OCTOBER
2023

Salinas River Lagoon and Sandbar Management
Low Effect Habitat Conservation Plan

Monterey County Water Resources Agency
1441 Schilling Place, North Building
Salinas, CA 93901

SALINAS RIVER LAGOON AND SANDBAR MANAGEMENT LOW EFFECT HABITAT CONSERVATION PLAN

PREPARED FOR:

Monterey County Water Resources Agency
1441 Schilling Place
North Building
Salinas, CA 93901
Contact: Jason Demers
831.755.4868

PREPARED BY:

ICF
201 Mission Street, Suite 1500
San Francisco, CA 94105
Contact: Bernadette Clueit
707.223.4267

October 2023

Cover Photo Credits:
Salinas River Lagoon: Monterey County Water Resources Agency
Tidewater goby: FISHBIO
Western snowy plover: Matt Lau/National Park Service
Monterey spineflower: Michael Mitchell

Monterey County Water Resources Agency. 2023. *Salinas River Lagoon and Sandbar Management Low Effect Habitat Conservation Plan*. October. Salinas, CA. Prepared by ICF, San Francisco, CA.

Contents

Tables

Page

Figures

Page

Acronyms and Abbreviations

AMMs	avoidance and minimization measures
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
DPS	Distinct Population Segment
eDNA	environmental DNA
ESA	Endangered Species Act
FTE	full time equivalent
HCP	habitat conservation plan
HCP Handbook	Habitat Conservation Planning and Incidental Take Permit Processing Handbook
HUC	hydrologic unit code
ITP	incidental take permit
LTMP	Long-Term Management Plan
MCWRA	Monterey County Water Resources Agency
NEPA	National Environmental Policy Act
NGVD29	National Geodetic Vertical Datum of 1929
NMFS	National Marine Fisheries Service
OSR	Old Salinas River
PCE	primary constituent element
ppt	parts per thousand
Salinas River NWR	Salinas River National Wildlife Refuge
SCCCS	South-Central California Coast steelhead
State Parks	California Department of Parks and Recreation
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

This Page Intentionally Left Blank

Chapter 1
Introduction

1.1 Overview of the Habitat Conservation Plan

The Salinas River Lagoon and Sandbar Management Low Effect Habitat Conservation Plan (HCP) serves as the basis for an application from the Monterey County Water Resources Agency (MCWRA or Applicant) for an incidental take permit (ITP) from the U.S. Fish and Wildlife Service (USFWS) under the federal Endangered Species Act (ESA). The ITP would provide incidental take authorization of covered species from activities described in this HCP related to the management of the Salinas River Lagoon and sandbar in Monterey County, California (Figure 1-1). This HCP is developed as partial fulfillment of an ITP application pursuant to Section 10(a)(1)(B) of the ESA and regulatory guidance in the *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* (HCP Handbook) (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016).

The covered activities described in this HCP include management of the water surface elevation in the Salinas River Lagoon via sandbar management to facilitate breaching of the lagoon and avoid or minimize flooding impacts to adjacent agricultural lands and residences. This low effect HCP is expected to be replaced by a more comprehensive HCP called the Salinas River Operations HCP which is currently in development by MCWRA. The Salinas River Operations HCP will include the covered activities and species described herein, as well as other covered activities and species related to a wider range of MCWRA operations. The permit term of this low effect HCP is proposed to be five (5) years based on the expected time needed to implement the covered activities and conservation strategy, and to complete the Salinas River Operations HCP.

There are three federally listed species that have the potential to be affected by covered activities for which MCWRA is seeking take coverage: tidewater goby (*Eucyclogobius newberryi*); western snowy plover, (*Charadrius nivosus nivosus*) Pacific Coast distinct population segment (DPS); and Monterey spineflower (*Chorizanthe pungens* var. *pungens*). Critical habitat for tidewater goby and western snowy plover is also present in the permit area and has the potential to be affected by covered activities. The HCP includes avoidance and minimization measures, a conservation strategy to mitigate effects that cannot be avoided, and an associated monitoring and adaptive management program to ensure the conservation strategy achieves its intended outcomes. The conservation strategy was informed by the conservation recommendations outlined in the Salinas River Long-Term Management Plan (LTMP) (Monterey County Water Resources Agency and State Coastal Conservancy 2019) and by the conservation actions identified in the recovery plans for each of the three covered species.

Overall, management of the Salinas River Lagoon and sandbar is expected to result in temporary impacts to lagoon habitat and approximately 1.35 acres of temporary impacts to beach habitat during each facilitated breach event during the permit term. These temporary impacts will occur in roughly the same location during each breach event and will be mitigated by a combination of data collection, monitoring, and directed research in support of species recovery efforts for tidewater goby; monitoring, and financial support for California Department of Parks and Recreation's (State Parks) plover habitat management and public education program at Salinas River State Beach; and

data collection and invasive plant species removal to enhance beach habitat for Monterey spineflower in cooperation with State Parks.

1.2 Geographic Scope

The geographic scope of the HCP encompasses the last reach of the Salinas River, which drains in a northwesterly direction into Monterey Bay and is located at the boundary of the Salinas River State Beach to the north, and the Salinas River National Wildlife Refuge (Salinas River NWR) to the south, approximately 3 miles southwest of the City of Castroville (Figure 1-1).

The HCP defines two different boundaries for the purposes of the HCP, the *plan area* and the *permit area*, each of which is defined below consistent with how they are used in the HCP Handbook.

The *plan area* is the specific geographic area where covered activities described in the HCP, including mitigation, may occur. The plan area includes at least the permit area but often includes lands outside of the permit area.

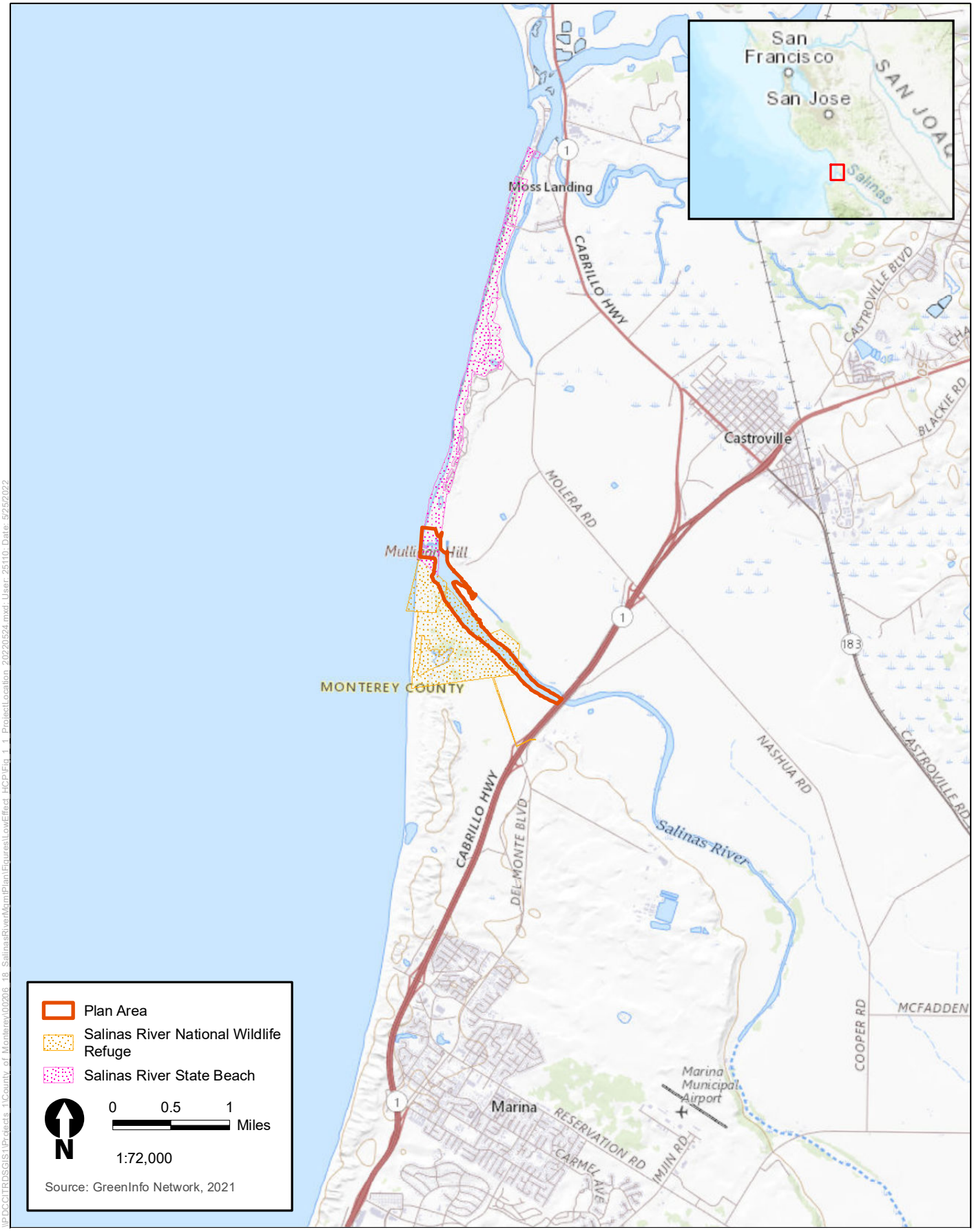
The *permit area* is the geographic area where the impacts of the covered activities occur for which an ITP is requested. The permit area must be delineated in the ITP and be included within the plan area of the HCP.

For the purposes of this low effect HCP, the plan area and the permit area are the same.

1.2.1 Permit Area Boundary

The permit area encompasses approximately 142 acres of the upstream reach of the Salinas River to the Highway 1 Bridge (from the mean high water mark plus 6 feet of elevation) and an approximate 100 foot stretch of the of the Old Salinas River (OSR) north of the slidegate (Figure 1-2).

To determine the permit area, the project boundary delineated by MCWRA for sandbar management activities (Monterey County Water Resources Agency 2022) was assessed in relation to the historical movement of the lagoon and river mouth. The project boundary was overlaid against historic aerial imagery from 1993 – 2021 to determine the extent of movement of the lagoon and river mouth over time. The location of the lagoon and river mouth have been relatively stable since 2012 with some periodic minor expansion to the north, but no significant southward movement. Thus, the southern boundary delineated by MCWRA as the project boundary was deemed likely to encompass any potential southward movement of the lagoon over the five years of the proposed permit term for this low effect HCP. The northern boundary delineated by MCWRA as the project boundary is less likely to encompass the potential for northward expansion of the lagoon over the five years of the proposed permit term and does not include an access path across the sand dunes and beach that is clearly visible on aerial images.



\\PDCITRDSGIS1\Projects_1\County_of_Monterey\00206_18_SalinasRiverMgmtPlan\Figures\LowEffect_HCP\Fig_1_1_ProjectLocation_20220524.mxd User: 26110 Date: 5/25/2022

Figure 1-1
Project Location and Regional Map

The permit area boundary encompasses the project boundary delineated by MCWRA and includes an approximately 250-foot expansion to the north to account for potential northward movement of the lagoon and associated northward movement of the access route needed to reach the breach site. The boundary includes the clearly visible vehicular access path across the dunes and beach, and the western boundary aligns with the mean low tide mark. The permit area includes all areas where covered activities and impacts from covered activities may occur, including the OSR slidegate, equipment staging area, access to the breach site, and breach location. All potential locations for pre-breach tidewater goby sampling fall within the permit area, as do all recent sampling locations for tidewater goby used to inform ongoing lagoon distribution and population studies (Figure 1-2: lettered markers).

1.3 Background

The Salinas River, like most central California coastal river systems, can be hydrologically disconnected from the ocean for most of the year due to a naturally occurring beach sandbar that blocks flows and creates what is known as the Salinas River Lagoon. When the lagoon is blocked by the sandbar, high flow events resulting from winter storms or reservoir releases have the potential to raise the surface elevation of the lagoon (also referred to as *lagoon stage*) to a point high enough to naturally breach the sandbar and reconnect the river to the ocean. However, low-lying upland areas surrounding the lagoon, including agricultural lands and residences, can be negatively affected by flooding at a lower lagoon surface elevation than that necessary for a natural (hereafter referred to as *unassisted*) sandbar breach.

The Monterey County Water Resources Agency Act (California Water Code, Appendix 52) formally established MCWRA as a public flood control and water agency in its current form in 1991[1]. Section 9(e) of the Agency Act defines MCWRA's responsibility to "[c]ontrol the flood and storm waters of the Agency … and protect from damage from those flood or storm waters the watercourses, watersheds, public highways, life, and property in the Agency…". Under this authority, MCWRA manages the water levels in the Salinas River Lagoon to control flooding in the adjacent uplands. When the Salinas River mouth is closed to the ocean, the water level in the lagoon is regulated using a slidegate to the OSR channel located at the base of Mulligan Hill (Figure 1-2). The OSR channel, an earthen channel approximately 4.5 miles long and 8–200 feet wide, connects the Salinas River Lagoon to Moss Landing Harbor and the mouth of Elkhorn Slough. MCWRA constructed the slidegate at the mouth of the OSR channel in 1996 to replace a degraded slidegate and culvert built in 1990. Flow through the slidegate is limited by the physical capacity of the outlet structure, and by the hydrologic capacity in the OSR channel. Therefore, sandbar management to facilitate a lagoon breach is necessary when outflow through the OSR channel is at capacity and flow in the Salinas River is predicted to cause an increase in lagoon stage that threatens to flood adjacent agricultural lands and homes.

[1] The agency was previously known as the Monterey County Flood Control and Water Conservation District established in 1947 and organized as a division of the Public Works Department of the County of Monterey.

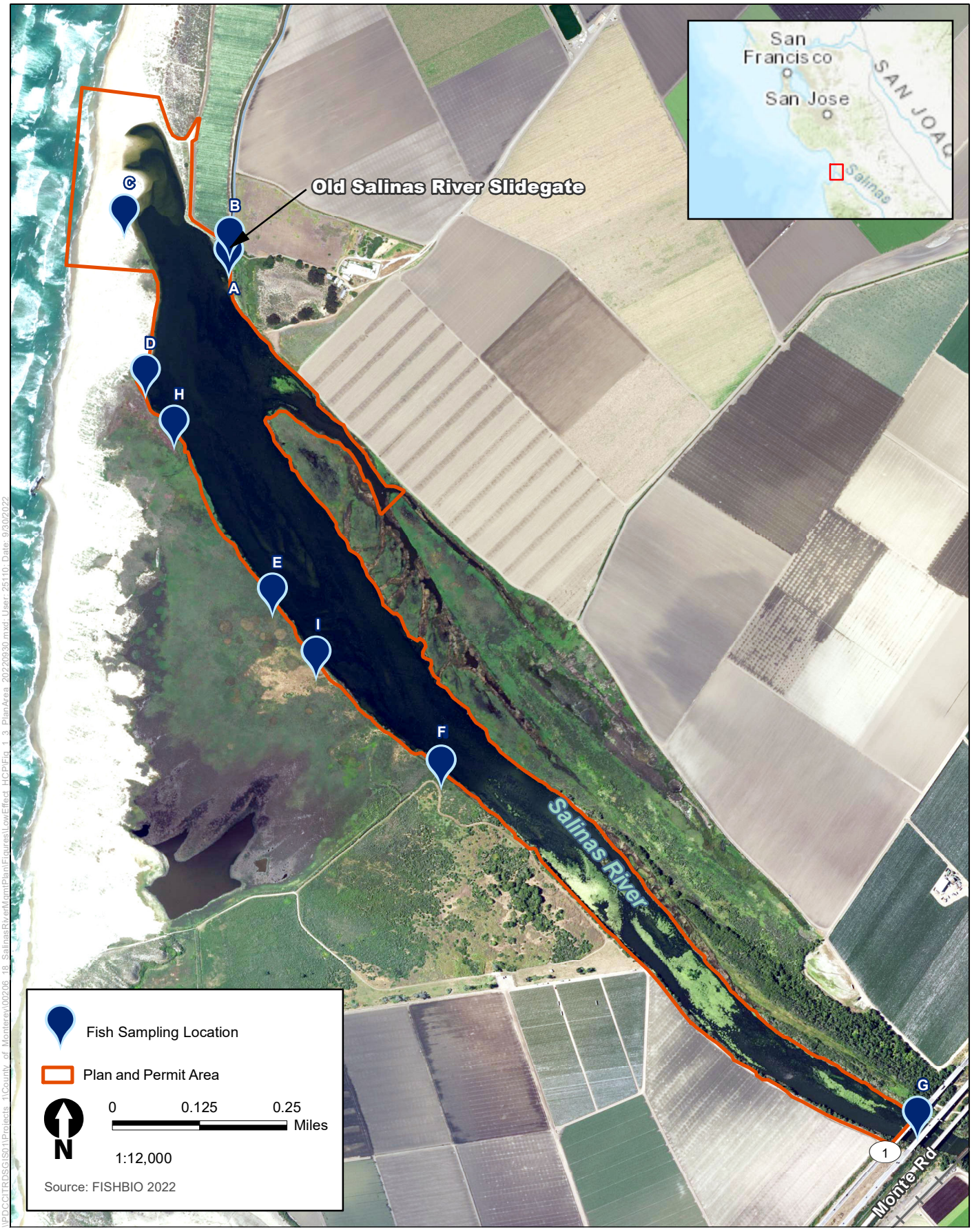


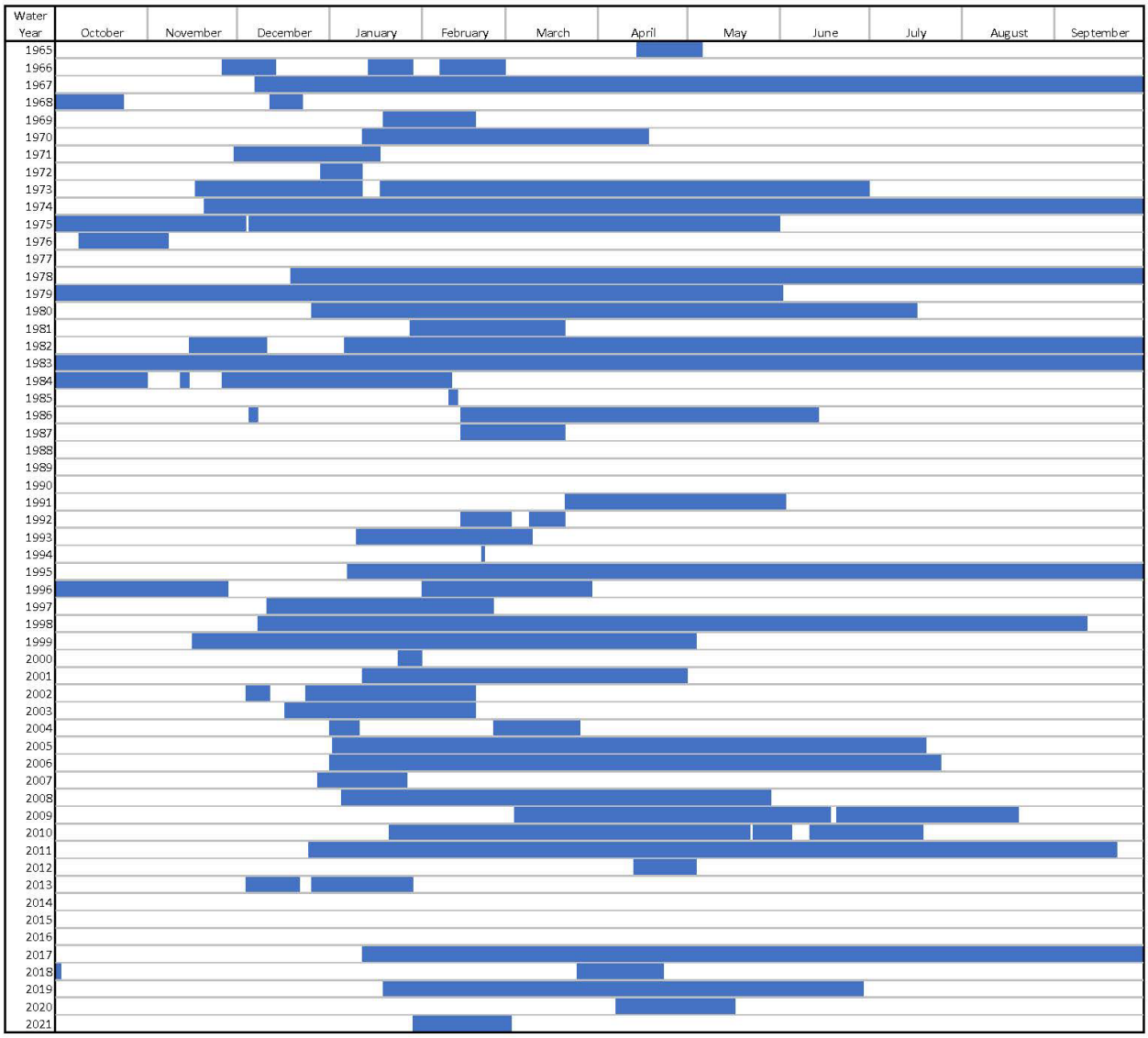
Figure 1-2
Salinas River Lagoon and Sandbar Management Low Effect HCP
Plan and Permit Area

To address flooding at and upstream of the Salinas River Lagoon, MCWRA developed the Salinas River Lagoon Sandbar Management Plan Project Description (Monterey County Water Resources Agency 1997). This document defines criteria for managing the sandbar elevation to allow direct outflow of the river to the ocean when water levels in the lagoon are high and flooding in the nearby uplands is imminent. Sandbar management includes two main components to facilitate a breach of the lagoon. First, a drainage channel (referred to as a *pilot channel*) is excavated across the beach sandbar to direct water flow from the lagoon once it reaches a critical elevation and the breach occurs, and then the remaining sandbar is lowered to an elevation that will promote a lagoon breach prior to upland flooding.

Lagoon breaching is most likely to occur in conjunction with winter storms in November, December, or January. Facilitated breaching is typically undertaken by MCWRA during this period and is designed to closely mimic the conditions that would result from an unassisted breach event, but without the associated upland flooding. The initial breach event of the wet season is most likely to be a facilitated breach with subsequent breaches occurring unassisted, although facilitated breaching can occasionally occur anytime between October and June in response to storm events if the sandbar elevation is high enough to promote upland flood risk. MCWRA conducts facilitated breaching during storm events as high flows increase the scour potential at the mouth; if flows are not high enough to scour the sand out of the river mouth, the sandbar has an increased potential to form again before the breach is complete, requiring additional work to maintain the mouth opening. Subsequent breach events throughout the wet season after a facilitated breach are more likely to occur unassisted because the height of the sandbar has often not rebuilt to its pre-breach elevation and water can overtop the sandbar to breach the lagoon without the risk of upland flooding. River flows typically recede in late spring to low levels and, depending on tide and wave conditions, the mouth may close by summer and reform the lagoon. In dry years, river flows from rain events may not be large enough to trigger lagoon breaching (unassisted or facilitated), leaving the sandbar in place for a year or more. Conversely, natural conditions can also cause the mouth to remain open and the river to remain hydrologically connected to the ocean for a year or more (Figure 1-3).

