



— BUREAU OF —
RECLAMATION

2022-2026 Paired Sample Study of Managed Flow and Food Subsidies on the Availability and Quality of Delta Smelt Habitat and Prey

Environmental Assessment

CGB EA 2022-003

**U.S. Department of the Interior
Interior Region 10 California-Great Basin
Bureau of Reclamation**

March 2022

Mission Statements

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Contents

Introduction.....	1
Background.....	1
Need for the Proposal	2
Alternatives Including the Proposed Action	3
No Action Alternative.....	3
Proposed Action Alternative.....	3
<i>Research Questions</i>	4
<i>Proposed Action Components</i>	5
Abiotic Parameters	5
Biotic Parameters.....	5
Proposed Action Timeline	6
Conservation Measures.....	7
Affected Environment and Environmental Consequences	8
Resources Not Analyzed in Detail.....	8
Resources Analyzed in Detail.....	9
Bay Delta Fisheries.....	9
Consultation and Coordination	14
References.....	16

List of Acronyms and Abbreviations

CDFW	California Department of Fisheries and Wildlife
CFR	Code of Federal Regulations
cm	centimeters
DOP	Directed Outflow Project
EA	Environmental Assessment
EDSM	Enhanced Delta Smelt Monitoring
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
ITA	Indian Trust Assets
km	kilometers
m	meters
LSZ	Low Salinity Zone
NDFS	North Delta Food Subsidies
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
Reclamation	United States Bureau of Reclamation
SFHA	Summer-Fall Habitat Action
SMSCG	Suisun Marsh Salinity Control Gates
UC	University of California
USC	United States Code
USFWS	United States Fish and Wildlife Service
X2	Location (km) of 2 parts per thousand isohaline from the Golden Gate

Introduction

The Bureau of Reclamation (Reclamation) proposes to study the effects of managed flow and food subsidies on the availability and quality of Delta Smelt habitat and prey. Researchers would monitor fish habitat that could be paired with United State Fish and Wildlife Service (USFWS) Enhanced Delta Smelt Monitoring (EDSM) data to inform water management actions in the delta of the Sacramento and San Joaquin Rivers. Reclamation and its partners would collect data each year from 2022 – 2026 during March through November. Reclamation would use the results of this study to inform modified outflow, Suisun Marsh Salinity Control Gates (SMSCG) operations, and Summer-Fall Habitat Action (SFHA) food subsidy actions for Delta Smelt. The SFHA includes modifying project operations to maintain low salinity habitat in this area by maintaining a monthly average 2 parts per thousand isohaline (X2) at 80 kilometers (km) from the Golden Gate in above normal and wet water years in September and October.

This Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) (42 United States Code (USC) §4321 et seq.), the Council on Environmental Quality Regulations for implementing the Procedural Provisions of the NEPA 40 Code of Federal Regulations (CFR) Parts 1500-1508, and Department of Interior regulations for the Implementation of the NEPA (43 CFR Part 46). If there are no significant environmental impacts identified as a result of the analyses, a Finding of No Significant Impacts (FONSI) can be signed to complete the NEPA compliance process.

Background

Delta Smelt (*Hypomesus transpacificus*) rearing habitat quality appears to be limited by food production, availability, and salinity. The location and size of the low salinity zone (LSZ) in and around Suisun Bay and Marsh are important factors (Interagency Ecological Program, 2015). The SFHA is a standard project component in the Coordinated Operations of the Central Valley Project and State Water Project (USFWS, 2019). The SFHA is aimed at improving Delta Smelt recruitment, growth, and survival by providing contiguous high-quality habitat and food supplies in a geographic area extending from the Cache Slough Complex to Suisun Marsh. The SFHA includes measures to manage salinity and food in Delta Smelt habitat areas. The North Delta Food Subsidy Study (NDFS) and Sacramento River Deepwater Ship Channel Food Study aim to promote Delta Smelt food delivery from relatively high productivity areas to less productive waters downstream.

This study will continue sampling conducted by Reclamation and partners since 2017 as part of the Directed Outflow Project (DOP). The study area includes habitats important for Delta Smelt food production, migration, and rearing in the North Delta Arc (Moyle, Brown, Durand, & Hobbs, 2016). Environmental and biological goals of the SFHA include the establishment of contiguous low salinity habitat from Cache Slough Complex to the Suisun Marsh (USFWS, 2019). Modified outflow and the SFHA flow and food subsidy actions are aimed at enhancing

connectivity across these habitats to benefit Delta Smelt habitat, food, condition, growth, and survival. All were identified in the Delta Smelt Resiliency Strategy (CNRA, 2016).

