult, and adult Delta Smelt could be progeny of surviving release groups and evidence of reproduction by cultured fish. Throughout the course of the Proposed Project, efforts would be made to develop a preservation method for larval Delta Smelt that would facilitate subsequent genetic analysis.

2.6 ONGOING MONITORING AND DATA COLLECTION

The Proposed Project would rely on ongoing implementation of IEP monitoring programs for sampling. All juvenile, sub-adult, and adult Delta Smelt caught by ongoing monitoring programs would be retained and preserved in a method that allows for subsequent genetic analysis (for example ethanol or liquid nitrogen) to ensure that genetic analyses to establish the parentage (wild, hatchery, or hybrid) can be conducted

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by the GVL, CDFW or Abernathy laboratories. Preservation of larval Delta Smelt using a method that allows for subsequent genetic analysis is not currently feasible, however an ongoing evaluation of collection and preservation protocol would be conducted to develop a method that may allow for genetic analyses of larval Delta Smelt caught in surveys. Additionally, minor special studies or minor adjustments to monitoring methods consistent with current IEP monitoring efforts may occur based on observations and preliminary results from the Proposed Project and as part of the normal work plan development and review process conducted by IEP annually.

As part of the Proposed Project, data on Delta Smelt vital rates including length, population age-structure, growth, diet, fecundity, genetics, and other parameters will be collected and shared with other participating IEP agencies for analyses. CDFW and USFWS would work with IEP to establish a new project work team (PWT) tasked with ongoing data analysis and evaluation of experiments described as a part of the Proposed Project. This PWT would also be responsible for communicating its progress and results to the ERTT and CASS on a regular basis throughout Project implementation and to IEP directors, coordinators, and stakeholders upon request.

2.7 TRIBAL NOTIFICATION PROCESS

On July 16, 2021, tribal notification letters were sent to all tribes identified by the Native American Heritage Commission affiliated with the area soliciting their input regarding the Proposed Project through direct communication or consultation to identify potential Project impacts to tribal interests or cultural resources. As of August 10, 2021, CDFW received one response. No tribes have requested consultation to date.

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CHAPTER 3

ENVIRONMENTAL CHECKLIST

PROJECT INFORMATION	
1. Project Title:	Experimental Release of Delta Smelt
2. Lead Agency Name & Address:	California Department of Fish and Wildlife
3. Contact Person & Phone Number:	Melissa Farinha, Environmental Program Manager, (530) 351-4801
4. Project Location:	The sections of intertidal wetlands, sloughs, rivers and open water within the boundaries of the Sacramento-San Joaquin Delta, Suisun Bay and Grizzly Bay in Sacramento, Yolo, Solano, and Contra Costa Counties.
5. Project Sponsor Name & Address:	California Department of Fish and Wildlife - Bay Delta Region 2825 Cordelia Road, Suite 100 Fairfield, CA 94534
6. General Plan Designations:	Various, see Section XI, Land Use and Planning
7. Zoning:	Various, see Section XI, Land Use and Planning
8. Description of Project:	Refer to Chapter 2, Section 2.5 of this document for a detailed Description of Project
9. Surrounding Land Uses & Setting:	Refer to Section IX, Land Use and Planning
10. Approval Required from Other	Refer to Chapter 1, Section 1.4 Public Agencies

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ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

- | | | |
|--|---|---|
| ☐ Aesthetics | ☐ Agriculture and Forest Resources | ☐ Air Quality |
| ☐ Biological Resources | ☐ Cultural Resources | ☐ Energy |
| ☐ Geology / Soils | ☐ Greenhouse Gas Emissions | ☐ Hazards & Hazardous Materials |
| ☐ Hydrology / Water Quality | ☐ Land Use / Planning | ☐ Mineral Resources |
| ☐ Noise | ☐ Population/Housing | ☐ Public Services |
| ☐ Recreation | ☐ Transportation | ☐ Tribal Cultural Resources |
| ☐ Utilities / Service Systems | ☐ Wildfire | ☐ Mandatory Findings of Significance |

DETERMINATION (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☒	I find that the proposed project could not have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
☐	I find that although the proposed project COULD have a significant effect on the environment, there WILL NOT be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
☐	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
☐	I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
☐	I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION , including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

DocuSigned by:

Stacy Sherman

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8/10/2021

Stacy Sherman, Acting Regional Manager
California Department of Fish and Wildlife – Bay Delta Region

Date

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ENVIRONMENTAL ISSUES**3.1 AESTHETICS**

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
I. Aesthetics. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

3.1.1 Environmental Setting

Aesthetic resources are generally defined as both the natural and built features of the landscape that contribute to the public's experience and appreciation of the landscape. Depending on the extent to which a project's presence would negatively alter the perceived visual character and quality of the landscape, there may be impacts to aesthetic resources. For the purposes of this section, "Project Area" refers to the area that encompasses the extent of the waterways and intertidal wetlands throughout the North Delta Arc, generally up to levee crests, and "Project Site" refers specifically to those locations where physical activities associated with carrying out the Proposed Project would occur, such as marinas, boating traffic lanes, waterways, and intertidal wetlands.

The California Legislature initiated the California Scenic Highway Program in 1963, with the goal of preserving and protecting the state's scenic highway corridors from changes that would reduce their aesthetic value. The State Scenic Highway System consists of eligible and officially designated routes. A highway may be identified as eligible for listing as a state scenic highway if it offers travelers scenic views of the natural landscape, largely undisturbed by development. Eligible routes advance to officially designated status when the local jurisdiction adopts ordinances to establish a scenic corridor protection program and receives approval from the California Department of Transportation. The section of Highways 4 and 160 traversing through the North Delta

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Arc is Officially Designated or Eligible State Scenic Highways (California Department of Transportation 2018).

The Project Area is primarily in a rural setting with variable degrees of visual quality characterized by tidal and intertidal wetlands, sloughs, rivers, and bays surrounded by levees that support either private or public roadways. The levee slopes immediately surrounding the Project Site are generally covered by bare dirt, rock slope protection, rudimentary vegetation, shrub scrub habitat or mixed riparian woodlands. These levees also support recreational boating infrastructure such as private docks and public boat ramps and marinas.

Nighttime views in the Project Area are dark and generally free of light pollution except for public roadways and associated nighttime traffic. Existing sources of nighttime light within the Project Site generally include those used for highway safety, boating safety and navigational aids, safety lighting on marinas and docks and from nighttime boating traffic. Residences or other residential-like structures are generally not directly visible from within the Project Site where activities may take place.

Proposed Project activities that may be visible from Highway 4 or Highway 160 include transport vehicles using existing public state, county, or city roadways to move fish from the FCCL to existing marinas and boat ramps. In addition, boats being used to transport fish may also be visible when using boating traffic lanes.

3.1.2 Discussion

a) Have a substantial adverse effect on a scenic vista?

Less-than-significant. As stated in the Environmental Setting above, the proposed transport of fish on existing roadways and boating traffic lanes may be visible from Highway 4 or Highway 160. The Proposed Project may result in a slight increase of vehicle use on public boating traffic lanes. However, these uses would be brief and episodic events that would result in only a negligible increase in existing use. Release enclosures and monitoring equipment may be placed adjacent to existing boating traffic lanes and marked with navigational aids such as signage and solar-powered marine safety lights for up to a three-week period at any location where enclosures may be placed. This may result in a negligible increase compared to existing conditions throughout the Project Area. However, these temporary activities are generally consistent with existing activities and would not significantly alter or permanently affect any scenic vistas within the Project Area.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No impact. The Proposed Project does not physically affect trees, rock outcroppings, buildings, or other fixed resources. The Proposed Project would be utilizing existing public roadways, marinas, and boating lanes. The only new ground disturbance from the Proposed Project within the Project Site would be minor ground disturbances for temporarily anchoring equipment in submerged

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muddy or sandy bottoms of tidal marshes and waterways, which would have no impact on scenic resources.

c) Substantially degrade the existing visual character or quality of the site and its surroundings?

Less-than-significant. See discussion item a) above. The Proposed Project would not substantially degrade the existing visual character or quality within the Project Area or its surroundings.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less-than-significant. Solar-powered marine warning lights and navigational aids would be installed on temporary release enclosures and associated monitoring equipment, such as those used to anchor ARIS cameras, when left unattended or overnight to prevent boating accidents. As described in the Project Description Section 2.5, any item requiring lights or reflective material would be placed where they would not be seen from residences or other inhabited structures (e.g., hotels). The warning lights and navigational aids would be removed within three-weeks of installation or sooner when temporary release enclosures and associated monitoring equipment are no longer necessary. No other materials used to carry out the Proposed Project would introduce new sources of light or glare.

3.2 AGRICULTURE AND FOREST RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
II. Agriculture and Forest Resources.				
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997, as updated) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.				

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Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

3.2.1 Environmental Setting

For the purposes of this section, “Project Area” refers to the area that encompasses the extent of the waterways and intertidal wetlands throughout the North Delta Arc, generally up to levee crests, and “Project Site” refers specifically to those locations where physical activities associated with carrying out the Proposed Project would occur, such as marinas, boating traffic lanes, waterways, and intertidal wetlands.

The State of California Department of Conservation (DOC) maps farmlands under the Farmland Mapping and Monitoring Program (FMMP). The FMMP was created by the State of California to provide data on farmland quality for use by decision-makers in considering possible conversion of agricultural lands. Under the FMMP, land is delineated into the following eight categories: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban or Built-Up Land, Other Land, and Water. Mapping is conducted on a county-wide scale, with minimum mapping units of 10 acres unless otherwise specified. Proposed Project activities would be occurring within the various water courses throughout the North Delta Arc and surrounding lands are designated under the FMMP as Other Land (Exhibit 3.2-1) (DOC 2014). Many of the lands adjoining the Project Area have been used continuously for farming or other agricultural purposes over the past 100 years and continue to be used for those purposes today.

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There are no areas with a land use designation of timberland or forestry uses that overlap with the Project Area (Contra Costa County 2005, Sacramento County 2011, Solano County 2008, Yolo County 2009). A review of the California Department of Forestry and Fire Protection's geographic information systems data on approved Timber Harvest Plans and Non-industrial Timber Management Plans was conducted, and no current or historical records of such designations were found within the Project Area (CalFire 2021a and 2021b).

3.2.2 Discussion

a-b) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use? Or Conflict with existing zoning for agricultural use or a Williamson Act contract?

No impact. There is no Proposed Project component that will interfere with the use of or result in the conversion of agricultural land to a non-agricultural use. Although lands adjoining the levees surrounding the Project Area are used for agricultural purposes, the Project Site itself does not contain any Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The Project would not disrupt or modify any land uses. Therefore, the Proposed Project will have no effect on any category of California Farmland, conflict with any existing zoning for agricultural use or Williamson Act contract or result in the conversion of farmland to non-agricultural use.

c-d) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))? Or Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. There are no lands with a land use designation of timberland or zoned for forestry uses within the Project Area. The Proposed Project would not include any tree removal or conversion of forest land to non-forest uses.

e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?

No impact. As noted in the Environmental Setting above, farmlands adjacent to the Project Area have been used for agricultural production without interruption and continue to be used for this purpose. Proposed Project activities are limited to short-term activities and transitory uses of existing marinas, boating traffic lanes, waterways, and intertidal wetlands that would not disrupt or modify surrounding land uses. Additionally, no forest or agricultural resources are located within the Project Site, and as discussed above in items a) through d),

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the Proposed Project would not involve changes in the existing environment which, due to their location or nature, that could result in conversion of forest land or agricultural land. Therefore, no impact would occur.

3.3 AIR QUALITY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
III. Air Quality.				
Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied on to make the following determinations.				
Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

3.3.1 Environmental Setting

Existing air quality conditions in an area are determined by such natural factors as topography, meteorology, and climate, as well as the concentrations and volumes or rates of emissions released by existing air pollution sources. Natural factors that affect transport and dilution of ambient concentrations of air pollutants and their emissions include terrain, wind, atmospheric stability, and sunlight.

The California Air Resources Board (CARB) divides the state into air basins that share

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similar meteorological and topographical features. California's 35 local Air Districts are responsible for regional air quality planning, monitoring and stationary source and facility permitting at the local level. The Project Area spans across two air basins. The Sacramento Valley Air Basin (SVAB) which includes Yolo, Sacramento, and Contra Costa counties; and the northeastern portion of Solano County. Within the SVAB the Project Area falls under the jurisdiction of the Yolo-Solano Air Quality Management District (YSAQMD) which manages all of Yolo County and the northeastern portion of Solano County, and the Sacramento Metropolitan Air Quality Management District (SMAQMD) which covers all of Sacramento County. The Project Area also falls into the San Francisco Bay Area Air Basin (SFBAAB) which includes Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties; the southern portion of Sonoma County; and the southwestern portion of Solano County. The Bay Area Air Quality Management District (BAAQMD) manages the entirety of the SFBAAB.

3.3.1.1 General Air Quality Environmental Setting

To protect the public's health, both the State and federal governments have established health-based Ambient Air Quality Standards (AAQS) for seven air pollutants: ozone (O₃), particulate matter (PM₁₀, or particulate matter less than 10 microns in diameter), fine particulate matter (PM_{2.5}, or particulate matter less than 2.5 microns in diameter), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and lead (Pb). These seven pollutants are known to have adverse effects on human health and the environment. In addition, the state has set standards for sulfates, hydrogen sulfide (H₂S), vinyl chloride (VC), and visibility-reducing particles (VRPs). California law does not require that State AAQS be met by specified dates as is the case with federal AAQS, instead it requires incremental progress toward attainment.

An "attainment" designation for an area signifies that pollutant concentrations did not violate the AAQS for that pollutant in that area. A "nonattainment" designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation was caused by an exceptional event, as identified in the criteria. A "maintenance" designation indicates that the area previously had nonattainment status and currently has attainment status for the applicable pollutant; the area must demonstrate continued attainment for a specified number of years before it can be redesignated as an attainment area. An "unclassified" designation signifies that data do not support either an attainment or a nonattainment status.

3.3.1.2 Sacramento Valley Air Basin

The SVAB is relatively flat and bordered by mountains to the east, west, and north. Air flows into the SVAB through the Carquinez Strait and moves across the Sacramento–San Joaquin Delta, bringing with it pollutants from the San Francisco Bay Area. The climate is characterized by hot, dry summers and cool, rainy winters. Periods of dense and persistent low-level fog that are most prevalent between storms are characteristic of weather in the winter within the SVAB. From May to October, the SVAB region experiences intense heat and sunlight that lead to high ozone concentrations and summer inversions are strong and frequent. Autumn inversions, formed by warm air

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subsiding in a region of high pressure, have accompanying light winds that do not provide adequate dispersion of air pollutants.

Sacramento County currently meets the state ambient air quality standards for sulfur dioxide, nitrogen dioxide, and carbon monoxide. The Sacramento Region is currently designated nonattainment for the state ambient air quality standards for ozone and particulate matter. More information on the attainment status for each of these parameters can be found here: <http://www.airquality.org/air-quality-health/air-quality-plans/state-planning>.

The YSAQMD is in the attainment status of the following AAQs: CO, NO₂, SO₂, and sulfides. Carbon monoxide, nitrogen dioxide, and sulfur dioxide. The YSAQMD currently designated as having a nonattainment status for the AAQS for ozone and has a non-attainment status under the federal AAQS for fine particulate matter. More information on the attainment status for each of these parameters can be found here: <https://www.ysaqmd.org/plans-data/attainment/>.

3.3.1.3 San Francisco Bay Area Air Basin

The SFBAAB is characterized by cool summers, mild winters, and infrequent rainfall. The atmospheric processes often combine to restrict the ability of the atmosphere to disperse air pollution. Frequent dry periods occur during the winter when ventilation (rapid horizontal movement of air and injection of clean air) and vertical mixing are low, and pollutant levels build up. During rainy periods, however, ventilation and vertical mixing are usually high, leading to low levels of air pollution.

The BAAQMD is currently designated as a nonattainment area for state and national ozone standards and national particulate matter ambient air quality standards. More information on the attainment status for each of these parameters can be found here: <https://www.baaqmd.gov/about-air-quality/research-and-data/air-quality-standards-and-attainment-status>. BAAQMD's nonattainment status is attributed to the region's development history. Past, present, and future development projects contribute to the region's adverse air quality impacts on a cumulative basis. By its very nature, air pollution is largely a cumulative impact.

3.3.1.4 Thresholds of Significance

Each local Air District within which the Project Area is located has developed guidelines for CEQA significance thresholds of AAQS for use by lead agencies when preparing an environmental document (BAAQMD 2017b, SMAQMD 2009, YSAQMD 2007; Table 3). However, no single project is sufficient in size to, by itself, result in nonattainment of ambient air quality standards within a local Air District. Instead, a project's individual emissions are assessed for how they would contribute to existing cumulatively significant adverse air quality impacts. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant. In addition, several of these thresholds do not apply to non-construction-related projects such as the Proposed Project.

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Table 3. Summary of Non Construction-Related AAQS Thresholds of Significance for the Project Area – Note if an AAQS differs between the Air Quality Management Districts then the more restrictive value was retained.

Pollutant	Operational-Related	
	Average Daily Emissions (lb/day)	Maximum Annual Emissions (tpy)
ROG	54	10
NO _x	54	10
PM ₁₀ (exhaust)	80	15
PM _{2.5} (exhaust)	54	10
PM ₁₀ /PM _{2.5} (fugitive dust)	None	
Local CO	9.0 ppm (8-hour average), 20.0 ppm (1-hour average)	
Odors	5 confirmed complaints per year averaged over three years	

3.3.2 Discussion

a) Conflict with or obstruct implementation of the applicable air quality plan?

No impact. The Proposed Project does not conflict with or obstruct the implementation of an air quality plan.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Less-than-significant. The Proposed Project could contribute to air quality impacts due to the increased vehicle and boat trips generated by the Proposed Project's activities. The Proposed Project would be using either gas or diesel-fueled full-sized (1/2 to 1 ¼ ton) pickup trucks which fall into the EPA's Class IIb of Heavy-Duty Vehicle Classifications (EPA 2008). Up to eight trucks will be used per release event and approximately 16 roundtrips that would, at a maximum, total 112 miles per roundtrip between the FCCL and the boat launch in Suisun Marsh. An estimated six release events would occur each year. An overly conservative estimate is that the Proposed Project could result in a maximum of 1,792 vehicle miles in a day for an individual release event or 10,752 miles per year.

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Table 4. CEQA Thresholds of Significance for Air Pollutants and Proposed Project Emission Estimates

Pollutant	Fuel	lb (grams per mile)	Estimated Grams Per Day/Release Event (Pounds)	Estimated Tons per Year
VOC (lower range)	gas diesel	1.353 0.189	2,425 (5.3lbs) 339 (0.7lbs)	0.02 <0.01
VOC (upper range)	gas diesel	1.400 0.194	2,509 (5.5lbs) 348 (0.8lbs)	0.01 <0.01
CO	gas diesel	11.220 0.839	20,107 (44.3lbs) 1,504 (3.3lbs)	0.11 <0.01
NOx	gas diesel	2.734 3.088	4,899 (10.8lbs) 5,534 (12.2lbs)	0.03 0.03
PM2.5	gas diesel	0.043 0.091	77 (0.2lbs) 163 (0.4lbs)	<0.01 <0.01
PM10	gas diesel	0.049 0.099	88 (0.2lbs) 178 (0.4lbs)	<0.01 <0.01

Seven small vessels (i.e., 26-foot or under) and possibly one large vessel (e.g., 42-foot boat) would be used to transport personnel, equipment, and fish from a marina/boat launch to each release location.

The level of traffic and associated air quality and greenhouse gas emissions generated by the Proposed Project can be presumed to be less-than-significant and are well under the thresholds of significance for the standards listed in Table 4. Since the Project's emissions fall below these thresholds no further analysis was determined to be necessary.

- c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?**

Less-than-significant. See discussion above under 3.3(b).