Chapter 3, *Covered Activities*, includes a more detailed description of the activities proposed for coverage under this HCP.

Figure 1-3. Duration of Salinas River Mouth Openings for Water Years 1965 to 2021



Notes: Blue bars indicate times the Salinas River was hydrologically connected to the ocean; white indicate times the sandbar blocked the river mouth forming the lagoon.

1.4 Permit Term

The *permit term* is the period for which covered activities receive incidental take authorization. The permit term is also when the biological goals and objectives of the HCP must be met.

The permit term of the HCP is proposed to be 5 years. MCWRA proposes this permit term based on the expected time needed to implement the covered activities and conservation strategy, and to complete the Salinas River Operations HCP and the issuance of incidental take permits for that plan.

1.5 Applicant

The Monterey County Water Resources Agency is the proposed applicant for this HCP and would be the sole permit holder (Permittee) under the ITP. MCWRA has prepared this HCP pursuant to the requirements of ESA Section 10(a)(1)(B) as well as the permit issuance criteria described in Title 50 of the Code of Federal Regulations [CFR] Section 17.22(b).

The Applicant's future responsibilities and commitments as an ESA Section 10(a)(1)(B) incidental take permit holder are discussed in Chapter 6, *Plan Implementation*, and Chapter 7, *Cost and Funding* of this HCP.

1.6 Covered Species

MCWRA is requesting incidental take coverage for three federally listed species that could be adversely affected by the covered activities: tidewater goby, western snowy plover, and Monterey spineflower. All other federally listed plant and wildlife species either do not have the potential to occur in the permit area or are unlikely to be affected by covered activities because key habitat elements are not present or will be avoided. Appendix A provides an evaluation of the federally listed species with a range overlapping the permit area and the rationale for covering or not covering each species under this HCP.

South-Central California Coast steelhead (*Oncorhynchus mykiss*) and critical habitat for the species occurs in the permit area. MCWRA is not requesting incidental take coverage for this species because the covered activities described in the HCP are not expected to result in take of the species. Appendix B provides the rationale for this determination.

1.7 Regulatory Framework

1.7.1 Federal Endangered Species Act

The purpose of the ESA is to provide a means whereby the ecosystems upon which threatened and endangered species depend may be conserved, and to provide a program for the conservation of such species. USFWS and the National Marine Fisheries Service (NMFS) (collectively, the Services) are responsible for conservation and protection of threatened and endangered species under the ESA, including the listed species covered by this HCP. USFWS has jurisdiction over federally listed plants, invertebrates, wildlife, and freshwater resident fish. NMFS has jurisdiction over all marine species and anadromous fish.

ESA Section 9 prohibits the take of any fish or wildlife species listed under the ESA as endangered. Take of threatened fish or wildlife species is prohibited by ESA Section 4(d). For threatened species, USFWS or NMFS issues regulations upon listing that describe which activities are specifically prohibited by ESA Section 9 and which activities are not prohibited (i.e., allowed without a Section 9 exemption).[2] The ESA includes mechanisms that allow project proponents to apply for exemptions from the ESA Section 9 take prohibitions. These exemptions are addressed in ESA Section

[2] Before regulations changed in 2019, USFWS issuance of "4(d)" rules for threatened species was optional. Before 2019, if USFWS did not issue a 4(d) rule for a threatened species at the time of listing, the take prohibitions of ESA Section 9 were applied fully, with no exceptions. Western snowy plover was listed as threatened in 1993 and as such, is covered by the protections of the pre-2019 "blanket" 4(d) rule. In 2006, USFWS issued a proposed special rule under section 4(d) that would replace the blanket take prohibition; that special rule was never adopted.

10(a)(1)(B) for nonfederal actions as ITPs. Federal agencies must consult under ESA Section 7 to receive take exemptions for federal actions. The requirements of the relevant sections of the ESA are summarized in the following subsections.

1.7.1.1 Endangered Species Act Section 10

Under ESA Section 10(a)(2)(A), a nonfederal party may apply to the USFWS or NMFS for an ITP providing authorization to incidentally take listed species. The application must include an HCP, which must describe the following mandatory elements (50 CFR 17.22[b]).

- The impact that will likely result from the taking of covered species.
- The steps the ITP applicants will take to monitor, minimize, and mitigate such impacts to the maximum extent practicable.
- The funding that will be available to implement such steps.
- The procedures to be used to deal with unforeseen circumstances[3].
- The alternative actions to such taking the ITP applicant considered and the reasons why such alternatives were not selected.
- Other measures that the Secretary of the Department of the Interior or Commerce may require as being necessary or appropriate for purposes of the HCP.

This HCP is intended to satisfy these requirements of ESA Section 10 for each of the proposed covered species.

USFWS has established and provided a categorical exclusion for a special category of HCP, called a low effect HCP (516 DM 8.5.C(2)). A low effect HCP is defined by USFWS as one that has (1) minor or negligible effects on species and their habitats covered under the HCP both individually and cumulatively and after accounting for minimization and mitigation measures proposed in the HCP; and (2) minor or negligible effects on all other environmental values or resources considered under the National Environmental Policy Act (NEPA), both individually and cumulatively. In order to qualify as low effect, a plan must also be eligible for a categorical exclusion under NEPA.

The issuance of an ITP is also subject to evaluation by USFWS via the ESA Section 7 consultation process described in the following subsection.

1.7.1.2 Endangered Species Act Section 7

ESA Section 7 requires all federal agencies, in consultation with the Services, to ensure that any action "authorized, funded, or carried out" by any agency "…is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification" of critical habitat (16 United States Code [USC] 1536(a)(2)). Before initiating an action, the federal agency must determine whether the action may affect listed species or their designated critical habitat. If the agency determines that the action *may affect* a listed species or destroy or adversely modify critical habitat, it is required to consult with either USFWS or NMFS pursuant to Section 7(a)(2) of the ESA. If the agency determines that the action is likely to jeopardize a proposed species or likely to destroy or adversely modify proposed critical habitat, the

[3] *Unforeseen circumstances* are changes in circumstances affecting a covered species or geographic area covered by the HCP that could not reasonably have been anticipated by the HCP developers, and that result in a substantial and adverse change in the status of a covered species. Refer to Chapter 6.

agency is required to conference with either USFWS or NMFS pursuant to Section 7(a)(4). If the agency determines, and USFWS or NMFS concurs, that the action is likely to adversely affect neither listed species nor designated critical habitat, the consultation is concluded. If the agency determines that the action is likely to adversely affect a listed species or designated critical habitat, a formal consultation is initiated.

During formal consultation, USFWS or NMFS prepares a biological opinion in response to information provided by the action agency. The biological opinion contains an analysis of the effects of the proposed action on listed species and critical habitat and a determination of whether the action is likely to jeopardize the continued existence of the species or destroy or adversely modify designated critical habitat.

Because the issuance of an ITP is a federal action, the Services must consult or confer with themselves under ESA Section 7. This HCP will provide USFWS with supporting information for its intra-Service and inter-Service biological opinions.

The HCP is not intended to alter the obligation of USFWS, as a federal agency, to consult itself or NMFS pursuant to ESA Section 7. USFWS will conduct ESA consultations for covered activities in accordance with the established regulatory process and deadlines (50 CFR 402.14).

1.7.2 National Environmental Policy Act

NEPA, established in 1969, serves as the nation's basic charter for determining how federal decisions affect the human environment (42 USC 4332). Federal agencies must complete environmental documents pursuant to NEPA before implementing discretionary federal actions. Such documents disclose environmental information, assist in resolving environmental problems, foster intergovernmental cooperation, and enhance public participation.

Any federal agency undertaking a major federal action that is likely to affect the human environment must prepare and conduct an environmental review pursuant to NEPA. USFWS's issuance of an ITP under ESA Section 10(a)(1)(B) is a federal action subject to NEPA. USFWS has determined that this HCP qualifies as a low effect HCP and therefore meets the requirements of a categorical exclusion under NEPA, in accordance with U.S. Department of the Interior Departmental Manual 6, Section 516, Chapter 8 (516 DM 8.5.C(2)). To satisfy NEPA requirements, USFWS has prepared an Environmental Action Statement that serves as USFWS's record of NEPA compliance for this categorically excluded action.

Chapter 2
Physical Setting and Biological Resources

2.1 Physical Setting

The Salinas River is located in the Salinas Cataloging Unit watershed hydrologic unit (hydrologic unit code [HUC] 18060005). Hydrologic units are arranged or nested within each other, from large geographic areas (regions) to small geographic areas (cataloging units). Cataloguing units are further divided into 8-, 10-, and 12-unit HUCs. HUCs correspond to the natural divisions between watershed boundaries and are based on the U.S. Geological Survey's (USGS) hydrologic unit maps (U.S. Geological Survey 2021). The permit area is located in the HUC 12 Alisal Creek-Salinas River Watershed. The topography of the permit area is relatively flat and elevation ranges between approximately 5 and 15 feet above mean sea level.

2.1.1 Hydrology

Hydrologically, the lagoon is the last reach of the Salinas River, which drains in a northwesterly direction into Monterey Bay from its headwaters in San Luis Obispo County. The last reach of the Salinas River was historically a complex of natural dune, scrub, riparian, wetland, and riverine communities (San Francisco Estuary Institute 2009). The river mouth was likely "meandering," moving north and south along the beach in response to oceanic and river processes. In the late nineteenth and early twentieth centuries, the Salinas River flowed north along the dune community until it joined Elkhorn Slough and opened to the ocean near Moss Landing (San Francisco Estuary Institute 2009). With the construction of Moss Landing Harbor, in addition to agricultural and residential development beginning in the 1950s, the northward connection to the ocean was severed and the river mouth now opens to the ocean in its current position just southwest of the small, unincorporated town of Castroville.

Upstream of the Salinas River Lagoon, the natural hydrology of the river and its primary tributaries have been altered by several manmade structures managed by MCWRA including the Salinas River Diversion Facility, Nacimiento Reservoir, and San Antonio Reservoir. With the exception of the last 15 miles, the reach of the river running through the Salinas Valley was historically broad and sandy, spanning up to about a half mile wide. Prior to the construction of the reservoirs and diversion, this reach experienced a considerable amount of variability in seasonal flows on both an average and inter-annual basis. During the wet season, the sediment-laden Salinas River would flood and overflow onto the adjacent bottomlands, depositing sand as the river receded (San Francisco Estuary Institute 2009). During the dry season, the Salinas River was described as a discontinuous, shallow brook that regularly maintained baseflows and substantial summertime pools in many of the reaches (San Francisco Estuary Institute 2009). Relative to historical conditions, the channel bed in this reach has narrowed significantly and substantial agricultural conversion has occurred in what was once the bottomlands, resulting in extensive reduction of the riparian corridor (Monterey County Water Resources Agency 2014). Landowners along much of the Salinas River have historically constructed levees (often not engineered and composed of sand, broken concrete, and other construction materials) to protect agricultural lands from flooding (Monterey County Water Resources Agency 2014) further reducing the historical floodplain of the river and constraining flows.

The management of reservoir releases and diversions alter historical hydrology in two primary ways: by decreasing flows during the wet season and increasing flows during the dry season. Through these upstream structures, MCWRA manages surface water to reduce flooding and help recharge the groundwater table which supplies most agricultural and municipal demand in the Salinas Valley.

In years when river flow is insufficient to maintain connectivity to the ocean, a naturally occurring sandbar separates the Salinas River from the ocean to form the lagoon. Facilitated breaching of the Salinas River Lagoon for flood control via sandbar management has been conducted since approximately 1910, and around 1965, MCWRA became the agency responsible for the sandbar management program (Entrix Inc. 2001). Over the past two decades, on average during the spring, summer, and fall, the lagoon surface water elevation has been maintained at approximately 3.5 feet National Geodetic Vertical Datum of 1929 (NGVD29). Thus, the managed conditions in the lagoon are considered normal circumstances.

2.1.2 Precipitation and Growing Season

The climate in the vicinity of the Salinas River Lagoon is temperate with warm, dry summers and cool, wet winters. National Weather Service cooperative weather station number SNSC1 (Salinas No. 2) is the closest weather station to the Salinas River Lagoon. Average annual precipitation at this weather station is approximately 15.38 inches, with most rain falling between the months of November and April. The average annual temperature is approximately 58.4 degrees Fahrenheit (U.S. Department of Agriculture, Natural Resources Conservation Service 2022a). Due to the temperate climate, the growing season is typically year-round.

Based on data from the National Weather Service California Nevada River Forecast Center (Salinas No. 2), the Salinas River Lagoon vicinity received below average precipitation for the 2020-2021 water year, recording only 7.69 inches or 50 percent of average for the year. Total recorded precipitation for the 2021-2022 water year is 5.69 inches. The water year starts on October 1 and the most current data are based on the months of November 2021 through August 2022 (National Weather Service 2022).

2.1.3 Soils

The permit area is dominated by water which makes up 79.2 percent of the area, and the following soil types as identified by the U.S. Department of Agriculture, Natural Resources Conservation Service (2022b).

- **Dune Land** is the major soil type in the permit area, comprising 16.8 percent of the area. It is not listed as hydric. This soil consists of parent material made up of quartz and feldspar eolian sands. The upper 60 inches of the profile is characterized as fine sand that is very well drained.
- **Psamments and Fluvents** is the next most abundant soil type, comprising 2.1 percent of the area. This type is not hydric and is composed of parent material of sandy and gravelly alluvium derived from sedimentary rock. The typical profile is characterized as up to 79 inches of sand that is excessively drained.
- **Pacheco clay loam** (1.9 percent of the area) is a hydric soil type found in flood plains. Parent material is alluvium derived from sedimentary rock with a deep profile, up to 79 inches, of clay

loam overlaying fine sandy loam, loam, and silty clay loam. This type is poorly drained and is classified as Prime Farmland when irrigated.

- **Coastal Beaches** (1.8 percent of the area) is listed as hydric. This soil consists of parent material made up of sandy and gravelly beach sand. The upper 60 inches is characterized as sand with a very low water holding capacity and frequent flooding.
- **Alviso Silty Clay Loam** (1.7 percent of the area) is a hydric soil type consisting of silty and clayey alluvium derived from sedimentary rock. The typical profile includes 14 inches of silty clay loam overlaying silty clay to a depth of 45 inches, and very fine sand to a depth of 60 inches. This soil type is classed as very poorly drained with frequent flooding.
- **Metz Fine Sandy Loam** (1.2 percent of the area) is not listed as hydric. Parent material is sandy alluvium derived from sedimentary rock. The profile of this soil type typically consists of 12 inches of fine sandy loam over stratified sand to very fine sandy loam to a depth of 99 inches. When irrigated, it is classified as Prime Farmland and is somewhat excessively drained.

2.2 Biological Resources

This section presents an overview of the biological setting of the permit area. It describes the baseline biological conditions upon which the effects analysis (Chapter 4, *Effects of Covered Activities*) and conservation strategy (Chapter 5, *Conservation Strategy*) are based.

2.2.1 Ecoregion

Ecoregions are areas that exhibit general similarity in their ecosystems and in the composition of their biotic and abiotic phenomena, including geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. Ecoregions have been designated in California to help structure and implement management strategies for federal and state agencies and other organizations responsible for resource management. The permit area is included in the Central California Foothills and Coastal Mountains Level III Ecoregion. This ecoregion is defined by its Mediterranean climate (hot dry summers and cool moist winters) and associated vegetation comprised primarily of chaparral and oak woodlands, grasslands in lower elevations, and patches of pine at high elevations. The permit area also overlaps the Monterey Bay Plains and Terraces ecoregion subregion (level IV).

The Monterey Bay Plains and Terraces subregion (6w) occurs near the mouth of the Salinas River along the coast and consists of alluvial plains and terraces that wrap around Monterey Bay. The climate is cooler and wetter than adjacent subregions farther upstream in the watershed due to the marine-influenced climate, which receives more precipitation and consistent summer fog. Its geology is shaped by quaternary marine and non-marine deposits, and elevations range from about 0–400 feet above sea level. Extensive sand dunes are present along the coast and support some herbaceous plant communities with coastal scrub and sage common on stabilized dunes in the southeast of Monterey Bay. The surrounding plains are home to species such as coast live oak (*Quercus agrifolia*) and California oatgrass (*Danthonia californica*). Soil moisture regimes are mostly xeric with some aquic regimes on floodplains. Soluble salts have accumulated in some soils near the ocean. In estuaries, including the Salinas River Lagoon, pickleweed (*Salicornia* spp.) is common.

2.2.2 Natural Communities and Land Cover Types

Communities are composed of land cover types that are grouped together because of similarity in vegetation type, vegetation structure, ecological function, and current land use. A *land cover type* is defined as the dominant character of the land surface discernible from aerial photographs, as determined by vegetation, water, or human uses. Land cover types are the most widely used units in analyzing ecosystem function, habitat diversity, natural communities, wetlands and streams, and covered species habitat.

The Salinas River Lagoon is in the Central Coast subregion of the California Floristic Province (Baldwin et al. 2012). The vegetation surrounding the majority of the Salinas River Lagoon is natural and not actively managed (e.g., not mowed, planted, or irrigated) and is located within the boundaries of public lands at the Salinas River State Beach to the north and the Salinas River NWR to the south, with privately owned land along the northeast. The eastern banks of the lagoon are substantially disturbed due to prior armoring and other placement of fill to support the adjacent agricultural lands. The natural communities and land cover types in the permit area were mapped to inform the LTMP (Monterey County Water Resources Agency and State Coastal Conservancy 2019) and are shown in Table 2-1 and Figure 2-1.

Table 2-1. Approximate Extent of Communities and Land Cover Types in the Permit Area

Salinas River Lagoon Communities and Land Cover Type	Acres in the Permit Area	Percent of Permit Area
Coastal Strand and Dune Communities		
Pacific coastal beach and dune	18.02	12.7%
Shrublands		
Californian chaparral	0.04	0.03%
Riparian		
Arundo donax	0.14	0.10%
Wetlands		
North American Pacific coastal salt marsh	5.04	3.6%
Riverine		
Riverine	116.40	82.3%
Marine		
Marine	1.34	0.93%
Agriculture		
Fallow field and weed vegetation	0.48	0.34%
Total	**141.42**	**100%**

Note: Estuarine habitat is not mapped separately from riverine habitat for the Salinas Lagoon.

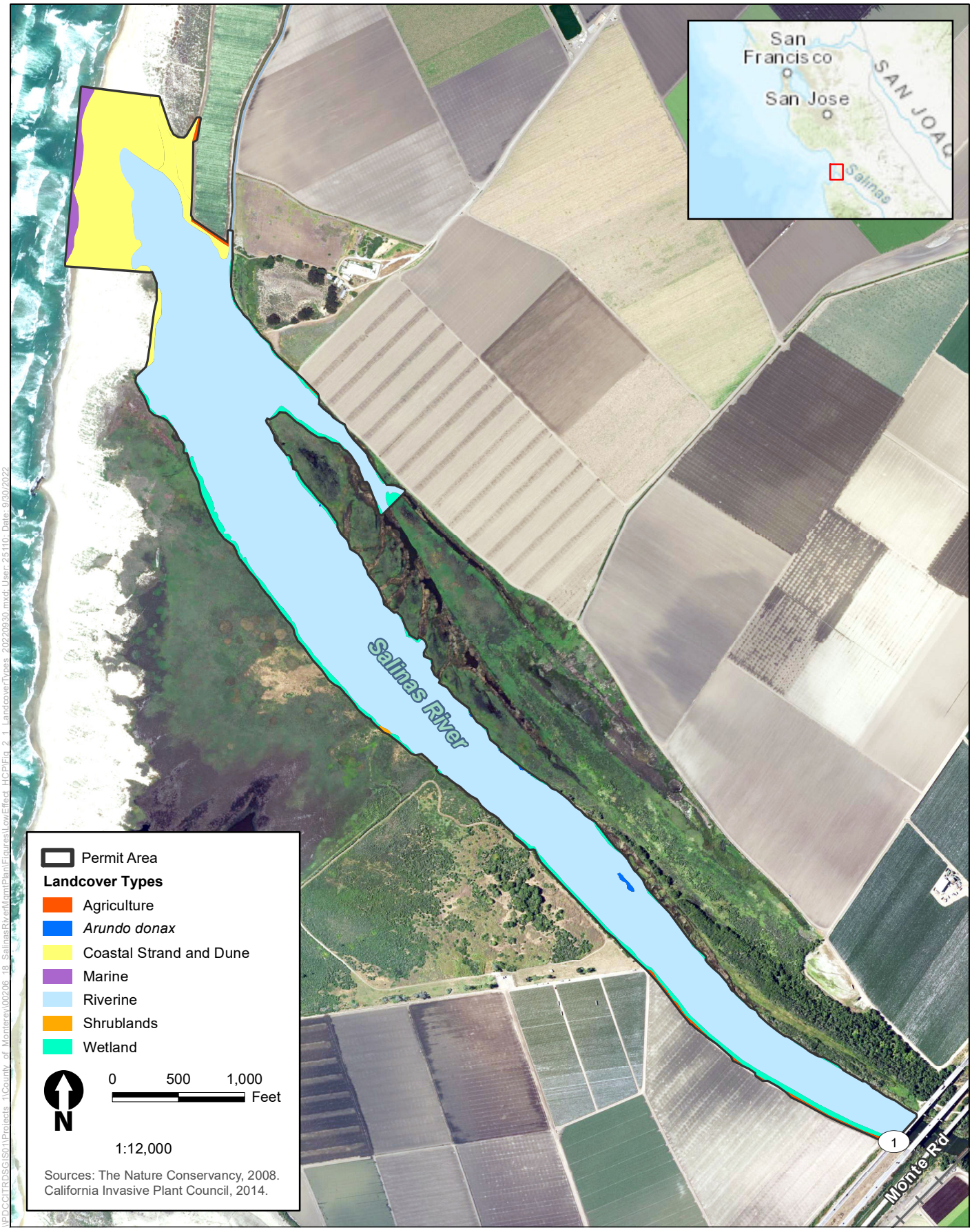


Figure 2-1
Landcover Types in the Permit Area

2.2.2.1 Coastal Strand and Dune Communities

Coastal dunes are dynamic plant communities that respond to a moving sand substrate, wind and wave patterns, and changing dune and beach configurations. Blowing sand undermines and buries plants, but most dune plants are adapted to shallow burial and blasting by sand. Large areas of destabilized sand, called "blowouts," result in large-scale removal of vegetation and change in dune structure. As plants reinvade the bare sand, they stabilize the dune. Native plants found on the coastal dunes of the Salinas River Lagoon include coastal sand verbena (*Abronia latifolia*), pink sand verbena (*Abronia umbellata* var*. umbellata*), beach sagewort (*Artemisia pycnocephala*), beach bur (*Ambrosia chamissonis*), beach evening primrose (*Camissonia cheiranthifolia* ssp. *cheiranthifolia*), beach morning-glory (*Calystegia soldanella*), Douglas' bluegrass (*Poa douglasii*), mock heather (*Ericameria ericoides*), wild buckwheat (*Eriogonum latifolium*) (also known as coast buckwheat), seacliff buckwheat (*Eriogonum parvifolium*) and cudweed aster (*Corethrogyne filaginifolia*).