Need for the Proposal

The need for the Proposed Action is to evaluate the mechanistic hypotheses that support summer and fall outflow and Yolo Bypass Toe Drain actions. Specifically, habitat quality and quantity are predicted to improve when the LSZ occurs in Suisun Bay and Marsh and, in turn, lead to improved health, growth and survival for Delta Smelt using this area. Second, Yolo Bypass Toe Drain outflows are hypothesized to increase prey availability and quality in the connecting North Delta and facilitate improved health, growth, and survival for the rearing life stages of Delta Smelt occupying the North Delta and proximate downstream areas. Scientists and stakeholders disagree about the applicability of these hypotheses to short-term flow alteration actions in the summer or fall and whether such actions will result in measurable responses in Delta Smelt habitat, condition, growth, and survival.

The implementation of these flow and food subsidy actions occurs only for certain water year types and may not occur annually or in the same combinations. Further, the NDFS and, to a lesser extent, the SMSCG actions can be implemented in different ways depending on hydrologic conditions. For example, the NDFS was only able to re-route Sacramento River water (versus agricultural drainage) in 2016. This high variability in implementation across years requires a longer monitoring time frame to detect responses. Continued monitoring of habitat, prey, and Delta Smelt responses to flow and food subsidy actions across different water year types and for multiple implementations is important for decision-making, measuring success, and implementing adaptive management.

Alternatives Including the Proposed Action

This EA considers two alternatives which include the No Action Alternative and the Proposed Action Alternative. The No Action Alternative reflects the conditions without the Proposed Action and serves as a basis of comparison for determining the potential effects to the human environment as a result of implementing the Proposed Action.

No Action Alternative

Under the no action alternative, Reclamation would not implement paired sampling with USFWS EDSM to study the effects of managed flow and food subsidy actions on Delta Smelt habitat and prey.

Proposed Action Alternative

Under the Proposed Action, Reclamation would collect and analyze data to measure the effects of water management on Delta Smelt habitat, food quality, and quantity. Researchers would collect Delta Smelt habitat and prey data concurrent with EDSM and contribute to other SFHA action monitoring. The Proposed Action consists of launching a motorized boat from various, existing boat launches into the Sacramento River, Cache Slough Complex, and Suisun Bay and Marsh. The boat will be unloaded and uploaded from the water by a trailer at the existing boat launches. The Proposed Action will not require or involve any ground disturbance.

The data collection would occur during years with and without an X2 action and/or more localized SFHA flow and food subsidy actions. The action area spans from the Lake Washington section of the Deepwater Ship Channel downstream to the Carquinez Strait and stratified by the EDSM study area boundaries (Figure 1). Researchers would sample three locations within each of the five strata weekly for the duration of the study. Researchers would sample randomly within each stratum over a period of five days, or less before moving on to sample the next stratum.