- d) Expose sensitive receptors to substantial pollutant concentrations?**

Less-than-significant. As discussed in item b) above, the Project would not result in a level of air pollutant emissions or emissions of their precursors that would exceed local Air District thresholds of significance and therefore would not expose receptors to substantial pollutant concentrations.

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e) Create objectionable odors affecting a substantial number of people?

Less-than-significant. The Proposed Project would not introduce any new major odor sources that have an established recommended screening distance (e.g., wastewater treatment facilities, landfills, composting facilities). During transportation of fish, the operation of diesel-powered vehicles or boats may generate temporary, localized odors from exhaust. However, such emissions would be short-term and would dissipate rapidly with increasing distance from the source. Furthermore, the Project Site primarily lies within natural or rural settings where the odor exposure to a substantial number of people has little to no possibility.

3.4 BIOLOGICAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
IV. Biological Resources. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☐	☒	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒

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f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒
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3.4.1 Environmental Setting**3.4.1.1 Introduction and Methods**

This section addresses biological resources known or with potential to occur within the Project Area that may be affected by the Proposed Project including transport of cultured Delta Smelt to waterways, installation of temporary indirect release enclosures with associated monitoring equipment, and either direct release from boats into the water, or indirect release into enclosures followed by release. Three biological resources (California Natural Diversity Database, California Rare Plant Society, and USFWS Information for Planning and Consultation) as well as published scientific literature documenting species distribution and natural history were consulted to identify sensitive plant, fish, and wildlife species that could be affected by the Proposed Project.

3.4.1.2 Habitat Types

Vegetation communities and land cover types present in the Project Area include aquatic habitat in which the cultured Delta Smelt would be transported and released as well as terrestrial habitat within 20 feet of the margins of the aquatic habitat identified in the Project Area. The following sections describe the varying habitat and land cover types currently present in the Project Area.

Tidal Perennial Aquatic

Tidal perennial aquatic habitat consists of open water habitat the Sacramento-San Joaquin Delta and within Suisun and Grizzly bays and is categorized into two zones – deep water aquatic and shallow aquatic zones of estuarine bays, river channels, and sloughs. Deep water aquatic habitat is characterized by water depths greater than 10 feet from mean lower low tide. Shallow aquatic habitat is characterized by water depths less than or equal to 10 feet from mean lower low tide. The tidal Delta is primarily freshwater, with brackish and saline conditions occurring in the western Delta and Suisun and Grizzly bays during high tides and low outflow. The Project Area spans freshwater, brackish, and saline portions of the Delta.

Tidal Mudflat

Tidal mudflats, or tideflats, are characterized by unvegetated sediment along the intertidal zone between the high tide and the mean lower low tide. These areas are often submerged and associated with either the upper edge of tidal freshwater or brackish emergent wetlands or the lower edge of tidal perennial aquatic habitat. Substrate varies in mudflats but tends to be soft mud or sandy mud due to the deposition of fine sediments combined with organic matter, water saturation, and bacterial influence.

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Low Salinity Zone and X2

The low salinity zone of the San Francisco Estuary occurs where salinity ranges from approximately 0.5 to 6 parts per thousand (ppt). X2 is located within the low salinity zone and is defined as the distance from the Golden Gate Bridge upstream to where salinity, measured from the bottom of the water column, is approximately 2 ppt. Salinity is roughly linearly distributed between X2 (2 ppt) and the San Francisco Bay (~30 ppt). The position of X2 is dependent on multiple physical factors, including river flow (outflow), water diversion, and tides, and can shift many kilometers both daily and seasonally. In the summer and fall, the X2 position generally ranges from the San Pablo Bay to the Delta based on tides.

Tidal Freshwater Emergent Wetland

Tidal freshwater emergent wetland habitat is typically a transition zone between tidal aquatic habitat and valley foothill riparian or upland plant communities. In the Project Area, tidal freshwater wetlands often occur at the shallow and slow-moving edges along the Sacramento Deep Water Ship Channel, Sacramento River, as well as in some wetlands in Suisun Marsh and some of the large islands within the Project Area including restored wetlands. Tidal freshwater emergent wetlands are regularly flooded by the tides. The low elevation wetland zone is influenced by the daily tides and is frequently flooded, while the middle elevation zone is also frequently flooded, but the soil is exposed above the water level for multiple hours each day. The high-elevation tidal zone is only occasionally flooded, but depressions in the landscape can keep some parts of the zone flooded after the tides recede.

Tidal Saline/Brackish Emergent Wetland

Tidal saline emergent wetlands typically occur along the margins of bays, lagoons, and estuaries and are sheltered from excessive wave action. In the Project Area, tidal saline emergent wetland natural communities are predominantly found in Suisun Marsh. Tidal wetland habitats are influenced by salinity levels, which vary throughout the year depending on freshwater inflow from the Delta and by tidal saltwater from San Francisco Bay. In Suisun Marsh, tidal saline emergent wetlands primarily consist of tidal brackish marshes that occur as either large continuous tracts of undisturbed wetlands, or in narrow bands of fringing tidal wetlands. Large brackish marsh generally consists of expansive marsh plains, a network of tidal channels and ponds, and an upland transition zone, while fringing marsh typically occurs in narrow bands along the exterior levees of diked managed wetlands.

Tidal saline emergent wetlands are categorized into three zones—low marsh, middle marsh, and high marsh. Low marsh wetlands are inundated once or twice per day. Due to high salinity levels, deep inundation, and frequent disturbance by waves or currents, the low marsh zone supports the lowest amount of species richness. Like the low marsh, plant species composition in the medium marsh is strongly influenced by salinity, but species richness is often higher than the lower zone. Tidal inundation in the high marsh occurs intermittently during the monthly tidal cycle with only the highest tides and

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provides habitat for many plant species. The upland transition zone occurs between the high marsh and upland habitats. This zone, which provides refuge to wildlife during high tides, is composed of a mix of high marsh plant species as well as more upland species.

Managed Wetlands

Managed wetlands are typically formed as a result of intentional seasonal flooding to enhance habitat for overwintering migratory waterfowl, breeding waterfowl, and shorebirds. In the Project Area, managed wetlands are predominantly found in the leveed and diked areas of Suisun Marsh within the historical boundary of the high tidal marsh zone and adjacent uplands. The timing, duration, and depth of inundation, operation of flood and drain gates, and salinity and soil type, influence the distribution and abundance of vegetation communities in managed wetlands. The hydrologic regime for managed wetlands usually includes a winter flooding phase that coincides with the arrival of migratory birds, followed by a gradual drawdown phase to promote plant seed production and to control mosquito populations, and summer irrigation to grow forage for waterfowl and to provide habitat for summer migrants.

Valley Foothill Riparian

Valley foothill riparian habitat is typically a transitional community between aquatic and upland terrestrial habitats. This habitat is generally associated with low velocity flows, floodplains, and gentle topography that occur in the Central Valley and the lower foothills of the Cascade, Sierra Nevada, and Coast ranges. The valley foothill riparian plant assemblage usually consists of a multilayered woodland plant community with a tree overstory and shrub understory. In the Project Area, riparian forest and woodland are limited to narrow bands alongside and interspersed with emergent wetland species in major and minor waterways, oxbows, sloughs, and levees associated with the Sacramento Deepwater Channel, Sacramento River, Cache Slough complex, as well as small areas of Suisun Marsh.

Grassland

Grasslands are distributed throughout California from Oregon to Baja California in regions characterized by a broad range of climatic conditions and elevations ranging from sea level to 1,500 meters. The annual and perennial grassland community can range from natural grasslands to intensively managed vegetation dominated by nonnative grasses. Currently, introduced annual grasses are the dominant plant species in grasslands that were once occupied by native perennial grasses and forbs. In the Project Area, grasslands typically occur near freshwater emergent wetlands, the understory layer of remnant riparian forests, leveed ecosystems, and areas that have been cleared of natural vegetation such as the edges of roads. Grassland communities provide important foraging, breeding, and cover habitat for a wide variety of wildlife species.

Ruderal Lands

Ruderal lands are characterized by herbaceous, nonnative plant species, including some species considered invasive by the California Invasive Plant Council. Prior or

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regular land disturbance (e.g., mowing or tilling) also dominates this landscape. Areas that are regularly disturbed have a low value to special-status species and provide openings for invasive species to establish.

Cultivated Lands

Cultivated lands are typically divided into croplands, non-croplands, and fallow lands. Croplands include row crops and cover types in agricultural production, including small grains, field crops, forage crops, irrigated pasture, orchards, and vineyards. Non-croplands consist of livestock feedlots, dairies, poultry farms, small roads, ditches, and nonplanted areas associated with cultivated lands. Fallow lands are temporary croplands left bare during the duration of a crop year. Cultivated lands can provide habitat for a variety of wildlife species, including special-status species. Orchard habitats are used by common woodland-associated species and vineyards generally provide little wildlife habitat but can be used by mourning doves (*Zenaida macroura*) or raptors (if nest boxes are installed).

Developed Lands

Developed lands include residential, industrial, and urban land uses as well as land disturbed by landscaping, pipelines and powerlines, riprap, roads, and transportation facilities. Developed lands also include barren areas that have been previously disturbed and left unvegetated. Common plant and wildlife species occur in urban areas, with species richness dependent on the level of development. Suburban areas with mature trees and less dense urban settings can support greater wildlife diversity, including some native species that would not inhabit dense urban settings. Developed lands are not a naturally occurring habitat; however, they do provide habitat diversity for nesting and sheltering of resident and migratory birds as well as foraging habitat for common species.

3.4.1.3 Special-Status Fish Species

A number of special-status fish species occur in the Project Area during some part of their life cycle, including several species that are listed as threatened or endangered under ESA and/or CESA. The waters within the North Delta Arc function as spawning, rearing, foraging, and migratory habitat for these species. The following subsections describe the life history and distribution of special-status fish species that would be likely to occur in the Project Area during the timeframe when experimental releases could occur each year (October – April).

Table 5. Special-Status and Commercially and Recreationally Important Fish and Aquatic Species That Occur within the Project Area

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Common Name	Scientific Name	Category				
		Federal Status ¹	State Status ¹	Economically Important ²	Recreationally Important ²	Other ³
Pacific Lamprey	<i>Entosphenus tridentatus</i>	N/A	SSC	N/A	N/A	N/A
River Lamprey	<i>Lampetra ayresi</i>	N/A	SSC	N/A	N/A	N/A
White Sturgeon	<i>Acipenser transmontanus</i>	N/A	SSC	Economically Important	Recreationally Important	N/A
Green Sturgeon, Southern DPS	<i>Acipenser medirostris</i>	FT	SSC	N/A	N/A	N/A
Steelhead, Central Valley DPS	<i>Oncorhynchus mykiss</i>	FT	N/A	Economically Important	Recreationally Important	N/A
Chinook Salmon, Central Valley Fall-Run ESU	<i>Oncorhynchus tshawytscha</i>	SC	SSC	Economically Important	Recreationally Important	N/A
Chinook Salmon, Central Valley Late Fall-Run ESU	<i>Oncorhynchus tshawytscha</i>	SC	SSC	Economically Important	Recreationally Important	N/A
Chinook Salmon, Sacramento River Winter-Run ESU	<i>Oncorhynchus tshawytscha</i>	FE	SE	N/A	N/A	N/A
Chinook Salmon, Central Valley Spring-Run ESU	<i>Oncorhynchus tshawytscha</i>	FT	ST	Economically Important	Recreationally Important	N/A
Longfin Smelt	<i>Spirinchus thaleichthys</i>	FC	ST	N/A	N/A	N/A
Delta Smelt	<i>Hypomesus transpacificus</i>	FT	SE	N/A	N/A	N/A
Sacramento Hitch	<i>Lavinia exilicauda exilicauda</i>	N/A	SSC	N/A	N/A	N/A
Sacramento Splittail	<i>Pogonichthys macrolepidotus</i>	N/A	SSC	N/A	N/A	N/A
Hardhead	<i>Mylopharodon conocephalus</i>	N/A	SSC	N/A	N/A	N/A
Central California Roach	<i>Lavinia symmetricus</i>	N/A	SSC	N/A	N/A	N/A
Striped Bass	<i>Morone saxatilis</i>	N/A	N/A	Economically Important	Recreationally Important	N/A

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Largemouth Bass	<i>Micropterus salmoides</i>	N/A	N/A	Economically Important	Recreationally Important	N/A
Smallmouth Bass	<i>Micropterus dolomieu</i>	N/A	N/A	Economically Important	Recreationally Important	N/A
Spotted Bass	<i>Micropterus punctulatus</i>	N/A	N/A	Economically Important	Recreationally Important	N/A
American Shad	<i>Alosa sapidissima</i>	N/A	N/A	Economically Important	Recreationally Important	N/A
Threadfin Shad	<i>Dorosoma petenense</i>	N/A	N/A	Economically Important	Recreationally Important	N/A
Sacramento–San Joaquin Tule Perch	<i>Hysterocarpus traski</i>	N/A	N/A	N/A	N/A	Other
Bay Shrimp	<i>Crangon franciscorum</i>	N/A	N/A	Economically Important	N/A	N/A
Starry Flounder	<i>Platichthys stellatus</i>	N/A	N/A	Economically Important	N/A	N/A

Sources: CDFW 2017; USFWS 2017a; Moyle et al. 2015

Notes:

DPS = Distinct Population Segment; ESU = Evolutionarily Significant Unit; N/A = not applicable

For this discussion of fisheries and aquatic resources, the Longfin Smelt range is recognized as extending beyond the boundaries of the Sacramento–San Joaquin Delta to include San Pablo Bay, San Francisco Bay, and the nearshore Pacific Ocean.

¹ Listing Statuses:

FC	Federal candidate for listing
FE	Federally listed as endangered
FT	Federally listed as threatened
SC	Federal species of concern (National Marine Fisheries Service)
SE	State listed as endangered
SSC	State species of special concern
ST	State listed as threatened

² Species considered important because of existing regulatory management that limits commercial or recreational harvesting.

³ Other species identified because of a specific or unique life-history strategy or ecological adaptation.

3.4.1.4 Special-Status Aquatic Species

Pacific Lamprey

Pacific Lamprey (*Entosphenous tridentatus*) is the largest lamprey species found in California waters, and has been in decline throughout their range within the state leading to their status as a species of special concern (Moyle et al. 2015). Their range extends from coastal waters of Los Angeles County up to Del Norte County and includes the inland rivers of the Central Valley (Moyle et al. 2015). In the Central Valley, Pacific Lamprey migrate up the Sacramento and San Joaquin rivers in the spring to

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spawn, with the majority of adults migrating between March and June. Adult lamprey will seek out low gradient riffles to dig their nest and eventually spawn. After spawning, adults will bury the embryos in fine sediments where they will incubate for approximately 19 days before hatching (Moyle et al. 2015). Once hatched, ammocetes will travel downstream until they find areas of sand or mud where they will burrow to feed on detrital material. After 5-7 years, ammocetes undergo a physiological transition into the macrothalmia stage, allowing the species to tolerate salt water (Moyle et al 2015). Macrothalmia harness spring flows to assist in their seaward migration towards the ocean, where they will feed and grow before returning to spawn as adults.

Western River Lamprey

Western River Lamprey (*Lampetra ayresii*) occur in coastal streams from just north of Juneau, Alaska, south to San Francisco Bay. In California, they have been recorded from the Sacramento-San Joaquin Delta, tributaries to the San Francisco Estuary (Napa River, Sonoma Creek, Alameda Creek), and tributaries to the Sacramento and San Joaquin rivers (e.g. Tuolumne River, Stanislaus River, Cache Creek) (Moyle et al. 2015). Little is known about the Western River Lamprey within California, although it is thought that they are in decline throughout their range within the state (Moyle et al. 2015), making them a species of special concern. In British Columbia, adult Western River Lamprey migrate into freshwater in the fall and will spawn through the winter. River Lamprey use similar habitat as the Pacific Lamprey. Spawning habitat occurs in low gradient gravely riffles in permanent streams, and larval rearing habitats consist of fine sediments and mud. The transition from ammocete to macrothalmia begins during the summer and may take up to 10 months to complete. Newly metamorphosed Western River Lamprey will rear in near shore habitats for only a few months in the spring, where they rapidly grow before beginning their migration back into freshwater habitats to spawn (Moyle et al. 2015).

White Sturgeon

White Sturgeon (*Acipenser transmontanus*) are large, long-lived anadromous fish that are native to the west coast of North America. White Sturgeon in the Sacramento-San Joaquin watersheds represent the southernmost spawning population of the species. Within this system, white sturgeon occur in deep, soft-bottomed areas of the San Francisco estuary. White sturgeon disperse to intertidal areas during high tides to opportunistically feed on a variety of benthic invertebrates, including crabs, clams, and shrimp, as well as other fish species such as flounder, smelt, and anchovy. During the winter, adult sturgeon begin migrating up the Sacramento River for spawning. Spawning is triggered by flow increases during the spring and typically occurs from February to early June in the reaches of the Sacramento River between Knights Landing and Colusa in swift, deep riffles or pools with rock and gravel substrate. The distribution and abundance of sturgeon in the San Francisco estuary is age-dependent and influenced by salinity tolerance. Juvenile sturgeon are more abundant towards the upstream end of the estuary whereas older fish are found towards the ocean. Nonetheless, White Sturgeon are capable of dispersing throughout the San Francisco estuary to find optimal habitat conditions.

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Green Sturgeon, Southern DPS

Green Sturgeon (*Acipenser medirostris*) are a large, long-lived, anadromous fish with a limited distribution in California. There are two genetically identifiable populations, or Distinct Population Segments (DPS), of Green Sturgeon recognized by the state and federal resource agencies. The northern DPS is known to spawn in the Klamath River in California, as well as the Rogue River in Oregon. Southern DPS Green Sturgeon are found in the Sacramento and San Joaquin rivers and Delta. During the late winter and spring months, adult Southern DPS Green Sturgeon enter San Francisco Bay and migrate quickly up the Sacramento River. Spawning, which begins between March and July, typically occurs in reaches of the mainstem upper Sacramento River with swift, deep, cold moving water with a hard substrate riverbed. In recent years, spawning has been documented in the Feather and Yuba rivers. After hatching, Green Sturgeon larvae passively disperse downstream to the San Francisco estuary and the Sacramento-San Joaquin Delta where they either leave freshwater as yearlings, or rear for multiple years prior to migrating to the ocean during the summer and fall months. Adult Green Sturgeon spend most of their life in the ocean making seasonal migrations northward during the fall and southward in the spring. Green Sturgeon are benthic feeders that consume amphipods, opossum shrimp, clams, anchovies, and occasionally other fish (Moyle 2002; Moyle 2015).

Steelhead, Central Valley DPS

Central Valley Steelhead (*Oncorhynchus mykiss*) are anadromous rainbow trout that are distributed throughout the Central Valley of California. Historically, steelhead were present from the upper Sacramento and Pit Rivers south to the Kings River. Due to the construction of large impassable dams, Central Valley Steelhead are now predominantly confined to the Sacramento River and its tributaries, including Mill, Deer, Butte, and Antelope creeks, and the Yuba River. Steelhead were thought to be extirpated from the San Joaquin River watershed, however recent monitoring has detected small populations of steelhead in the Stanislaus, Mokelumne, and Calaveras rivers (NMFS 2014). Juvenile steelhead rear in tidal wetlands, non-tidal freshwater wetlands, and other shallow water habitats in the Delta for short periods of time before entering the ocean. Central Valley steelhead feed on a variety of aquatic and terrestrial prey, including zooplankton, drifting organisms, insects, small fish and frogs. The Central Valley Steelhead DPS population includes steelhead that are propagated at the Feather River Fish Hatchery, Coleman National Fish Hatchery, and Mokelumne River Fish Hatchery (NMFS 2014).