There are an estimated 18.02 acres of coastal strand and dune communities in the permit area accounting for approximately 12.7 percent of the habitat in the permit area. Coastal strand and dune communities occur north and south of the Salinas River Lagoon, mainly on protected lands such as Salinas River State Beach and Salinas River NWR. Much of the habitat is composed of beaches, bluffs, blowouts, and disturbed dunes that are generally devoid of vegetation because of frequently moving substrates. The vegetation that establishes in these areas consists of species tolerant of frequent ground disturbance such as sea rocket (*Cakile maritima; C. edentula*), beach evening primrose, soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), annual fescue (*Festuca* ssp.) and kikuyu grass (*Pennisetum clandestinum*). Some areas support a stabilized dune community dominated by the nonnative, aggressive iceplant (*Carpobrotus edulis*), which forms extensive mats. While it provides cover for some wildlife, it crowds out native plant species and provides very little forage material for wildlife.

2.2.2.2 Shrublands

The shrublands natural community is composed of chaparral and scrub land cover types. Chaparral habitats include a variety of shrubs with thick, stiff, sclerophyllous leaves where no one species is clearly dominant. At maturity, this community can be dense and nearly impenetrable. Stand structure is dependent on age since last burn, precipitation, aspect, and soil type. Dominant species include chamise (*Adenostoma fasciculatum*), birchleaf mountain mahogany (*Cercocarpus betuloides*), silktassle (*Garrya* spp.), coyote bush (*Baccharis pilularis*), hollyleaf cherry (*Prunus ilicifolia*) and several species of ceanothus (*Ceanothus cuneatus, C. leucodermis*), manzanita (*Arctocstaphylos glandulosa*, *A. glauca*), redberry (*Rhamnus ilicifolia, R. crocea*) and oak (*Quercus chrysolepis, Q. dumosa, Q. berberidifolia, Q. wizlizenii)* (U.S. National Vegetation Classification System 2017, Mayer and Laudenslayer 1988, Holland 1986).

A very small area of chaparral is located in the permit area (0.04 acre). Maritime chaparral is a coastal form of chaparral associated with specific soil conditions, and its occurrence may be limited to the summer fog zone. It is characterized by a wide variety of evergreen, sclerophyllous shrubs occurring in moderate to high density on sandy, well-drained substrates. This community is primarily dominated by woollyleaf manzanita (*Arctostaphylos tomentosa* subsp. *tomentosa*). Other species found in the shrub layer include chamise, Toro manzanita (*Arctostaphylos montereyensis*), sandmat manzanita (*Arctostaphylos pumila*), toyon (*Heteromeles arbutifolia*), blue blossom ceanothus (*Ceanothus thyrsiflorus*), and Monterey ceanothus (*Ceanothus rigidus*).

2.2.2.3 Riparian

The riparian natural community consists of a multilayered woody plant community dominated by a hydrophytic tree overstory and diverse shrub layer associated with riverine water sources. In mature riparian forests, canopy heights reach up to 100 feet and canopy cover ranges from 20 to 80 percent. Historically, riparian communities were vast and dense throughout the Salinas Valley floor, often immediately adjacent to the river extending over 0.5 mile on one or both sides of the main channel. In the vicinity of the lagoon, the riparian community is limited to small patches of *Arundo donax* (giant reed; referred to herein as Arundo).

Arundo is known as one of the worst plant invaders of California's riparian and wetland communities. It is a fast-growing, tall grass species that spreads easily, consumes large amounts of water, forms dense monotypic stands, crowds out native vegetation, degrades wildlife habitat, increases fire frequencies, and causes flooding into adjacent upland areas during high flow events. Similar to bamboo, Arundo is a clonal grass species native to eastern Asia. It can reproduce sexually (i.e., cross pollination) and asexually (i.e., vegetative propagation) originating from a large fleshy rhizome that forms dense mats underground. With its high reproductive fitness, the species is very successful in colonizing habitats where water is easily accessible and establishing thick stands over short timeframes. As a result, Arundo has developed into a major threat to California's riparian communities and the endemic species that rely on them. As of 2011, approximately 8,907 acres of Arundo were mapped in coastal California watersheds from Monterey to San Diego (California Invasive Plant Council 2011). Of this total, the Salinas River supported 2,006 acres (23% of known Arundo stands mapped in all of coastal California) in 2011. The permit area includes 0.14 acre of Arundo, upstream of the lagoon.

2.2.2.4 Wetlands

The wetland natural community includes habitats subject to seasonal or perennial flooding or ponding and may have hydrophytic herbaceous vegetation. Salt marsh and freshwater wetlands generally differ in their surface area to volume ratio, water level fluctuations, and vegetation cover. Salt marsh wetlands typically support halophytic (i.e., plants that grow in high salinity water) vegetation, while freshwater wetlands do not. Historically, wetland communities in the Salinas River Valley dominated the coastal sloughs and lagoons in the form of salt or brackish marshlands (as they do today) as well as in abandoned channels of the Salinas River adjacent to the active floodplain.

Coastal salt marsh contains halophytic wetland vegetation located below the high tide line, subject to the ebb and flow of daily tides. Coastal salt marsh vegetation colonizes microhabitats within intermittently or perennially tidal areas dependent upon tidal elevations and drainage patterns. Zones include low marsh, middle marsh, and high marsh. Salt marsh vegetation in the Salinas River Lagoon can be characterized as a remnant patch of the high marsh zone dominated by a variety of halophytes including woody pickleweed (*Salicornia pacifica),* jaumea (*Jaumea carnosa*) alkali-heath (*Frankenia salina*), saltgrass (*Distichlis spicata*), and marsh gumplant (*Grindelia hirsutula*). High marshes typically occur in drier areas of the marsh above the mean high water level along elevated or relatively better-drained sediment deposits. Approximately 5.04 acres of coastal salt marsh habitat occurs in the permit area.

2.2.2.5 Riverine

The Salinas River is the third largest riverine system in California, and accounts for approximately 116.4 acres (82.3 percent) of the permit area. The Salinas River supports a defined bed and bank, is subject to tidal action, and sustains perennial flows which are navigable up to River Mile 7. Historically, the river was characterized by a dynamic, vegetated floodplain about a half a mile wide surrounded by a complex set of lower and higher terraces that ranged from 75 to 150 feet above the riverbed (San Francisco Estuary Institute 2009). Channel migration was common, but dramatic lateral shifts in channel alignment occurred in the river's lowest 15 miles. Many old channels in this downstream section are identified as lowland sloughs today, such as Tembladero and Alisal Sloughs. Upland vegetation is present in some areas between the margin of the Mean High Water and High Tide Line. Plant species in these areas are part of the coastal dune natural community. Dominant plant species include coastal sand verbena, beach sagewort, and beach bur.

2.2.2.6 Estuarine

The estuarine natural community consists of tidally influenced aquatic areas below the topographical contour that corresponds to the maximum possible extent of the tides. This natural community is subject to tidal fluctuations in water height that may be natural or muted by human-made structures such as tidal gates or culverts. An estuary is a semi-enclosed body of water where two other waterbodies, usually saltwater and freshwater, meet and mix. Examples of estuaries include bays, lagoons, sounds, and sloughs. The acreage of estuarine habitat occurring in the permit area is variable and dependent on the river remaining hydrologically connected to the ocean.

The Salinas River Lagoon is a bar-built estuary, which is the dominant estuary type in California. Many of these small estuaries are subject to closure with a sand barrier separating a lagoon estuary from the ocean for days, months, or even years. In the lagoon impounded behind the sand barrier, water levels may rise or fall depending on net water budget, and water quality extremes may develop. The frequency and duration of inlet closure varies naturally across bar-built estuaries and across years, and can be altered by mouth management (i.e., breaching). The mouth state is not binary (fully open or fully closed) as these systems transition among multiple mouth states, including non-tidal phases (closed mouth), perched overflow, tidal choking (muted tides relative to ocean), and fully tidal (fully open mouth). The salinity regime of a bar-built estuary can be highly variable, exhibiting tidal fluctuations when open; also, different bar-built estuaries can be entirely fresh, vertically stratified, or entirely hypersaline when closed, dependent on the hydrological balance and the condition of the sand barrier at the mouth of the system.

2.2.2.7 Marine

The marine environment of Monterey Bay is widely recognized as important habitat for an array of marine wildlife and has been approved for federal protection as part of the Monterey Bay National Marine Sanctuary. Most species of marine mammals and seabirds that occur in Monterey Bay occur as non-breeding residents or spring and fall migrants. Special-status birds may fly over the marine range area or float in the open water, and southern sea otters (*Enhydra lutris nereis*) may occasionally feed in the marine range area, but there are no important marine mammal haul-out or breeding areas (EMC Planning Group and EDAW 1997). Species in the marine environment known to occur in the permit area include harbor seals (*Phoca vitulina*), California sea lions (*Zalophus californianus*), and aquatic species such as South-Central California Coast steelhead and tidewater goby. Approximately 1.34 acres of Monterey Bay are located along the coastline of the permit area.

2.2.2.8 Agriculture

This land cover type is predominantly characterized by tilled land supporting various fruits, vegetables, and hay crops. Row crops are those areas tilled and cultivated for common agricultural crops such as strawberries, lettuce, artichoke, and cauliflower. Irrigated or dry, these crops are usually harvested in rows as edible or useful herbaceous products for stock or human use. Agricultural crop fields are also occasionally planted for both animal forage and to improve nitrogen levels, as with legumes such as alfalfa (*Medicago sativa*) or sweet clovers (*Melilotus* spp.). This land cover type includes ruderal areas and areas that have been left fallow for several growing seasons. Ruderal sites may be dominated by weeds such as black mustard (*Brassica nigra*) or thistles. Approximately 0.48 acre of agricultural lands occur in the permit area.

2.2.3 Covered Species

This section describes the relevant ecology and threats for each of the three covered species. See Appendix A and Appendix B for the rationale for not covering other species in this HCP.

2.2.3.1 Tidewater Goby

Tidewater goby is listed as endangered under the ESA (59 FR 5494). USFWS proposed in 2014 to reclassify tidewater goby as threatened (79 FR 14340). However, to date, tidewater goby remains listed as endangered because of ongoing and likely increasing threats of urbanization, artificial breaching, stochastic environmental conditions, and introduced predators. Tidewater goby is also identified as a Species of Special Concern by the California Department of Fish and Wildlife (CDFW).

Geographic Distribution

Tidewater goby is endemic to California and found primarily in waters of coastal lagoons, estuaries, and marshes that are relatively protected from the marine environment. Tidewater goby historically ranged from Tillas Slough (mouth of the Smith River, Del Norte County) to Agua Hedionda Lagoon (northern San Diego County) (U.S. Fish and Wildlife Service 2007a). It is currently found throughout the known historic range but occupies fewer locations than historically, having been extirpated from some sites as a result of drainage, water quality changes, introduced predators, and drought. The species is naturally absent from several large (50- to 135-mile) stretches of coastline that lack lagoons or estuaries, and that have steep topography or swift currents that may prevent tidewater goby from dispersing between adjacent localities. These natural gaps in the distribution include a 100-mile stretch of coastline from the Eel River (Humboldt County) to Ten Mile River (Mendocino County); a 60-mile stretch between Lagoon Creek (Mendocino County) and Salmon Creek (Sonoma County); and a 100-mile stretch between the Salinas River (Monterey County) and Arroyo del Oso (San Luis Obispo County). Tidewater goby is also absent from an 80-mile stretch of coastline between the Los Angeles Basin (city of Santa Monica, Los Angeles County) and San Mateo Creek on Camp Pendleton (San Diego County) as a result of habitat loss and alteration (79 FR 14340).

Life History and Habitat Requirements

Tidewater goby generally lives for only one year, with few individuals living longer than a year (Moyle 2002). Juveniles that survive to maturity breed the following season (U.S. Fish and Wildlife Service 2007a). Reproduction can occur across a range of conditions at any time of the year, but it tends to peak in spring, with a second, smaller peak in late summer. Tidewater goby prefers a sandy

substrate for breeding, but they can be found on rocky, mud, and silt substrates as well. Male tidewater gobies initiate spawning by digging a burrow in unconsolidated, clean, coarse sand; the composition of the substrate and the availability of sediments are important for burrow construction and spawning. Males may dig multiple burrows placed at least 3 or 4 inches apart to attract a female. Female gobies fight for access to males with burrows in which to lay their eggs and will lay 300 to 500 eggs per clutch in 6 to 12 clutches per year. Males continuously guard the burrow for approximately 9 to 11 days until the eggs hatch. Following hatching, the larvae live in vegetated areas of estuaries until they reach 0.5 to 0.7 inches standard length, at which time they have matured sufficiently to become free-swimming and benthic. Tidewater goby feeds on small aquatic animals such as shrimp, amphipods, ostracods, and midge larvae and other aquatic insects (U.S. Fish and Wildlife Service 2005).

Tidewater goby is a bottom dweller typically found in lagoon margin habitat at water depths of less than 3 feet, although the species can occur at water depths up to 15 feet in large lagoons. Goby prefers habitat with salinity less than 12 parts per thousand (ppt), and inhabits areas of slow-moving water, avoiding strong wave action or currents. Tidewater goby appears to spend all life stages in lagoons, estuaries, and river mouths, although it has been documented in slack freshwater habitats as far as 5 miles upstream from San Antonio Lagoon in Santa Barbara County (U.S. Fish and Wildlife Service 2005). The presence of backwater and marshy habitats, which may provide refuge habitat during winter flood flows, likely aids in the persistence of the species in lagoons. Optimal lagoon habitats are shallow, sandy-bottomed areas, surrounded by beds of emergent vegetation. Open areas are critical for breeding, while vegetation is critical for overwintering survival and probably for feeding.

Tidewater goby habitats are typically separated from the Pacific Ocean by sandbars for most of the year, which effectively isolates populations and prevents fish from moving amongst existing populations or colonizing new habitats. Because migration between populations is relatively rare, substantial genetic differences have developed among tidewater goby populations (e.g., McCraney et al. 2010). As a species, tidewater goby is thought to persist as a metapopulation, wherein individual subpopulations in relatively isolated habitats experience localized extirpation and are then recolonized during periods of ocean connectivity (Lafferty et al. 1999a, Lafferty et al. 1999b). In the metapopulation model, sub-populations survive or remain viable through continued exchange of individuals, or recolonizations after extirpations. Extinction and recolonization rates are higher in the southern portion of the tidewater goby range, lending evidence for the metapopulation structure (Lafferty et al. 1999a, Lafferty et al. 1999b), whereas subpopulations are more stable along California's North Coast and may exhibit drift in isolation rather than a metapopulation structure (Kinziger et al. 2015).

When bar-built estuaries breach, generally during periods of high rainfall and large surf, they often drain rapidly. This is followed by an influx of ocean water with the tidal cycle, which drastically changes the salinity and temperature of the habitat. Adult tidewater gobies have a broad tolerance for environmental changes to cope with such dramatic fluctuations. Monitoring of 17 populations post-flood has shown that tidewater goby can persist in occupied habitats after flood events without significant changes in population size, even when slack water refuge habitat is apparently unavailable (Lafferty et al. 1999b, U.S. Fish and Wildlife Service 2007a). In contrast, observations of artificial breaching events at three coastal lagoons that caused substantial dewatering of the lagoons found large numbers of stranded tidewater goby in dewatered areas, as well as freshly dead goby in the wrack line along the ocean beach in one instance (Swift et al. 2018). Juvenile gobies also appear less resilient to breaching events and suffer high rates of mortality when exposed to increases in

salinity (Hellmair and Kinziger 2014). Tidewater goby is rarely observed in the ocean; therefore, migration between lagoons probably is carried out by more resilient adults after flood events flush individuals into the littoral zone where strong longshore currents can move small fish substantial distances down the coast (Lafferty et al. 1999b, U.S. Fish and Wildlife Service 2005).

The ability of tidewater goby to reproduce under a variety of environmental conditions throughout the year means that a large range of individual ages and sizes can often be observed in tidewater goby populations at any given time. This reproductive strategy may increase the resilience of the population to the stress of estuary breaching events by balancing the risk of high juvenile mortality with maximized reproductive output (Hellmair and Kinziger 2014). Some reproduction can occur during all times of the year ensuring the continual presence of salinity-tolerant adults, while peak spawning activity is observed during late spring and summer, when the chance of estuary breaching and high juvenile mortality is lower. However, some tidewater goby populations found along the northern California coast are composed entirely of similar-sized individuals, indicating that their reproductive period is restricted to a particular time of year (Hellmair and Kinziger 2014). This demographic variation is often mirrored in a population's genetic diversity so that populations with a diversity of fish sizes and ages tend to also have higher genetic diversity, while those composed of similar-sized individuals tend to be more genetically similar (Hellmair and Kinziger 2014). Furthermore, the lack of size and age diversity within populations of low genetic diversity appears to increase their vulnerability to environmental disturbance. In such populations, reproduction is mostly limited to a short window of time, and a spike in salinity during or shortly after this period when the population consists exclusively of small, less tolerant individuals can lead to extirpation. In contrast, the continuous presence of adults with broader physiological tolerance makes it more likely for goby populations with diverse age demographics to persist through such events (Hellmair and Kinziger 2014).

Threats

Tidewater goby is threatened by modification and loss of habitat resulting from coastal development, channelization of streams and estuaries, diversions of water flows, groundwater overdrafting, and alteration of water flows. Potential threats also include discharge of agricultural and sewage effluents, increased sedimentation from improper agricultural activities, unnatural breaching of estuaries and lagoons, upstream alteration of natural sediment flows, introduction of predatory fishes and invasive plants, and direct habitat damage and watercourse contamination resulting from vehicular activity in the vicinity of lagoons.

The tidewater goby recovery plan (U.S. Fish and Wildlife Service 2005) identifies four primary actions to address threats to the species and aid recovery: (1) Monitor, protect and enhance currently occupied tidewater goby habitat; (2) Conduct biological research to enhance the ability to integrate land use practices with tidewater goby recovery and revise recovery tasks as pertinent new information becomes available; (3) Evaluate and implement translocation where appropriate; and (4) Increase public awareness about tidewater gobies. Primary tasks recommended for recovery in critical habitat Sub-Unit GB11 include surveys to identify additional tidewater goby habitat in the Salinas Valley and reintroduction of the species to appropriate habitat. In addition, the most recently available 5-Year Review for tidewater goby (U.S. Fish and Wildlife Service 2007a) identifies the need for increased data collection and the need for habitat protection as high priority recovery actions.

Status in Permit Area

The Salinas River is located within designated critical habitat Sub-Unit GB11 in the Greater Bay Recovery Unit. Within the boundaries of the sub-unit, available tidewater goby habitat in the river encompasses approximately 250 acres from the mouth of the river to approximately 1.85 miles upstream of the Highway 1 bridge; the OSR is not included in the designation (U.S. Fish and Wildlife Service 2005, 78 FR 8745). The species was collected from this locality in 1951, but was not detected during surveys in 1991, 1992, 2004, or 2010-2012 and was presumed extirpated. The extirpation of tidewater goby in the Salinas River may have occurred during a time period when poorly treated sewage was discharged into the lagoon, causing algal blooms and resultant anoxic conditions (U.S. Fish and Wildlife Service 2005). Bennet Slough to the north, also within Sub-Unit GB11, has maintained a persistent population of tidewater goby which genetic analysis has shown are highly significantly differentiated from all other tidewater goby in the Greater Bay Recovery Unit (U.S. Fish and Wildlife Service 2005). The large number of interconnected waterways in the Salinas Valley make it likely that tidewater goby persists in other localities in this sub-unit.

In 2013, two individual tidewater goby were found during routine fish monitoring surveys in the Salinas River Lagoon, with both individuals observed along the sandbar at the northwestern edge of the lagoon. In routine fish monitoring surveys conducted in 2014, tidewater goby was the second most abundant fish species observed after threespine stickleback. One individual was captured at the mouth of the lagoon near the usual location of breaching, four individuals were captured along the sandbar at the northwestern edge of the lagoon, and 53 individuals were captured near the Highway 1 Bridge (Hagar Environmental Services 2015). It is possible that the gobies captured in the lagoon during 2013–2014 surveys naturally dispersed from nearby Bennett Slough or Moro Cojo Slough, although no genetic studies have been conducted to confirm this hypothesis (78 FR 8746).

Recent survey information suggests that the tidewater goby population in the Salinas River Lagoon has most likely persisted since it was detected in 2013. As individuals of this species rarely live longer than one year, continuous presence of tidewater goby in the Salinas River Lagoon (and the OSR) are a strong indication that the species can successfully reproduce in the Salinas River Lagoon over multiple generations. While the exact size of the population is unknown, repeated collections since 2013 confirm that the lagoon provides suitable habitat for tidewater goby growth, survival, and reproduction (Hellmair et al. 2018, 2020; Hellmair and Lee 2022).

Tidewater goby distribution surveys conducted in October 2018 found the species at each sampled location along the sandbar, near the breach site, and along the southwest shoreline of the lagoon until water depth precluded sampling (upstream from the wildlife refuge parking area; Hellmair et al. 2018). This finding contrasts with survey results from most previous years, when the distribution of tidewater goby appeared restricted to the lower lagoon (with the exception of 2014, when the species was documented as far upstream as the Highway 1 bridge). Surveys conducted in April 2021 also found tidewater goby at all previously established sampling locations throughout the lagoon except the upstream site under the Highway 1 bridge (D. Lee, pers. comm. 2021). This survey, conducted after a facilitated breaching event in January 2021, documented captured individuals of various sizes, including gravid females, indicating a healthy population that is spawning year-round. A facilitated breach was conducted in December 2021 and tidewater goby distribution surveys in the lagoon were completed again in May 2022. Two goby were captured at separate sampling locations south of the sandbar separating the lagoon from the ocean, and both showed coloration indicative of recent spawning (Hellmair and Lee 2022). Given the reproductive state of the captured individuals, is possible that the small number of goby detected during this survey may have been

due to the timing of the survey coinciding with a peak in reproduction with mature individuals still guarding eggs in burrows, or possibly decreased abundance due to post-spawn mortality (Hellmair and Lee 2022).