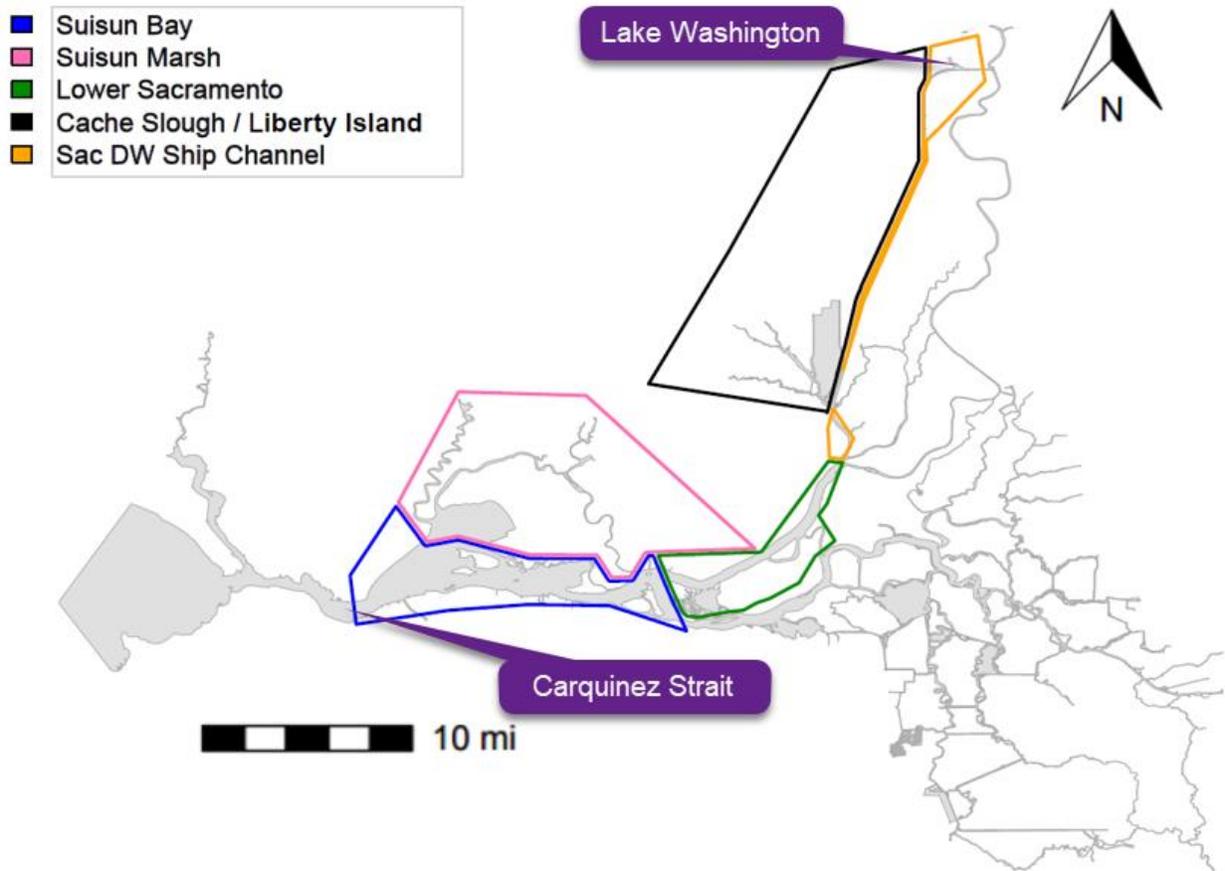


Figure 1. Map of the Proposed Action study area with sampling strata boundaries. Technical assistance provided by Lara Mitchell, USFWS.

Research Questions

Maintaining X2 at 80 km is hypothesized to increase Delta Smelt access to areas in Suisun Bay and Marsh with greater prey availability and quality and better growth and survival conditions by improving habitat suitability (i.e., salinity, temperature, turbidity). Researchers hypothesize that outflows from the Yolo Bypass Toe Drain increase Delta Smelt prey availability and quality by transporting nutrients, phytoplankton, and/or zooplankton to the North Delta. Without the Yolo Basin outflow action, water typically flows landward in the Yolo Bypass Toe Drain during late summer and fall due to local agricultural diversions. The data collection will enable analyses to test these hypotheses.

- Do Delta Smelt habitat quality and prey availability and quality improve when X2 is in the Suisun Marsh and Bay area ($X2 < 81$ km)?
- Do outflows from the Yolo Bypass Toe Drain lead to increased prey availability and quality in the North Delta by directly seeding the area with nutrients, phytoplankton and/or zooplankton?

These data would enable researchers to analyze Delta Smelt habitat, food supply, distribution, and population demographics to identify potential relationships that inform future water

management decisions in the Sacramento Delta. This approach would improve the power of scientific investigations to inform habitat and prey results related to Delta Smelt distribution.

Proposed Action Components

Researchers would sample several abiotic and biotic parameters during the study. Sampling would not occur when boating conditions are unsafe.

Abiotic Parameters

Abiotic measures would include turbidity, salinity, temperature, depth, velocity, dissolved oxygen, pH, nutrients, and contaminants. Researchers would use sonar to measure water depth and use a Secchi disk to measure water clarity. Researchers would lower an electronic sonde sensor by hand into the water at each sample site to measure turbidity, salinity, specific conductance, dissolved oxygen, pH, and chlorophyll. Researchers would take sonde readings from one meter below the water surface at all sample locations. Researchers would take sonde readings from the bottom $\frac{1}{2}$ to $\frac{3}{4}$ of the water column at sample locations deeper than three feet.

Biotic Parameters

Researchers would lower a bongo net into the water to sample zooplankton and crustaceans. The net frame diameters are 15 inches (in). The nets would be 200 cm long. The mesh of one net would be 500 microns for sampling crustaceans. The other net mesh would be 150 microns to sample zooplankton. Each net would be equipped with a flow meter to calculate the volume of water filtered through each net. Researchers would tow the net from the boat for seven minutes at each sample location. Each tow would occur just under the surface of the water column at shallow sites and in the lower half of the water column at deep channel sites (Figure 3). For example, if the channel is 10 meters (m) deep, the bottom tow would occur below 5 m deep for the entire length of the tow. The bongo net would be weighted with a chain or downrigger ball for deep channel tows to sink the net to a fixed position within the bottom half of the water column. Hobo pressure loggers would be attached to the bongo nets to verify and record the sampling depth of each tow. Upon retrieval, the net would be systematically washed down towards the cod end and the contents would be emptied into jars with 10% formalin. Researchers would sample harmful algae with a visual ranking method.

Researchers would collect water samples at each sample site from approximately one meter below the surface using a pump. Water samples would be bottled, stored, and delivered to a lab for analysis. The lab's results would quantify total and dissolved nitrogen, phosphorus, chlorophyll, phytoplankton, nutrients, and contaminants. Researchers would store water samples in plastic containers.



Figure 2 Bongo net frame design.