Chinook Salmon, Central Valley Fall-Run ESU

Fall-run Chinook Salmon (*Oncorhynchus tshawytscha*) were historically present in all major Central Valley rivers from the upper Sacramento River and the McCloud and Pitt rivers in the north to the Kings River in the south. Currently, Fall-run Chinook Salmon are restricted to the downstream reaches of dams in every major river. Central Valley Fall-run Chinook salmon abundances have fluctuated widely in recent years, but they are currently the most widely distributed and abundant run in the Central Valley, supporting important commercial, recreational, and tribal fisheries (NMFS 2014).

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Fall-run Chinook Salmon are an ocean-type fish that are adapted to spawning in the lower reaches of major rivers and their tributaries. Adult Fall-run Chinook Salmon migrate from the ocean in late summer and early fall in mature conditions. Spawning may occur within a few days or weeks after arriving on the spawning grounds from early October through late December with the peak during October to November. Juvenile Fall-run Chinook Salmon emerge from December through March and rear in freshwater for one to seven months before freshwater exit. Juvenile Chinook salmon are opportunistic feeders that eat a variety of terrestrial and aquatic invertebrates, including chironomid midges, mayfly and caddisfly larvae, and zooplankton. Once in the ocean, Fall-run Chinook Salmon from California rivers typically stay along the food-rich waters of the California coast for one to five years (Moyle, 2002; NMFS 2014).

Chinook Salmon, Central Valley Late Fall–Run ESU

Central Valley Late Fall-run Chinook Salmon (*Oncorhynchus tshawytscha*) are usually larger in size compared to the four Central Valley Chinook salmon runs and are primarily found in the Sacramento River below Keswick Dam. Their historic range likely included reaches of the upper Sacramento and McCloud rivers as well as the San Joaquin River in the Friant Dam area; however, their range has been restricted due to the construction of dams on these waterways. Late fall-run Chinook salmon have an intermediate ocean-type and stream-type life history strategy. Adult Late Fall-run Chinook Salmon migrate from the ocean in late fall and early winter and spawn soon after arrival on the spawning grounds from December through January (Moyle et al. 2015). Juvenile late fall-run salmon emerge from gravel from April through June and rear in freshwater for seven to thirteen months before freshwater exit (Yoshiyama et al. 1998). Peak migration of smolts occurs in October, with some juveniles outmigrating at younger ages and smaller sizes throughout the year (Moyle et al. 2015). Juveniles forage along streamside habitat with riparian cover that provides food (e.g., aquatic and terrestrial invertebrates), cover from predators, and slower water velocities (Moyle 2002). Currently, the species is listed as a California species of special concern.

Chinook Salmon, Sacramento River Winter-Run ESU

Sacramento River Winter-run Chinook Salmon (*Oncorhynchus tshawytscha*) are listed as an endangered species under both ESA and CESA. Winter-run Chinook Salmon are unique among the four runs because they spawn during the summer months when air temperatures are at yearly maxima. Winter-run Chinook Salmon require stream reaches with cold-year around water sources that will protect embryos and juveniles from warm ambient summer temperatures. Adult Winter-run Chinook Salmon begin migrating through the Delta and into the lower Sacramento River from December through January, with a peak from January to April. Juvenile winter-run Chinook salmon are observed migrating past Knights Landing and entering the Delta between November and March, with a peak generally in December. Juvenile Chinook salmon rear in shallow water habitats associated with riparian vegetation cover, slow water velocity, and suitable substrates that provide habitat for invertebrate prey species (NMFS 2014).

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Chinook Salmon, Central Valley Spring-Run ESU

Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) are listed as threatened under both ESA and CESA. Currently, the only known tributaries that support genetically distinct viable populations of spring-run Chinook salmon in the Sacramento River watershed are Mill, Deer, and Butte Creeks. The Feather River Fish hatchery is the only hatchery in the Central Valley producing spring-run Chinook salmon. Adult spring-run Chinook salmon begin their upstream migration in late January and enter the Sacramento River from March to September with peak migration in May and June. Fry emerge from the gravel between November and March, and juveniles may rear in freshwater for over a year, but many will exit freshwater as young-of-the-year fish within eight months of emergence. Juvenile Chinook salmon are opportunistic feeders that eat a variety of terrestrial and aquatic invertebrates, including chironomid midges, mayfly and caddisfly larvae, and zooplankton (NMFS 2014).

Longfin Smelt

Longfin Smelt (*Spirinchus thaleichthys*) in California is a small (to 150 mm TL), presumably semelparous, anadromous member of the “true smelt” family Osmeridae (Moyle 2002) and occur along coastal watersheds from San Francisco, California, to Cook Inlet, Alaska (CDFG 2009). Longfin Smelt have been in decline within the San Francisco Estuary since monitoring began in the late 1960’s (Rosenfield and Baxter 2007; Sommer et al. 2007) and were listed as threatened under CESA in 2009 (CDFG 2009). In the late fall and winter, maturing and immature fish move toward freshwater sources as water cools and appear to stage in low salinity habitat prior to spawning (CDFG 2009). Spawning begins in the winter and occurs throughout the Sacramento – San Joaquin River Delta, Suisun Bay, and Suisun Marsh, as well as tributaries to San Pablo and San Francisco Bays (Eakin 2021; Lewis et al. 2019). Spawning ends as water temperatures increase in the spring. Once hatched, larval Longfin Smelt rear and grow in low salinity to freshwater habitats for some time before transitioning to more saline habitats as juveniles, where they will rear and grow until adulthood (Rosenfield and Baxter 2007).

Delta Smelt

The Delta Smelt (*Hypomesus transpacificus*) is a small (≤ 120 mm TL), euryhaline, member of the “true smelt” family Osmeridae that is endemic to the upper San Francisco Estuary, primarily Suisun Bay and the Delta (Moyle 2002; Sweetnam 1999). Delta Smelt have a one-year life history (Moyle 2002) though a few adults survive after spawning (Baxter 1999) and may contribute to subsequent spawning periods (Bennett 2005). The Delta Smelt have undergone a protracted abundance decline since sampling began in the late 1960’s. This decline is influenced by changes in hydrology, Delta hydrodynamics and the upper estuary pelagic food web; changes in contaminant loads and possibly as a result of increased predation (Baxter et al. 2008; Baxter et al. 2010; IEP 2015; Sommer et al. 2007). In 1993, Delta Smelt were listed as threatened under both ESA and CESA, and then in 2009, their status was changed to endangered under CESA.

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Through much of its life, a large contingent of the Delta Smelt population inhabits the low salinity zone (Dege and Brown 2004 (Dege and Brown 2004; Feyrer et al. 2007; Feyrer et al. 2011; Sommer et al. 2011); Feyrer et al. 2007a; Feyrer et al. 2011; Sommer et al. 2011), whose location is indexed by X2; which is the distance of the 2 PSU isohaline from the Golden Gate Bridge measured in kilometers (Kimmerer 2004). From December through February, the migratory contingent inhabiting the low salinity zone uses periods of increased turbidity to move upstream into freshwater habitats (Bennett and Burau 2014; Grimaldo et al. 2009; Sommer et al. 2011) where they stage, continue to forage, and eventually spawn. Delta Smelt release small adhesive eggs that form a stalk to hold the egg above the substrate (Wang 2007). Egg incubation can last between 8-13 days depending on water temperature. After hatching, young of the year Delta smelt will transition down to the low salinity zone as water temperatures increase within the Delta. Delta Smelt will rear and grow in the low salinity zone through the summer and fall prior to maturing in the winter to spawn.

Sacramento Hitch

Sacramento Hitch (*Lavinia exilicauda exilicauda*) appear to be in long-term decline and is a species of special concern in the state of California (Moyle et al. 2015). Sacramento hitch inhabit warm, lowland waters including clear streams, turbid sloughs, lakes, and reservoirs. Historically, Sacramento Hitch were found throughout the Sacramento and San Joaquin river watersheds in low elevation streams and rivers, as well as in the Delta. However, Hitch have all but been extirpated from the San Joaquin River and the lower reaches of its tributaries from Friant Dam down to the Merced River (Moyle et al. 2015). Sacramento Hitch are still widespread across much of their native range within the Sacramento River, and still found within sloughs of the Delta. Hitch are omnivorous and feed upon zooplankton and insects, and are estimated to have a lifespan of 4-6 years with sexual maturity occurring between 1-3 years of age. Spawning typically occurs in the warmer parts of the spring, with young of the year fish schooling in shallow water or near aquatic vegetation until they are large enough to forage in open water habitats (Moyle et al. 2015).

Sacramento Splittail

Sacramento Splittail (*Pogonichthys macrolepidotus*) are a large cyprinid endemic to the Central Valley and confined to the Delta, Suisun Bay region, and the San Francisco Bay. Sacramento Splittail were listed as threatened under ESA on February 8, 1999, but were delisted on September 22, 2003 with their status reaffirmed on October 7, 2010. Data suggests that the southern Delta population may be small and declining, whereas the northern part of the population (within the Suisun Marsh) appears to have declined less severely (Moyle et al. 2015). Currently, the species is listed as a California species of special concern. Sacramento Splittail are adapted to estuarine conditions and can tolerate salinities ranging from 0 to 29 parts per thousand (ppt) and water temperatures ranging from 5 to 33°C (Moyle et al. 2015). Adults migrate from November through February in response to increased flow, providing access to floodplains or flooded edge habitat for spawning. The most important known spawning areas include the Yolo Bypass, Sutter Bypass, and the Cosumnes River floodplain. Spawning occurs between

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March and April followed by larvae emergence and downstream migration once flood waters recede. Juveniles rear in estuarine marshes for up to two years prior to spawning. Splittail are benthic feeders, foraging on invertebrates (e.g., earthworms, overbite clam [*Potamocorbula amurensis*], insect larvae) as well as detrital material (Moyle et al. 2015).

Hardhead

Hardhead (*Mylopharodon conocephalus*) are large cyprinids found throughout California waters in low to mid-elevations in the Sacramento-San Joaquin and Russian River drainages. Populations are declining throughout their range and they are listed as a California species of special concern. Hardhead prefer pools and runs with deep, clear water and slow velocities with sand, gravel, or boulder substrates (Moyle et al. 2015). Adults (age 2) migrate upstream into smaller tributaries between April and June to spawn. Spawning has not been directly observed, but it is assumed that adults aggregate in pools and deposit eggs in sand or gravel in riffles, runs, or heads of pools (Moyle 2002). After hatching, larvae and post-larvae move into stream margins with cover and move into deeper areas as they grow larger (Wang 1986). Hardhead are primarily benthic feeders, foraging on invertebrates and aquatic plant material along the stream substrate as well as drifting insects and algae (Moyle et al. 2015).

Central California Roach

Central California Roach (*Lavinia symmetricus symmetricus*) are small, stout-bodied cyprinids found in tributaries to the Sacramento and San Joaquin rivers and tributaries to the San Francisco Bay. Populations are not thought to be at risk of extinction; however, very little is known about the status, abundance, and taxonomy of the species. Currently, the species is listed as a California species of special concern. Central California roach are well adapted to live in both intermittent watercourses (e.g., isolated pools) as well as main channels. Adults mature in their second or third year and spawn between March and early July, depending on water temperature. Adults aggregate in riffles over coarse substrate where they simultaneously spawn and clear silt and sand from the substrate. After hatching, larvae remain in the gravel until they are able to swim and are often dispersed by stream flow. Central California roach are opportunistic omnivores, foraging along the benthic substrate for algae, crustaceans, and insects (Moyle et al. 2015).

Striped Bass

Striped Bass (*Morone saxatilis*) are pelagic, predatory fish species native to streams and bays of the Atlantic coast, and were introduced into the Sacramento-San Joaquin river valley in 1879, when 135 fish were successfully transplanted from the Navasink River in New Jersey (Moyle 2002). Bass are one of the largest and most abundant predatory fishes of the Delta, and opportunistically prey on both native and nonnative fish and invertebrate species. Striped Bass are estimated to live well over 30 years, with sexual maturity occurring between 4-6 of age for females, and 2-3 years for males. Spawning can begin as early as April as fish start moving into suitable areas, and peaks

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between May and June (Moyle 2002). Hatching occurs within a couple days of fertilization, and shortly thereafter, young of the year Striped Bass transport themselves downstream into the Delta, via freshwater flow, to rear and grow. Striped Bass are an economically and recreationally important species of the estuary, and were the impetus for the establishment of long-term management and monitoring efforts which have since become important tools for native fish species management within the estuary (Stevens 1977; Tempel et al. 2021).

Black Basses: Largemouth Bass, Smallmouth Bass, and Spotted Bass

Black basses (*Micropterus* spp.) are a suite of nonnative predatory fishes which were introduced into California for recreation purposes. Black basses are commonly found in the freshwater reaches of the Delta, as well as rivers and reservoirs of the Central Valley. Black bass species share many similar life history strategies while occupying different habitats (Moyle 2002).

- Largemouth Bass (*Micropterus salmoides*) typically inhabit warm, shallow waters of moderate clarity, with beds of aquatic plants. In the Delta, they can be found in sloughs and low flow backwaters which are typically inundated with aquatic vegetation and co-occur with other nonnative fish species, such as bluegill and brown bullhead catfish (Moyle 2002).
- Smallmouth Bass (*Micropterus dolomieu*) prefer large, clear lakes and rivers with ample cover and relatively cooler summer temperatures (20-27°C). In California, they are most abundant in riverine settings and often found in the Sacramento River reaches of the Delta, along the rocky substrate of armored levees (Moyle 2002).
- Spotted Bass (*Micropterus punctatus*) occupy more intermediate habitats which are typically too slow and turbid for Smallmouth Bass but too quick for Largemouth Bass (Moyle 2002).

Black basses typically spawn during the spring, as water temperatures begin increasing. Sexual maturity generally occurs between 2-4 years of age, but differs slightly among species. Black basses are opportunistic predatory fish and consume a variety of native and nonnative fish and invertebrate species.

American Shad

American Shad (*Alosa sapidissima*) are a large clupeid native to the Atlantic Coast from southeastern Canada south to central Florida. In the late 1800s, American Shad were planted in the Sacramento River and are now found along the Pacific Coast from Alaska to Mexico (Moyle 2002). In California, American Shad are found in large numbers in the Sacramento River up to Red Bluff and within the American, Feather, and Yuba rivers. There are smaller runs in the Mokelumne, Cosumnes, and Stanislaus rivers and in the Delta. Mature adults move into the lower estuary where they adjust to low salinities prior to entering freshwater between March and June (Moyle 2002). Spawning takes place in

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main channels of rivers in areas of sand and gravel substrate. Embryos suspend in water and drift downstream until they emerge after one or two weeks of development. Larvae are planktonic and cannot tolerate salinity until they metamorphose into swimming juveniles. Juveniles enter saline conditions between September and November. Some juveniles rear in the San Francisco Estuary for up to two years before migrating to the ocean (Moyle 2002). While in the estuary, juveniles forage on zooplankton as well as drifting invertebrates. Adults can feed while in freshwater and forage primarily on zooplankton, clams, and larval fish.

Threadfin Shad

Threadfin Shad (*Dorosoma petenense*) are a small, nonnative pelagic forage fish. Threadfin Shad typically inhabit open waters of reservoirs, lakes and large ponds as well as slower moving backwaters and sloughs of the Delta, and forage primarily on plankton. Threadfin Shad are a schooling species and are an important prey species for some of the larger Delta predators, such as Striped Bass. Threadfin Shad are typically sexually mature by age-2 with a life span between one to two years (Moyle 2002). Spawning occurs in the late spring as water temperatures begin to increase, starting in April and lasting through August, with a peak in June. Once deposited, embryos will generally hatch within 3-6 days and larvae assume a planktonic existence for 2-3 weeks (Moyle 2002). Threadfin Shad are one of the four species identified in the Pelagic Organism Decline within the Delta, and abundance sharply declined beginning in the early 2000's (Sommer et al. 2007).

Sacramento–San Joaquin Tule Perch

Sacramento-San Joaquin Tule Perch (*Hysterocarpus traski*) are the only freshwater surfperch found in low-elevation waters of the Central Valley and the Delta (CDFW 2011). Tule Perch have a high salinity tolerance (up to 30 ppt) and prefer water temperatures below 22°C (Moyle 2002). They primarily occupy deep pools with either aquatic cover or overhanging vegetation that can help maintain cooler water temperatures. Surf Perch are viviparous and give birth to live young in the spring and into the summer (CDFW 2011). Tule perch are benthic feeders, foraging on invertebrates, plants, and zooplankton found along the bottom of a stream.

Bay Shrimp

California Bay Shrimp (*Crangon franciscorum*) are a commercial crangonid found along the Pacific Coast from Puget Sound to southern California. They are the largest bay shrimp and are abundant in the San Francisco and San Pablo bays, Suisun Bay, and Suisun Marsh, and the western Delta in low salinity areas. California Bay Shrimp are adapted to estuarine life and can tolerate salinities ranging from 2.8 to 25.9 ppt (CDFG 2001). Within the San Francisco Estuary, females can live up to 2.5 years while males can live up to 1.5 years and can exhibit protandric hermaphroditism (CDFG 2001). Spawning in the summer occurs in the mouth of the estuary, whereas spawning in the winter and spring occurs in nearshore areas outside of the estuary. Juveniles distribute into shallow, low salinity waters and migrate into deeper, higher salinity waters as they

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grow larger (CDFG 2001). California Bay Shrimp are opportunistic feeders and forage on different prey as they grow. Smaller shrimp (less than 1.2 inches TL) feed on foraminifera, ostracods, and copepods; intermediate size shrimp feed on amphipods and bivalves; larger shrimp (greater than 2.4 inches TL) feed on bivalves, caridean shrimp, and polychaetes (CDFG 2001).

Starry Flounder

Starry Flounder (*Platichthys stellatus*) are one of very few flounders that can be found in freshwater. Their range extends along the coast of the Pacific Ocean from Alaska to the mouth of the Santa Ynez River in southern California (Moyle 2002). Starry Flounder are common in the San Francisco Estuary. Spawning occurs in near-shore habitats between September and March, peaking in December and January (Moyle 2002). Some spawning may take place in the San Francisco Bay. As larvae, Starry Flounder are pelagic and can be found in freshwater habitats (salinity less than 2 ppt) feeding on planktonic algae and planktonic crustaceans (Moyle 2002). The San Francisco Estuary provides suitable rearing habitat for juveniles prior to metamorphosis. After metamorphosis (between 39-75 days post-hatch), Starry Flounder settle in low gradient, sandy or muddy substrate and feed on bottom dwelling and drifting invertebrates (Moyle 2002).

3.4.1.5 Special-Status Terrestrial Species

A number of special-status wildlife and plant species occur in the North Delta Arc in habitats that are adjacent to the Project Site. Several of these species are listed as threatened or endangered under ESA and/or CESA. Tables 6 and 7 provide an overview of all special-status wildlife and plant species that have the potential to occur adjacent to waterways in the Project Area during the timeframe when experimental releases could occur each year (October – April).

A list of special-status species potentially present within the study area was generated by searching the California Native Plant Society’s (CNPS’s) Inventory of Rare and Endangered Plants of California (CNPS 2021) and conducting a RareFind 5/Biogeographic Information and Observation System (BIOS) query of the California Natural Diversity Database (CNDDB; CDFW 2021a). The USFWS Information for Planning and Consultation (IPaC) tool was used to generate a list of federally protected species with the potential to occur in the study area (USFWS 2021b). The search area was limited to include all contiguous aquatic habitat and margin habitat within 200 ft of aquatic habitat spanning from the upstream extent of the Sacramento Deep Water Shipping Channel to the downstream extent of the Suisun Marsh and Bay.

Table 6. Special-status wildlife species that have the potential to occur within the Project Area.