In general, repeated surveys since 2013 suggest that tidewater goby is distributed broadly throughout the lagoon, although the surveys did not identify any specific areas of high densities or large concentrations of individuals. Current surveys determine presence/absence of goby at the various sample locations to provide a snapshot of the species' distribution in the lagoon and are not adequate to estimate abundance due to low capture numbers. Variables that may affect the shifting occupancy pattern in the lagoon from year to year are also unknown, and it is clear there are many aspects of goby biology in the lagoon that are not well understood, including the extent to which facilitated lagoon breaching may affect the population. The length range of captured tidewater gobies documented in recent years suggests a reproductive period spanning several months and, as a consequence, likely a moderate level of resilience to environmental disturbance (Hellmair and Lee 2022). An additional survey during fall, when tidewater goby abundance is usually highest, would provide a greater understanding of the reproductive period in the lagoon.

Critical Habitat

Critical habitat for tidewater goby was re-designated in 2013 to cover approximately 12,156 acres of estuaries and lands in portions of Del Norte, Humboldt, Mendocino, Sonoma, Marin, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties, California (78 FR 8746).

The permit area includes 131.7 acres of designated critical habitat for tidewater goby in the Salinas River. The primary constituent element (PCE) of tidewater goby critical habitat is defined as the following (78 FR 8746).

1) *Persistent, shallow (in the range of approximately 0.3 to 6.6 ft [0.1 to 2 m]), still-to-slow-moving lagoons, estuaries, and coastal streams with salinity up to 12 ppt, which provide adequate space for normal behavior and individual and population growth that contain one or more of the following:*

    a. *Substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction;*

    b. *Submerged and emergent aquatic vegetation, such as* Potamogeton pectinatus*,* Ruppia maritima, Typha latifolia*, and* Scirpus *spp., that provides protection from predators and high flow events; or*

    c. *Presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity.*

2.2.3.2 Western Snowy Plover

The Pacific Coast DPS of western snowy plover was listed as federally threatened on March 5, 1993 (58 FR 12864). It is also protected under the Migratory Bird Treaty Act and is identified by CDFW as a Species of Special Concern.

Geographic Distribution

Historically found along the entire California coast, western snowy plover was once more widely distributed and abundant throughout its range, especially in southern California (U.S. Fish and Wildlife Service 2007b). The current breeding range of the Pacific Coast DPS of western snowy plover extends from Midway Beach, Washington, to Bahia Magdelena, Baja California Sur, Mexico (U.S. Fish and Wildlife Service 2019). The population is sparse in Washington, Oregon, and northern California. Eight geographic areas support over three-quarters of the California coastal breeding population: San Francisco Bay, Monterey Bay, Morro Bay, the Callendar Mussel Rock Dunes area, the Point Sal to Point Conception area, the Oxnard lowland, Santa Rosa Island, and San Nicolas Island (U.S. Fish and Wildlife Service 2007b).

Banding and breeding data collected over an extended period of years indicate that the Pacific coast population is distinct from western snowy plovers that breed in the interior, and interbreeding between the coastal and interior populations is extremely rare (U.S. Fish and Wildlife Service 2007b). The two populations appear to function demographically largely independent of one another, and it is unlikely that declines in the coastal population would be offset by immigration of interior population birds to the coast (U.S. Fish and Wildlife Service 2007b).

Life History and Habitat Requirements

Western snowy plover is a small shorebird approximately 5.9–6.6 inches long. The plover's body is pale-gray brown above and white below, with a white hindneck collar and dark lateral breast patches, forehead bar, and eye patches. The bill and legs are blackish. In breeding plumage, the males have black markings, and the females have dark brown markings on the head and breast (U.S. Fish and Wildlife Service 2007b). The sexes are indistinguishable in non-breeding plumage. The mean annual life span of western snowy plovers is estimated at about 3 years, but at least one individual was at least 15 years old when last seen (Page et al. 2009).

Sparsely vegetated dunes and sandy dune-backed beaches, sand spits, beaches at river and creek mouths, and salt pans at estuaries and lagoons provide the primary coastal nesting habitat for western snowy plover. Less commonly used nesting habitats include bluff-backed beaches, dredged material disposal sites, salt pond levees, dry salt ponds, and gravel bars (U.S. Fish and Wildlife Service 2007b). In winter, western snowy plover is found on many of the beaches used for nesting as well as on beaches where they do not nest, in man-made salt ponds, and on estuarine sand and mud flats. The Pacific coast breeding population consists both of year-round residents and migrants; migrants typically begin arriving at breeding areas in central California as early as January, although peak arrival is from early March to late April (Page et al. 2009). Western snowy plover maintains high site fidelity, returning to the same area to breed year after year and mated birds from previous breeding seasons frequently reunite (U.S. Fish and Wildlife Service 2007b).

Pre-nesting courtship behaviors such as territorial defense by males and nest scraping behavior can be observed as early as mid-February in California. Breeding and nesting occur from March through September, with peak nest initiation occurring from mid-April to mid-June. Nests are found above the high-tide mark on sandy, open ground and consist of a shallow scrape or depression, sometimes lined with beach debris (e.g., small pebbles, shell fragments, plant debris, and mud chips); nest lining increases as incubation progresses (U.S. Fish and Wildlife Service 2007b). Driftwood, kelp, and dune plants provide cover for chicks that crouch near objects to hide from predators. Invertebrates are

often found near debris, so driftwood and kelp are also important for harboring western snowy plover food sources (Page et al. 2009).

Western snowy plover is monogamous by clutch although females often initiate a second clutch with a new male after successfully hatching the first clutch and can have multiple clutches per year, usually of three eggs (range from two to six eggs) per clutch. Both the male and female incubate the eggs. The young are precocial and will leave the nest within hours of hatching in search of food. Fledging is reached at approximately 1 month after hatching but the young will rarely remain in the nesting territory until fledging. Typically, males will continue to care for and feed the young while the female initiates a new nest. Western snowy plovers are highly sensitive to disturbance and may abandon their nests if disturbed (U.S. Fish and Wildlife Service 2007b).

In 2006, the breeding window survey[4] estimated a Pacific coast-wide population of 1,877 adults (U.S. Fish and Wildlife Service 2019). The 2007 breeding window survey revealed large adult population decreases, compared to the 2006 population estimate, in four out of six recovery units (RU2: Northern California; RU4: Monterey Bay area; RU5: San Luis Obispo area; and RU6: San Diego area) (U.S. Fish and Wildlife Service 2019). Since the 2007 decline, the Pacific coast-wide population trajectory has been gradually increasing with minimal annual fluctuation. While some local population sizes have surpassed recovery objectives in some areas (including Monterey Bay), the overall population remains below the recovery target of 3,000 birds, and it is likely that average annual productivity of fledglings per male is not being met (U.S. Fish and Wildlife Service 2019).

Threats

Threats to western snowy plover include habitat degradation caused by human disturbance, urban development, introduced beachgrass (*Ammophila* spp.), and expanding predator populations including ravens and skunks (U.S. Fish and Wildlife Service 2007b). Recreational use of beaches in suitable nesting habitat increases potential adverse impacts to nesting plovers through direct mortality as well as increased disturbance, habitat modification, and increased predation. Vehicles driving through dune habitats can crush nests and chicks, as can pedestrian traffic. Pets such as unleashed dogs can also chase, harass, and kill adult and juvenile plovers. Disturbance due to the presence of humans and pets can lead to nest abandonment, reduction in food provisioning to chicks, and increased exposure to predators, particularly if family groups are separated. Beach fires and camping may be harmful to western snowy plovers by attracting large groups of people and pets for prolonged periods of time, removing driftwood used by plovers for cover, and increasing garbage which attracts scavengers and predators such as gulls and corvids.

Recovery actions identified in the *Recovery Plan for the Pacific Coast Population of the Western Snowy Plover* (U.S. Fish and Wildlife Service 2007b) include: (1) Monitor breeding and wintering populations and habitats of the Pacific coast population to determine progress of recovery actions and to maximize survival and productivity; (2) Manage breeding and wintering habitat of the Pacific coast population to ameliorate or eliminate threats and maximize survival and productivity; (3) Develop mechanisms for long-term management and protection of western snowy plovers and their breeding and wintering habitat; (4) Conduct scientific investigations that facilitate the recovery of

[4] Breeding window surveys are a one-time pass of a surveyor, or team of surveyors, through potential western snowy plover nesting habitat during May or June. The surveyor counts all adult western snowy plovers in the habitat and identifies the adults as male or female when possible. Window surveys may not detect all birds and are only comparable to more intensive population studies once a correction factor has been applied.

western snowy plover; and (5) Conduct public information and education programs about western snowy plover.

Status in Permit Area

The permit area includes western snowy plover nesting areas on the Salinas River NWR and Salinas River State Beach within the Monterey Bay area recovery unit (RU4) and the Monterey to Moss Landing (CA 22) critical habitat unit (U.S. Fish and Wildlife Service 2007b; 77 FR 36728; California Department of Fish and Wildlife 2021). These nesting sites are managed by USFWS and State Parks, and monitoring of nesting plovers is performed in partnership with Point Blue Conservation Science. Since 2012, 96 plover nests (including nests found at the brood stage) have been found within the permit area throughout the nesting season (Table 2-2).

Table 2-2. Western Snowy Plover Nests in the Permit Area 2012-2021

Year	Number of Nests	Dates Sandbar Open
2012	11	4/13/12 – 5/3/12 12/4/12 – 12/21/12 12/26/12 –
2013	10	– 1/28/13
2014	22	
2015	24	
2016	12	
2017	0	1/12/17 – 10/2/17
2018	7	3/25/18 – 4/22/18
2019	9	1/19/19 – 6/28/19
2020	1	4/7/20 – 5/17/20
2021	0	1/29/21 – 3/3/21 12/27/21 – 2/16/22
Total	**96**	

In the Monterey Bay region (an approximately 22 mile stretch of coastline including the beaches of Monterey Bay from just north of Sunset State Beach south to Monterey State Beach, the former salt ponds adjacent to Elkhorn Slough, and pocket beaches in northern Santa Cruz County), the estimated number of breeding western snowy plovers dropped below the Recovery Plan population target of 338 in 2019, and remained below target in 2021 for the third consecutive year with a breeding population estimate of 306 plovers (Neuman et al. 2021b). The regional minimum number of chicks fledged per male in 2021 was 0.77, lower than the 1.0 target needed for population stability. However, this represents a slight increase in productivity over the previous five consecutive years of decline in the number of chicks fledged per breeding male (Neuman et al. 2021a). In the North Salinas River and Salinas River NWR monitoring areas which overlap the permit area, the clutch hatch rates were 80 percent and 45 percent respectively, and estimated fledge rates were 100 percent and 43 percent, respectively (Neuman et al. 2021b). Avian predation, particularly by common raven, was the most common documented cause of nest failure in these monitoring areas, accounting for 9 of 17 known failed nests (Neuman et al. 2021b).

Based on monitoring data provided by Point Blue Conservation Science, plover nests are commonly located in the permit area directly north and south of the mouth of the Salinas River (Figure 2-2a – 2-2i). From February 2013 to January 2017 the Salinas River experienced an extended period of hydrologic disconnection from the ocean. During that time, there would have been an expanse of suitable beach nesting habitat west of the lagoon uninterrupted by the river channel. The increase in available suitable nesting habitat may have led to the relatively high number of plover nests located within the permit area (Table 2-2). However, disturbance due to human activity may also be increased at times when the river mouth remains closed. Point Blue Conservation Science noted high levels of trespass in nesting areas closed to the public related to recreational anglers (often accompanied by dogs) accessing the lagoon to fish for striped bass (*Morone saxatilis*) during this time period (Page et al. 2014).

Since 2018, the median nest initiation date in the Monterey Bay region has been recorded in mid-May (Table 2-3). The 2020 breeding season recorded both the earliest nest initiation (February 25) and the latest nest initiation (July 20) over this time period (Table 2-3). In all years, the initial breach of the Salinas Lagoon, most likely a facilitated breach, occurred well before the median nest initiation date. However, in 2018 and 2020, the initial breach occurred after the earliest nest initiation date, which indicates there is some potential for plover nests to be located in the permit area prior to the need for a facilitated lagoon breach in some years.

Table 2-3. Western Snowy Plover Nest Initiation Dates in the Monterey Bay Region 2018-2021

Year	Number of Nests in Permit Area	Initial Lagoon Breach Date	Nest Initiation Date Median (Range)
2018	7*	3/25/18	May 16 (Mar 6 – Jul 17)
2019	9	1/19/19	May 13 (Mar 12 – Jul 13)
2020	1	4/7/20	May 18 (Feb 25 – Jul 20)
2021	0	1/29/21	May 15 (Mar 2 – Jul 19)

*One nest in the permit area in 2018 was located at the brood stage.
Source: Neuman et al. 2019; 2020; 2021a; 2021b

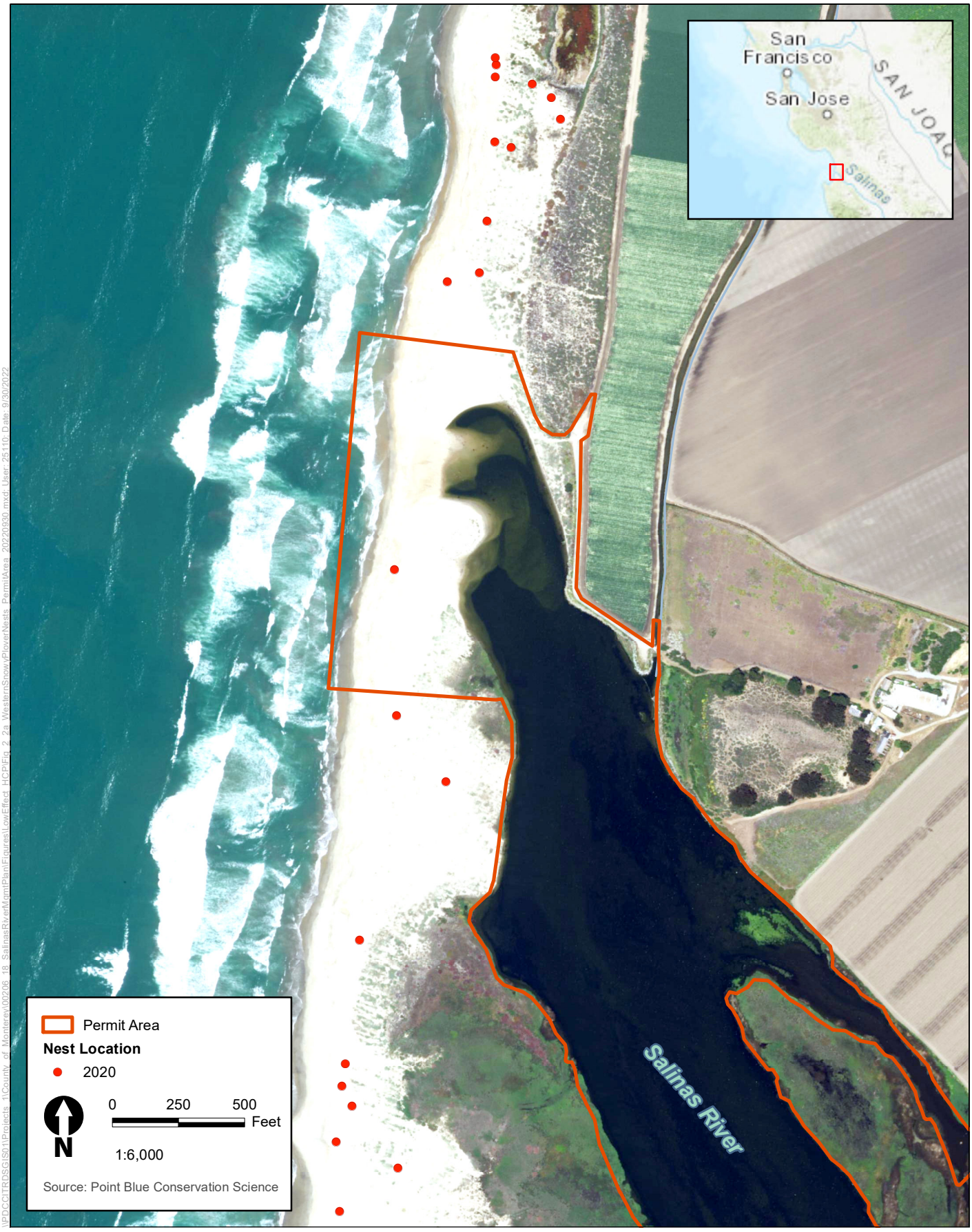
Critical Habitat

Revised critical habitat for the Pacific coast DPS of western snowy plover was designated on June 19, 2012 (77 FR 36728). The permit area includes 95.2 acres of designated critical habitat in the Monterey to Moss Landing Unit (CA 22). PCEs of western snowy plover habitat are defined as the following (77 FR 36728).

> *Sandy beaches, dune systems immediately inland of an active beach face, salt flats, mud flats, seasonally exposed gravel bars, artificial salt ponds and adjoining levees, and dredge spoil sites, with:*
>
> *1) Areas that are below heavily vegetated areas or developed areas and above the daily high tides;*
>
> *2) Shoreline habitat areas for feeding, with no or very sparse vegetation, that are between the annual low tide or low- water flow and annual high tide or high- water flow, subject to inundation but not constantly under water, that support small invertebrates, such as crabs, worms, flies, beetles, spiders, sand hoppers, clams, and ostracods, that are essential food sources;*

3) Surf- or water-deposited organic debris, such as seaweed (including kelp and eelgrass) or driftwood located on open substrates that supports and attracts small invertebrates described in PCE 2 for food, and provides cover or shelter from predators and weather, and assists in avoidance of detection (crypsis) for nests, chicks, and incubating adults; and

4) Minimal disturbance from the presence of humans, pets, vehicles, or human-attracted predators, which provide relatively undisturbed areas for individual and population growth and for normal behavior.



\\PDC\GTRDSGIS01\Projects_1\County_of_Monterey\00206_18_SalinasRiverMgmtPlan\Figures\LowEffect_HCP\Fig_2_2a_WesternSnowyPloverNests_PermitArea_20220930.mxd User: 25110 Date: 9/30/2022

Figure 2-2a
Western Snowy Plover Nests in the Permit Area in 2020

Figure 2-2b
Western Snowy Plover Nests in the Permit Area in 2019

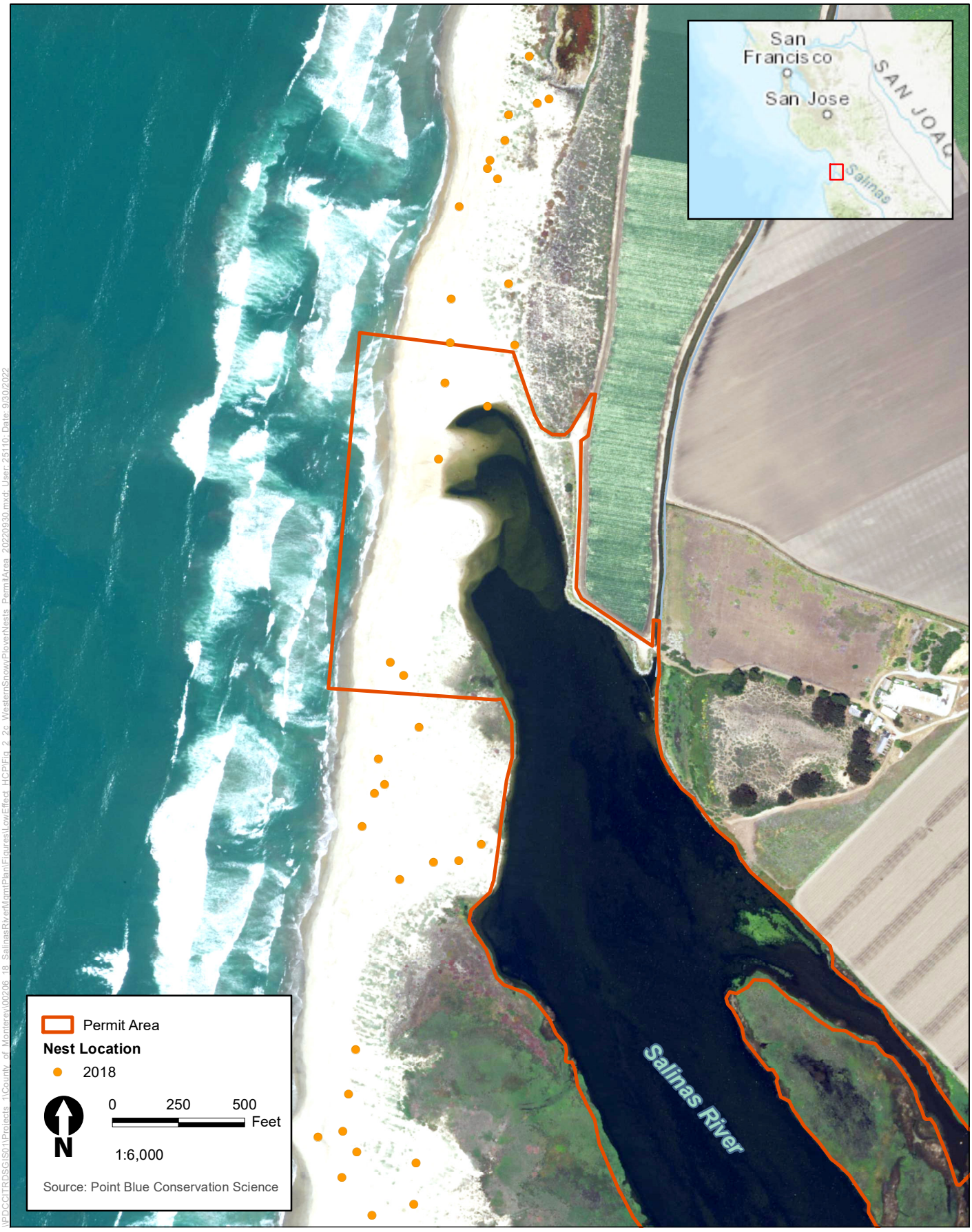
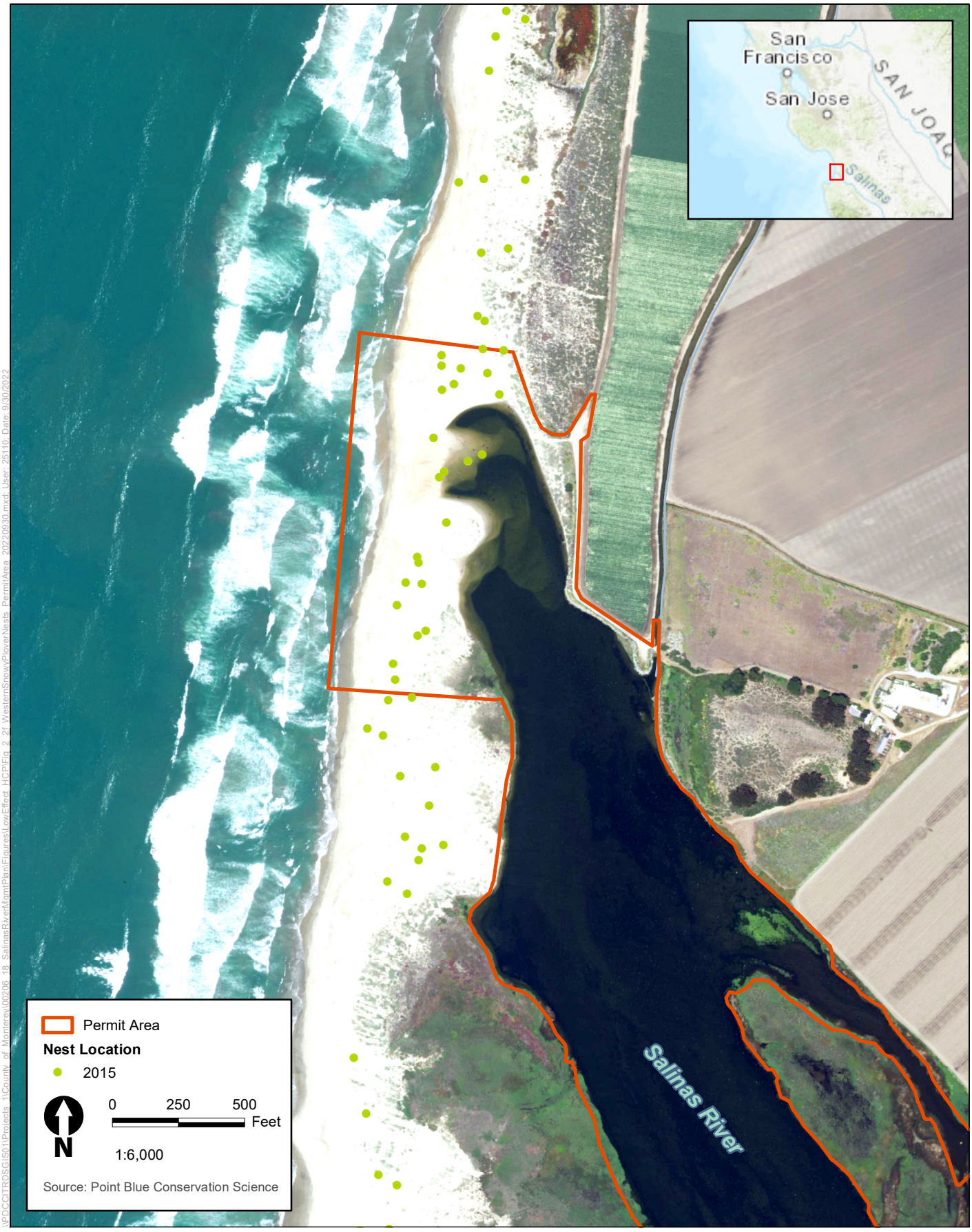