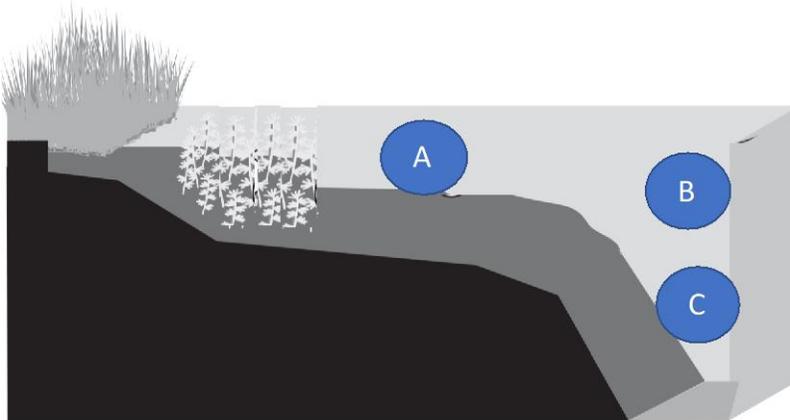


Figure 3. Conceptual sample locations for zooplankton include three locations at each sample site: littoral habitat (A), channel surface (B), and near the channel bottom (C).

Proposed Action Timeline

Field preparation and coordination would begin in winter and field sampling would occur from March through November of each year through 2026. For a given year, sample processing, data entry, and data quality assurance/quality control will vary by parameter, spanning from April through September of the following year (Table 1). Report writing and presentations will occur

in fall through early winter. Coordination meetings will be with USFWS and collaborators from California Department of Fish and Wildlife (CDFW) and University of California (UC) Davis.

Table 1. Proposed annual schedule for Proposed Action activities

Year	2022												2023											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Task 1. Pre-project Preparation																								
1.1 Prep Equipment	█	█																						
1.2 Coordination meetings																								
Task 2. Data collection, management, analysis																								
2.1 Field surveys																								
2.2 Abiotic data entry and QAQC																								
2.3 Sample processing:																								
nutrients, chl a, Microcystis																								
phytoplankton																								
invertebrates																								
2.6 Biotic data entry and QAQC																								
2.7 Data Analysis																								
Task 3. Management																								
3.1 General Management	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
3.2 Report Writing																								
3.3 Report Review and Edits																								
3.4 Data upload to EDI or Rise																								
3.5 Presentations																								

Conservation Measures

Researchers would use a bongo net designed specifically for microorganisms and crustaceans. Researchers would check the net contents at the completion of each seven-minute sampling interval. Non-target species would be removed from the nets by hand and immediately released back into the open water. Researchers will notify the National Marine Fisheries Service and the USFWS in the event that fish species listed as threatened or endangered, pursuant to the Endangered Species Act (ESA) become entrained during the study.

All equipment would be inspected daily for fuel, lubrication, and coolant leaks; and for leak potentials (e.g., cracked hoses, loose filling caps, stripped drain plugs); and all equipment would be free of fuel, lubrication, and coolant leaks. Vehicles or equipment would be washed/cleaned only at approved off-site areas.

Affected Environment and Environmental Consequences

This section describes the affected environment and evaluates the environmental consequences that may occur with implementation of the Proposed Action and the No Action Alternative.

Resources Not Analyzed in Detail

The Proposed Action would not affect several resources. The following section explains why this EA does not analyze certain resources for which the Proposed Action would have no measurable or observable effects.

Indian Trust Assets (ITAs): ITAs are legal interests in assets that are held in trust by the United States for federally recognized Indian tribes or individuals. There are no Indian reservations, rancherias or allotments in the Proposed Action area. Based on the nature of the planned work it does not appear to be in an area that will impact Indian hunting or fishing resources or water rights nor is the proposed activity on actual Indian lands. It is reasonable to assume that the Proposed Action will not have any impacts on ITAs.

Indian Sacred Sites: There are no identified Indian Sacred Sites within the Proposed Action area; therefore, the Proposed Action would not inhibit use or access to any Indian Sacred Sites. Sacred sites are defined in Executive Order 13007 (May 24, 1996) as “any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, and Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.”

Cultural Resources: Reclamation has determined that the Proposed Action has no potential to affect historic properties. Reclamation’s determination is pursuant to the Title 54 U.S.C. § 306108, commonly known as Section 106 of the National Historic Preservation Act (NHPA) regulations codified at 36 CFR § 800.3(a)(1).

Environmental Justice: The Proposed Action would not result in adverse human health or environmental effects to minority or low-income populations. Executive Order 12898 requires each Federal agency to identify and address disproportionately high and adverse human health or environmental impacts, including social and economic effects of its program, policies, and activities on minority populations and low-income populations.

Climate Change and Greenhouse Gases: Climate change refers to significant change in measures of climate (e.g., temperature, precipitation, or wind) lasting for decades or longer. There would be no impacts contributing to climate change or greenhouse gases under the No Action Alternative. For the Proposed Action, minor and temporary impacts to climate change or greenhouse gases could result from the use of the pickup truck to transport the boat to the Proposed Action area and the use of the boat during the sampling surveys.