Common Name	Scientific Name	Status ¹ (Federal/State/CDFW)
Western bumble bee	<i>Bombus occidentalis</i>	–/SC/–

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Western pond turtle	<i>Actinemys marmorata</i>	–/–/SSC
Giant garter snake	<i>Thamnophis gigas</i>	FT/ST/–
Tricolored blackbird	<i>Agelaius tricolor</i>	BCC/ST/–
Tule greater white-fronted goose	<i>Anser albifrons elgasi</i>	–/–/SSC
Short-eared owl	<i>Asio flammeus</i>	BCC/–/SSC
Burrowing owl	<i>Athene cunicularia</i>	BCC/–/SSC
Swainson's hawk	<i>Buteo swainsoni</i>	–/ST/–
Yellow rail	<i>Coturnicops noveboracensis</i>	BCC/–/SSC
White-tailed kite	<i>Elanus leucurus</i>	–/–/FP
Willow flycatcher	<i>Empidonax traillii</i>	BCC/SE/–
American peregrine falcon	<i>Falco peregrinus anatum</i>	FD/SD/FP
Saltmarsh common yellowthroat	<i>Geothlypis trichas sinuosa</i>	BCC/–/SSC
Bald eagle	<i>Haliaeetus leucocephalus</i>	FD/SE/FP
Least bittern	<i>Ixobrychus exilis</i>	–/–/SSC
California black rail	<i>Laterallus jamaicensis coturniculus</i>	–/ST/FP
Song sparrow (Modesto population)	<i>Melospiza melodia</i>	–/–/SSC
Suisun song sparrow	<i>Melospiza melodia maxillaris</i>	–/–/SSC
Double-crested cormorant	<i>Phalacrocorax auritus</i>	–/–/WL
White-faced ibis	<i>Plegadis chihi</i>	–/–/WL
California Ridgway's rail	<i>Rallus obsoletus obsoletus</i>	FE/SE/FP
Bank swallow	<i>Riparia riparia</i>	–/ST/–
California least tern	<i>Sternula antillarum browni</i>	FE/SE/FP
Western red bat	<i>Lasiurus blossevillii</i>	–/–/SSC
Salt marsh harvest mouse	<i>Reithrodontomys raviventris</i>	FE/SE/FP
Suisun shrew	<i>Sorex ornatus sinuosus</i>	–/–/SSC

Source: CDFW 2021a & 2021b; USFWS 2021a & 2021b

¹ Status:

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Federal/USFWS:

FE Federally Endangered under the federal Endangered Species Act
 FT Federally Threatened under the federal Endangered Species Act
 BCC Bird Species of Conservation Concern by the U.S. Fish and Wildlife Service within California (regions 15, 32, or 33)
 FD Federally Delisted under the federal Endangered Species Act
 – No status

State/CDFW:

FP Fully Protected under the California Fish and Game Code
 SE State Endangered under the California Endangered Species Act
 ST State Threatened under the California Endangered Species Act
 SC Candidate Species under the California Endangered Species Act
 SSC Species of Special Concern by the California Department of Fish and Wildlife
 SD State Delisted under the California Endangered Species Act
 WL Watch List Species by the California Department of Fish and Wildlife
 – No status

Table 7. Special-status plant species that have the potential to occur within the Project Area.

Common Name	Scientific Name	Status ² (Federal/State/CRPR)
Big tarplant	<i>Blepharizonia plumosa</i>	–/–/1B.1
Lyngbye's sedge	<i>Carex lyngbyei</i>	–/–/2B.2
Pappose tarplant	<i>Centromadia parryi</i> ssp. <i>parryi</i>	–/–/1B.2
Soft salty bird's-beak	<i>Chloropyron molle</i> ssp. <i>molle</i>	FE/SR/1B.2
Bolander's water-hemlock	<i>Cicuta maculata</i> var. <i>bolanderi</i>	–/–/2B.1
Suisun thistle	<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	FE/–/1B.1
Mt. Diablo buckwheat	<i>Eriogonum truncatum</i>	–/–/1B.1
Jepson's coyote-thistle	<i>Eryngium jepsonii</i>	–/–/1B.2
Fragrant fritillary	<i>Fritillaria liliacea</i>	–/–/1B.2
Woolly rose-mallow	<i>Hibiscus lasiocarpus</i> var. <i>occidentalis</i>	–/–/1B.2
Carquinez goldenbush	<i>Isocoma arguta</i>	–/–/1B.1
Alkali-sink goldfields	<i>Lasthenia chrysanthra</i>	–/–/1B.1
Delta tule pea	<i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	–/–/1B.2
Heckard's pepper-grass	<i>Lepidium latipes</i> var. <i>heckardii</i>	–/–/1B.2
Mason's lilaeopsis	<i>Lilaeopsis masonii</i>	–/SR/1B.1

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Delta mudwort	<i>Limosella australis</i>	–/–/2B.1
California alkali grass	<i>Puccinellia simplex</i>	–/–/1B.2
Sanford's arrowhead	<i>Sagittaria sanfordii</i>	–/–/1B.2
Long-styled sand-spurrey	<i>Spergularia macrotheca</i> var. <i>longistyla</i>	–/–/1B.2
Suisun Marsh aster	<i>Symphyotrichum lentum</i>	–/–/1B.2
Saline clover	<i>Trifolium hydrophilum</i>	–/–/1B.2

Source: Calflora 2021; CDFW 2021a & 2021c; CNPS 2021; USFWS 2021b

Notes: CRPR = California Rare Plant Ranking

² Status:

Federal:

FE Federally Endangered under the federal Endangered Species Act
– No status

State:

SR State Rare under the California Native Plant Protection Act
– No status

CRPR:

1B Plant species considered rare, threatened, or endangered in California and elsewhere
2B Plant species considered rare, threatened, or endangered in California but more common elsewhere

Threat Ranks:

0.1 Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat)
0.2 Moderately threatened in California (20-80% occurrences threatened/moderate degree and immediacy of threat)

3.4.2 Discussion

a) and d): Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, or the National Marine Fisheries Service?

Or,

Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

3.4.2.1 Special-Status Fish Species

Historical data on the distribution of resident and migratory special-status fish species (Table 5) in the North Delta Arc indicate that a variety of life stages are likely to be

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present in the vicinity of the Proposed Project activities. However, in many cases they are unlikely to interact with Proposed Project activities due to the limited temporal extent of in-water activities each year and the very limited spatial extent of proposed activities within waterways. The Proposed Project includes transporting cultured Delta Smelt by trucks and boats and either directly releasing them into north Delta waterways or releasing them into temporarily installed enclosures, for subsequent release after an initial acclimation period. The incremental and short-term increase in boat traffic within the Project Area associated with approximately six releases per year is not expected to have an effect on special-status fish species. Similarly, the temporary nature and limited size of experimental enclosures are not expected to impact fish species because they will be small relative to the waterways in which they are placed, resulting in no impact to migratory, rearing, spawning, or foraging behaviors.

Our analysis identified several potential impacts to special-status fish species as a result of the proposed introduction of cultured Delta Smelt into waterways in the North Delta Arc, which we discuss in more detail below. The potential impacts identified include potential genetic changes in wild fish populations, introduction of pathogens or aquatic invasive species, competition between cultured Delta Smelt and wild Delta Smelt, and entrainment of cultured Delta Smelt into existing water diversions. The following subsections discuss each impact analyzed and the associated conclusions regarding the level of impact anticipated.

3.4.2.2 Potential Impacts as a Result of Genetic Changes in Wild Fish Populations

Genetic diversity allows a species to adapt and survive under changing environmental conditions. Species with low genetic diversity are at risk of not being able to respond to these changes, resulting in reduced reproduction rates or survival. Genetic fitness refers to the extent that an individual is able to produce offspring in its local environment. While many studies have been performed to understand the reduction of genetic diversity and genetic fitness in salmonid populations due to continuous hatchery supplementation, there is currently little understanding on the impact of a limited series of experimental releases over the course of three years on a native population of fish. Taking a conservative approach, we can apply what we understand from salmonid supplementation to the experimental release of cultured Delta Smelt to target potential areas of concern regarding both genetic diversity and genetic fitness within the wild Delta Smelt population. Potential genetic impacts on wild Delta Smelt and co-occurring species as a result of the proposed experimental releases include:

- *Inbreeding depression*, whereby the use of a small brood stock population increases the relative frequency of deleterious recessive genes in the hatchery population through the mating of close relatives.
- *Outbreeding depression*, whereby hatchery-raised fish interbreed with the native population, potentially resulting in progeny with a combination of hatchery selected and naturally selected traits which may or may not be suitable for the local environment.

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- *Hybridization and introgression*, whereby hatchery-raised individuals interbreed with closely related but separate species, bringing hatchery selected traits across species boundaries. Introgression occurs when hybridization events produce fertile offspring, and those hybrids continue to reproduce within their native population.
- *Loss of genetic diversity*, whereby multiple processes such as genetic drift, natural selection, and founder effects reduce the genetic diversity of a population, resulting in a reduced ability of that population to adapt to future change.
- *Domestication*, whereby traits that are advantageous in a hatchery operation (growth rate, age of maturity, etc.) are selected for in the hatchery, increasing their frequency in the hatchery population. These traits may or may not be advantageous in the wild.

The Delta Smelt acts as a single large population within the Bay-Delta (Trenham 1998, Fisch et al. 2011). Population size estimates conducted between 2008 and 2017 used wild smelt brought into the FCCL hatchery and showed a very large effective population size, meaning high levels of genetic diversity despite low census population estimates. Effective population sizes were indistinguishable from infinity due to limitations of the model (Finger et al. 2017, 2018). These two factors suggest that, although population decline has been sharp and rapid, the genetic diversity of the few remaining individuals is high.

3.4.2.3 Genetics Impact 1: Inbreeding Depression

Inbreeding depression, or the increase in deleterious recessive alleles in the hatchery population through the mating of close relatives, is always an issue in any hatchery operation. Currently, the FCCL utilizes rigorous genetic testing and brood pair selection protocols. As a part of these protocols the FCCL minimizes the potential for inbreeding depression by (1) genetically testing all potential brood stock using microsatellite loci, (2) combining these tools with detailed historic pedigrees on all past paired families, and (3) choosing the best male/female pairs with the lowest kinship (relatedness) when making brood pair choices. In addition, when available, the FCCL brings wild caught Delta Smelt into their breeding program, increasing the number of unrelated individuals in their hatchery and enhancing their ability make the best low kinship mate pairs. The current genetic testing and brood pair selection protocols at the FCCL are important tools that minimize potential impacts of inbreeding depression on the cultured and wild Delta Smelt populations. With continued implementation of the genetic testing and brood pair selection protocols used by the FCCL, the cultured fish used for the Proposed Project would not be a source of inbreeding depression and would avoid any potentially significant impacts to the wild Delta Smelt population. As a result, the potential impact to wild Delta Smelt as a result of inbreeding depression is considered less-than-significant.

3.4.2.4 Genetics Impact 2: Outbreeding Depression

Outbreeding depression occurs when two populations of the same species begin to

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interbreed, and genetic variants which were favorable in the home environment of one population are now disadvantageous in the new environment. This can happen in hatchery operations, as genetic variants that are advantageous in hatcheries may or may not be advantageous in the natural environment. When hatchery raised fish are released into wild populations and interbreed, the combination of hatchery selected genes and naturally selected genes may produce offspring with reduced genetic fitness in the population. As a result, without protocol to minimize differentiation between cultured and wild populations, introduction of a cultured population could adversely affect wild populations.

As described for Genetic Impact 1, the FCCL uses rigorous genetic testing and brood pair selection protocols to reduce the amount of inbreeding in the Delta Smelt hatchery. Additionally, the FCCL has been bringing new wild-caught Delta Smelt into the hatchery breeding operation for years to reduce the genetic difference between the hatchery population and the wild population. These efforts have been successful, genetic investigations into the difference between the hatchery and wild populations have revealed very little genetic differences between them (Finger et al. 2017, 2018). Because the FCCL has managed its captive population using genetic testing and brood pair choice protocols, as well as the long history of bringing wild Delta Smelt brood stock into the captive breeding population, the cultured Delta Smelt released as part of the Proposed Project would avoid any potentially significant impacts as a result of outbreeding depression on the wild Delta Smelt population, as evidenced by the published lack of difference between the hatchery and wild populations. As a result, potential impacts as a result of outbreeding depression on wild Delta Smelt are considered less-than-significant.

3.4.2.5 Genetics Impact 3: Hybridization and Introgression Between Cultured Delta Smelt, Wakasagi, and Longfin Smelt

Hybridization is the process of two species interbreeding, producing first generation progeny that are a combination of the two species genomes. If those progeny are infertile, long term genetic mixing between the two species cannot occur, as each hybrid is a reproductive “dead-end,” unable to contribute progeny to subsequent generations. Introgression, however, occurs when hybrid progeny are fertile and pass on their mixed genomes to their own progeny. This introgression occurs over multiple generations allowing gene flow to occur between the two hybridizing species.

Delta Smelt have been known to hybridize with two other osmerid species within the Bay-Delta, the Longfin Smelt (*Spirinchus thaleichthys*), and the introduced Wakasagi Smelt (*Hypomesus nipponensis*). However, levels of existing hybridization are low, and there is no observed introgression between the species (Fisch et al. 2014). The introduction of more cultured Delta Smelt into the existing population would not likely change the rate of hybridization between these three species, and it is unlikely to have longer-term impacts on the species complex as no introgression has been observed to date. The Proposed Project is expected to have a less-than-significant impact on the wild Longfin Smelt, Wakasagi Smelt, and Delta Smelt populations as a result of hybridization and introgression.

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3.4.2.6 Genetics Impact 4: Loss of Genetic Diversity

Loss of genetic diversity as a result of multiple processes such as genetic drift, natural selection, and founder effects could result in a reduced ability of cultured and wild Delta Smelt populations to adapt to future change. Through ongoing genetic testing and brood pair selection protocols the cultured Delta Smelt population is carefully managed (Gille et al, in prep) to have the largest effective population size possible. Through the long-term inclusion of wild-caught Delta Smelt into the brood stock and implementation of genetic testing and brood pair selection protocols, the current brood stock at the FCCL retains a high degree of genetic variation. Effective population size estimations remain large after several generations in the hatchery and genetic diversity within the hatchery has been maintained at levels close to that of the wild population (Finger et al. 2017, 2018). However, with limited numbers of wild brood stock available into the future, this level of diversity is expected to decrease over time, potentially increasing the frequency of any given allele (deleterious, advantageous, or neutral) within the cultured population to complete fixation. An allele is one of two or more versions of a gene (NIH 2021) and fixation of an allele in a population occurs when it is the only allele present at a locus. As a result, the Proposed Project could affect genetic diversity in wild Delta Smelt populations if interbreeding between cultured and wild fish occurs and genetic diversity in the cultured population is less than the wild population. However, the effect on fitness may be deleterious, advantageous, or neutral depending on the specific alleles that increase in frequency.

As the wild population census size declines, the effective population size (a measure of genetic diversity) of the wild population will also begin to decline. This is called a “genetic bottleneck,” when a rapid decline in population census numbers reduces the overall genetic diversity of that population through increased inbreeding. Due to extremely small census population size estimates, the wild population is expected to go through a substantial genetic bottleneck, making random genetic drift and a rapid reduction in genetic diversity inevitable unless census population sizes increase. Experimental release has the possibility of increasing census population sizes, and effective population sizes, thus delaying the impacts of an expected overall long-term trajectory of decline in genetic diversity wild Delta Smelt. As a result, the effect of the Proposed Project on wild Delta Smelt genetic diversity may be positive, slowing the expected decline in the long-term genetic diversity of Delta Smelt. Without the influx of genetic diversity from the proposed experimental releases, the wild Delta Smelt population could more rapidly become less genetically diverse and inbred as a natural consequence of the reduced population size. At present, it is generally understood that the cultured and wild population levels of genetic diversity are equivalent.

Experimental release would be subject to monitoring that is expected to inform our understanding of the potential benefits, or impacts, of releasing cultured Delta Smelt into the wild. To inform experimental release of cultured fish and have a benchmark measurement for all fish released into the Bay-Delta, the Proposed Project would characterize the population of experimentally released Delta Smelt with the genetic tools available. This information will be a vital comparator for future genetic characterization of the wild Delta Smelt population and will allow researchers to

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understand and minimize potential genetic impacts of experimental release on future generations of Delta Smelt through ongoing brood pair selection and genetic management protocols at the FCCL.

In summary, genetic diversity is likely to decline in the cultured Delta Smelt populations as a result of reduced brood stock collections. Reductions in census population sizes in the wild Delta Smelt population are expected to result in reduced effective population size and genetic diversity over time. If genetic diversity in the cultured population is lower than the wild population the Proposed Project, and wild and cultured fish interbreed, the Proposed Project could impact genetic diversity in the wild population. However, the Proposed Project has the potential to benefit genetic diversity in the wild Delta Smelt Population by increasing the census population size of Delta Smelt in the wild and thus reducing the chance or magnitude of a genetic bottleneck. As a part of the Proposed Project, genetic diversity would be assessed in both the cultured fish population and among all Delta Smelt caught in ongoing monitoring programs. With ongoing implementation of the genetic testing and brood pair choice protocols used by the FCCL and the new genetic monitoring of experimentally released fish proposed as a part of the Proposed Project, the Project would avoid and/or minimize potentially significant impacts to the wild Delta Smelt population. The Proposed Project is expected to have a less-than-significant effect on wild Delta Smelt as a result of loss of genetic diversity.

3.4.2.7 Genetics Impact 5: Domestication of Cultured Delta Smelt

The current brood stock at the FCCL has shown some degree of domestication selection after only nine generations in the hatchery, where the number of offspring produced from crosses made from hatchery parents is much higher than that of crosses made with a wild parent (Finger et al. 2018). Domestication index is an additive measurement that quantifies the length of time (in number of generations) that the genome of an individual fish has spent in the hatchery (Ivy and Lacy 2012). Fish with a higher domestication index (their genome has had a longer time in the hatchery) have higher relative reproductive success than wild fish when measured in the hatchery, though the causal mechanism of this phenomenon remains unknown. These assessments of reproductive success were conducted in hatchery conditions, not the wild. It is unknown how, or even if, these hatchery-selected traits will change the performance of cultured fish released in the wild. Current studies are underway looking at the performance of cultured Delta Smelt in cages in the field using both low and high domestication index fish (Gille et al. *in prep*, Baerwald et al. *in prep*), as well as genomic and transcriptomic studies attempting to understand the underlying genomic causes of the observed hatchery traits.

The FCCL uses genetic testing and brood pair selection protocol to minimize the level of domestication within the captive population. As a part of these protocol the domestication index of each cross at the FCCL is calculated; the higher amount of hatchery ancestors in a parent, the higher the domestication index of that specific cross. The FCCL, in partnership with the GVL, takes this into account when the FCCL establishes brood pairs and make crosses. The long-term genetic testing and brood pair selection process minimizes the overall domestication index for any crosses in order to reduce any potential domestication selection that may occur (Gille et al. *in prep*).

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The FCCL and GVL continue to conduct crosses with the lowest domestication index possible, using their genetic testing and brood pair selection protocols with available brood stock. However, there are fewer and fewer wild stock being brought into the FCCL each year. As such, the current management of domestication is the best that can be done considering the very low abundance of wild Delta Smelt. Beginning experimental release promptly, before several successive years of very little to no available wild brood stock, means that the source population will have a lower domestication index than may occur in the future, minimizing the potential impacts of domestication selection from the released Delta Smelt on wild Delta Smelt. With continued implementation of the genetic testing and brood pair choice protocols, as well as the long prior history of bringing wild Delta Smelt brood stock into the captive breeding population, the Proposed Project would avoid any potentially significant impacts as a result of domestication selection on the wild Delta Smelt population. Potential impacts on wild Delta Smelt as a result of domestication in cultured Delta Smelt are expected to be less-than-significant.

3.4.2.8 Potential Impacts as a Result of Introduction of Novel Pathogens or Aquatic Invasive Species

During any systematic ongoing or single event fish release activity, aquatic pathogens and/or aquatic invasive species may inadvertently be introduced into native ecosystems. These impacts are of greatest concern when the transfers occur between watersheds and entail the introduction of invasive species or pathogens to which native fish and amphibian populations are highly susceptible (Pacific Northwest Fish Health Protection Committee 1989).