Figure 2-2c
Western Snowy Plover Nests in the Permit Area in 2018

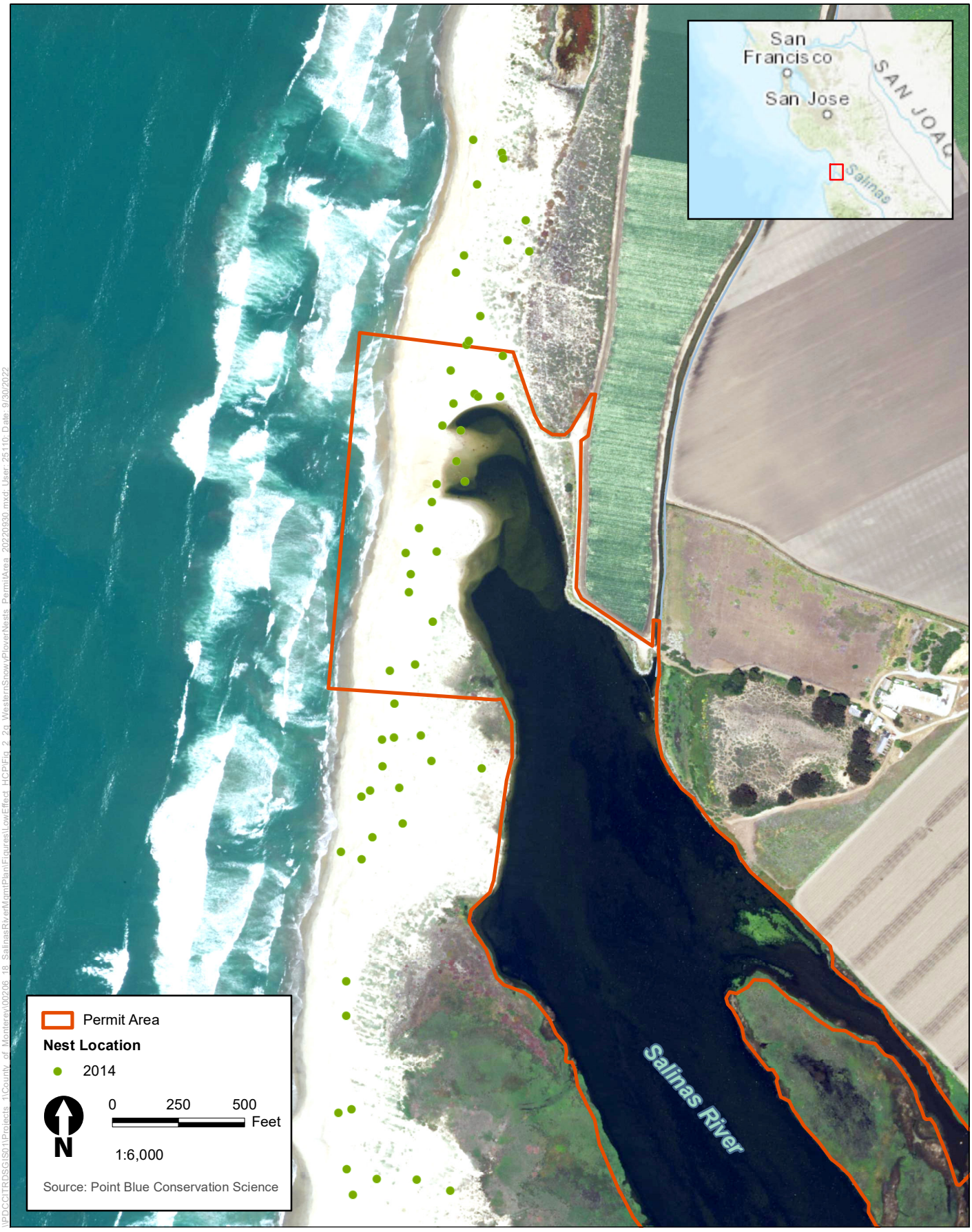
Figure 2-2d
Western Snowy Plover Nests in the Permit Area in 2017

Figure 2-2e
Western Snowy Plover Nests in the Permit Area in 2016



\\PDC\GTRDSGIS01\Projects_1\County_of_Monterey\00206_18_SalinasRiverMgmtPlan\Figures\LowEffect_HCP\Fig_2_2f_WesternSnowyPloverNests_PermitArea_20220930.mxd User: 25110 Date: 9/30/2022

Figure 2-2f
Western Snowy Plover Nests in the Permit Area in 2015



\\PDC\GTRDSGIS01\Projects_1\County_of_Monterey\00206_18_SalinasRiverMgmtPlan\Figures\LowEffect_HCP\Fig_2_2g_WesternSnowyPloverNests_PermitArea_20220930.mxd User: 25110 Date: 9/30/2022

Figure 2-2g
Western Snowy Plover Nests in the Permit Area in 2014

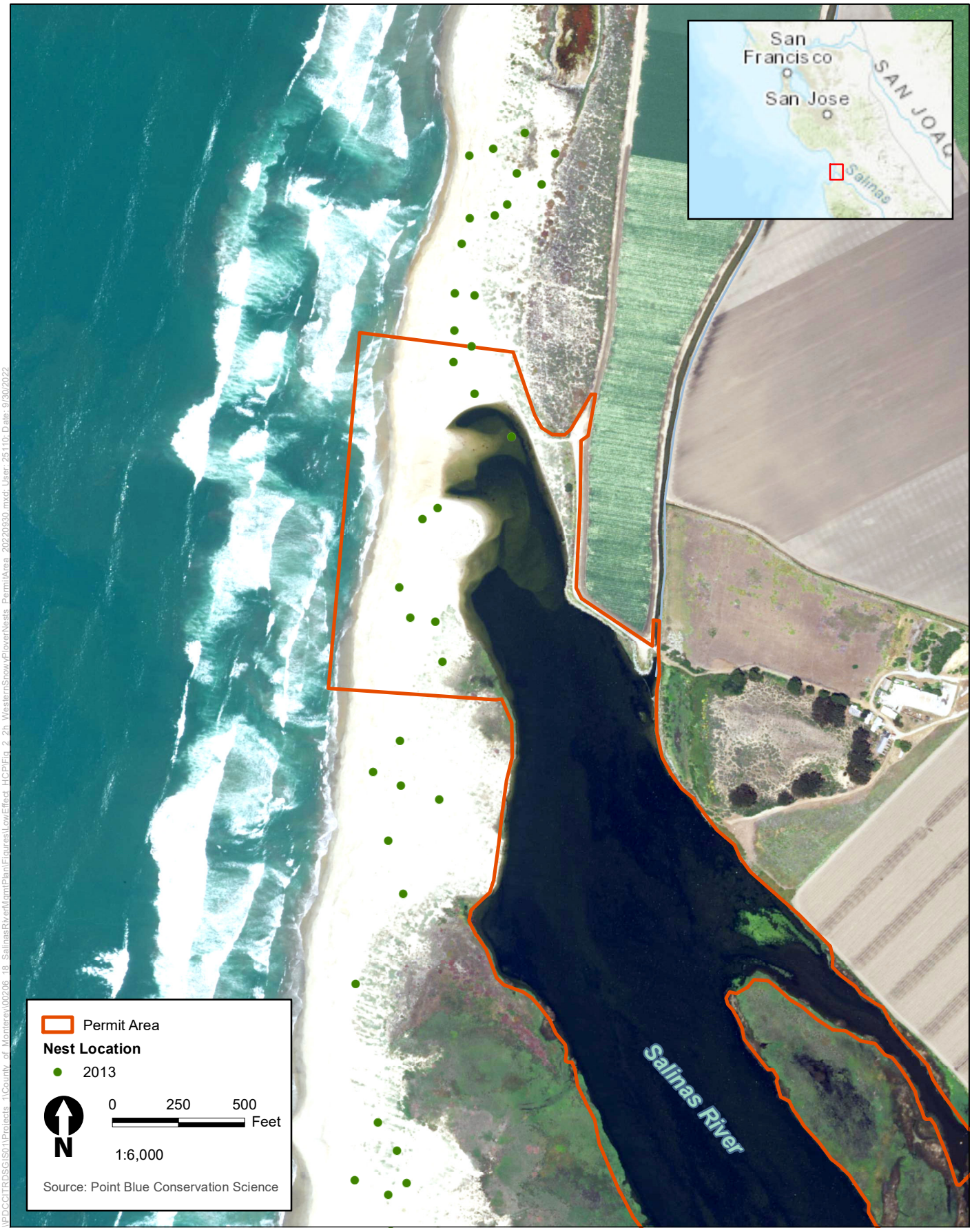


Figure 2-2h
Western Snowy Plover Nests in the Permit Area in 2013

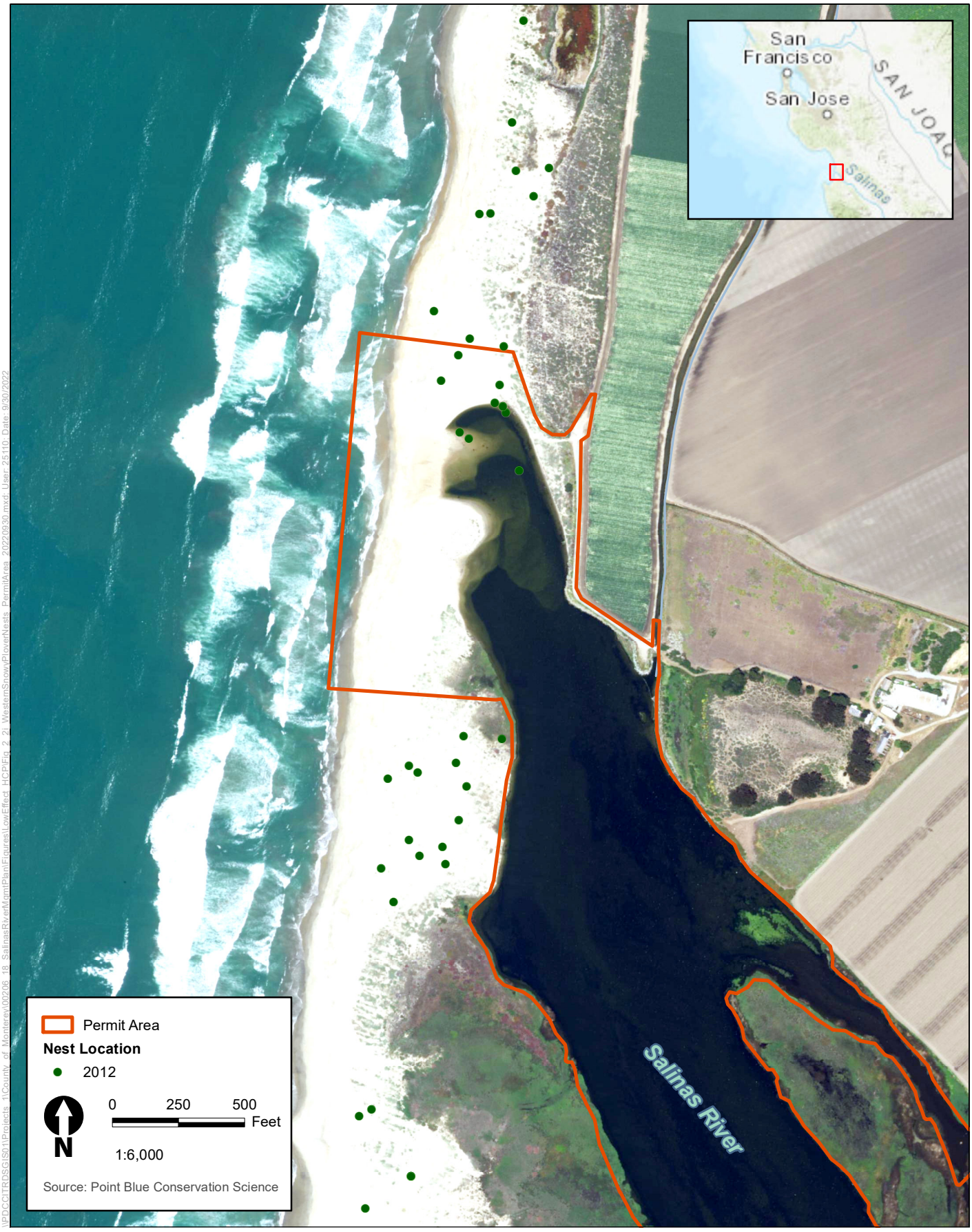


Figure 2-2i
Western Snowy Plover Nests in the Permit Area in 2012

2.2.3.3 Monterey Spineflower

Monterey spineflower was listed as federally threatened in 1994 (59 FR 5499). The species is categorized as a California Native Plant Society Rank 1B.2 species.[5]

Geographic Distribution

Monterey spineflower is known from the mountains of Santa Cruz County south to the coastline of Monterey and inland to the coastal plain of the Salinas Valley. Historically, this species occurred farther south near San Lucas in southern Monterey County and near San Simeon along the coast of northern San Luis Obispo County (California Native Plant Society 2021). Historical occurrences in the Salinas Valley have been extirpated primarily because of conversion of natural habitat to agricultural land. The range of Monterey spineflower is now limited to the interior of Santa Cruz County south along the coastal areas of the Monterey Peninsula, as well as the inland coastal plain of the Salinas Valley. The northernmost population is known from the Santa Cruz Mountains between Scotts Valley and Felton, and the southernmost population is located on the south side of the Salinas River levee approximately 2.5 miles southeast of the town of Soledad (California Department of Fish and Wildlife 2021).

Life History and Habitat Requirements

Monterey spineflower is an annual prostrate herb in the buckwheat family (*Polygonaceae*). It has linear, alternate leaves and the inflorescence is characterized by hooked involucre awns. Plants typically germinate soon after winter rains, flowering occurs in the spring from April through July, and seed is set in the summer. It produces small seeds that are dropped or shaken by wind from their capsule and may then be dispersed with blowing sand or by fur-bearing animals to which the spiny fruits may attach and be carried (U.S. Fish and Wildlife Service 2009). The species colonizes open sandy sites and tends to invade roadsides and firebreaks (U.S. Fish and Wildlife Service 1998).

Monterey spineflower is found in maritime chaparral, coast live oak woodland, coastal scrub, grassland, and coastal dune habitats. This species can tolerate some disturbance, such as scraping of roads and firebreaks, which can reduce the competition from other herbaceous species and consequently provide favorable conditions for Monterey spineflower. Occurrences range in elevation from 7 to 2,300 feet.

Threats

At the time of listing, several threats to Monterey spineflower habitat were identified, including industrial and residential development, agricultural conversion, recreational use including horseback riding, dune stabilization projects, sand mining, military activities, and road improvements. Urban development in coastal cities has resulted in the loss of large portions of the range of Monterey spineflower. Introduction of invasive iceplant and European beach grass (*Ammophila arenaria*) for dune stabilization has altered typical Monterey spineflower habitat and made conditions unsuitable for the species. Restoration programs implemented on protected lands in dune habitat between 1998 and the species status review in 2009 reduced the severity of the threat from invasive species and dune stabilization. In the 2009 USFWS 5-year review for the species, newly identified threats to the species include climate change and sea level rise; however,

[5] *1B* means rare, threatened, or endangered in California and elsewhere; *.2* means fairly endangered in California.

the extent of these threats is unknown (U.S. Fish and Wildlife Service 2009). The most recent status review for Monterey spineflower was completed in 2020 and found that urban and infrastructure development continue to be a primary threat to the species, with the greatest impact due to development and remediation as part of the former Fort Ord closure and reuse plan (U.S. Fish and Wildlife Service 2020). Invasive species and habitat succession are other primary threats. Although the impact from invasive species is lessened in areas with active weed control programs such as Salinas River State Beach where iceplant removal and native plant restoration has been ongoing since 2015, a permanent funding source to restore all areas of suitable habitat or to continue to maintain treated areas is lacking (U.S. Fish and Wildlife Service 2020).

Monterey spineflower recovery actions are described in the *Recovery Plan for Seven Coastal Plants and the Myrtle's Silverspot Butterfly* (U.S. Fish and Wildlife Service 1998). The fundamental strategy for recovery of the species is to protect existing populations and habitat from further losses, restore degraded habitat, and ensure the establishment of larger and more numerous populations over a greater proportion of the historic range. Recommended actions from the 2020 status review include monitoring populations on State Parks' beaches, and restoration and reintroductions in coastal dune systems where disturbance or invasive species have inhibited natural establishment of Monterey spineflower (U.S. Fish and Wildlife Service 2020).

Status in Permit Area

Monterey spineflower is known to occur in the coastal dune community adjacent to the lagoon, including the Salinas River State Beach and Salinas River NWR (California Department of Fish and Wildlife 2021). The species has also been seen in the vicinity of the route used to access the beach for sandbar maintenance activities (A. Palkovic, pers. comm. 2022) although the full extent of its presence in the permit area is currently unknown.

Critical Habitat

Critical habitat for Monterey spineflower was designated in 2002 (67 FR 37497) and revised in 2008 (73 FR 1525). There is no designated critical habitat within the permit area.

Chapter 3
Covered Activities

3.1 Overview

Covered activities are those projects or ongoing activities that receive incidental take authorization under the ITP. The primary covered activity of the HCP is the continued management by MCWRA of the Salinas River Lagoon and sandbar in response to storm events to prevent flooding of adjacent uplands, including flooding associated with flood control releases from San Antonio and Nacimiento Dams necessitated by storm events. The facilitated breaching of the sandbar at the mouth of the Salinas River Lagoon will occur after an emergency proclamation in order to alleviate imminent upland flooding by reducing the sandbar elevation between the Salinas River Lagoon and the Pacific Ocean. Before management of the sandbar occurs, MCWRA will implement all other available measures of flood protection to reduce flood potential to the greatest extent feasible, including operation of the OSR slidegate to release water into the OSR. Sandbar management is conducted only after other available options have proven insufficient to avoid or alleviate flooding.

3.2 Sandbar Management

Through established upstream reservoir and diversion facilities, over the last 20 years MCWRA has been managing water levels at the mouth of the Salinas River to approximately 3.5 feet NGVD29 on average throughout the year to control flooding in the adjacent uplands. When the Salinas River mouth is closed to the ocean, the water level in the lagoon is regulated using a slidegate to the OSR channel located at the base of Mulligan Hill. Flow through the slidegate is limited by the physical capacity of the outlet structure, and by the hydrologic capacity in the OSR channel. The OSR channel is tidally influenced and high inflows from other sources during winter storms (primarily through Tembladero Slough) severely restrict the amount of water that will drain through the lagoon outlet gate. Therefore, implementation of sandbar management is necessary when flow in the Salinas River is predicted to be sufficiently high to cause an increase in lagoon stage that threatens to flood adjacent agricultural lands and homes.

MCWRA may perform sandbar management activities once to multiple times per year, usually from late fall to late spring (October to April) to minimize flooding. A very small number of lagoon breaches have historically occurred in May and June (Figure 3-1). Because these breaches are not the first breach event of the water year, they are most likely to be unassisted lagoon breaches that occur after natural conditions have rebuilt the sandbar at a lower elevation that allows the lagoon to breach prior to causing upland flooding, rather than facilitated breaches. To date, MCWRA has only conducted sandbar management activities under an emergency declaration from the County of Monterey County Administrative Officer after all other available measures to manage the lagoon stage have proven insufficient to avoid or alleviate imminent flood risk. The decision to mobilize and conduct emergency sandbar management is based upon one or more of the following conditions.

1. **Lagoon Water Elevation.** Mobilization would occur when the lagoon water level reaches a surface elevation of 5.0 feet NGVD29 or higher, as measured at the staff gage located at the slidegate in the lagoon. Actual pilot channel excavation across the beach and lowering of the

sandbar elevation would begin when the lagoon water level reaches a surface elevation of 5.5 feet or higher and is rising.