Any impacts to climate change or increases in greenhouse gases would be expected to be insignificant due to the size and scope of the Proposed Action, small amount of change from

current conditions, duration of use that is limited to the Proposed Action's activities and compliance with pollution related laws and regulations. Reclamation would comply with applicable federal, state, or local air pollution laws and regulations.

Many environmental changes can contribute to climate change (e.g., changes in sun's intensity, changes in ocean circulation, deforestation, urbanization, burning fossil fuels). Climate change implies a significant change having important economic, environmental, and social effects in a climatic condition such as temperature or precipitation. Climate change is generally attributed directly or indirectly to human activity that alters the composition of the global atmosphere, additive to natural climate variability observed over comparable time periods.

Recreation: The use of a boat within the Proposed Action's area during sampling activities would not result in adverse effects to recreationalists. The area is spacious, with plenty of room to perform the Proposed Action's activities without impeding on other recreationalists activities.

Noise: The Proposed Action would not increase the ambient noise levels within the Proposed Action area above the current levels. The boat ramps that would be used are existing boat ramps and the operation of the boats would not increase the noise level above those currently experienced within the Proposed Action area.

Socioeconomics: The Proposed Action would not result in adverse effects to socioeconomics. The Proposed Action could create a small short-term demand for Proposed Action related products and services though that demand would be unmeasurable.

Terrestrial wildlife and plants: The Proposed Action's activities would have no measurable or observable effects on terrestrial wildlife species, invertebrates, birds, amphibians, reptiles, or plant species and, therefore, these species are not discussed further.

Resources Analyzed in Detail

This EA analyzes the affected environment of the alternatives to determine the potential impacts to the following environmental resources.

Bay Delta Fisheries

Affected Environment

The Proposed Action area includes boat ramps, estuaries, and bays of the Sacramento River Deep Water Ship Channel, Yolo Bypass, Cache Slough Complex, the lower Sacramento River, the confluence of the Sacramento and San Joaquin Rivers, the Suisun Marsh, and the Suisun Bay ending at the Benicia-Martinez Bridge (Figure 1). The area includes both natural habitat and man-made navigation features. Tidal wetlands, tidal mudflats, and riparian habitat are present throughout the area. Land adjacent to the banks is used for agricultural, residential, commercial and industrial purposes.

Section 4.8.1 of the Reinitiation of Consultation on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project is incorporated here by reference as a description of the focal fisheries that would be affected by the Proposed Action and that section is incorporated here, by reference (Reclamation, 2019, pp. 4-34 to 4-39). Table 2 summarizes the

focal fish stocks that could potentially be affected by the Proposed Action. Reclamation used a variety of sources to identify special status fish species that may potentially occur in or near the Proposed Action area (USFWS, 2022) (NOAA Fisheries, 2022). State listed species were identified through the California Natural Diversity Database (CDFW, 2022).

Table 2. Focal fish stocks of the affected environment

Common Name	Scientific Name	Federal Status	California Special Status
Winter-Run Chinook Salmon	<i>Oncorhynchus tshawytscha</i> pop. 7	Endangered	Endangered
Spring-Run Chinook Salmon	<i>Oncorhynchus tshawytscha</i> pop. 11	Threatened	Threatened
Fall-Run and Late Fall-Run Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	-	High Concern
Central Valley Steelhead	<i>Oncorhynchus mykiss irideus</i> pop. 11	Threatened	-
Green Sturgeon	<i>Acipenser medirostris</i>	Threatened	-
White Sturgeon	<i>Acipenser transmontanus</i>	-	High Concern
Delta Smelt	<i>Hypomesus transpacificus</i>	Threatened	Threatened
Longfin Smelt	<i>Hypomesus transpacificus</i>	-	Threatened
Sacramento Splittail	<i>Pogonichthys macrolepidotus</i>	-	Moderate
Striped Bass		-	None
Pacific Lamprey	<i>Entosphenus tridentatus</i>	-	Moderate Concern

Delta Smelt abundance has declined during the past several decades. Once the most abundant fish sampled in Delta trawl surveys, Delta Smelt catches were reduced to such a low level as to justify its listing as threatened under the ESA in 1993 (58 FR 12854). The long-term decline in Delta Smelt abundance coincides with declines in phytoplankton and native zooplankton production, suggesting zooplankton availability and quality may have played a role (Sommer, et al., 2007) (Winder & Jassby, 2011) (Slater & D., 2014) (Stompe, Moyle, Kruger, & Durand, 2020).

Environmental Consequences Common to All Focal Bay Delta Fisheries

No Action

Focal fisheries in the Bay Delta would not be affected because no bongo nets would be submerged into the water. Long-term trends in abundance of focal fish species in the Bay Delta would be likely to continue.