It is hypothesized that fish have a certain level of resistance to diseases with which they have coevolved. Therefore, the greatest risk of pathogen transfer occurs between watersheds, either when hatchery-raised fish are transported to distant release waters or through the transportation of eggs between hatcheries (Chen 1984; Pacific Northwest Fish Health Protection Committee 1989; Hulbert 1996). Chen (1984), for example, suggested that there are several strains of the IHN virus, and that salmonid juveniles often lack resistance to the non-endemic strains. Additionally, it is hypothesized that the brown trout's resistance to whirling disease is the result of co-evolution with the disease parasite over many generations in Northern Europe, far longer than whirling disease has been present in North American rainbow and cutthroat fisheries. This observation is strengthened by the discovery that a rainbow trout strain in Germany (the "Hofer" strain), transferred from Colorado in 1903 and raised in whirling disease-positive waters for close to a century, has equal or better resistance to whirling disease than brown trout (Hedrick et al. 2003, Schisler et al. 2006).

In the United States, there are varied examples of inadvertently stocking diseased fish into the wild, with subsequent spread of disease within wild fish populations. One well known example of this is the spread of whirling disease throughout the western United States, which has been largely attributed to fish stocking practices. For instance, in 2008, a routine import inspection by a pathologist from the CDFW Fish Health Lab detected spores of *Myxobolus cerebralis* (the causative agent of whirling disease) in fish

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showing no obvious signs of disease that were being delivered from a hatchery in Idaho under a private stocking program in a southern California lake. Such incidents are rare because CDFW requires all shipments of fish entering the state to be planted into waters of the state to be from facilities certified as disease free by a certified laboratory, but the impact of a single disease introduction could be substantial.

Both ongoing and single event release activities also have the potential to spread invasive species. Once established within waters of the state, invasive species threaten the diversity, abundance, and stability of native ecosystems and sensitive native species.

The dissemination of aquatic pathogens and invasive species during the proposed experimental release of Delta Smelt has been evaluated for its potential to result the following impacts on native fish or wildlife:

- Introducing/spreading pathogens into native fish populations
- Introducing/spreading pathogens into native amphibian populations (Discussed in Wildlife section below)
- Introducing invasive species into native ecosystems

3.4.2.9 Fish Pathology Impact 1: Introducing Pathogens to Native Fish Populations

CDFW maintains a comprehensive fish health monitoring program utilizing a professional staff of pathologists and veterinarians. CDFW Fish Health Lab pathologists conduct diagnostic examinations and health inspections of hatchery produced trout and salmon at the Department's fish hatcheries, at private registered aquaculture facilities, of imported fishes, and at any additional wild trout and salmon egg collecting stations. CDFW Fish Health Lab pathologists perform examinations for bacteria, viruses, fungi, protozoa, other parasites, and non-infectious diseases using a variety of laboratory techniques. Diagnostic procedures for pathogen detection follow American Fisheries Society professional standards as described by the American Fisheries Society Fish Health Section Bluebook (2020). Knowledge of pathogens and diseases allows for the accurate and rapid diagnosis and appropriate treatment of fish in hatcheries, with the goal of quickly addressing disease problems in order to maximize the health of released fish. Through the hatchery fish health program CDFW attempts to minimize potential negative health impacts on managed species.

Following the listing of Delta Smelt under ESA and CESA, CDFW identified the need for scientific research to support creation of a refuge population of Delta Smelt and for refining hatchery and production techniques (CDFG 1993). Intensive fish culture techniques were initiated and funded by DWR and USFWS in 1993. Since 2007 Delta Smelt have been collected in the Delta and transported to the FCCL in Byron to use as brood stock for genetic management of the refugial population. The water supply for the FCCL is the same Delta water from which captured Delta Smelt brood stock were sourced. Since 2015 the only other fish that have been held at the FCCL are Longfin Smelt that were also collected from the Bay-Delta (T. Hung pers comm.).

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According to a recent health evaluation of the fish at the FCCL (Appendix 3), cultured Delta Smelt have a similar frequency of pathogen prevalence as wild Delta Smelt. Beginning in 2005, the USFWS Fish Health Center has assayed over 1,500 Delta Smelt for viral and bacterial pathogens and has found no significant occurrence of any pathogen other than *Mycobacteria sp.*, which is present at similar levels inside the FCCL hatchery operation and in the wild Delta Smelt sampled.

Recently, a survey of potential salmonid pathogens was performed on Delta Smelt collected from the FCCL, cultured Delta Smelt used in a caged exposure experiment at Rio Vista (Gille et al. *in prep*, Baerwald et al. *in prep*), and several historically preserved Delta Smelt specimens throughout the range of occurrence (Gille et al. *in prep*). Using DNA assays, the researchers found the presence of *Ichthyophthirius multifiliis* (Ich) DNA on gill tissue sampled from cultured fish at the FCCL. *Ichthyophthirius multifiliis* is an endemic organism in delta waters and its presence does not mean that the tested population is diseased. It is an opportunistic pathogen and only causes disease when environmental conditions allow. No significant finding was made in the archived or caged fish groups with this survey. The prevalence of Ich DNA in this study may have been due to the experimental design, where FCCL mortalities were sampled rather than healthy fish. Ich infections are opportunistic in nature and more likely to infect already stressed or dying fish and when environmental conditions like elevated water temperatures allow. In contrast, live fish from the FCCL were placed in experimental enclosures at Rio Vista as a part of ongoing research by DWR, and no Ich infections were detected among fish in these experiments. As a result, the salmonid pathogen assay provides a conservative assessment of potential pathogens among Delta Smelt at the FCCL.

In order to ensure no significant source of pathogens are being released as a result of the Proposed Project, the USFWS and CDFW will conduct the following monitoring protocols which are also described in Appendix 3:

- Prior to the release, Delta Smelt mortalities associated with the marking action in the FCCL will be sampled for pathogen infection status. Planned experimental release will be halted if any viral agent or “significant pathogen” is isolated from the population of mortalities.
- During the 45 days prior to the experimental release, the FCCL will immediately notify the USFWS FHC if a 3-day cumulative mortality of >2.0% occurs within a rearing unit population of cultured Delta Smelt destined for release. This will trigger a diagnostic by the FHC to determine the cause of mortality, and the release will be suspended if a “significant pathogen” is detected. It will also be suspended if the chronic mortality continues without diagnosis of cause.

As a result of long-term assessments of fish health status at the FCCL by the USFWS FHC, recent assays of cultured fish used in experimental enclosure studies by DWR (Gille et al. *in prep*, Baerwald et al. *in prep*), and implementation of a fish health protocol by USFWS and CDFW (Appendix 3), the Proposed Project is not likely to result in the introduction of a new pathogen to the existing fish community. The Proposed Project is expected to have no effect on wild Delta Smelt and other native fish species populations as a result of introduction of pathogens.

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3.4.2.10 Fish Pathology Impact 2: Introducing Aquatic Invasive Species into Native Ecosystems

The CDFW aquatic invasive species management plan (CDFG 2008) identifies the accidental transport of invasive species through stock enhancement as a primary vector for invasive species introduction. Early detection of invasive species in hatchery waters is critical, therefore, to prevent their unintended distribution.

The FCCL currently operates in an open-loop system connected with waters and organisms already existing within the Bay-Delta. Water from the Delta is brought in to the FCCL, filtered, used in the culture and reproduction of Delta Smelt, then filtered again, and returned to the Delta. Along with pathogens, any organisms already present within the Delta are likely to exist within the FCCL hatchery operation, and therefore make up the list of species potentially reintroduced back into the Delta as a result of the planned experimental release operation. No new introduced species or potentially invasive species are involved on either side of the operation. As a result, the Proposed Project is expected to have no effect as a result of introduction of aquatic invasive species in the Bay-Delta.

3.4.2.11 Competition Between Experimentally Released Cultured Delta Smelt and Wild Delta Smelt

Competition is an interaction between individuals, brought about by a shared requirement for a resource in limited supply which leads to a reduction in survivorship, growth and/or reproduction of at least some of the competing individuals (Begon, Harper, Townsend 1986). The release of cultured Delta Smelt into habitats within the North Delta Arc, across Suisun Marsh and the northern Delta has been evaluated for any potential impacts between cultured Delta Smelt and wild Delta Smelt including competition for food resources, competition for spawning habitat, and apparent competition.

3.4.2.12 Competition Impact 1: Competition for Food Resources

The Sacramento-San Joaquin Delta has been characterized as a food limited environment for pelagic forage fishes and food availability has been identified as a key factor limiting the recovery of Delta Smelt (Sommer et al. 2007, Mac Nally et al. 2010, Moyle et al. 2016, Hamilton et al. 2018). Delta Smelt are zooplanktivores, consuming pelagic prey, and exhibiting selectivity for calanoid copepods (Lott 1998, Nobriga 2002, Slater and Baxter 2014). However, cultured Delta Smelt are transitioned to a dry feed soon after the larval life stage is completed (Lindberg et al. 2013) and are fed ad-libitum within the FCCL. Cultured Delta Smelt are also reared in optimal conditions, free of predators and other stressors wild Delta Smelt encounter. In such low-risk settings, cultured Delta Smelt need to only compete with other tank mates for resources which are plentiful. These optimal rearing conditions likely train cultured Delta Smelt to feed differently than their wild counter parts, leading to uncertainty regarding their ability to compete for limited prey in the wild.

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Aquaculture techniques are known to promote behaviors that differ from wild fish. For example, hatchery reared Atlantic Salmon have been shown to exhibit bolder, non-risk averse behaviors as compared to the less aggressive, risk-averse fish in the wild (Huntingford and Adams 2005). Because of these learned behaviors in aquaculture, cultured fish could have a foraging advantage over wild fish, indicating that cultured Delta Smelt could generally be more competitive for food resources than wild Delta Smelt. Recent studies show that cultured Delta Smelt are able to switch to wild prey when provided opportunities to feed in cages (Baerwald et al 2019) held within the Delta and in flow-through tanks at the FCCL (Hung et al 2019). Therefore, cultured Delta Smelt released into the Delta are not only expected to acquire wild prey soon after release, but could also have a foraging advantage over the remaining wild Delta Smelt, due to learned behaviors in the aquaculture setting.

Zooplankton densities tend to be greater in the freshwater portions of the Delta, while feeding success is greater in the regions with low-salinity conditions in the fall and winter months (Hammock et al. 2017). This discrepancy has been largely attributed to the differences in turbidity between freshwater and the low-salinity zone (Hammock et al. 2015, 2017). Competition for limited prey resources between cultured and wild Delta Smelt may be minimized by careful assessment of prey density and turbidity throughout the freshwater and low-salinity regions of the North Delta Arc prior to release. The Proposed Project will include such prey density and turbidity assessments prior to releases to target release sites with greater prey densities and lower potential for competition. The Proposed Project is expected to have a less-than-significant impact on the wild Delta Smelt populations as a result of competition for food resources because pre-release surveys of prey density and turbidity will be used to inform the location and timing of release events.

3.4.2.13 Competition Impact 2: Competition for Spawning Habitat

Cultured Delta Smelt released into the North Delta Arc are expected to survive and reproduce, potentially mating with wild Delta Smelt. While little is known regarding mate-choice in Delta Smelt, they do appear to be polygynous and polyandrous (LaCava et al. 2015). This method of mate selection would be conducive to inter-breeding between hatchery and wild fish, as little mate specificity is made. For example, Delta Smelt spawning in culture have been observed to form multiple mating pairs aggregating and making movements to the bottom of tanks to deposit and fertilize adhesive eggs (Tsai et al. 2021). Studies conducted in laboratory conditions have shown that hatchery-wild fish crosses have poor fitness, contributing very few offspring in multi-family matings (Finger et al. 2018), suggesting inter-breeding between cultured and wild Delta Smelt may be deleterious to the wild population. However, it is also possible that inter-breeding between cultured and wild Delta Smelt may provide an important benefit to the wild Delta Smelt population by increasing the effective population size and reducing the potential for a “population bottleneck” (see analysis of Genetics Impact #4).

Delta Smelt have been hypothesized to spawn along sandy shores around the confluence of the Sacramento and San Joaquin Rivers (Bennett 2005); however, spawning in the wild has not been observed. Meanwhile, cultured Delta Smelt exhibited

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selection for spawning habitat substrates consisting of coarse sand (250-500 μm) and pebbles (2.9-cm L x 1.8 cm W x 1.3 cm H) in moderate velocity habitats (8.8 – 15.4 cm/s) (Lindberg et al. 2020). While this habitat type has yet to be identified and mapped in detail, shallow sub-tidal habitats which would consist of comparable substrates in the freshwater reaches of the Delta have been overrun by invasive aquatic weeds (Hester, et al. 2016, Ta et al. 2017, Ustin et al. 2019), potentially limiting the availability of spawning habitat for Delta Smelt. Delta Smelt have also been suggested to spawn in Suisun Marsh (Polansky et al. 2018, Hobbs et al. 2019) where invasive aquatic vegetation has yet to dominate the shallow sandy shores near Nurse Slough, likely due to seasonally high salinity.

Release of cultured Delta Smelt may lead to limitation of the remaining available spawning habitat for wild Delta Smelt. The distribution and abundance of Delta Smelt spawning habitat is unknown within the Project Area and there are no detailed maps available of potential spawning habitat substrates. However, the broad range of release locations, including likely releases in the Suisun Marsh where spawning habitat may be more abundant, is expected to prevent releases of cultured fish from overwhelming spawning locations. It is also possible that attempts to entirely limit overlap in spawning locations between cultured and wild fish would diminish a potential benefit of this Proposed Project as a result of positive population outcomes if interbreeding between cultured and wild Delta Smelt occurs (see analysis of Genetics Impact #4). Consequently, the Proposed Project is expected to have a less-than-significant impact on wild Delta Smelt as a result of competition for potentially limiting spawning habitat because experimental releases will occur across a broad geographic area, and some of the cultured Delta Smelt will be released in Suisun Marsh where spawning habitat may be more abundant.

3.4.2.14 Competition Impact 3: Apparent Competition

Apparent competition is defined as an interaction in which two or more organisms have adverse effects on one another by virtue of the beneficial effects that each has on a predatory organism which they share (Begon, Harper, Townsend 1986). In this case, experimental release of cultured Delta Smelt will lead to higher densities of Delta Smelt (cultured and wild) for some time post-release, which will attract predators that would have otherwise not targeted wild Delta Smelt due their low densities (Nobriga et al. 2020). Piscivorous fishes (e.g. Striped Bass) are more likely to target prey species as a function of species density, with greater densities eliciting aggressive behaviors and attracting more predators (Essington and Hansson 2004). Furthermore, cultured Delta Smelt have not been exposed to predators and are likely to not have well developed predator avoidance behaviors. Relatively large schools of cultured Delta Smelt could attract more predators to an area, and as a result, may result in increased predation on wild Delta Smelt, if nearby.

Assessments of the piscivore community will be conducted prior to, during, and after indirect release events and predator abundance will be included as a factor to inform release location site choice. Additionally, the use of direct release strategies is expected to minimize interactions between cultured Delta Smelt and predators by minimizing

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predator attraction during acclimation periods that could occur through the use of indirect release acclimation periods. As a result of these protocols, the Proposed Project will have a less-than-significant impact on wild Delta Smelt as a result of apparent competition associated with predators.

3.4.2.15 Entrainment of cultured Delta Smelt into water diversion facilities in the Delta

All life stages of Delta Smelt are known to be vulnerable to entrainment in water diversion facilities within the Delta, such as SWP facilities including Clifton Court Forebay (CCF) in the south Delta and the Barker Slough Pumping Plant (BSPP), CVP facilities including the Jones Pumping Plant, and other water diversion facilities (Eakin et al. 2020, Grimaldo et al. 2009, and USFWS 2019). Entrainment of fish occurs when they are transported along with flow out of their normal habitat into unnatural or harmful environments, in this case water diversions. It is possible that cultured Delta Smelt released as a part of the Proposed Project could be entrained into water diversion facilities in the Delta.

However, entrainment of cultured Delta Smelt released as part of the Proposed Project is not expected to result in a significant impact on the environment in light of the analyzed thresholds of significance and any change to the existing environment caused directly or indirectly by the Proposed Project. The cultured Delta Smelt that would be released as a part of the Proposed Project would otherwise be euthanized to maintain space at the FCCL needed to produce subsequent generations of fish for the refugial populations at FCCL and LSNFH and to conduct ongoing experiments. Therefore, these fish would not have existed or persisted in the environment in the absence of the Proposed Project, and their potential entrainment as an indirect result of being released would not result in an adverse change to environmental conditions existing prior to the release. Once released, the cultured Delta Smelt will be subject to numerous environmental and habitat conditions that could affect their survival or spawning success, including predation and hydrologic conditions.

Further, CEQA's consideration of significant environmental effects does not encompass the environment's effects on the Project, including effects of existing hazards such as water diversions. And, the Proposed Project includes no changes to existing diversion facilities and therefore does not exacerbate the risk of entrainment of wild-born Delta Smelt or other fish existing in the Project Area.

3.4.2.16 Special-Status Wildlife Species

Historical data on the distribution of resident and migratory special-status wildlife species (Table 6) in the North Delta Arc indicate that a variety of life stages are likely to be present in the vicinity of the Proposed Project's activities. However, in many cases they are unlikely to interact with Proposed Project activities due to the limited temporal extent of activities each year and the limited spatial extent of activities within waterways. The Proposed Project includes transporting cultured Delta Smelt by trucks and boats to either directly release them into waterways within the North Delta Arc or releasing them into temporarily installed enclosures, for subsequent release after an initial acclimation

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period. The small incremental increase in truck and boat traffic within the Project Area is not expected to have an effect on special-status wildlife species. Similarly, the temporary nature and small size of experimental enclosures are not expected to impact nearby wildlife species because they will be small in size relative to the waterways in which they are placed, resulting in no impact to migratory or other behaviors. Additionally, the Proposed Project includes a commitment to avoid all ground disturbing activities, which is expected to contribute to avoiding potential impacts on special-status wildlife species within the Project Area.

Our analysis identified one potential impact to special-status wildlife species as a result of the potential introduction of novel pathogens into native amphibian populations when cultured Delta Smelt are released into waterways, which we discuss in more detail below.

3.4.2.17 Wildlife Pathology Impact 1: Introducing Pathogens to Native Amphibian Populations

Experimental and genetic evidence has shown that the transfer of the amphibian pathogens *Ranavirus* sp. and *Saprolegnia ferax* between fish and amphibians occurs, and that these amphibian pathogens are transferred during salmon and trout stocking practices (Mao et al. 1999; Kiesecker et al. 2001). Work conducted by Kiesecker (2001) showed that hatchery reared rainbow trout served as potential vectors for *Saprolegnia ferax*, a water-borne fungus that can cause embryonic mortality of amphibians. In these studies, mortality induced by *Saprolegnia ferax* was greater in western toad (*Bufo boreas*) embryos exposed directly to hatchery-reared rainbow trout (*Oncorhynchus mykiss*) experimentally infected with *S. ferax* and hatchery-reared trout not experimentally infected, than in control embryos. In addition, the potential for fish to carry *Batrachochytrium dendrobatidis*, a fungal disease that has devastated amphibian populations around the world, is an area of current investigation (Rachowicz et al. 2006).

Ranaviruses (genus *Ranavirus*, family Iridoviridae) comprise another important group of amphibian pathogens. These viruses are known to infect amphibians, reptiles, and fish, in which they are often highly virulent. Transmission studies have shown that some ranaviruses can cross animal orders, or even classes, while others appear to be more species-specific (Daszak et al. 2003). Further evidence of the potential for transmission of pathogens between fish and amphibians was shown by Mao et al. (1999) who isolated identical iridoviruses from wild sympatric fish and amphibians.

It is always important to consider cross-species impacts when performing any hatchery-raised fish release operations. These considerations are critical when fish are released into a *novel* environment. However, no new amphibian pathogens are likely to be introduced into the Bay-Delta as a result of the Proposed Project, as the wild brood stock were all collected from the Delta, and the FCCL itself operates using Delta water as a supply for its operation. Any crossover or carrier events between Delta Smelt and amphibian pathogens are already occurring in the Delta, and this experimental release will not exacerbate an existing interaction, if any exists. As a result, the Proposed Project is expected to have no effect on native amphibian populations due to introduction of pathogens.