2. **River Flows.** When the rate of increase in water level in the lagoon, as estimated on the staff gage, indicates less than six hours until the water level in the lagoon reaches a surface elevation of 5.0 feet, or when Salinas River flows reach or exceed approximately 300 cubic feet per second (cfs), as provided by the USGS stream gage at Spreckels.
3. **Ocean Influence (High Tides and/or Storm Surge).** When monitoring indicates wave over-topping would begin to rapidly increase the water level of the lagoon as well as increase the sandbar elevation.

A history of lagoon breaching events from 1965 to the present is provided in Appendix C to illustrate the frequency of historical breaching as an indicator of the potential timing and frequency of future breaching. While MCWRA records do not indicate for the entire period of record whether each event occurred unassisted or was facilitated by sandbar management, it is likely that the first breach event of each water year was a facilitated breach. The only known unassisted initial water year breach of the Salinas River Lagoon occurred on December 4, 2001 when the lagoon surface elevation of 6.4 feet NGVD29, combined with unusually large waves of 20 feet in height, lowered the sandbar elevation sufficiently to cause an unassisted breach (Entrix, Inc. 2001). This initial unassisted breach was followed by a later facilitated breach on December 24, 2001. All other initial breach events, with the exception of 2010, are thought to be facilitated breaches resulting from sandbar management that have occurred anytime between October and April in response to actual or imminent flooding (Figure 3-1). A unique set of conditions in January 2010 resulted in an unassisted breach despite a facilitated breach in progress. MCWRA initiated sandbar management activities and achieved slow dewatering of the lagoon through the pilot channel, but high inflows increased the lagoon stage to 8 feet and caused an unassisted breach south of the existing pilot channel, creating a shorter, more direct channel to the ocean with significant outflow (Hagar Environmental Science 2010). While it was technically the naturally created channel that effectively lowered the lagoon stage to 4 feet and alleviated flooding, facilitated breaching was already in progress and this initial breach event is therefore considered a facilitated breach.

The timing of sandbar management activities coincides with winter storm events and high river flows that would result in substantial flooding followed by an unassisted lagoon breach if a facilitated breach was not performed. The objective of sandbar management is to alleviate flooding by facilitating the lagoon's breaching of the sandbar separating the lagoon and the Pacific Ocean and allowing flows to drain to the ocean. Flows into the lagoon may recede to low levels between storms and, depending on tide and wave conditions, the mouth may close again for periods of time with subsequent unassisted or facilitated breaching occurring again later in the season. Facilitated breaching typically occurs only once to occasionally twice per year, although in some years it is not needed. After an initial facilitated breach has lowered the sandbar and an outflow channel has formed, subsequent events are more likely to occur without any mechanical assistance, particularly when the duration between closure and re-opening of the lagoon mouth is short (i.e., days or up to a few weeks). Water Year 2003/2004 is the most recent year for which MCWRA has detailed records that indicate facilitated breaching occurred twice: on January 1, 2004, and again on February 25, 2004 (J. Demers, pers. comm. 2022). Prior to this, from 1965 to 1992, there were only six water years with multiple breach events, and it is unknown how many of these were facilitated breaches (Appendix C).

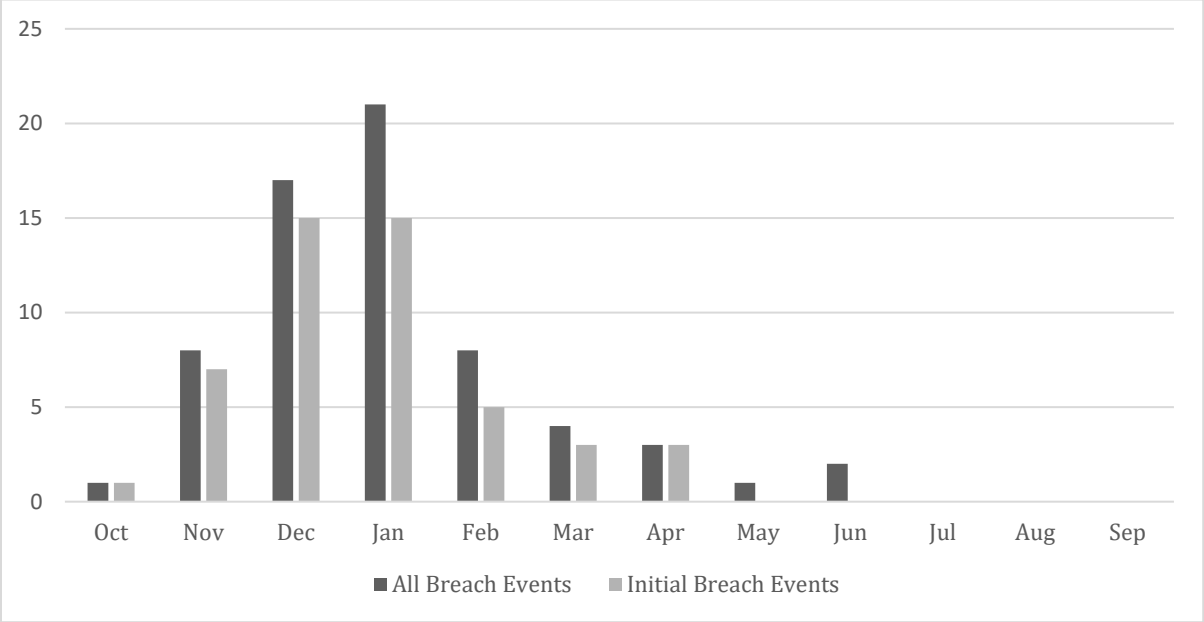


Figure 3-1. Number of Breach Events and Number of Initial Breach Events by Month for Water Years 1965 to 2021.

3.2.1 Pilot Channel Excavation

Sandbar management involves grading or excavating a drainage channel (the *pilot channel*) across the beach and lowering the sandbar at the lagoon to drain the lagoon when the lagoon stage reaches a critical elevation, approximately 6.0 ft NGVD29. At this surface elevation, the lagoon begins to crest the south bank behind the beach and floods an extensive area of low marsh vegetation in the Salinas River NWR to the south of the lagoon. Water also beings to overtop low points in the levee on the north side of the lagoon and low-lying agricultural fields to the north begin to experience limited flooding. Inundation of residences in this area becomes imminent and will occur if the lagoon elevation rises above 7 feet.

MCWRA staff perform a survey of existing conditions at the lagoon and beach crest prior to initiation of sandbar management that includes the following steps.

- Verification of lagoon water surface elevation using a local benchmark, typically the staff gage at the OSR slidegate.
- Surveying the beach berm for approximately 600 linear feet to determine the lowest point of the berm.
- Verification of the lowest elevation by field and office staff to ensure it is a feasible location for sandbar management to occur.
- Setting grade stakes at the verified location from beach berm toward the lagoon's water edge with cut slopes stated on the grade stakes to achieve an elevation of 6.0 feet NGVD29.
- Placing a final stake at the elevation of 6.0 feet with a zero cut to represent the longest distance of the pilot channel.

The grade stakes are set 10 to 20 feet offset from the channel location so they can be utilized during excavation of the pilot channel. A trapezoidal channel is excavated across the beach sandbar between the ocean and the lagoon to expedite breaching of the lagoon, allowing water to reach the ocean and minimize flooding. The pilot channel is typically 18 feet wide and up to 400 feet long. The location of the pilot channel is determined based on existing conditions of the beach and lagoon features at the time of sandbar management activities as determined by the survey steps described above. The excavated channel is normally located at the lowest point of the sandbar and follows a northwesterly alignment, usually on Salinas River State Beach lands managed by State Parks. The features of the pilot channel are designed to mimic an unassisted lagoon breach event and to encourage channel sinuosity. The channel begins at an elevation of approximately 6.0 ft NGVD29 near the mouth of the lagoon and slopes slightly downward toward the ocean to allow for slow flow release. A sand plug is left in place between the lagoon and the pilot channel so that as the water elevation in the lagoon rises, the water naturally breaks through the sand and into the pilot channel. The pilot channel includes a bend of approximately 25-45 degrees near the beach crest for the purposes of reducing water velocity and slowing the evacuation of the lagoon. Once breaching is complete, the pilot channel is subject to fluvial and tidal influences that determine the changing width and sinuosity of the channel.

MCWRA utilizes a bulldozer and/or excavator to create the pilot channel. The quantity of displaced sand is approximately 2,000 cubic yards which is left on site directly adjacent to the excavated channel for redistribution by natural processes. Equipment is staged on the landward side of the dunes on an existing access road to the north of the channel in an area where an accidental spill of fluids would not reach a waterway. Equipment is checked for leaks prior to staging and prior to accessing the beach. Equipment enters the beach from this access road and proceeds in the most direct manner possible to the pilot channel location along a path that has been surveyed by qualified biologists during daylight hours for the presence of listed species. The access pathway is approximately 12 feet wide, and equipment is driven on the beach for sandbar management only. The equipment exits from the excavation area along the same path it entered. The total length of site disturbance from the beach access point to the pilot channel location is approximately 700 linear feet. The total area of site disturbance, including the equipment access path and the pilot channel itself, is generally less than 0.35 acre. For safety reasons, most sandbar management activities occur during daylight hours. However, on occasion it may be necessary to perform some activities either late into the evening or early in the morning before light.

Because of the dynamic nature of the storm events that can precipitate a facilitated breach, on occasion, storm surge or tidal action can collapse the side slopes of the pilot channel or deposit enough sand to partially or fully block the mouth of the pilot channel before the breach is complete (i.e., before lagoon stage has lowered sufficiently to alleviate flood risk and the lagoon has become tidally influenced). When this occurs, typically within hours, equipment may be re-mobilized to re-open the pilot channel to allow the breach to proceed to completion. The breach event on January 29, 2021 is the most recent occasion when a re-opening of the pilot channel was necessary. During this event, the pilot channel was initially excavated and outflow established before tidal influx filled the channel with sand and required re-establishment of the channel within 12 hours (Monterey County Water Resources Agency 2021). After the reestablishment, lagoon stage dropped, and the lagoon became tidally influenced within approximately 3 hours.

3.2.2 Slidegate Operation

MCWRA operates the OSR slidegate in a manner that reduces the potential for flooding of adjacent upland areas. The slidegate is opened or closed to maintain the lagoon water elevation at the operational target, currently set at approximately 3.5 feet NGVD29. When the need for sandbar management is imminent, the slidegate is typically closed unless operational needs dictate that it remain open, and MCWRA installs the pilot channel across the sandbar to facilitate breaching if needed. The slidegate typically remains closed as long as the Salinas River is connected to the ocean.

3.3 Non-covered Activities

Flow requirements and operational targets for managing steelhead trout in the Salinas River have been incorporated into MCWRA's water rights for the San Antonio and Nacimiento Reservoirs, including defined actions to achieve these requirements. The only action that would specifically encourage a breach of the Salinas River Lagoon is a release of water called a *block flow* release that would require a mean daily stream flow greater than or equal to 700 cfs at the USGS stream gage Salinas River at Soledad for five consecutive days. However, because of natural flow conditions to date, MCWRA has not had to address a potential lagoon breach as a direct result of block flow releases and does not expect to do so during the permit term.

Chapter 4
Effects of Covered Activities

4.1 Overview

This chapter discusses the potential effects from the lagoon and sandbar management activities described in Chapter 3, *Covered Activities*, on covered species (listed in Chapter 1, *Introduction*) within the permit area and requests specific levels of take authorization. *Effects* include the direct and indirect effects of a covered activity on the covered species or their habitats in the permit area. Effects can be adverse or beneficial, occurring at the time and place of covered activity implementation (direct effects), or later and/or beyond the footprint of a covered activity (indirect effects). As used in this document, the term effects is synonymous with the term impacts.

The effects analysis establishes a base level for potential effects associated with implementing the covered activities to inform appropriate avoidance and minimization measures (AMMs), and mitigation measures. Chapter 5, *Conservation Strategy*, describes the measures that will minimize and mitigate the effects of the covered activities and fully offset these impacts. The effects analysis identifies covered activities that may result in incidental take[6] of covered animal species. Effects of the covered activities on a species may include direct mortality, injury, or harm[7] to individuals. Effects may also occur later in time, but still be reasonably certain to take place, and can often be subtler, affecting species' populations and habitat quality over an extended period, sometimes long after project activities are completed. Take of listed plants is not described in the ESA, though Section 9 of the Act prohibits certain actions which may adversely affect listed plants. However, before USFWS issues a permit, the effects of the permit on listed plants must be analyzed because Section 7 of the ESA requires that issuance of an ITP must not jeopardize any listed species, including plants. To maintain consistency with Section 7(a)(2) of the ESA, Section 10 prohibits the issuance of an ITP that will appreciably reduce the likelihood of the survival and recovery in the wild (i.e., "jeopardize") of any endangered or threatened species, including plants. Although not specifically addressed by Section 10, listed plants can be covered by HCPs under USFWS's No Surprises Assurance rule, discussed in Section 6.3.

The purpose of the activities described in Chapter 3 is to alleviate upland flooding by facilitating the breach of the Salinas River Lagoon when environmental conditions are such that significant upland flooding followed by an unassisted breach would be likely to occur. Since breaching is a natural event that is likely to occur, it is necessary to define the temporal duration of potential impacts to covered species resulting from the covered activities, as opposed to the potential impacts of natural processes to covered species that occur in coastal lagoons subject to periodic hydrologic disconnection from the ocean and seasonal breaching. For the purposes of this HCP, we consider the duration of potential impacts from covered activities to occur from the time of initiation of sandbar management activities (i.e., entry onto the beach to conduct the initial survey of existing conditions

[6] Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect.

[7] Harm is defined as "An act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering." (50 CFR 222.102)

to determine the location of equipment access route and pilot channel as well as any necessary pre-activity species surveys), to the point at which the lagoon becomes tidally influenced after the breach has occurred. At this point, natural lagoon processes take over, and wave and tidal action either maintain the hydrologic connection of the river to the ocean or rebuild the sandbar to reform the lagoon.

HCPs are required to include a determination of the amount of incidental take that may occur as a result of covered activities and that will be authorized during the permit term (50 CFR Section 17.22[b]). The total allowable take as described and quantified for each covered species represents the limit, or cap, on total take proposed under the HCP. Once these limits are reached, no further take is permitted pursuant to the HCP without an amendment (see Chapter 6, *Plan Implementation* for a description of the amendment process). Take limits are established for the HCP as a whole, not by covered activity type. The following estimate of take considers the AMMs described in Chapter 5, *Conservation Strategy,* which are designed to reduce the level of take.

4.2 Tidewater Goby

Based on the presence of suitable lagoon habitat and known occurrences of tidewater goby within the permit area, there is potential for tidewater goby to be impacted by covered activities.

4.2.1 Project-Specific Impacts

4.2.1.1 Sandbar Management

Sandbar management activities are not expected to result in take of tidewater goby as these activities do not occur in tidewater goby habitat. Excavation of the pilot channel is performed from the open beach, and construction equipment does not enter the lagoon at any time during this activity.

4.2.1.2 Lagoon Breaching

Based on the historical frequency of lagoon breaching, it is reasonable to assume that one facilitated breach may occur in each year during the permit term (i.e., 5 breaches). Permanent loss of lagoon habitat for tidewater goby is not expected to occur as the result of facilitated lagoon breaching. Facilitated lagoon breaching is considered a temporary effect to lagoon habitat because mechanical lowering of the sandbar facilitates a natural event that is likely to occur even without mechanical intervention, and the lagoon is allowed to close naturally once flooding has abated. However, a full understanding of whether there is any difference in effects to tidewater goby in the Salinas River Lagoon between unassisted and facilitated breaches is lacking. Once river flows recede, wave and tidal action typically rebuild the sandbar at the mouth of the river over time, eventually disconnecting the river from the ocean and re-creating the lagoon in a similar size and configuration of its perimeter. Temporary effects to critical habitat caused by facilitated lagoon breaching are discussed below (Section 4.2.1.3).

A rapid rise in lagoon stage within hours or days, followed by a facilitated breach is generally expected to have a very limited adverse effect on the resident adult tidewater goby population. Tidewater goby benefits from a relatively stable surface water elevation provided when the sandbar is in place, although adults have a broad tolerance for a wide range of salinities and oxygen concentrations and environmental changes to cope with the dramatic fluctuations that result from a

breaching event (U.S. Fish and Wildlife Service 2007a). Tidewater goby is a bottom-dwelling fish and much less mobile in the water column than mid-water species. The species is also typically closely associated with widgeon grass (*Ruppia maritima*) and other submerged and emergent aquatic vegetation, although recent surveys have noted the absence of widgeon grass in areas where goby have been captured in the lagoon, possibly because its detection was obscured by high water turbidity (Hellmair and Lee 2022). Newly inundated habitat, particularly in the vicinity of the breaching location, often consists of sandy substrate, devoid of the aquatic vegetation preferred by tidewater goby. Despite typically occupying lagoon margin habitat at depths of three feet or less, individuals are not expected to occupy newly inundated areas in substantial numbers since the rise in lagoon stage happens rapidly during flow events that may lead to a breach. Due to the low expected numbers of tidewater goby in newly inundated habitat prior to the breach, the risk of stranding or disruption in the natural behavior of the species is expected to be minimal.

A rapid rise in water level and subsequent drop induced by breaching is unlikely to affect lagoon bottom habitat areas permanently occupied by tidewater goby because the lagoon will never completely dewater during a facilitated breach owing to the high and continuing freshwater inflows that precipitated the need for the facilitated breach. The design of the pilot channel is intended to lower the outflow velocity of the breach and minimize rapid dewatering that may increase risk of goby being flushed to the ocean or stranded as the lagoon stage decreases. While the timing of each event differs based on existing conditions, lagoon stage typically decreases over several hours until connectivity with the ocean is established. Once the lagoon has become fully tidal, the surface elevation oscillates with the tides while the mouth remains open. Fish are inherently well adapted to retreat to deeper water as water levels decrease, and while some fish may get trapped and isolated in depressions in the landscape as water levels rapidly recede, the stranding risk for tidewater goby is expected to be low, owing in part to the generally trough-shaped topography of the Salinas River Lagoon.

If there is a need for sandbar management during the late spring or early summer, this could disrupt goby breeding which can occur year-round but typically peaks in late spring with a second smaller peak in early fall. Breaching events during the peak reproductive period have the potential to dewater or collapse burrows constructed for egg deposition. In addition, larval tidewater gobies are planktonic for 18 to 31 days after hatching before becoming benthic, and thus may be at increased risk of stranding or flushing to the ocean since they are weaker swimmers than adult fish and may not be able to find refuge from high flows. Because goby live an average of one year, the loss of one peak breeding season could limit recruitment into the tidewater goby population in the Salinas River Lagoon. Tidewater goby surveys conducted in the lagoon since 2018 have estimated hatch dates for captured goby anywhere from November to August based on length at capture, but a peak in breeding activity seems to occur around April – May (Hellmair and Lee 2022). Since 1965, the lagoon has breached 65 times, and four of those breaches have occurred in April or May; of which, three (4.6 percent of the total number of breaches) were the initial breach of the season (Figure 3-1). A facilitated breach during the peak breeding season most recently occurred during the 2019/2020 water year on April 7, 2020 (Appendix C). In general, facilitated breaching during the peak breeding season is very uncommon and not expected to occur regularly during the permit term.

Persistence of a tidewater goby population through winter is highly dependent on the presence of a large population going into the fall and winter. Large flood events may sweep a substantial number of individuals out to the ocean; therefore, a large population increases the potential for some individuals to survive winter flood events and comprise the initial breeding population the following

summer. Tidewater goby can find refuge from heavy flows and being washed to sea in backwater sloughs lateral to the main channel, allowing a population to persist in a lagoon (U.S. Fish and Wildlife Service 2005). Such habitats may exist at the confluence of Tembladero Slough and the OSR, or along the northern shoreline of the lagoon (Figure 1-3). However, the current status of tidewater goby occupancy and the environmental suitability of these habitats is unknown. Tidewater goby often migrate upstream from lagoons into tributaries, generally in summer and fall (U.S. Fish and Wildlife Service 2005). Thus, a late season breach is likely to have less potential to flush goby from the lagoon if they have moved into upstream locations. To date, surveys for tidewater goby in the Salinas River have only occurred upstream as far as the Highway 1 bridge, and the extent of upstream migration in this population is unknown.

Goby life history is adapted to the annual cycle of the coastal lagoons in which they live. Since facilitated breaching of the Salinas River Lagoon would only be performed in response to storm events resulting in flows with the potential to result in upland flooding followed by an unassisted breach, any natural behavioral response of goby to the rain event will likely be maintained. Any larval or juvenile goby present in the lagoon during a breach are less likely to exhibit such a response to the extent that it is protective during a breach; however, the extended reproductive period exhibited by tidewater goby in the lagoon (Hellmair and Lee 2022) increases the likelihood that more resilient adult goby will be present throughout the year and can maintain the population. The Salinas River Lagoon has been managed to prevent upland flooding by facilitated breaching since approximately 1910. Lagoon surveys have not been conducted on a regular basis throughout the years, but were implemented in 1991, 1992, 2004, and 2010-2012. Until their detection during routine fish monitoring surveys in the lagoon in 2013, tidewater goby were last documented in the lagoon in 1951. It therefore appears that their current presence in the lagoon may be due to a natural recolonization event. Since 2013, the Salinas Lagoon has breached six times. During this same time period, surveys have found the tidewater goby population in the lagoon appeared to persist and showed evidence of spawning activity (Hellmair et al. 2018, D. Lee pers. comm. 2021, Hellmair and Lee 2022) suggesting that the population is resilient to the current management practice of facilitated breaching.

4.2.1.3 Critical Habitat

Facilitated breaching of the Salinas River Lagoon would not result in the lagoon's sandbar being open at times when it would otherwise be closed because these activities would only be undertaken in response to high flow events that are likely to cause an unassisted breach. Therefore, any reduction in the stability of lagoon conditions or degradation of PCE 1c would be temporary and largely related to natural flow events. There may be some loss of lagoon substrate (PCE la) due to facilitated breaching and erosion of the breach channel. However, this effect would be small relative to the amount of substrate available in the system. There may also be some loss of aquatic vegetation (PCE 1b), if areas of aquatic vegetation dry out and die due to reduced water levels following a breach. Because the lagoon is typically managed to an elevation of approximately 3.5 feet NGVD29 throughout the year, this effect is expected to be negligible since areas that can support the growth of aquatic vegetation are not expected to vary significantly from pre-breach conditions to post-breach conditions. In summary, there may be some minor adverse effects to tidewater goby critical habitat, but they are expected to be very limited in geographic and temporal scope.