Proposed Action

Under the Proposed Action, Reclamation would collect and analyze data to measure the effects of water management on Delta Smelt habitat, food quality, and quantity. Researchers would collect Delta Smelt habitat and prey data concurrent with EDSM. Data may be used to augment other SFHA action monitoring. The Proposed Action consists of launching a motorized boat from various, existing boat launches into the Sacramento River, Cache Slough Complex, and Suisun Bay and Marsh. The risk of focal fish species of the North Sacramento Arc to become entrained in research bongo nets would increase slightly but only to the extent that larvae happen to encounter the bongo nets. The potential for fish to become entrained in the bongo net would be extremely small because the nets are designed to collect zooplankton and crustaceans. The bongo net would have a small diameter of approximately 15 in and fine mesh sizes of between 150 to 500 microns. Additionally, the apparatus would be checked and cleared by researchers at the completion of each seven-minute sampling interval.

Effects to special status fish species including Central Valley steelhead, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, and Green Sturgeon from the Proposed Action would not be measurable or observable because these fish species would be able to detect and avoid the bongo net.

Environmental Consequences to Delta and Longfin Smelt

No Action

Under the No Action Alternative, Reclamation would not implement paired sampling with USFWS EDSM to study the effects of managed flow and food subsidy actions on Delta Smelt habitat and prey. A lack of paired data for Delta Smelt prey and habitat conditions would continue to limit Reclamation’s ability to understand relationships between water management actions, Delta Smelt populations, and prey abundance. Annual variations in water and prey abundance would continue to limit Reclamation’s ability to determine effectiveness of certain long-term water operations for Delta Smelt conservation. The EDSM sampling for Delta Smelt would continue.

During Directed Outflow Project sampling (paired with EDSM) from 2019 through summer 2021, researchers incidentally collected a total of seven unidentified larval Wakasagi or Delta Smelt (size range: 8.5-10 mm long) and 268 Longfin Smelt (size range: 6.5-30 mm long) during crustacean and zooplankton sampling between late March through early May (Table 3).

Table 3. Incidental take of Delta and Longfin Smelt by zooplankton and mesocrustacean nets during directed outflow project sampling (2019-2021)

Species	Life Stage	Incidental Take 2019 (count)	Incidental Take 2020 (count)	Incidental Take 2021 (count)
Wakasagi or Delta Smelt	larval	7	0	0
Longfin Smelt	yolk-sac	3	3	21
	larval	41	19	44

	pre-juvenile	14	69	34
	juvenile	0	0	20

Proposed Action

Under the Proposed Action Alternative, Reclamation would implement paired water and zooplankton collection during years with and without an X2 action and/or more localized SFHA flow/food subsidy actions. The bongo nets proposed for this study are designed to catch small crustaceans and zooplankton. The net mesh would be 500 microns. Some incidental catch of larval and early juvenile Delta and Longfin Smelt could occur, due to their small size and relatively poor swimming ability. The risk of collecting larval and juvenile smelt species is low because the bongo nets used for lower trophic monitoring are not designed to capture juvenile or adult fish.

The small net diameter and short sampling intervals limit the potential for incidental capture of Delta Smelt. Grimaldo, Stewart, & Kimmerer (2017) reported the probability of catching Delta Smelt older than larval stage and greater than 15 mm long in a 500-micron mesh ring net was less than two percent. Capture probabilities decrease with larger fish. Incidental catch is expected to be higher earlier in the year when greater abundances of larval and early juvenile fishes are present. The relative likelihood of entrainment is low. The sample nets are 15 in in diameter and would be checked by researchers after each seven-minute sampling interval for incidental catch.

The paired study would enable Reclamation to collect a long-term data set to measure the effects of certain water management operations on Delta Smelt habitat and food quality and quantity. A preliminary power analysis being conducted on zooplankton collected by the CDFW Fall Midwater Trawl study and the Directed Outflow Project from 2017-2020 suggest that additional years of sampling could improve the power to detect a response in some study regions. Continued monitoring over time is critical to detecting the effects of these actions, given that implementation is dependent on water year type and typically does not occur annually. Continued paired monitoring with EDSM would improve Reclamation’s ability to manage flow and food subsidy actions adaptively for Delta Smelt. Reclamation would draw more accurate inferences about how to adaptively manage water operations to benefit Delta Smelt over the long-term. The data could indirectly improve Delta Smelt habitat conditions over the long-term by improving Reclamation’s understanding of how certain water management operations affect Delta Smelt prey abundance.

The Proposed Action would continue to collaborate and cooperate with other agencies and studies to better document and understand the effects of outflow and more localized flow and food subsidy actions on Delta Smelt habitat, food, condition, growth, and survival. The DOP was able to leverage other data sets, and vice versa, to address hypotheses linking environmental conditions and prey fields to metrics of Delta Smelt foraging, health, and survival (Hammock, Hartman, B., Hennessy, & Teh, 2019) (Schultz, Directed Outflow Project: Technical Report 2, 2021) (Schultz, Directed Outflow Project: Technical Report 1, 2019). The DOP also supported research to evaluate new approaches for sample collection, preservation, and analysis. These synergies are expected to continue as part of the Proposed Action.