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3.4.2.18 Special-Status Plant Species

Historical data on the distribution of special-status plant species (Table 7) in the Project Area indicate that several species are likely to be present in the vicinity of the Proposed Project activities. However, in many cases they are unlikely to occur at individual release sites or interact with Project activities due to the limited temporal extent of in-water activities each year and the very limited spatial extent of proposed activities within waterways. The Proposed Project includes transporting cultured Delta Smelt by trucks and boats, then either directly releasing them into north Delta waterways or releasing them into temporarily installed enclosures, for subsequent release after an initial acclimation period. The small incremental increase in truck and boat traffic within Project Area is not expected to have an effect on special-status plant species. Additionally, the Proposed Project includes a commitment to avoid all ground disturbing activities, which is expected to avoid potential impacts on special-status plant species within the Project Area.

3.4.2.19 Cumulative Impacts

Wild Delta Smelt abundance has been in sharp decline for many years, and at historic lows following drought conditions in 2015. The Proposed Project's experimental release of cultured Delta Smelt into the North Delta Arc is not expected to make a cumulatively considerable incremental contribution to cumulative impacts on the wild Delta Smelt population. As discussed in the subsections above within the Biological Resources Section, the Proposed Project would have either no impact or a less-than-significant impact on the wild Delta Smelt population as a result of potential introduction of pathogens, competition with cultured Delta Smelt, and genetic changes as a result of interbreeding between wild and cultured Delta Smelt. It is also possible that the Proposed Project would have a benefit to wild Delta Smelt populations through increased effective population size and reduced risk of population bottlenecks. The Project Description references other ongoing work with cultured Delta Smelt. Specifically, the FCCL has been conducting ongoing work to refine production, transportation, and acclimation measures for cultured Delta Smelt as well as developing protocol to physically mark cultured fish. DWR also initiated an experimental enclosure research program in 2018 that uses cultured fish to better understand Delta Smelt response to habitat attributes in the field and conduct research and development for experimental enclosure technology. Both the FCCL and DWR's ongoing work with cultured fish has been, and is expected to continue to be, conducted using cultured fish that would otherwise be euthanized to maintain space for annual production and the refuge population at the FCCL. Other known stressors for the wild Delta Smelt population include predation, entrainment into water diversions, contaminants, limited food availability, water temperature, and limited spatial and temporal distribution of suitable habitat. When considered together with these related past, present, and reasonably foreseeable future projects, there is no indication based on the foregoing analysis that the Proposed Project would result in any cumulatively considerable impact or that would compound or increase the cumulative harm to Delta Smelt.

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- b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?**

The Proposed Project involves a small incremental increase in truck traffic on existing roads and boat traffic in North Delta Arc waterways. It includes a commitment to avoid all ground disturbance. As a result, the Proposed Project is expected to have no impact on riparian or other sensitive natural communities identified by local or regional plans, policies, or regulations.

- c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?**

The Proposed Project involves a small incremental increase in truck traffic on existing roads and boat traffic in North Delta Arc waterways. It includes a commitment to avoid all ground disturbance. As a result, the Proposed Project is expected to have no effect on federally protected wetlands as defined by Section 404 of the Clean Water Act. No impact would occur.

- e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?**

The Proposed Project is not expected to have an effect on local policies or ordinances protecting biological resources, such as tree preservation. No impact would occur.

- f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?**

The Proposed Project would not conflict with the provisions of any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. No impact would occur.

3.5 CULTURAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
V. Cultural Resources. Would the project:				

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a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

3.5.1 Environmental Setting

The Proposed Project does not propose to, directly or indirectly, demolish, destroy, relocate, or alter any structures, historical or otherwise, nor does it involve any ground disturbance. The Proposed Project would be restricted to utilizing existing paved roads, boat traffic lanes, and marinas for access to release locations in the brackish water environment. Disturbance to substrates within the aquatic environment for temporary anchoring of release equipment would be negligible at any single release location. Additionally, natural sediment transport processes throughout the Project Site create instability in the bottoms of wetlands and riverbeds at the depths which release enclosures and monitoring equipment would be anchored. It is highly unlikely that human remains would be fixed in location at any one place or time that would be influenced by the Proposed Project activities that are also transitory in nature.

3.5.2 Discussion

- a) *No impact.* The Project as proposed would not cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5.
- b) *No impact.* The Project as proposed would not cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.
- c) *No impact.* The Project as proposed would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.
- d) *No impact.* It is highly unlikely that the Project as proposed would disturb any human remains, including those interred outside of dedicated cemeteries. Section 7050.5 of the California Health and Safety Code dictates that in the event any human remains are recognized or found during Project activities they shall be reported to the proper official(s) and there shall be no further excavation or disturbance of the site, or any nearby area reasonably suspected to overlie adjacent remains.

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3.6 ENERGY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VI. Energy. Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☐	☒
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

3.6.1 Environmental Setting

The extent of energy resources used for the Project would be from hatchery trucks and boats utilizing fuels obtained from existing infrastructure that are already covered in the Air Quality section and Greenhouse Gas section, no measurable increase in either fossil fuel use or electricity use would result from Project implementation.

3.6.2 Discussion

- a) *No impact.* As discussed in prior sections, the Project does not involve any construction or earth moving activities. The Project would be using existing infrastructure and equipment already owned by CDFW and other cooperating agencies including the USFWS and DWR, to carry out the proposed Project activities.
- b) *No impact.* Each of the Project's proposed experimental release events would be completed in a short amount of time and would not require local energy use nor have any impact or conflict with local energy plans.

3.7 GEOLOGY AND SOILS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VI. Geology and Soils. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				

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i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

3.7.1 Environmental Setting

The Proposed Project does not include any surface ground disturbance or other activity that would result in disturbance to the soils or geology throughout the Project Area. Anchoring of release enclosures and monitoring equipment would occur temporarily and at depths that would only cause negligible disturbance at superficial depths of waterway beds or bottoms within the aquatic environment. No impacts would occur under any of the significance criteria under this resource area.

3.7.2 Discussion

- a) *No Impact.* The Project would not result in any new construction or placement of infrastructure that would expose people or structures to potential substantial adverse geologic effects such as the rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, or landslides.

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- b) *No Impact.* The Project would not result in substantial soil erosion or the loss of topsoil.
- c) *No Impact.* The Project could not potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.
- d) *No Impact.* The Project would not create substantial risks to life or property.
- e) *No Impact.* The Project does not propose to install septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water.

3.8 GREENHOUSE GAS EMISSIONS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VII. Greenhouse Gas Emissions. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

3.8.1 Environmental Setting

3.8.1.1 Greenhouse Gases

Certain gases in Earth's atmosphere naturally trap solar energy to maintain global average temperatures within a range suitable for terrestrial life. Those gases – which primarily include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride – act as a greenhouse on a global scale (Health and Safety Code, § 38505(g).) Thus, those heat-trapping gases are known as greenhouse gases (GHGs). The Legislature defined “greenhouse gases” to include the six gases mentioned above in California's Global Warming Solutions Act (Health & Safety Code, § 38500 et seq.). Similarly, the U.S. EPA has proposed regulation of those same six gases under the authority of the Clean Air Act.

3.8.1.2 Climate Change and Sea Level Rise

Greenhouse gases are considered a potential cause of climate change. One of the effects that climate change models project for California is a sea level rise of from 17 to 66 inches by 2100. However, the proposed Project is interim in nature and consists of

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multiple discrete release events that would last a maximum of three weeks at any one point and time.

3.8.2 Discussion

- a) *Less-than-Significant.* The Proposed Project would emit GHGs through the use of fuel to operate equipment such as transport trucks and boats. The Project would operate well below the significance thresholds and screening criteria established by the BAAQMD, SMAQMD and YSAMQD CEQA Guidelines for GHG emissions (see Section 3.3). Based on the traffic analysis conducted for the Proposed Project, it would generate up to 16 additional vehicle trips per release event of vehicles weighing up to $\frac{1}{2}$ - $1\frac{1}{4}$ tons and additional boat trips by up to seven small vessels (26 ft or under boats) and one large vessel (42 ft boat) would occur during each release event for the next three years. Based on the short duration and small scale of the activities, the Proposed Project would not generate a significant increase in GHG emissions above existing baseline levels, because the actions are discrete, limited in scope, and implemented during a short time period. It is extremely unlikely that the Proposed Project would exceed any district's GHG thresholds.
- b) *No impact.* Given the very low level of greenhouse gas emissions of the Proposed Project and its temporary timelines, the Proposed Project would not conflict with or obstruct implementation of an air quality plan.

3.9 HAZARDS AND HAZARDOUS MATERIALS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VIII. Hazards and Hazardous Materials. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐

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d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

3.9.1 Environmental Setting

For the purposes of this section, “Project Area” refers to the area that encompasses the extent of the waterways and intertidal wetlands throughout the North Delta Arc, generally up to levee crests, and “Project Site” refers specifically to those locations where physical activities associated with carrying out the Proposed Project would occur, such as marinas, boating traffic lanes, waterways, and intertidal wetlands. The Project Site is located within two miles of the Rio Vista Municipal Airport. No actively maintained private airstrips were found within the vicinity of the Project Area. White Elementary School, Rio Vista High School, and Riverview Middle School are located in the town of Rio Vista and occur within a quarter mile of the Project Site.

3.9.1.1 Hazardous Materials Sites

The Hazardous Waste and Substances Sites (Cortese) List is a planning document used by the State, local agencies, and developers to comply with CEQA requirements in providing information about the location of hazardous materials release sites. Government Code Section 65962.5 requires the California Environmental Protection Agency (CalEPA) to develop at least annually an updated Cortese List. The Department of Toxic Substances Control (DTSC) is responsible for a portion of the information contained in the Cortese List. DTSC's EnviroStor database provides DTSC's component of Cortese List data (DTSC, 2010). In addition to the EnviroStor database, the State

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Water Resources Control Board (SWRCB) is the other primary agency that provides data for development of the Cortese List. SWRCB's Geotracker database provides information on regulated hazardous waste facilities in California, including underground storage tank (UST) cases and non-UST cleanup programs, including Spills-Leaks-Investigations-Cleanups sites, Department of Defense (DOD) sites, and Land Disposal program. A search of the DTSC EnviroStor database and the SWRCB Geotracker, performed on July 20, 2021, determined that there are several known active hazardous waste generators or hazardous material spill sites within the Project Site.

Suisun Bay and Suisun Marsh

The Concord Naval Weapons Station (CNWS) was owned and operated by the Navy and has changed their name to Naval Weapons Station Seal Beach, Detachment Concord. The CNWS is a 12,992-acre military arsenal depot which is located south of Suisun Bay, about two miles north of downtown Concord, and west of Honker Bay. The facility was commissioned in 1942, as Port Chicago Naval Magazine and officially designated as CNWS in 1963. CNWS was placed on the federal National Priorities List in December 1994. Due to the size and complexity of CNWS, this site has been divided into three areas: Inland Area, Tidal Area, and Litigation Area. From 1944 to 1979 approximately 100 acres of CNWS wetlands and marshlands were used for disposal of chipped wood pallets and other wooden materials treated with wood preservatives at the marshland landfills. Contaminants include heavy metals, creosote, munitions, and pentachlorophenol.

The CNWS MRS 8 site, (GeoTracker, Site ID: T10000007781) is classified by the SWRCB as a Military Cleanup Site and occupies 4,923 acres of the 7,648-acre Tidal Area of CNWS including all or part of four islands in Suisun Bay (Ryer Island, Roe Island, West Seal, and East Seal Islands). In July of 1944, the largest U.S. mainland explosion of WW II destroyed the Navy's Port Chicago Magazine. The Port Chicago Terrestrial Explosion Area represents the full extent of the land-based area where munitions and debris were ejected from the 1944 explosion. An emergency response action was performed immediately after the explosion, and explosive ordnance disposal operations have periodically addressed the recovery of munitions and explosives of concern and munitions scrap since then. Field work for the investigation of MRS 8 was indicated to have been completed in 2014 and as of 2015, the site has been under ongoing verification monitoring.

The MRS 10 site (GeoTracker No. T10000007783) is also a Military Cleanup Site associated with CNWS and encompasses about 5,018 aquatic acres in Suisun Bay affected by the 1944 explosion and extends from the former Pier 1 to the west, north, and east in a 12,000-foot-radius half-circle. After the explosion, the U.S. Coast Guard surveyed near Pier 1 by dragging the bottom sediments and using divers to conduct surveys. The bay bottom sediment was reported to be heavily littered with large metal debris. Munitions and explosives of concern have been removed from the bay floor within the MRS near the piers. The MRS 10 remedial investigation is under an ongoing site assessment as of 2015. A munitions constituents' investigation is currently being conducted by collecting soil and sediment samples where there is known or suspected munitions and explosives of concern contamination.

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The Southern Pacific - Suisun Marsh site (EnviroStor ID: 48400001) site is located at the end of Chadbourne Road in Suisun Marsh, spans 0.3 acres, and has been certified as cleaned up with ongoing required maintenance by DTSC. On March 19, 1969 a Southern Pacific train derailed in Suisun Marsh and two tanker cars containing white phosphorus ruptured and upon exposure to the air, the phosphorus ignited and burned. Subsequently, the tank cars and a third box car containing corn were buried at the site, capped with concrete, and surrounded by a chain-linked fence.

The Bird's Landing Military Use Site, VHF 4K4 (GeoTracker ID: T10000001030) is approximately 2 miles northeast of Birds Landing in Suisun Marsh, spans 289.04 acres. There are no ongoing investigation or cleanup efforts at this site by SWRCB. The site was used as a radar and transmitter station. Facilities included the presence of one UST, a barracks, and a concrete pad which was once part of a gun emplacement. An old barracks, an underground storage tank, and a concrete pad (once used as part of a gun emplacement) remain on site. Part of the land is undeveloped grasslands and wetlands, and part is leased to a rancher for winter cattle grazing. The site is known or suspected to contain military munitions and explosives of concern (e.g., unexploded ordinance) and therefore may present an explosive hazard.

The PG&E Kirby Hills Dehydrator Station site (GeoTracker ID: SL186072965) is located at the north terminus of Birds Landing Road in Solano County and a small 50-foot by 90-foot area where cleanup was completed on August 3, 2009. The site is adjacent to wetlands and was historically used to dehydrate and odorize natural gas for transport in PG&E's gas transmission system. Compounds of concern were benzene, petroleum, fuels, oils, and volatile organic compounds.

The Cordelia Gun Club site (GeoTracker ID: T10000003397) is located at on the southern terminus of Thomasson Lane in the Suisun Marsh, and includes 600 acres of wetlands. Site cleanup was complete, and the case closed as of May 7, 2012. Contaminants of concern were lead from gunshot pellets the potential for groundwater impacts from a fuel drum storage area on site.

The Kinder Morgan Suisun Slough Release Site (GeoTracker ID: SL0609520685) is located off Chadbourne Road where it passes between Cordelia Slough and Suisun Slough in the Suisun Marsh, and consists of 220 acres of managed wetlands. Approximately 2,454 barrels of diesel fuel were discharged into the managed wetlands on April 27, 2004. As of August 20, 2009, the site was classified as cleaned up and the case was closed by the SWRCB.

San Joaquin River and Contra Costa County Shoreline

The Salt River Construction site (GeoTracker ID: T10000004118) is located on the bank of New York Slough at East 3rd Street, in the City of Pittsburg. Very little information was publicly accessible, and the site was classified by the SWRCB as "Open-Inactive" as of May 18, 2015. The contaminant of concern at this location is petroleum.

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The West Island Site (EnviroStor ID: 07990015) is located on West Island which is bordered by the San Joaquin River to the north and New York Slough to the south. The site spans approximately 156 acres and was a voluntary cleanup site certified by the SWRCB as of June 9, 2005. Two 24-inch concrete pipelines had been installed across the island in the mid- to late- 1950s to transport treated wastewater from the East Mill property to the deep channel of the San Joaquin River. There has not been any known use, handling, storage, or disposal of hazardous substances at the site.

The Fulton Shipyard site (EnviroStor ID: 07440009) is located at 307 Fulton Shipyard Road in the City of Antioch, spans approximately 700 feet of the San Joaquin River's shoreline, and has been classified by DTSC as being in active cleanup since January 27, 2005. The Fulton Shipyard operated a ship maintenance and repair facility between 1918 and 1999. The site is bordered to the north by the river, to the east by Antioch Dunes National Wildlife Refuge, to the south by vacant undeveloped land, and to the west by the Antioch Marina Boat Launch Facility. The shipyard provided repair and maintenance services for tugboats, private and commercial vessels, and military craft. The site was also used to make crane equipment. Currently, the site is used for storage of construction equipment and materials. A remedial investigation of the site was completed in 2014. Contaminants of concern (COC) in soil, groundwater and river sediments were identified. In soil, the COCs are metals, diesel- and motor oil-range petroleum hydrocarbons, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). In groundwater, the COCs are metals, petroleum hydrocarbons and PAHs. In river sediments, the potential COCs are metals, PAHs, PCBs and tributyltin. Future work at the site will include a data gaps analysis, cleanup of soil contamination, and further investigation of groundwater and river sediments.

Sacramento River at Rio Vista

The Rio Vista Storage Annex site (EnviroStor ID: 8000058) is divided into two sections, one on Decker Island in Solano County, and the second on Sherman Island in Sacramento County. The Army used this site for boat landing and storage facilities. No contaminants of concern were specified and DTSC has determined no further action on the pursuit of a cleanup action was warranted on October 30, 2014.

The Rio Vista Army Reserve Center site (RVARC; EnviroStor ID: 48970004) is located on the western bank of the Sacramento River in the city of Rio Vista, covers approximately 28 acres in Solano County, and had a certified cleanup status as of June 30, 2003. The RVARC was used by the Army primarily for training of Army Reserve units for amphibious assaults, ship maintenance, and stevedoring (i.e., the loading and unloading of cargo). Site investigation data indicated that there were several petroleum contaminated sites that were the result of underground storage tank leaks. Metal contaminations in soil at several sites and in the Marine Railway were detected and dioxin contamination was also detected in the vicinity of the onsite incinerator. The US Army removed about 4550 cubic yards of contaminated soil in October 2000. The Sacramento Regional Water Quality Control Board and DTSC oversaw the remediation.

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The Project Area is not within the designated Wildfire and Urban Interface Fire Area with a fire hazard zone classification.

3.9.2 Discussion

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

No Impact. Except for fuels and oils used in everyday, routine operations and maintenance of motorized vehicles for transport of personnel and cultured fish, the Proposed Project would not result in any additional routine transport, use, or disposal of hazardous materials.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?

Less-than-significant. The Proposed Project would be operating watercraft, vehicles and small motorized equipment for offloading fish or boats at marinas. During these activities, there could be accidental releases of hazardous materials such as fuels, oils, grease, and lubricants from equipment use. As described in Chapter 2, “Project Description and Background,” the Proposed Project would include CDFW’s routine ongoing best management practices that require that these hazardous materials to be properly managed during the conduct of the Proposed Project’s activities. These include the following:

- No fuels or lubricants or other chemicals would be stockpiled or stored where they could spill into watercourses.
- Equipment and materials for cleanup of spills would always be made available on boats. All spills and leaks would be cleaned up immediately and disposed of in accordance with all regulatory requirements.
- All equipment used in the Project Site would be inspected for leaks each day prior to initiation of work and action taken to repair leaks prior to use.
- No equipment would be serviced from within the Project Site unless equipment stationed in these locations cannot be readily relocated.
- Implementation of the practices listed above would minimize the potential for release of hazardous materials such that the Proposed Project would not cause a significant hazard to the environment or the public.