4.2.2 Estimated Level of Take

Predicting and documenting potential take of tidewater goby as a result of facilitated breaching of the Salinas River Lagoon is inherently difficult. Population size, distribution within the lagoon, and prevalence of vulnerable versus resilient life stages can vary greatly within a season, and from year to year. In addition, the physical characteristics of the breach, including the rate of water level rise and the timing of the breach, can influence the effects of a lagoon breaching event on the tidewater goby population. Lagoon breaching events are also an important natural mechanism that may support the species' metapopulation structure. Breaching has the potential to cause local extirpation of goby populations. However, lagoon breaching may also facilitate the dispersal and migration of tidewater goby when conditions allow, resulting in (re)colonization of habitats not currently occupied, and contributing to gene flow among extant populations which is generally considered beneficial to population resilience.

Incidental take of tidewater goby in the form of harm, injury, or death may occur as a result of facilitated lagoon breaching if goby are swept out to the ocean, particularly at a vulnerable life stage, or become stranded on the shoreline of the lagoon or in the breach channel as water elevation drops. Temporary habitat degradation that may result in take is also possible. Very little is known about the actual impacts to tidewater goby from facilitated lagoon breaching in the Salinas River Lagoon because take associated with these activities has not been observed due in part to insufficient data from post-breach stranding surveys. It is not possible to determine exactly how many tidewater goby could be injured or killed during the proposed breaching for several reasons.

- Tidewater goby is difficult to detect because of its small body size.
- Finding a dead or injured specimen is unlikely, in part because of the presence of numerous scavengers (e.g., gulls, corvids), and has not been observed at the Salinas River Lagoon to date.
- Assigning a cause of death to a specimen is problematic.
- Population abundance can fluctuate dramatically throughout the year and from year to year (Hellmair et al. 2011).

Although AMMs will be implemented to minimize take, a small amount of take may still occur. Despite potential periodic mortality caused by breaching operations, the tidewater goby population is expected to continue to persist in the Salinas River Lagoon as it has done since 2013. As discussed in the species profile (Section 2.2.3.1), tidewater goby populations naturally fluctuate widely within and between years and the extended breeding period that has been noted in the Salinas River Lagoon population is expected to increase the likelihood of more resilient adult goby being present in the lagoon throughout the year which may assist the population to persist and rebound from any losses caused by facilitated breaching events. The majority (62 percent) of initial breaching events (i.e., those events most likely to be facilitated breaches) have historically occurred during December and January and avoided the peak breeding season which also limits the potential adverse effects to the goby population. A peak in breeding activity in the Salinas River Lagoon seems to occur around April and May. Only six initial breaching events (12 percent) have occurred in March and April, and no initial breaches have occurred from May to September (Figure 3-1). The HCP recognizes that for every tidewater goby found dead or injured, other individuals may be killed or injured that are not detected. Additionally, MCWRA would require a USFWS-approved biologist to survey for stranded tidewater goby after facilitated breaching events, and capture and relocate individuals out of harm's way. As a result, the following estimation of take is considered to be a worst-case scenario and is not

expected to occur in most years if at all. MCWRA proposes that all stranded tidewater goby would be taken in the form of capture and relocated, although expect that this number would be very low because the likelihood of stranded individuals is low (as explained in 4.2.1.2). MCWRA expects no more than five percent of captured tidewater goby could be injured or killed during the process of capture and relocation. MCWRA has no records of tidewater goby injury or mortality from facilitated breaching activities in the Salinas River Lagoon to date. Therefore, it is assumed that up to five tidewater gobies of any life stage may be taken (i.e., found dead or injured) per year over the 5-year permit term.

4.3 Western Snowy Plover

Based on the presence of suitable nesting and foraging habitat and known breeding western snowy plover within the permit area, there is potential for western snowy plover to be impacted by the covered activities.

4.3.1 Project-Specific Impacts

4.3.1.1 Sandbar Management

MCWRA estimates that each time the lagoon is breached due to sandbar management activities, between 0.1 and 0.35 acre of suitable nesting habitat for western snowy plover would be temporarily disturbed by heavy equipment moving across the beach and excavating the pilot channel. Such disturbance may only result in take if the species is present, as discussed below. Based on the historical frequency of lagoon breaching, it is reasonable to assume that one facilitated breach may occur in each year during the permit term (i.e., 5 breaches), and that one of those breaches may occur during the breeding season when nests may be present in the permit area.

Sandbar management activities at any time of year may result in disturbance of adult western snowy plovers and could also result in mortality of adults at any time of year if equipment is driven on the beach at speeds sufficient to accidentally strike plovers. Western snowy plover typically nests on the beach and sandbar blocking the mouth of the Salinas River between March 1 and September 30. In the Monterey Bay region, nests have been initiated as early as February 25 and as late as July 20, with the peak in nesting activity occurring in mid-May (Table 2-3). If sandbar management occurs during this time, the presence of people and construction equipment may disrupt courtship or breeding behavior, causing plovers to either not initiate a nest in the area around the river mouth, abandon a scrape which would have become a nest, or to abandon an active nest. Plovers may also become separated from their chicks which can result in inadequate attendance and exposure of chicks to increased risk of predation. Destruction of nests with eggs or mortality of chicks could occur if they are crushed by heavy equipment. Since 1965, the initial breach of the season, most likely to be a facilitated breach, has occurred 11 times (17 percent of the total number of breaches) between February and April, and no initial breaches have occurred after April.

For safety reasons, most sandbar management activities occur during daylight hours. However, on occasion it may be necessary to perform some activities either late into the evening or early in the morning before light. In those instances, any pre-activity surveys are performed during daylight hours prior to any night work. MCWRA's AMMs ensure that the access path used by the equipment is a defined area that has been surveyed in daylight hours to be clear of plover nests and evidence of nesting behavior. A buffer of 100 feet from any nest or evidence of nesting behavior is implemented

unless access or safety constraints necessitate a closer approach, in which case the maximum possible buffer is implemented. The path is clearly marked, and monitors walk ahead of equipment as it is deployed to the beach and as it returns along the same path to keep speeds low and ensure adult and fledgling plovers have adequate time to move out of the path and project area. Monitors are present to walk with equipment regardless of the timing of the work. Therefore, the risk of direct mortality of adults, nests, or chicks is expected to be very low. The restriction of equipment to a single path of entry and exit while in suitable habitat will also minimize the potential area of disturbance to western snowy plover nesting habitat. Because the majority of facilitated breaches would likely occur in December through January, prior to initiation of nesting behavior, the potential disruption of courtship and early breeding behaviors is expected to be minimal.

4.3.1.2 Lagoon Breaching

MCWRA estimates that up to 1 acre of western snowy plover nesting habitat would be temporarily unavailable due to water flowing to the ocean created by each facilitated breach. It is possible that for initial breach events this may represent a lower level of habitat disturbance than would occur during an unassisted breach of the sandbar since an unassisted breach would be accompanied by a higher lagoon water surface elevation, and water would likely initially wash over a much larger area of the beach if it were not directed into a pilot channel. If a facilitated breach occurs early during the active nesting season between March 1 and September 30, there is the potential for nests with eggs or young that have just hatched in the area of the lagoon mouth to be washed away as the water evacuates the lagoon. The risk of this potential effect diminishes later in the breeding season as the number of newly initiated nests decreases and chicks become more mobile and capable of moving out of the path of flowing water.

Facilitated breaching of the Salinas River Lagoon is unlikely to result in the mouth of the river being open to the ocean for a greater proportion of the year than would occur naturally since facilitated breaching would only be undertaken during high flow events that are likely to result in a natural breach. When the river mouth is closed, the shoreline of the lagoon provides foraging habitat for western snowy plovers. Opening the river mouth would temporarily reduce by a small amount available western snowy plover lagoon shoreline habitat due to water outflow through the pilot channel. However, high flow events that precede a facilitated breach result in higher water surface elevations and extensive inundation of lagoon shoreline habitat, naturally reducing its availability for plover foraging prior to a lagoon breach. When the river mouth is open to tidal flushing, extensive new mudflats are exposed at low tide which are expected to provide favorable foraging habitat for plovers. Surf conditions also contribute to the creation and availability of plover foraging habitat in the area. High surf can overtop the sandbar and inundate the beach surrounding the lagoon. This, combined with the sand movement and lowering of lagoon surface elevation that results from the opening of the lagoon mouth, can expose previously inundated areas to drying and increase access to foraging habitat along the boundary of the lagoon and dunes. In addition, when the river mouth is closed, the permit area may experience increased recreational use including foot traffic along the ocean shoreline and increased use of the shoreline and potentially the lagoon by recreational anglers. Increased recreational beach use, particularly when domestic dogs accompany humans, can result in a higher level of disturbance to plover during the breeding season and a large number of nest losses and chick mortality (Neuman et al. 2021b). Recreational disturbance can be continuous throughout the breeding season rather than restricted to a short (less than a week) period as occurs with facilitated breaching activities.

Overall, while there may be a slight reduction in available nesting habitat, this represents a very small percentage (less than 1 percent) of the total nesting habitat available in the Monterey Bay region, which extends approximately 22 miles from north of Sunset State Beach south to Monterey State Beach. Additionally, the availability of foraging habitat is not expected to be significantly reduced, but plovers may transition from utilizing the lagoon shoreline to tidal mudflats and other available areas. The changes in availability or extent of nesting and foraging habitat that may occur after a facilitated breach are not expected to differ substantially from those expected after an unassisted breach.

4.3.1.3 Critical Habitat

Facilitated breaching of the Salinas River Lagoon would involve excavation within western snowy plover critical habitat resulting in a temporary loss of sparsely vegetated beach above the high tide line (PCE 1) and a short-term increase in human presence and activity (PCE 4). Because facilitated breaching is performed as an emergency action to alleviate imminent flood risk, mobilization to the beach to perform pre-activity surveys and implement sandbar management is typically completed in a matter of one to several days. Monitoring of conditions after the breach can continue for approximately one week. Suitable foraging habitat (PCE 2) is not expected to be reduced, although there may be a transition from shoreline foraging habitat to tidal mudflat habitat. While there may be minor adverse effects to western snowy plover critical habitat due to covered activities, they are expected to be very limited in geographic and temporal scope.

4.3.2 Estimated Level of Take

It is not possible to determine exactly how many western snowy plovers could be harmed, injured, or killed during the proposed breaching for several reasons.

- The exact location and timing for each breach is not determined until immediately before the breach.
- The amount of habitat washed out by the breach will vary.
- The locations of western snowy plover nests and the date when nesting is initiated vary from year to year.

Take of adults is unlikely with the implementation of MCWRA's AMMs, and due to their ability to move out of the area during sandbar management operations. There is potential for one to several clutches (typically with three eggs/chicks each) to be lost each time the lagoon is breached during the nesting season. However, based on historic data, facilitated breaching of the lagoon during the nesting season is expected to occur rarely (Appendix C). Since 2012, an initial breach has occurred three times during the breeding season in March or April, and a total of 15 plover nests were located in the permit area during those three years (15.6 percent of the total nests in the permit area 2012-2021). To date, MCRWRA has not documented the loss of a plover nest with eggs or chicks due to facilitated breaching of the Salinas River Lagoon, and will attempt to salvage any nest identified as being at risk of injury or destruction if possible. Potential disruption of courtship or early breeding behavior such as abandonment of a scrape prior to a clutch being laid may occur due to disturbance from facilitated breaching activities, particularly early in the breeding season. This likewise has not been documented, but that may be due in part to the challenge of detection. Conversely, MCWRA was notified by USFWS of the loss of one plover nest to inundation during an event when the lagoon

was not breached and surrounding uplands were flooded (E. Krafft, pers. comm. 2021). Given the uncertainties surrounding annual nest initiation timing and specific locations of nests from year to year, MCWRA conservatively assumes that up to two nests (assuming three eggs or three chicks in a nest), for a total of six individuals may be taken over the 5-year permit term either as a result of sandbar management and facilitated breaching activities, or as the result of implementation of *BMP-9 Salvage and Captive Rearing*. Because MCWRA has never previously documented the loss of a plover nest with eggs or chicks due to sandbar management or facilitated breaching at the Salinas River Lagoon, it is highly unlikely that two nests will be taken during the permit term. However, a take allowance for two nests allows greater certainty that the permit remains valid for the full 5-year period without potential for exceeding the allowable take. The AMMs that will be implemented by MCWRA will effectively minimize mortality of adult and juvenile plovers.

4.4 Monterey Spineflower

Based on the presence of suitable coastal scrub and dune habitat and known occurrences of Monterey spineflower near the access route used for sandbar management activities within the permit area (A. Palkovic, pers. comm. 2022), there is potential for Monterey spineflower to be impacted by covered activities.

4.4.1 Project-Specific Impacts

4.4.1.1 Sandbar Management

Sandbar management would not contribute to habitat loss for Monterey spineflower as suitable habitat does not occur in the open beach area directly impacted by the excavation of the pilot channel. Although this species has been noted by State Parks staff near the route used by equipment to access the beach from the equipment staging area, the route is surveyed and demarcated to avoid existing coastal scrub and dune vegetation and the known population of Monterey spineflower by utilizing existing pathways and open beach devoid of vegetation. Monterey spineflower individuals are and will continue to be avoided unless they should colonize a currently unoccupied area of the access pathway that would be impossible to avoid due to safety concerns. If that were to happen, Monterey spineflower individuals, particularly small seedlings that may be difficult to detect early in the season, could potentially be trampled or crushed by foot or equipment traffic, resulting in physical injury to the plant and potential loss of the plant. Damage from crushing or trampling can also prevent the plant from flowering and producing seed or result in a lower reproductive output. Disruption of the seedbank can occur if disturbance uncovers seeds and causes them to desiccate from exposure at the ground surface during the dry season or buries them at inappropriate depths. Since Monterey spineflower typically germinates soon after winter rains begin, and begins flowering in April, if sandbar management activities occur between February and April, they are more likely to affect earlier life stages from seedling to early flowering. An initial breach has not occurred in May or later, therefore adverse effects to mature plants setting seed are not expected.

Construction equipment access during facilitated breaching activities may reduce habitat quality for Monterey spineflower by destabilizing substates which can lead to increased erosion, particularly during wind events. Construction equipment may also inadvertently introduce or spread nonnative invasive species by moving seeds or plant segments on tires. Nonnative invasive species are known to degrade native vegetation communities by competing with native species and colonizing newly disturbed areas. The access pathway is typically 12 feet wide and approximately 700 linear feet

from equipment staging area to the pilot channel location, so MCWRA estimates that the maximum area of suitable habitat that could be affected by each breaching event is approximately 0.19 acre. Implementing AMMs as described in Chapter 5, *Conservation Strategy*, will minimize this threat to the maximum extent feasible. Overall, while there may be a slight impact to available habitat along the path utilized by construction equipment to access the beach, this represents a very small percentage of the total suitable habitat available in the region. Additionally, the availability of suitable coastal scrub or dune habitats are not expected to be significantly reduced by the covered activities.

4.4.1.2 Lagoon Breaching

Suitable habitat for Monterey spineflower does not occur on the open beach area that is typically impacted by water evacuating the lagoon, thus no impacts are expected from the breach of the lagoon.

4.4.2 Estimated Level of Impacts

Impacts to Monterey spineflower are unlikely due to MCWRA's ability to avoid known individuals during sandbar management activities. However, Monterey spineflower is adapted to germinate in disturbed sandy soils and may colonize the vehicle access pathway, or the lagoon perimeter may shift requiring equipment to travel along a new access pathway in an area of suitable habitat. If this were to occur, any individual plants that colonize the access pathway could be trampled or crushed, resulting in physical injury, disruption of reproduction, or loss of the plant. In addition, if a new access route is needed due to changed conditions and requires travel through a previously undisturbed area of suitable habitat, there is potential for minor reduction in habitat quality along the new access route from destabilized substrates. Implementation of the AMMs described in Chapter 5 will minimize any potential impacts to the maximum extent practicable.

Chapter 5
Conservation Strategy

The Salinas River Lagoon and Sandbar Management Low Effect HCP conservation strategy was designed to address the ESA requirement to minimize and mitigate the impacts of the taking on the covered species to the maximum extent practicable (16 USC 1539). It is the goal of this conservation strategy to fully offset the impacts of the taking on each of the covered species that may result from implementation of covered activities. The conservation strategy was designed to minimize and mitigate the impacts described in Chapter 4, *Effects of Covered Activities*, including direct, indirect, temporary, and permanent effects based on a conservative estimate of impacts (i.e., a likely overestimate of impacts). This conservation strategy is based on best available science, taking into account the limitations of the baseline data available for the HCP permit area and the covered species (refer to Chapter 2, *Physical Setting and Biological Resources*) and the uncertainties in anticipated effects on covered species (described in Chapter 4).

The HCP Handbook (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016:9-2) provides guidance on what the conservation strategy should be, stating that, "[t]he conservation strategy must be founded on the biological needs of species, a structured and logical approach to problem solving, forward thinking to anticipate future changes, and it must be developed to fit into the larger conservation context occurring around the HCP."

The HCP Handbook also notes that there are relatively few "ironclad rules" to follow when developing a conservation program. Rules that must be met include the following.

- Applicants must minimize and mitigate the effects of their actions to the maximum extent practicable and the measures must be feasible and enforceable.
- The applicant must clearly articulate the biological goals and objectives in the HCP with measurable success criteria.

5.1 Developing Biological Goals and Objectives and Conservation Measures

Biological goals are broad, guiding principles based on the biological needs of the covered species, and should broadly describe the desired future conditions for covered species in the HCP plan area in succinct statements (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016:9-8). Each biological goal steps down to one or more biological objectives that define how to achieve the goal in measurable terms. Biological objectives are expressed as specific desired conditions that are measurable and quantitative when possible and provide the foundation for evaluating effectiveness of the conservation strategy.

Biological goals and objectives should be developed based on existing conservation information relevant to the covered species. Key resource documents include, at a minimum, species recovery plans, 5-year species status reviews, State Wildlife Action Plans, and any other existing documents with conservation strategies for the covered species that represent the best scientific information available (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016). Biological goals and objectives should be developed to remain attainable given the projected effects of climate

change in the HCP plan area (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016:9-5).

Biological objectives are implemented through one or more conservation measures. Conservation measures can be any of the avoidance, minimization, or mitigation actions taken to achieve the goals and objectives of the HCP. There are typically two types of conservation measures: avoidance and minimization measures (AMMs), and mitigation measures. Conservation measures should be trackable through compliance monitoring or effectiveness monitoring.

When designing mitigation measures to offset impacts of the taking, the duration of the covered activity and the outcome of the mitigation measures should be considered. The necessary duration of the mitigation outcome should be based on the biological value of what is lost (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016:9-14).

5.1.1 Biological Goals and Objectives

This section lists the biological goals and objectives that guide the conservation strategy.

Table 5-1. Biological Goals and Objectives for Covered Species

Tidewater Goby	
Goal TIGO1: Maintain currently occupied tidewater goby habitat in the permit area. **Objective TIGO1-1**. Avoid and minimize effects on existing populations of tidewater goby in the permit area.	
Conservation Measures	**Monitoring**
Implement measures to avoid and minimize impacts to tidewater goby during facilitated breaching activities.	Monitor the population of tidewater goby in the lagoon to document persistence of the population when breach events occur.
Capture and relocate any live goby found stranded during breach events to safe areas of the lagoon.	Track and report annually the number of stranded goby found and the number of live goby released to the lagoon.
Develop and implement a monitoring program to assess the status of tidewater goby in the permit area.	Track and report annually the results of tidewater goby monitoring.
	Track and report annually water quality parameters at sites with extant occurrences of tidewater goby.
Contribute toward the recovery of tidewater goby by conducting research to further advance the recovery of the species.	Provide interim and final reports of results of directed research studies.
Western Snowy Plover	
Goal WSP1: Maintain occupied and suitable western snowy plover habitat (foraging and breeding) within the permit area. **Objective WSP1-1:** Avoid and minimize effects on nesting western snowy plover in the permit area.	
Conservation Measures	**Monitoring**

Implement measures to avoid and minimize impacts to western snowy plover during facilitated breaching activities.	Monitor response of western snowy plover to breaching and habitat minimization and avoidance measures.
Attempt to salvage any nest identified as being at risk of injury or destruction if possible.	Track and report annually any salvaged nests and their fate, if known.
Contribute funding to State Parks' existing western snowy plover management and public education programs to advance recovery of the species.	Track and report annually the contributions to State Parks' snowy plover management and public education programs at Salinas River State Beach.
Monterey Spineflower	
Goal MSF1: Maintain existing populations of Monterey spineflower in the permit area. **Objective MSF1-1:** Maintain the distribution and abundance of Monterey spineflower populations within the permit area. **Objective MSF1-2:** Avoid and minimize effects on populations in the permit area from anthropogenic factors which negatively impact Monterey spineflower, including exotic plants, unnatural disturbances, and erosion.	
Conservation Measures	**Monitoring**
Survey suitable habitat in the permit area to assess the status of existing Monterey spineflower occurrences and to identify previously unknown occurrences.	Provide survey report and GIS shapefiles documenting any occurrences of Monterey spineflower in the permit area.
Implement measures to avoid and minimize impacts to Monterey spineflower during facilitated breaching activities.	Monitor impacts to Monterey spineflower, if present, during facilitated breaching events.
In cooperation with State Parks, collect seeds from any mature plants that cannot be avoided during sandbar management activities for future transplantation into protected suitable habitat.	Track and report annually any seed collected and disposition of such seeds.
Contribute funding to existing invasive species eradication plan implemented by State Parks to enhance and restore habitat for Monterey spineflower on Salinas River State Beach.	Track acres of habitat treated and monitor the impacts of management techniques on known occurrences of Monterey spineflower.

5.2 Conservation Measures

This section describes the conservation measures proposed to achieve the biological goals and objectives. The conservation measures provide detailed information on how the actions are anticipated to be implemented. Collectively, these proposed conservation measures are designed to achieve the biological objectives.

5.2.1 Avoidance and Minimization Measures

As required by the ESA, this HCP contains measures to avoid or minimize the taking of covered species. The primary focus of these measures is to avoid or minimize take (i.e., death, injury, or harm) of individuals of covered species and impacts on high-quality habitat that may be affected by covered activities.

Many of the proposed AMMs presented below have been successfully implemented by MCWRA to avoid and minimize take of, and adverse effects on, the covered species for many years. These measures are based on measures in MCWRA's Salinas River Lagoon Management and Enhancement Plan (Monterey County Water Resources Agency 1997); the July 24, 2007 USFWS Biological Opinion covering the Breaching of the Salinas River Lagoon (PAS 646.693.7166); and MCWRA's 2018 Monitoring and Reporting Plan associated with the Statewide General Waste Discharge Requirements for Dredged or Fill Discharges to Waters Deemed by the U.S. Army Corps of Engineers to be Outside of Federal Jurisdiction, Order No. 2004-0004-DWQ issued by the Central Coast Regional Water Quality Control Board.