1. EDSM paired sampling. The Proposed Action would include close coordination with USFWS to accomplish paired sampling with EDSM. This has been accomplished successfully and consistently throughout the DOP and is anticipated to continue as such. Environmental and prey data from the Proposed Action augments data collected routinely as part of EDSM. Paired sampling with EDSM allows the Proposed Action to directly address hypotheses about Delta Smelt responses to flow and food subsidy actions by leveraging existing USFWS fish sampling, which also avoids additional take.
2. SFHA monitoring. The Proposed Action would include close coordination with California Department of Water Resources regarding the SMSCG and North Delta Food Subsidies actions. The DOP shared data to augment monitoring of these actions in the past, and additional opportunities exist with the Proposed Action to continue to contribute to monitoring the actions, particularly the North Delta Food Subsidies action.
3. Delta Smelt foraging, health, growth and survival. The Proposed Action would include continued coordination with partners from USFWS, CDFW, and UC Davis for related studies evaluating Delta Smelt prey electivity and foraging success, potential exposure to contaminants, histopathological indices of condition, and otolith estimates of growth and life history diversity. Although these studies occur outside of the Proposed Action, coordination in sampling and the exchange of data has and is anticipated to continue to result in mutual benefit for improving current scientific understanding and informing outflow and food subsidy management actions.

Under the Proposed Action, the potential for fish to become entrained in the bongo net would be low because the diameter of the bongo net would be approximately 15 in and that apparatus would be towed from a boat for seven-minute intervals. The risk of mortality for any fish entrained would be limited by the researchers' frequency of checking and clearing the nets. Any fish that happen to become entrained during the sample would spend no more than seven minutes entrained in the net. The study was designed to minimize and avoid any stress commonly associated with sampling. Reclamation has requested formal consultation with the USFWS due to the increasing decline in Delta Smelt abundance and the Proposed Action's activities within their potential habitat. The Proposed Action will implement the measures included in the biological opinion to reduce or avoid any significant impacts to Delta Smelt.

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area of the Proposed Action.

Non-Federal actions that may affect the action area include:

- Ongoing use of boats for recreation and fishing
- Southport Levee Improvement Project
- Ongoing commercial shipping practices

All of these activities and scenarios can degrade habitat or cause the injury or death of a listed species. The Proposed Action will not add measurably to these adverse cumulative effects. The Proposed Action may, however, if successful, provide benefits to Delta Smelt populations and associated critical habitat.

No projects or programs have been identified that will be impacted by the Proposed Action. The proposed monitoring action will substantially improve the state of knowledge of the factors affecting habitat quality and prey availability and their effects on the fish community in response to flow and food subsidy actions included in the 2019 USFWS Biological Opinion for Re-initiation of Consultation on the Coordinated Operations of the Central Valley Project and State Water Project (USFWS 2019).

Water Resources

Affected Environment

The Proposed Action area includes the Sacramento River Deep Water Ship Channel and Yolo Bypass / Cache Slough Complex area, the lower Sacramento River and confluence of the Sacramento and San Joaquin Rivers, and Suisun Marsh and Suisun Bay ending at the Benicia-Martinez Bridge. The area includes both natural habitat and man-made navigation features. Tidal wetlands and mudflats, and riparian habitat are present throughout the area.

Environmental Consequences

No Action Alternative

Under the No Action Alternative, Reclamation would not implement paired sampling with USFWS EDSM to study the effects of managed flow and food subsidy actions on Delta Smelt habitat and prey. Water resources would not be affected.

Proposed Action Alternative

Under the Proposed Action Alternative, Reclamation would launch a motorized boat from various, existing boat launches into the Sacramento River, Cache Slough Complex, and Suisun Bay and Marsh. The boat would be unloaded and loaded from the water by a trailer at the existing boat launches. Vehicles or equipment would be inspected prior to use and washed/cleaned only at approved off-site areas. No fill material would be deposited in the waterway. No measurable change in surface water elevation would result. Implementation of the Proposed Action would not result in increased turbidity in the surface water of Proposed Action area. All activities would be conducted via the boat. No material would be dredged or deposited. Implementation of the Proposed Action would not significantly impact water resources.

Consultation and Coordination

Agencies/Persons Consulted

Reclamation is consulting and coordinating with the USFWS regarding ESA-listed species affected by the Proposed Action. Although the likelihood is low, Reclamation has determined that the Proposed Action may affect and is likely to adversely affect Delta Smelt due to the potential for incidental capture of individuals of larval and early juvenile life stages. Reclamation has requested formal consultation for Delta Smelt. Reclamation has determined that effects to listed fish species under National Marine Fisheries Service jurisdiction would be neither

observable nor measurable. Reclamation has consulted with cultural staff on the Proposed Action. The Proposed Action does not have the potential to affect historic properties.