After review of the hazardous materials sites identified in Section 3.9.1.1, it is highly unlikely that the operation of watercraft in navigable waters and placement of release enclosures or monitoring equipment would disturb these sites in a manner that would cause the release of hazardous materials into the

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environment. Also of note is that most of the identified sites do not overlap with areas where boat-related operations would be possible.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Less-than-significant. There are three schools near the Sacramento River in the town of Rio Vista that fall within 0.25 miles of the Project Site. Operation of boats on the Sacramento River at this location would result in the emission of engine exhaust fumes. However, the Proposed Project would not result in a measurable increase of exhaust fumes above the ongoing, everyday use of recreational and commercial boats on the Sacramento River. Also, as discussed in earlier sections, the Proposed Project would not cross any thresholds of significance for air pollution and air quality standards.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Less-than-significant. After review of the hazardous materials sites identified in Section 3.9.1.1, it is highly unlikely that the operation of watercraft in navigable waters and placement of release enclosures or monitoring equipment would disturb these sites in a manner that would cause the release of hazardous materials into the environment. Additionally, almost all the identified sites are outside of areas where boat-related operations of the Proposed Project would be possible.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

No impact. The Proposed Project is within two miles of the Rio Vista Municipal Airport. However, the Proposed Project would not place people where they could reasonably be expected to become exposed to airport-related safety hazards.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

No impact. The Proposed Project would not place people where they could reasonably be expected to become exposed to the safety hazards from a private airstrip.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No impact. Because of its small scale and transitory nature, implementation of

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the Proposed Project would not impair or interfere with any adopted emergency response plans or emergency evacuation plans.

h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

No impact. The Project Site does not occur within any areas mapped as having moderate or greater fire hazard severity risk by either local or State agencies (California Office of the State Fire Marshal 2021).

3.10 HYDROLOGY AND WATER QUALITY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
IX. Hydrology and Water Quality. Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☒
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i) result in substantial on- or off-site erosion or siltation on- or off-site? ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or iv) impede or redirect flows?	☐	☐	☐	☒
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒

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e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒
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3.10.1 Environmental Setting**3.10.1.1 Surface Water Hydrology**

Hydrology in the North Delta Arc is tidal and influenced primarily by inflow from the Sacramento and San Joaquin rivers, tidal elevations at the Golden Gate, water diversions, input from local tributaries, and Delta outflow. The extent to which any of these factors drives hydrology within the North Delta Arc varies geographically. For example, hydrology in the Deepwater Ship Channel is primarily influenced by tidal elevation, as little water enters the channel from the Sacramento River past locked gates at the point when the channel connects with the river. Hydrology in the Cache Slough and Yolo Bypass portions of the North Delta Arc is influenced by tidal elevation, inflow from tributaries, agricultural discharges, wastewater discharges, water diversions, and Sacramento River flows as a result of its connection to the river via Miner and Steamboat Sloughs year-round and via the Yolo Bypass when upstream weirs overtop as a result of high flows in the mainstem. Suisun Marsh lies at the western edge of the Delta and eastern edge of San Francisco Bay, in a freshwater mixing zone that is influenced primarily by Delta outflow, tidal elevation, local water diversions, and operations of water control structures within the marsh, including the Suisun Marsh Salinity Control Gates.

3.10.1.1 Groundwater Hydrology

Groundwater levels adjacent to waterways within the North Delta Arc are generally shallow as a result of seepage into adjacent lower elevation agricultural lands. Groundwater elevation is generally driven by variation in tidal elevation, elevations of adjacent lands, soil types of adjacent lands, and properties of substrates underlying the waterways.

3.10.1.2 Surface Water Quality

Under California's Porter-Cologne Water Quality Control Act regional boards within the State Water Resources Control Board regulate the discharge of water to waters of the state. Surface water quality in the Project Area is regulated by two regional boards. The San Francisco Regional Water Quality Control Board encompasses Solano County and the portion of the Project Area that extends from the confluence between the Sacramento and San Joaquin rivers west through Suisun Marsh and Grizzly Bay. The Suisun Marsh wetlands and open water habitats west of the marsh are listed under the Clean Water Act Section 303(d) as impaired water bodies for mercury, low dissolved oxygen/organic enrichment, nutrients and salinity (SFRWQCB 2018), and water quality in the region is governed by the Water Quality Control Plan for the San Francisco Bay Basin (SFRWQCB 2019). The Central Valley Water Quality Control Board includes Yolo, Solano, and Sacramento counties and the portion of the Project Area east of the confluence between the Sacramento and San Joaquin rivers. The Bay Delta Water

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Quality Control Plan for the Sacramento and San Joaquin River basins serves as the basin plan for much of the Project Area east of the confluence. Water quality criteria were adopted by the SWRCB and the Central Valley Regional Water Quality Control Board in 1995 and serve as the basis for the Bay-Delta Water Quality Control Plan and Decision 1641 (SWRCB 1999) which includes terms and conditions for water rights to implement water quality objectives to protect beneficial uses in the Delta.

3.10.1.3 Groundwater Quality

Groundwater quality varies among the three groundwater basins within the Project Area. Groundwater quality in the Solano subbasin is generally good with occasionally high levels of total dissolved solids (TDS) (BDCP 2013). The Suisun-Fairfield Valley Groundwater Basin has been shown to have elevated levels of boron, TDS, and volatile organic compounds (VOCs) (BDCP 2013). Constituents of concern that have been identified in the Yolo Subbasin include salinity, boron, arsenic, total and hexavalent chromium, manganese, and selenium (Yolo Subbasin Groundwater Agency 2021).

3.10.1.4 Flood Flows and Hazards

Flood flows are common but episodic in the Central Valley of California and waterways connected to the Sacramento River. Because the Central Valley of California has a Mediterranean climate with cool, wet winters and dry, hot summers, flood flows are restricted to the mid-November through June timeframe, driven by precipitation and snowmelt upstream of the Delta. Flood conditions within the eastern portion of the Project Area occur as a result of high inflow from local tributaries and the Sacramento River. Flood flows are diverted off the Sacramento River at Freemont Weir and off the American River at the Sacramento Weir into the Yolo Bypass, reducing water surface elevations on the mainstem river and inundating the Yolo Bypass and allowing flow to move down through the Cache Slough complex and out of the Delta, into Suisun Marsh and Bay. Flood flows in the western portion of the Project Area, past the confluence, are driven by Delta outflow (primarily flows from the Sacramento and San Joaquin rivers) and input from local tributaries connected to the Suisun Marsh and Grizzly Bay.

3.10.1.5 Existing Water Quality Control Plans and Sustainable Ground Water Management Agencies

Within the Project Area there are several existing water quality control plans that regulate surface water quality including the Bay Delta Water Quality Control Plan issued by the SWRCB (SWRCB 1999) and the Water Quality Control Plan for the San Francisco Bay Basin (SFRWQCB 2019). The Project Area spans several groundwater sustainability agencies (GSAs) including the Solano Subbasin GSA, the Yolo Subbasin GSA, the Suisun-Fairfield Valley Basin, the Sacramento County GSA, and the Northern Delta GSA.

3.10.2 Discussion

- a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?**

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- b) *No impact:* The Proposed Project involves filling vessels with water from the FCCL to transport cultured Delta Smelt via trucks and boats into the Project Area for indirect and direct release at individual Project Sites. When cultured Delta Smelt are released, they will be poured, along with water from the FCCL, into waterways. The FCCL currently operates in an open-loop system connected with waters and organisms already existing within the Bay-Delta. Water from the Delta is brought in to the FCCL, filtered, used in the culture and reproduction of Delta Smelt, then filtered again, and returned to the Delta. As a result, the Proposed Project would not involve the discharge of waste or materials that would degrade surface or ground water quality. **Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?**

No impact. The Proposed Project does not include activities that would utilize groundwater supplies or influence groundwater recharge.

- c) **Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:**
- i) **result in substantial on- or off-site erosion or siltation on- or off-site?**
 - ii) **substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;**
 - iii) **create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or**
 - iv) **impede or redirect flows?**

No impact. The proposed Project would not involve any ground disturbing activities and all Project activities would be confined to existing roadways, boat launches, marinas and waterways within the North Delta Arc. No impact to erosion, siltation, surface runoff, or flows would occur as a result of the Proposed Project.

- d) **In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?**

No impact. The Proposed Project would not involve transportation of pollutants within the Project Area. The only materials transported and released within the Project Area would be water collected from the Delta through operations at the FCCL in Byron, CA.

- e) **Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?**

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No impact. The Proposed Project would not alter surface water flows, groundwater recharge, or surface- or ground-water quality. No impact on implementation of a water quality control plan or sustainable groundwater management plan would occur.

3.11 LAND USE AND PLANNING

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XI. Land Use and Planning. Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

3.11.1 Environmental Setting

For the purposes of this section, “Project Area” refers to the area that encompasses the extent of the waterways and intertidal wetlands throughout the North Delta Arc, generally up to levee crests, and “Project Site” refers specifically to those locations where physical activities associated with carrying out the Proposed Project would occur, such as marinas, boating traffic lanes, waterways, and intertidal wetlands.

The residential community that is nearest to the Project Area is the City of Rio Vista in Solano County located adjacent to the west bank of the Sacramento River at the Highway 12 crossing.

The San Francisco Bay Plan was prepared by the San Francisco Bay Conservation and Development Commission (BCDC) and adopted by the Legislature in 1969 and covers the tidally influenced areas from the Golden Gate Bridge and extends interior to where the Sacramento River meets Marshal Cut. The McAtter-Petris Act directs the Commission to exercise its authority to issue or deny permit applications for placing fill, extracting material, or changing use of any land, water, or structure within the Commission’s jurisdiction in conformity with the provisions and policies of both the McAtter-Petris Act and the Bay Plan. The law also directs the Commission to keep the Bay Plan up to date, through a program of continuing review.

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The Delta Protection Act of 1992 formed the State Delta Protection Commission. The resource management plan mandated by the Delta Protection Act was adopted by the State in 1995 for the purpose of providing direction to local jurisdictions in the Delta region on land use decisions. The Plan addresses the environment, utilities, infrastructure, land use, agriculture, water, recreation, access, levees, and boater safety. The General Plans for all jurisdictions within the Delta primary zone are required to be consistent with this plan.

BCDC also regulates use and development of the Suisun Marsh, which is the largest contiguous brackish (fresh and salt water) marsh on the West Coast, through the Suisun Marsh Protection Plan (Protection Plan). The objectives of the Protection Plan are to preserve and enhance the quality and diversity of the Suisun Marsh aquatic and wildlife habitats and to assure retention of upland areas adjacent to the Marsh in uses compatible with its protection. The Protection Plan was completed by BCDC in 1976 and adopted by the Legislature in 1977. The Protection Plan articulates BCDC's management policies for the Suisun Marsh within the Primary Management Area and the policy requirements for Local Protection Program components in the Secondary Management Area.

The Suisun Marsh Habitat Management, Preservation and Restoration Plan was completed in 2014 to address concerns over use of resources within about 50,000 acres of the Suisun Marsh. Operations of the federal CVP and the SWP influence the health of the ecosystem, much of which is privately owned and home to waterfowl hunting clubs. The Suisun Marsh Habitat Management, Preservation and Restoration Plan was designed to comprehensively address restoration of the ecological health of Suisun Marsh and improve water management for beneficial uses of the Bay-Delta. Seven principal members of the group include: USFWS, National Marine Fisheries Service, Reclamation, CDFW, DWR, Delta Stewardship Council, and the Suisun Resource Conservation District.

The 2005 Contra Costa County General Plan designated the areas of the Project Site within Contra Costa County as "Water." This designation was applied to approximately 68 square miles of water in San Francisco-San Pablo Bay and the portion of the Sacramento-San Joaquin River estuary system. Uses allowed in areas designated as "Water" include transport facilities associated with adjacent heavy industrial plants, such as ports and wharves, and water-oriented recreation uses such as boating and fishing. Construction of new residences or commercial uses and the subdivision of land are considered inconsistent with this General Plan designation.

The 2011 Sacramento County General Plan designated the areas of the Project Site within Sacramento County as "Natural Preserve." The "Natural Preserve" designation was used to identify critical natural habitat for priority resource protection. The designation includes riparian Valley Oak woodland and permanent or seasonal marshes with outstanding wildlife value, the extent of which has declined greatly throughout the Central Valley during the 20th Century. Preserve boundaries do not include intensively farmed areas.

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The 2008 Solano County General Plan designated the areas of the Project Site within Solano County as “Natural Resource: Water Bodies and Courses” and “Natural Resource: Marsh.”. These designations provide for protection of marsh and wetland areas and allow for aquatic and wildlife habitat preservation, marsh-oriented recreational uses, agricultural activities compatible with the marsh environment and marsh habitat, educational and scientific research, educational facilities supportive of and compatible with marsh functions, and restoration of historic tidal wetlands.

The Yolo County General Plan’s Land Use designation maps are very coarse in scale and do not provide a level of detail that would allow the County to make any distinctions between rivers, sloughs, roads or other linear features such as State highways. Therefore, most of the portion of Project Site within Yolo County is either designated as “Agriculture” or “Open Space.”

The Yolo County Habitat Conservation and Natural Community Conservation Plan (Yolo HCP/NCCP) was adopted in 2019. It is a comprehensive, countywide plan to provide for the conservation of 12 sensitive species (“covered species”) and the natural communities and agricultural land on which they depend. The Yolo HCP/NCCP provides a streamlined permitting process to address the effects of a range of future anticipated public and private activities (“covered activities”) on the Covered Species. The Yolo HCP/NCCP area encompasses the entire area of Yolo County, approximately 653,549 acres, and includes conservation activities outside of Yolo County within an additional 1,174 acres along Putah Creek in Solano County.

3.11.2 Discussion

a) Physically divide an established community?

No impact. The use of the Project Site is temporary and would not result in a physical change that would create a divide within an established community.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

No impact. The Proposed Project would be consistent with, and not conflict with, all land use plans, policies and regulations of all agencies with jurisdiction over the Proposed Project including General Plans and zoning designations. No changes in the land use designation, zoning, or any planning documents would be required.

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

No impact. Yolo County has an adopted HCP/NCCP as described above, and the Proposed Project does not conflict with any approved HCP/NCCPs that are applicable to the Project Area.

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3.12 MINERAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XI. Mineral Resources. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☒

3.12.1 Environmental Setting

The Project Area is within the jurisdiction of the California Geological Energy Management Division's Northern District. The Project Area can be characterized as being within sedimentary basins with oil, gas, or geothermal production potential. Both historic and active gas field production sites occur throughout the Project Area with many concentrated in the vicinity of the City of Rio Vista (California Department of Conservation 2001). Proposed Project activities are limited to short-term activities and transitory uses of existing marinas, boating traffic lanes, waterways, and intertidal wetlands that would not disrupt or modify surrounding land uses or involve any ground disturbance or restriction of access to mineral resources.

3.12.2 Discussion**a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?**

No impact. The Proposed Project is limited to short-term activities and transitory uses of existing marinas, boating traffic lanes, waterways, and intertidal wetlands that would not disrupt or modify surrounding land uses or involve any ground disturbance or restriction of access to mineral resources. These activities would not use or disrupt access to mineral resources in any way that could result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state, and no impact would occur.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

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No impact. Given the short-term and transitory use of the Project Site, it is not reasonably foreseeable that the Proposed Project would result in the loss on the availability of any mineral resource recovery site, and no impact would occur.

3.13 NOISE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XII. Noise. Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

3.13.1 Environmental Setting

The Proposed Project would involve transporting cultured Delta Smelt by truck to existing boat launches and marinas, transferring containers to boats, and transporting fish by boat to predetermined locations within the Project Area to be released through indirect or direct release methods. Each release event included as a part of the Proposed Project would require up to eight trucks (standard pick up and heavy-duty trucks) making one round trip each between the FCCL and boat launches/marinas. Each release event would require the use of two to three boats. Assuming up to 6 release events per year this would result in 48 round trips per year by truck and approximately 60 additional boat trips throughout the year. For example, it is expected that one small boat could transport up to 1,000 fish. If 60,000 adults are released in a given year, this would require 60 additional boat trips.

3.13.1.1 Existing Noise Environment

Background noise levels in the Project Area vary between rural and urban settings. Existing noise levels in residential areas are generally assumed to be less than 60 dBA

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in the Sacramento, Solano, Contra Costa, and Yolo counties general plans. Rural areas are assumed to have less noise than urban, with the exception of episodic agricultural activities. Daytime noise levels at sites within 100 feet of high-volume freeways or highways are assumed to be 55–65 dBA and noise abatement criteria are defined as 67 dBA for residential areas and areas with recreation, outdoor trails and parks (Caltrans 2013, 2020a). Sources of ambient noise in the Project Area include traffic, boats, outdoor recreation areas, agricultural operations, industrial plants, and aircraft.

3.13.1.2 Vibration Generated by Ground Transportation

Caltrans (2020) identifies traffic on highways as sources of continuous vibration. Table 5 in Caltrans (2020) describes vibration as a result of traffic between 0.4-0.6 (peak particle velocity per second) as being unpleasant while 0.2 would generally be considered to be annoying and 0.08 is readily perceptible. Existing groundborne vibration levels generally are not discernible at locations beyond the road shoulders of highways or freeways (Caltrans 2020b).

3.13.1.3 Public Airports

The only public airport that occurs within two miles of the Project Area is the Rio Vista Municipal Airport in Solano County. Additional private airstrips associated with agricultural operations are also likely to exist within the Project Area in Yolo, Contra Costa, Sacramento, and Solano Counties.

3.13.1.4 Regulatory Setting

Yolo County General Plan

Chapter 8 of the Yolo County General Plan characterizes existing noise conditions within Yolo County and identifies mobile sources, including automobiles, trucks, aircraft, and trains as the dominant noise sources in the county. In addition to mobile sources, it also identifies stationary noise sources including farming activities, mining activities, commercial and industrial facilities, and construction sites. Existing airports within Yolo County are all greater than two miles from the Project Area.

Contra Costa County General Plan

Chapter 11 of the Contra Costa General Plan describes existing noise sources within the county. The General Plan identifies traffic along freeways and major arterial roads as the primary sources of vehicular traffic noise. Additional sources of noise within the county include existing air traffic activity, rail operations, and industrial plants including oil refineries and material processing plants.

Solano County General Plan

The Solano County General Plan identifies major noise sources within the county as: traffic on Interstate 80 and city streets, commercial and industrial land uses, active recreation areas of parks, outdoor play areas and schools, railroad operations, and

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aircraft. Chapter 5 of the general plan also identifies common tools to reduce noise exposures as land buffers between noise sources and receptors which include open space.

Sacramento County General Plan

The Sacramento County General Plan Chapter 13 establishes goals and policies for noise within the county. Specific goals and policies are identified for noise associated with traffic, railroads, aircraft, non-transportation, construction, and transportation projects.

3.13.2 Discussion

- a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?**

No Impact. No substantial temporary or permanent increase in ambient noise levels in excess of standards established in local general plans would occur as a result of the Proposed Project. The Proposed Project would only involve a small incremental increase in pickup and heavy-duty truck traffic (approximately 48 trips per year) on existing roadways within the Project Area. The additional boat trips that would be needed to conduct the Proposed Project would not generate more than a small fractional increase, if any, of ambient noise relative to ongoing existing recreational and public agency use.

- b) Generation of excessive vibration or groundborne noise levels?**

No Impact. The Proposed Project would not generate an excessive vibration or groundborne noise level within the Project Area. The Proposed Project would only involve a small incremental increase in pickup and heavy-duty truck traffic (approximately 48 trips per year) on existing roadways within the Project Area.

- c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?**

No Impact. The Proposed Project is not expected to result in a measurable increase in noise levels detected by people residing or working in the Project Area in the vicinity the Rio Vista Municipal Airport in Solano County. Similarly, the Proposed Project would not expose people working within the Project Area at small private airstrips located on agricultural lands to excessive noise levels.

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3.14 POPULATION AND HOUSING

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIII. Population and Housing. Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒

3.14.1 Environmental Setting

Numerous communities with populations ranging from hundreds of thousands to a few hundred individuals reside within the four counties that overlap with the Project Area: Yolo, Solano, Contra Costa, and Sacramento counties. However, within the Project Area there are few communities, including the city of Rio Vista and the community of Birds Landing, when compared to the entire four county region. Tables 8 and 9 describe the population and housing characteristics of the four counties that overlap with the Project Area (US Census Bureau 2021).

Table 8. U.S. Census Bureau estimated population size as of July 1, 2019 and population growth rate from prior census in 2010.

County	Population census 2010	Population Estimate 2019	Estimated % change
Solano	413,344	447,643	8.3%
Contra Costa	1,049,025	1,153,526	9.9%
Yolo	200,855	220,500	9.8%
Sacramento	1,418,788	1,552,058	9.4%

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Table 9. U.S. Census Bureau estimated number of housing units as of July 1, 2019, number of building permits in 2020, and the number of households (2015-2019).

County	Estimated # housing units in 2019	# Building permits in 2020	Estimated # households
Solano	159,806	1,733	149,865
Contra Costa	418,707	2,803	394,769
Yolo	79,263	1,206	74,296
Sacramento	578,937	6,170	543,025

3.14.2 Discussion

- a) Induce substantial unplanned population growth in an area either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?**

No Impact. The Proposed Project would not result in substantial unplanned population growth in an area, either directly or indirectly.

- b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?**

No Impact. The Proposed Project would not displace substantial numbers of people or housing.

3.15 PUBLIC SERVICES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIV. Public Services. Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				

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Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

3.15.1 Environmental Setting

The Proposed Project involves transportation of cultured Delta Smelt from the FCCL to existing boat launches and marinas, then onto boats within the Project Area which overlaps with four counties (Solano, Contra Costa, Sacramento, and Yolo). No schools are in the vicinity of Project Sites. The following discussion provides an overview of fire protection, police protection, and public parks in the vicinity of Project Sites.

3.15.1.1 Fire Protection

Yolo County: The Clarksburg Fire Protection District would provide fire protection services for Project Sites within the portions of the Project Area that overlap with Yolo County, except for areas west of the Deep Water Ship Channel which are not covered by an existing fire district (Clarksburg Fire Protection District 2021).

Solano County: Several fire protection districts occur within portions of the Project Area that overlap with Solano County. These include the Cordelia Fire District, Suisun Fire District, Montezuma Fire District, City of Rio Vista Fire Department, and the Ryer Island Fire District (Solano County 2021).

Contra Costa County: Portions of the Project Area that overlap with Contra Costa County would be served by the Contra Costa Fire Protection District. Specifically, fire stations 84, 8,1 and 87 are closest in proximity to the Project Area.

Sacramento County: Several fire districts within Sacramento County occur within the Project Area and could serve individual Project Sites (Sacramento County 2021). These fire districts include the Delta Fire District, Isleton Fire District, Walnut Grove Fire District, and Courtland Fire District.

3.15.1.2 Police Protection

Yolo County: The Yolo County Sherriff's Office serves portions of the Project Area that overlap with Yolo County, including land and waterways. Specifically, their marine patrol/search and rescue unit is responsible for promoting the safety of the boating public and provides countywide search and rescue services for lost, stranded, and injured victims.

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Solano County: Within the Solano County portion of the Project Area, Project Sites would be served by the Solano County Sheriff's Office and the Marine Patrol Program within the sheriff's office. The Marine Patrol Program provides public safety resources to recreational boaters and commercial vessels in the navigable waterways of Solano County.

Contra Costa County: The Contra Costa County Office of the Sheriff would provide police protection services within portions of the Project Area that overlap with Contra Costa County. The office includes the Marine Services Unit which patrols over 80 square miles of waterways in Contra Costa County to protect the lives and property of people on the waterways of the county.

Sacramento County: The Sacramento County Sheriff's Department serves portions of the Project Area that overlap with the county, including unincorporated areas within the county. Additionally, it includes the Marine Enforcement Unit which is responsible for patrolling the river and Delta regions of the county where individual Project Sites might be located.

3.15.1.3 Public Marinas and Boat Launches

There are several public marinas and boat launches that may be used for the transportation of cultured Delta Smelt from trucks to boats as a part of the Proposed Project. Known public marinas within the Project Area include Belden's Landing in Solano County, Brannan Island State Recreation Area in Sacramento County, the Rio Vista Boat Launch in Solano County, the Antioch Marina Harbor in Contra Costa County, and the Pittsburg Marina in Contra Cosa County.

3.15.2 Discussion

- a) **Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times, or other performance objectives for any of the public services: fire protection, police protection, schools, parks, or other public facilities?**

No Impact. The Proposed Project would involve a small incremental increase in truck traffic on roadways within the Project Area, including public boat launches/marinas and a slight incremental increase in boat traffic within waterways in Sacramento, Solano, Yolo, and Contra Costa County. Because of the small incremental change in existing uses the Proposed Project is not expected to result in substantial adverse physical impacts associated with the provision of governmental facilities or result in the need for new or physically altered governmental facilities.

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3.16 RECREATION

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XV. Recreation. Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

3.16.1 Environmental Setting

The Proposed Project involves the transportation of cultured Delta Smelt from the FCCL to existing boat launches and marinas in the Project Area. Cultured fish would be transferred to boats and transported to the Proposed Project sites within waterways in the Project Area for direct or indirect release. There are several known public marinas and boat launches within the Project Area where the Proposed Project may transfer cultured fish from trucks to boats prior to release into the North Delta Arc. Waterways within the Project Area also support a diversity of recreational activities including boating, fishing, waterfowl hunting, and wildlife viewing.

3.16.1.1 Recreation in Waterways Within the Project Area

Within the entire legal Delta, the Delta Protection Commission estimated approximately 8 million resources-related visitor days related to boating and fishing and 2 million visitor days related to urban park related recreational activities (DPC 2021). The DPC (2021) also estimated visitation at key recreational locations within the Project Area including Brannan Island day use (27,688 users), camping (11,594 users) and boat launches (4,645 users), Decker Island Wildlife Area (300 users), Lower Sherman Island (8,000 users), Sherman Island County Park (24,944 users), Belden's Landing (20,926 users), and Sandy Beach County Park (105,324 users).

Boating is the most popular recreational activity within the waterways of the Project Area. The Delta Protection Commission (2021) estimates that there are 97 marinas within the legal Delta as a whole. There are several public marinas and boat launches that may be used for the transportation of cultured Delta Smelt from trucks to boats as a part of the Proposed Project including Belden's Landing in Solano County, Brannan Island State Recreation Area in Sacramento County, the Rio Vista Boat Launch in Solano County, the Antioch Marina Harbor in Contra Costa County, and the Pittsburg

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Marina in Contra Cosa County.

The waterways within the Project Area support regionally important recreational fisheries including bass (ex. striped bass), steelhead, salmon, sturgeon, and crustaceans. Fishing derbies are held within the Project Area and serve as popular recreational activities and important sources of income for the local Delta economy.

Suisun Marsh is located outside the legal Delta but encompasses a large portion of the Project Area. Suisun Marsh spans approximately 88,000 acres of land, bays, and sloughs and is the largest contiguous estuarine marsh in the United States. The Suisun Marsh Plan (2013) identifies hunting, fishing, and wildlife viewing as key recreational activities within the marsh and includes objectives intended to support them into the future.

Within the Project Area there are several notable public lands that offer a variety of water-related recreational activities:

- The Sherman Island County Park provides recreational opportunities within the waterways of the Project Area including an internationally-renowned windsurfing area. Other popular activities in the area include kite boarding, fishing, and boating.
- Brannan Island State Recreation Area (SRA) offers fishing opportunities for striped bass, sturgeon, catfish, bluegill, perch, and bullhead. In addition to fishing, visitors to the Brannan Island SRA also enjoy boating, swimming, and wildlife viewing.
- Within Suisun Marsh, the Grizzly Island Wildlife Area encompasses 12,900 acres across 10 parcels managed by CDFW, including 7,900 acres available for hunting. Within the wildlife area popular recreational activities include wildlife viewing, hunting, fishing, and boating. Depending on the time of year striped bass, brown bullhead, white catfish, white sturgeon, black crappie, and largemouth bass can be caught at Grizzly Island.
- The Yolo Bypass Wildlife Area extends across approximately 16,000 acres and is managed by CDFW. The wildlife area offers a variety of recreational opportunities including wildlife viewing, bird watching, educational programs, and hunting.

3.16.2 Discussion

- a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?**

Less-than-significant. The Proposed Project involves a small incremental increase in truck traffic, use of existing marinas and/or boat launches and boat traffic within waterways of the North Delta Arc. The Project would not increase the use of regional parks or recreational facilities such that substantial physical deterioration would occur or be accelerated.

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b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

No Impact. The Proposed Project does not include or require the construction or expansion of recreational facilities.

3.17 TRANSPORTATION

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVI. Transportation/Traffic. Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒

3.17.1 Environmental Setting

Countywide transportation plans applicable to the Project Area include the Contra Costa County Transportation Authority's *2017 Countywide Comprehensive Transportation Plan*, Solano Transportation Authority's *Solano County Active Transportation Plan 2020*, and the Sacramento Area Council of Governments' *2016 Metropolitan Transportation Plan/Sustainable Communities Strategy* which covers Sacramento, Yolo, Yuba, Sutter, El Dorado, and Placer counties and the 22 cities within those counties. Primary access to the Project Area would be via State Highways and paved County/City roadways from the FCCL to existing marinas and boat ramps. The potential boat launch site furthest away in road miles from the FCCL would be in the Suisun Marsh (approximately 56 miles one-way from FCCL to the boat launch at Belden's Landing). Primary travel routes

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would be Byron Highway, Camino Diablo, Vasco Road, State Highway 4, State Highway 160, and State Highway 12.

The Proposed Project does not include expansion or modification to transportation infrastructure on county roads and state highways. Neither would the Proposed Project include land use entitlements requiring discretionary approvals, such as zoning changes, conditional use permits or other permits subject to jurisdictional reviews as they pertain to the regulation of land uses.

3.17.1.1 Methods and Assumptions

The Proposed Project has the potential to increase traffic during transportation of personnel, equipment, and fish. The Project Area would continue to be accessed via existing public roadways. Assumptions used to evaluate traffic impacts are based on detail provided in Chapter 2, "Project Description." The Proposed Project would use either gas or diesel-fueled full-sized (1/2 to 1 and a 1/25 ton) pickup trucks which fall into the EPA's Class IIb of Heavy-Duty Vehicle Classifications (EPA 2008). Up to eight trucks would be used per release event and approximately 16 roundtrips that would, at a maximum, total 112 miles per roundtrip between the FCCL and the boat launch in Suisun Marsh. An estimated six release events would occur each year.

Seven small vessels (i.e., 26-foot or under) and possibly one large vessel (e.g., 42-foot boat) would be used to transport personnel, equipment, and fish from a marina/boat launch to each release location.

3.17.2 Discussion

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, including transit, roadway bicycle and pedestrian facilities?

Less-than-significant. There would be a temporary increase in traffic from transportation of personnel and equipment to the FCCL and then for travel between the FCCL and marinas or boat ramps. In addition, there may be an associated increase from personnel driving from their residences to their work duty stations to pick up work vehicles. The temporary addition of up to 80 vehicle trips on State Highways and City or County maintained roadways per year would not result in a substantial increase in overall traffic volumes that would trigger the need for additional analysis.

b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Less-than-significant. CEQA Guidelines section 15064.3(b) provides criteria for analyzing transportation impacts and determining the significance of transportation impacts. Qualitatively, the Proposed Project would be adding an additional 80 vehicle trips per year on heavily used public roadways, this would result in only a fractional increase in vehicle use and traffic relative to ongoing existing use.

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c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

No impact. The Proposed Project would have no effect on air traffic patterns because no structures would be placed where they could either influence or pose a risk to air traffic.

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No impact. The Proposed Project would not modify transportation infrastructure, including design features nor result in incompatible uses.

e) Result in inadequate emergency access?

No impact. The Proposed Project would not result in the reconfiguration of existing roads or the construction of new roads. All existing emergency access ingress and egress points would remain unchanged.

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

No impact. The Proposed Project would not result in the reconfiguration of existing roads, use, or modify any bicycle or pedestrian facilities or decrease their performance or safety. Therefore, the Proposed Project would not conflict with any adopted policies or programs for transit, bicycle, or pedestrian facilities.

3.18 TRIBAL CULTURAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVIII. Tribal Cultural Resources.				
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				

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a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☒	☐
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☒	☐

3.18.1 Environmental Setting

For the purposes of this section, “Project Area” refers to the area that encompasses the extent of the waterways and intertidal wetlands throughout the North Delta Arc, generally up to levee crests, and “Project Site” refers specifically to those areas that would be disturbed by activities associated with carrying out the Project, such as marinas, boating traffic lanes, waterways, and intertidal wetlands.

A County-by-County search of official California Historical Landmarks did not identify any locations or structures listed that overlapped within the Project Site (California State Parks 2021).

A search of the National Register of Historic Places (National Park Service 2021) identified the Delta King as being within the Project Site. The Delta King had been historically located on the Sacramento River near Rio Vista and is currently located north in the City of Sacramento and used as a hotel. The Delta King is the last remaining sternwheeler in the Delta. Originally owned by the California Transportation Company, it was fabricated in Glasgow, Scotland and assembled in Stockton, California.

In addition, there were three sites with restricted addresses that may or may not overlap with the Project Site and indicates that there may be prehistoric or pre-historic aboriginal resources.

3.18.2 Discussion

- a-b) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k); OR A resource determined by the lead agency, in its discretion and supported by**

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substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1?

Less-than-significant. In the unlikely event that the Proposed Project's activities would overlap with locations with tribal cultural resources, there are no foreseeable material changes to the physical environment other than placing of release enclosures, monitoring equipment, and release of fish. Release enclosures would be placed temporarily for up to three weeks at a time throughout the North Delta Arc, and their anchoring would involve negligible disturbance at superficial depths of waterway beds or bottoms within the aquatic environment. The Proposed Project involves no surface ground disturbance. Therefore, the Proposed Project would not cause a substantial adverse change in the significance of any tribal cultural resources.

3.19 UTILITIES AND SERVICE SYSTEMS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVIII. Utilities and Service Systems. Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒
c) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒
e) Comply with federal, State, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

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3.19.1 Environmental Setting

3.19.1.1 Water Supply

Water suppliers within the Project Area include cities, counties, special districts, and individual diversions. Water service providers within the Project Area span a wide range from single property owners to service providers with thousands of customers, including the SWP. Water supplies in the Project Area include surface water diversions and groundwater. The amount of water available to individual property owners and water service providers is determined by water rights, contractual agreements, groundwater pumping limitations, and limitations associated with infrastructure needed to pump, treat, and deliver water.

3.10.1.1 Wastewater Collection, Conveyance, and Treatment

Wastewater within the Project Area is collected, conveyed and treated by sanitary sewer systems, treatment plants, and individual septic systems. Sewer systems and treatment plants occur in conjunction with urban and suburban areas. Sewer systems collect wastewater is collected and transport it to treatment plants where it is treated and then discharged into a receiving water body. Septic systems are more commonly used in rural areas without access to sewer systems.

3.10.1.2 Solid Waste

Local municipal governments in the Project Area conduct their own solid waste collection and transportation systems to move solid waste to landfills, or contract with private entities to collect and transport solid waste. The California Department of Resources Recycling oversees state-managed non-hazardous waste handling and recycling programs.

3.10.1.3 Electrical, Natural Gas, and Communications

Electricity within the Project Area is generated by a combination of sources, potentially including gas-fired plants, hydroelectric facilities, renewable resources, and coal. Electricity is conducted through existing power transmission facilities and individual generators. Natural gas is distributed via natural gas pipelines and in tanks at individual parcels in the Project Area. Communication infrastructure includes both underground cable and fiberoptic lines as well as communication and transmission towers.

3.19.2 Discussion

- a) **Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?**

No Impact. The Proposed Project would not involve construction of any new facilities or infrastructure, including water, wastewater treatment, storm water

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drainage, electric power, natural gas, or telecommunications facilities.

b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?

No Impact. The Proposed Project would not involve construction of new facilities or changes to existing facilities that would change existing water use. Nor would the Proposed Project use water supplies, other than a small amount from the FCCL's existing and sufficient supply, nor would it lead to future development needing additional supplies. As described in the Project Description no change to operations of existing SWP export facilities in the Project Area as a result of the Proposed Project are expected.

c) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?

No Impact. The Proposed Project does not involve development or other activities that generate wastewater and thus would not use any existing wastewater capacity or require construction of new wastewater facilities or sewer lines.

d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impact the attainment of solid waste reduction goals?

No Impact. The Proposed Project would not involve any activities that would generate solid waste. As a result, the Proposed Project would not generate waste in excess of State or local standards or use any existing landfill capacity.

e) Comply with federal, State, and local management and reduction statutes and regulations related to solid waste?

No Impact. The Proposed Project would not generate any solid waste.

3.20 WILDFIRE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XX. Wildfire.				
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				

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a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes??	☐	☐	☐	☒

3.20.1 Environmental Setting

The Project Area is not within a mapped State Responsibility Area, nor does it overlap with lands that are classified as very high fire hazard severity zones.

3.20.2 Discussion

a-d) *No impact.* See section 3.20.1.

3.21 MANDATORY FINDINGS OF SIGNIFICANCE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XXI. Mandatory Findings of Significance.				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐

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b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐
Authority: Public Resources Code Sections 21083, 21083.5. Reference: Government Code Sections 65088.4. Public Resources Code Sections 21080, 21083.5, 21095; <i>Eureka Citizens for Responsible Govt. v. City of Eureka</i> (2007) 147 Cal.App.4th 357; <i>Protect the Historic Amador Waterways v. Amador Water Agency</i> (2004) 116 Cal.App.4th at 1109; <i>San Franciscans Upholding the Downtown Plan v. City and County of San Francisco</i> (2002) 102 Cal.App.4th 656.				

3.21.1 Discussion

- a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?**

Less-than-significant. As described in the biological resources analysis of this IS (Section 3.4), implementation of the Proposed Project would result in less-than-significant impacts related to biological resources. The Proposed Project does not have the potential to substantially degrade fish or wildlife habitat, adversely affect wildlife populations, or restrict the range of any special-status or other fish or wildlife species. Also, as indicated in the cultural resources analysis of this IS (Section 3.18), implementation of the Proposed Project would not adversely affect existing tribal cultural resources and there would be no adverse effects to unknown archaeological resources or human remains. These impacts would be less-than-significant.

- b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)**

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Less-than-significant. Cumulative environmental effects are multiple individual effects that, when considered together, would be considerable or compound or increase other environmental impacts. As discussed in Sections 3.1 through 3.19 above, all potential impacts of the Proposed Project would be less-than-significant. This evaluation considered the potential for incremental effects that are cumulatively considerable on all resources, including the wild population of Delta Smelt throughout its current range, as discussed in Section 3.4. Implementation of applicable best management practices already built into the Proposed Project to protect biological resources would ensure that the Proposed Project's contribution to cumulative impacts on wild Delta Smelt populations would not be cumulatively considerable. This IS's evaluation also considered the potential for incremental effects that are cumulatively considerable on all other resources evaluated. The Proposed Project would have temporary, localized and either less-than-significant or no impacts on all other resources evaluated because the geographic area is limited to existing roadways, existing boat launches/marinas, and waterways within the Project Area, and the Proposed Project's activities are small in scale and time-limited. When considering potential effects to resources the analysis considered their incremental contribution to cumulative effects, for example greenhouse gas emissions, and found that there would not be any long-term impacts related to the Proposed Project that could combine with other resource impacts considered. Therefore, the Proposed Project would not make a considerable contribution to a cumulative impact and cumulative impacts would be less-than-significant.

c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

Less-than-significant. As identified in this IS, all impacts associated with the Proposed Project would be temporary and would be less-than-significant. Therefore, implementation of the Proposed Project would not result in substantial adverse effects on human beings, either directly or indirectly.

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