Public Review Period

This EA is available for public comment for 30 days.

Federal Laws, Regulations, and Policies

National Historic Preservation Act (54 USF § 300101 et seq.)

54 U.S.C. § 304108, commonly known as Section 106 of the NHPA, requires that Federal agencies take into consideration the effects of their undertakings on historic properties. Historic properties are cultural resources that are included in, or eligible for inclusion in, the National Register. The 36 CFR Part 800 regulations implement Section 106 of the NHPA and outline the procedures necessary for compliance with the NHPA. Compliance with the Section 106 process follows a series of steps that are designed to identify if significant cultural resources are present in the Proposed Action area and to what level they would be affected by the proposed Federal undertaking. The Proposed Action would have no impact on historical or cultural resources. Reclamation does not have the need to consult with the State Historic Preservation Officer.

Section 7 of the Endangered Species Act (16 USC § 1531 et seq.)

Section 7 of the ESA requires Federal agencies to ensure that discretionary federal actions do not jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of the critical habitat of these species. Reclamation is preparing a biological assessment for formal consultation on Delta Smelt. A FONSI will not be signed and the project will not be implemented until the USFWS issues a biological opinion on the Proposed Action. Measures included in the biological opinion will be implemented to avoid impacts to Delta Smelt as appropriate.

References

- CDFW. (2022, February 8). *California Natural Diversity Database*. Retrieved from <https://wildlife.ca.gov/Data/CNDDB>
- CNRA. (2016). *Delta Smelt Resiliency Strategy*. California Natural Resources Agency.
- Grimaldo, L. F., Stewart, A., & Kimmerer, W. (2017). Dietary segregation of pelagic and littoral fish assemblages in a highly modified tidal freshwater estuary. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*, 1, 200-2017.
- Hammock, B. G., Hartman, R., B., S. S., Hennessy, A., & Teh, S. J. (2019). Tidal wetlands associated with foraging success of Delta Smelt. *Estuaries and Coasts*(42), 857-867.
- Interagency Ecological Program. (2015). *An updated conceptual model of delta smelt biology: our evolving understanding of an estuarine fish*. Interagency Ecological Program for the San Francisco Bay/Delta Esuary.
- Moyle, P., Brown, L., Durand, J., & Hobbs, J. (2016). Delta Smelt: Life History and Decline of a Once-Abundant Species in the San Francisco Estuary. *San Francisco Estuary and Watershed Science*, 14(2). Retrieved from <https://doi.org/10.15447/sfews.2016v14iss2art6>
- NOAA Fisheries. (2022, February 8). *ESA Section 7 Consultations on the West Coast*. Retrieved from <https://www.fisheries.noaa.gov/west-coast/consultations/esa-section-7-consultations-west-coast>
- Reclamation. (2019). *Environmental Impact Statement for the Reinitiation of Consultation on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project*. California Great Basin: U.S. Department of the Interior, Region 10. Retrieved from https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=41664
- Schultz, A. A. (2019). *Directed Outflow Project: Technical Report 1*. Sacramento: Bureau of Reclamation, Mid-Pacific Region, Bay-Delta Office.
- Schultz, A. A. (2021). *Directed Outflow Project: Technical Report 2*. Sacramento: Bureau of Reclamation, California-Great Basin Region Bay-Delta Office.
- Slater, S. B., & D., B. R. (2014). Diet, prey selection, and body condition of age-0 Delta Smelt, *Hypomesus transpacificus*, in the Upper San Francisco Estuary. *San Francisco Estuary and Watershed Science*(12), 1-26.
- Sommer, T., Armor, C., Baxter, R., Breuer, R., Brown, L., Chotkowski, M., . . . Souza, K. (2007). The collapse of pelagic fishes in the upper San Francisco Estuary. *Fisheries*(32), 270-277.

Stevens, D. J., & Olsen, A. (2004). Spatially balanced sampling of natural resources. *Journal of the American Statistical Association*(99), 262-278.

Stompe, D. K., Moyle, P. B., Kruger, A., & Durand, J. R. (2020). Comparing and Integrating Fish Surveys in the San Francisco Estuary: Why Diverse Long-Term Monitoring Programs are Important. *San Francisco Estuary and Watershed Science*, 18. Retrieved from <https://doi.org/10.15447/sfew.s.2020v18iss2art4>

USFWS. (2019). *Biological opinion for the reinitiation of consultation on the coordinated operations of the Central Valley Project and State Water Project*. U.S. Fish and Wildlife Service. Sacramento, CA: U.S. Fish and Wildlife Service.

USFWS. (2022, February 8). *IPaC Information for Planning and Consultation*. Retrieved from <https://ipac.ecosphere.fws.gov/location/index>

Winder, M., & Jassby, A. D. (2011). Shifts in zooplankton community structure: implications for food-web processes in the upper San Francisco Estuary. *Estuaries and Coasts*(34), 675-690.