5.2.1.1 Notification

Prior to initiation of sandbar management activities, MCWRA will contact USFWS, NMFS, State Parks, and the Central Coast Regional Water Quality Control Board, as is currently required by Order No. 2004-0004-DWQ. The contact will occur when MCWRA determines that conditions are forecasted that may necessitate sandbar management activities to facilitate a lagoon breach and alleviate flooding. Coordination with State Parks and Salinas NWR staff will ensure that MCWRA is informed of the current status of western snowy plover breeding activity in the permit area and will include the communication of any known active nest locations. MCWRA will provide updates on sandbar management activities (including monitoring of potential effects to covered species) until the situation has stabilized. MCWRA anticipates that initial notification will occur 1 to 3 calendar days ahead of any proposed activities. In addition to the notification to regulatory agencies, MCWRA will post a notice to the public on the agency's website that a lagoon breach may be imminent. MCWRA will work with the local health department to include lagoon status on any public notices related to beach closures.

5.2.1.2 Species-Specific Pre-Activity Surveys

The following species-specific pre-activity surveys will be conducted if sandbar management activities are forecast to occur during the listed timeframes in order to avoid and minimize effects to the covered species. If the covered species are observed during pre-activity surveys, avoidance measures as described herein including biological monitoring will be employed during work activities.

- Tidewater goby (all year round)
- Western snowy plover (all year round)
- Monterey spineflower (March 1 to June 30)

5.2.1.3 Biological Monitoring

A qualified biological monitor approved by USFWS will be on site to oversee sandbar management activities. Prior to any work, the monitor will survey the work area during daylight hours to identify an access path for tidewater goby monitoring locations, an access path for construction equipment, and a proposed pilot channel location free of Monterey spineflower and nesting snowy plovers. The monitor will conduct a worker environmental awareness training to notify the crew of possible covered species that may be on site during work activities, what to do in the event the covered species are found, and review the applicable best management practices (BMPs; described below), to be implemented during sandbar management activities. The monitor will remain on site

throughout the work activities to ensure that BMPs are implemented. The designated biological monitor will have the authority to immediately stop (and correct) any activity that does not comply with the required measures. All monitoring will be conducted in a safe manner and may be modified or eliminated if unsafe conditions exist. Below are details on specific species monitoring protocols.

The pilot channel will be monitored during daylight hours for fish (dead or alive) and for evidence of fish stranding from the time water begins to overtop the sandbar and flow into the pilot channel, until lagoon elevation has dropped and stranding risk has abated in the best professional judgement of the qualified biological monitor. Potential stranding areas around the lagoon perimeter will also be monitored for fish stranding. Any stranded fish will be identified to species. Stranded tidewater goby and other native fish species will be relocated into a location in the lagoon determined in advance of the breach that has been deemed safe from further effects of the breaching. Stranded nonnative fish or invasive predatory fish will not be returned to the lagoon and will be euthanized if necessary. Fish monitoring will be conducted in a manner to minimize unintended impacts to western snowy plover by maintaining avoidance buffers and minimizing time spent in the vicinity of any nesting western snowy plover.

Western snowy plover monitoring will include observation, visual scan surveys, and pedestrian surveys of the work site and all access routes by a qualified biologist. Western snowy plover adults, chicks, nests, nesting behavior, and potential nest identification will be included in the surveys. A path void of plovers, nests, or potential nests leading to the lagoon breaching location and tidewater goby monitoring locations will be identified during daylight hours, providing minimal clearance for single path routes for equipment and personnel. As an added precaution, the monitor will walk in front of the equipment regardless of the timing of the work, visually scanning the substrate that would be disturbed during beach access, and keep the equipment moving at a rate under 5 mph. If, despite MCWRA's best efforts to avoid plover nests, a nest is determined to be at risk of injury during project activities (e.g., within the path of the flow of water through the breached sandbar), and relocation is deemed not possible by the qualified biologist, MCWRA may capture up to 6 eggs or very young chicks (i.e., 6 individuals total, equivalent to 2 nests or broods) for captive rearing over the course of the permit term.

5.2.1.4 Photo-Documentation

Photographs will be taken to document the sandbar management activities. Photos depicting before, during, and after the action will be taken in both the upstream and downstream directions and represent the entire length and direction of the pilot channel. Photo-points will also be established of selected locations along the lagoon periphery where tidewater goby are often detected during lagoon sampling to document changes in water level and exposure of vegetation and substrates.

5.2.1.5 Best Management Practices

BMP-1. Environmental Awareness Training: All persons employed or otherwise working on site shall participate in an environmental education program before performing any work.

BMP-2. Spill Prevention: Prior to staging and accessing the beach, any equipment that will be used will be inspected for fluid leaks. Any leaks that are discovered will be repaired, or equipment will be replaced, before staging or entering the beach. Equipment will be staged on the landward side of the dunes on an existing access road. This is an area where an accidental spill of fluids would not reach the surrounding waterways. Loading and fueling will take place in the staging area. Spill response

materials will be kept on site for rapid containment in the event of an accidental release, and all staff will be trained in their proper use.

BMP-3. Access: Equipment will enter the beach at a designated access gate and proceed along the access pathway that has been surveyed and marked by the biological monitor. The access pathway will be approximately 12 feet wide and equipment will be driven on the beach for sandbar management only. The equipment will exit from the excavation area along the same path it entered.

BMP-4. Sensitive Habitat Avoidance: All work activities shall be confined to the designated work areas and will avoid environmentally sensitive areas not designated for the work area including coastal salt marsh wetlands, vegetated coastal dunes, and open waters.

BMP-5. Speed Limit: Vehicles and heavy equipment driven off-road during sandbar management activities will not exceed a speed of 5 miles per hour.

BMP-6. Stockpiling: Excavation of the pilot channel will utilize a bulldozer or excavator and will result in relocation of approximately 2,000 cubic yards of native beach sand. The stockpiles of sand will be left in place directly adjacent to the pilot channel location after sandbar management activities conclude and will naturally erode with future wave action.

BMP-7. Covered Species Avoidance: If a covered species is encountered during project implementation, the designated biological monitor will stop work and coordinate with the project lead to determine if the work area can be adjusted to avoid the covered species. Adult or fledgling snowy plover within the work area shall be allowed to leave on their own accord unharmed and they shall not be handled or disturbed. Snowy plover nests will not be approached within 100 feet unless a closer approach is necessary due to access or safety constraints.

BMP-8. Survey and Relocation. A qualified biologist will conduct a survey for tidewater goby in areas of the lagoon adjacent to the slidegate, the breach location, and accessible locations along the north and west sides prior to the lagoon breach to document presence of tidewater goby and any other fish species in areas likely to be impacted by the breach. Goby located in areas where the biologist determines they are likely to be harmed by breaching will be relocated to a location in the lagoon determined in advance of the breach that has been deemed safe from effects of the breaching. During the breach event, the biologist will monitor the pilot channel and lagoon perimeter for goby that become stranded in dewatered areas or in shallow pools that may dry out or have an increased risk of predation and will relocate any individuals into a location in the lagoon determined in advance of the breach that has been deemed safe from further effects of the breaching.

BMP-9. Salvage and Captive Rearing. If, despite MCWRA's best efforts to avoid plover nests, a nest is determined to be at risk of injury during project activities (e.g., within the path of the flow of water through the breached sandbar), MCWRA may capture up to 6 eggs or chicks (i.e., 6 individuals total, equivalent to 2 nests) for captive rearing during the permit term. In all cases, a qualified biologist will first determine whether the nest or chicks and accompanying adults can be moved to a safe location on the beach. If this is deemed not possible, the need for captive rearing will be determined by the qualified biologist and will be dependent on the feasibility and safety of temporarily suspending emergency operations to facilitate the recovery of the nest. It is also dependent on an approved facility such as International Bird Rescue or Monterey SPCA having the capacity to accept the eggs or chicks.

BMP-10. Directing Broods to Safety. If snowy plover chicks are determined to be at risk of injury during project activities, the designated biologist may slowly direct chicks and attendant adults out

of the area of project activities to a safe area of the beach by slowly and carefully walking toward chicks and adults and encouraging movement in the direction of the safe area. The biologist will monitor for the presence of potential avian predators before directing broods to an area, and will continue to watch to confirm that chicks and attendant adults remain in the safe area and do not re-enter the area of project activities.

BMP-11. Notification of Take or Injury: If a covered species is taken, trapped, injured or found dead within the vicinity of the project, the biological monitor will notify the MCWRA project lead immediately, prior to notifying USFWS.

BMP-12. Invasive Plants: To minimize the spread of invasive plant species on site, vehicles and heavy equipment driven off-road during sandbar management activities will be cleaned of visible soil and organic matter prior to use, and access routes will be planned to avoid areas infested with invasive species (where feasible).

BMP-13. Work Site Cleanliness: To minimize the attraction of potential predators of western snowy plover such as corvids, all activity and food-related trash will be placed in a covered receptacle and removed from the work site daily.

5.2.2 Mitigation Measures

As indicated in Chapter 4, *Effects of Covered Activities*, covered activities would result in minor and temporary impacts to lagoon habitat for tidewater goby, to suitable foraging and nesting habitat for western snowy plover, and to suitable habitat for Monterey spineflower. No permanent impacts or loss of habitat or critical habitat for any of the covered species is anticipated. There is potential for adverse effects to individuals of all covered species from the implementation of covered activities. MCWRA has proposed the following mitigation to offset these impacts.

5.2.2.1 Tidewater Goby

The recovery plan for tidewater goby (U.S. Fish and Wildlife Service 2005) identifies the need for monitoring, protecting, and enhancing currently occupied goby habitat, as well as the need for additional biological research to enhance the ability to integrate land use practices with tidewater goby recovery, and surveys to identify suitable habitat in the Salinas Valley. In support of these recovery actions, MCWRA is proposing the following mitigation.

1. Additional monitoring of breaching effects on goby to document population dynamics and persistence in the lagoon (i.e., post-breach stranding surveys, pre- and post-breach density and distribution surveys), to document actual take during breaching events, and to help inform management of the lagoon to aid in recovery of the species by supporting the persistence of the current population.

2. Contribution toward the recovery of tidewater goby by funding directed research to provide a greater understanding of the distribution and life history characteristics of goby in the Salinas River Lagoon and larger Salinas Valley region. These studies include two sampling events at each location timed several months apart and during seasons of highest expected abundance to capture potential seasonal variations in occupancy and size/age composition. Sampling events for the lagoon study and the regional study will be implemented concurrently. Final study designs will be determined through coordination between MCWRA and USFWS.

- Research in the lagoon will focus on providing a more detailed understanding of the reproductive patterns of the population in the lagoon to determine peak reproductive period(s) and an estimate of the resiliency of the population to stochastic events. The proposed seining survey aims to capture large numbers of tidewater goby in the Salinas River Lagoon (>100). Each captured goby will be measured to the nearest millimeter. As growth is directly correlated with age, and an age-at-length relationship has been established for the species (Hellmair and Kinziger 2014), obtaining length measurements for a large number of fish will aid in documenting when juvenile fish appear in the system, their relative abundance compared to larger fish, and will permit back-calculation of reproductive timing. This, in turn, will allow development of an estimate of the timing of reproductive activity throughout the year. Sampling will occur according to standardized USFWS protocol. Sampling sites will include the established locations surveyed during periodic goby distribution surveys in the lagoon (Figure 1-2). If the number of fish captured at these locations is low, additional accessible locations (most likely in the lower end of the lagoon) will be sampled until the desired sample size is reached (or the limits of time allotted for field sampling has been reached).

- A regional study will be implemented utilizing environmental DNA (eDNA) sampling to assess the broader tidewater goby distribution in the Salinas River and connected waterways to evaluate occupancy and the potential presence of nearby source or refuge populations. Up to 40 potentially suitable habitat locations with no access restrictions within the Greater Bay Area Recovery Subunits GB 10 and GB 11, including some locations which have previously been surveyed, will be identified for eDNA sample collection. Potentially low detection probability will be ameliorated by taking multiple samples at locations such that sample volume is proportionate to location size (i.e., a single sample may be sufficient for small, isolated locations, whereas larger locations may require 2-4 samples). Upon filtration of water samples, the filters containing the eDNA will be preserved according to standard practices and submitted to the CalPoly Humboldt Fisheries Genetics Laboratory for DNA extraction, amplification, and analysis, following procedures described in Sutter and Kinziger (2019).

To avoid potential adverse effects to nesting western snowy plover during the implementation of tidewater goby monitoring and research studies, access to the lower lagoon will be planned in coordination with State Parks and/or Salinas River NWR staff and up-to-date observations of plover nesting activities. Access to sampling locations is typically via boat or walking along the water's edge of the lagoon. If a proposed tidewater goby sampling location is identified as likely to result in disturbance to nesting western snowy plover, an alternate sampling location that avoids disturbance will be utilized.

5.2.2.2 Western Snowy Plover

The western snowy plover recovery plan (U.S. Fish and Wildlife Service 2007b) identifies the need for management of breeding and wintering habitat of the Pacific coast population to ameliorate or eliminate threats and maximize survival and productivity, as well as the need to conduct public information and education programs about western snowy plover. In support of these recovery actions, MCWRA is proposing the following mitigation.

1. MCWRA will contribute funding to support State Parks' breeding season habitat management and public education and outreach programs. In accordance with State Parks' priorities, funding

may be used for any combination of symbolic fencing with signage around important nesting areas, interpretive signs at major trailheads, animal-proof trash receptacles at trailheads and beach access points, and direct public outreach (e.g., docent program).

5.2.2.3 Monterey Spineflower

The recovery strategy for Monterey spineflower (U.S. Fish and Wildlife Service 1998) focuses primarily on the restoration of degraded habitat to ensure the establishment of larger and more numerous populations over a greater proportion of the historic range. Recommended actions from the 2020 species status review include monitoring populations on State Parks' beaches, and restoration and reintroductions in coastal dune systems. In support of these recovery actions, MCWRA is proposing the following mitigation.

1. MCWRA will contribute funding to invasive species removal on Salinas River State Beach in support of State Parks' invasives management program. To compensate for the temporary impacts of up to 0.19 acre of suitable Monterey spineflower habitat that may occur per breaching event, MCWRA will fund the removal of invasive species on 1 acre of Salinas River State Beach to enhance and restore Monterey spineflower habitat.

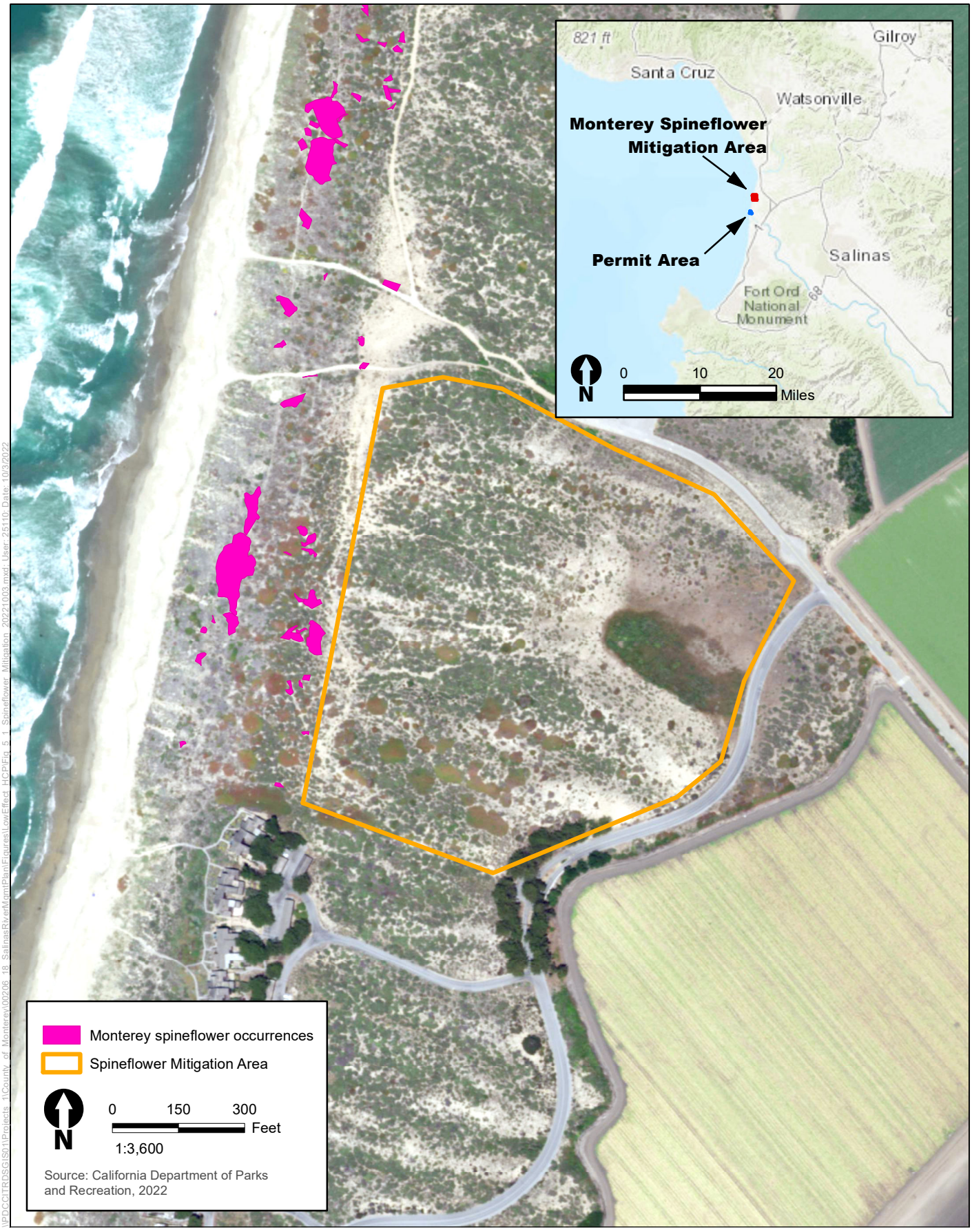
    - The area identified for restoration is adjacent to existing spineflower occurrences and will complement an ongoing removal effort in the same area (Figure 5-1).

    - Photo points will be established at the restoration site to capture baseline, implementation, and post-implementation conditions to monitor the success of removal efforts and document the re-colonization of native plants and wildlife use as observed.

    - Removal methods and the adaptive management approach for restoration areas are described in the *Salinas River State Beach Dune Restoration and Management Plan* (Central Coast Wetlands Group and Coastal Conservation and Research 2021).

2. MCWRA will conduct a botanical survey to document occurrence and locations of populations of Monterey spineflower in the permit area.

In cooperation with State Parks, seeds will be collected from any mature plants that cannot be avoided during sandbar management activities. Seeds will be transferred to State Parks' possession for future transplantation into protected suitable habitat, either outside the area of potential impact from breaching in the plan area, or in other areas of Salinas River State Beach.



\\PDC\GITRDSGIS01\Projects_1\County_of_Monterey\00206_18_SalinasRiverMgmtPlan\Figures\LowEffect_HCP\Fig_5_1_Spineflower_Mitigation_20221003.mxd User: 26110 Date: 10/3/2022

Figure 5-1
Monterey Spineflower Mitigation Area

Monitoring and Adaptive Management

5.2.3 Monitoring

HCPs are required to include provisions for monitoring to do the following.

1. Ensure compliance with the terms and conditions of the Plan.
2. Assess progress toward achieving the biological goals and objectives.
3. Evaluate the effectiveness of management actions on achieving the covered species goals and objectives over time.

Monitoring is considered an integral component of the conservation strategy of HCPs. This section includes specific requirements and guidance for the monitoring and adaptive management program throughout the permit term. Adaptive management actions are integrated in the approach described in Section 5.3.2, *Adaptive Management*, and monitoring will inform changes to management actions to improve outcomes of conservation measures for covered species. The goal of this section is to provide a sufficient framework and guidance to ensure that the monitoring and adaptive management program designed during implementation will meet ESA regulatory standards discussed in Section 1.7, *Regulatory Framework*. Another important goal of this section is to provide enough detail to estimate the cost of monitoring and adaptive management, and identify and ensure funding (see Chapter 7, *Cost and Funding*).

Compliance Monitoring

Compliance monitoring is monitoring that demonstrates compliance with the terms and conditions of the HCP and its permits. It also tracks progress of HCP implementation in accordance with the implementation schedule required for the conservation measure implementation or for other aspects of HCP implementation (e.g., annual report deadlines). Compliance monitoring determines whether the HCP is being implemented as intended, not whether the conservation strategy is working. MCWRA will conduct compliance monitoring to ensure the HCP is being implemented as described. MCWRA will use the annual reporting process to report HCP compliance and USFWS will verify compliance as part of the annual report review process. MCWRA responsibilities in implementing the HCP, including timing for development and release of the annual report, is described in Chapter 6, *Plan Implementation*.

Compliance monitoring is required to verify and document that all requirements in this HCP and terms and conditions of the incidental take permit are carried out. The Permittee must verify that the avoidance and minimization measures have been implemented successfully. To satisfy this condition, the Permittee will hire qualified biologists approved by USFWS to conduct necessary pre-activity surveys and monitoring during the implementation of covered activities. The biologists hired will be available on an on-call/as-needed basis with guaranteed availability for emergency response as a condition of the contract. MCWRA will document compliance with the avoidance and minimization measures of this HCP by submitting post-breaching activity reports to USFWS. These reports will present the activities that occurred and which avoidance and minimization measures were implemented. The HCP will be deemed in compliance if all of the terms and conditions of the incidental take permit have been implemented and documented.

Effectiveness Monitoring

Effectiveness monitoring is defined by USFWS as the collection of information necessary to support ongoing conservation decisions (81 FR 93702). As summarized in the HCP Handbook (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016:17-2), effectiveness monitoring evaluates whether the effects of implementing the HCP's conservation strategy are consistent with the assumptions and predictions made when the HCP was developed and approved (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016). Effectiveness monitoring is used to assess whether implementation of the conservation strategy is achieving the Plan's biological goals and objectives.

Effectiveness monitoring for this HCP is focused on the outcomes of implementing conservation measures. Understanding the effects of management actions is a critical component of the monitoring and adaptive management program. The purpose of this monitoring is to ascertain the success of conservation measures in achieving desired outcomes, and to provide information and mechanisms for altering conservation measures if necessary.

5.2.3.1 Qualified Biologist/Qualified Professional

The monitoring efforts described in this chapter will be conducted by a qualified biologist or qualified professional. *Qualified biologists* are those biologists who have the proper combination of experience, education, and training necessary to perform the tasks described in this Plan accurately and in an unbiased fashion. The term *qualified biologist* is used generically to mean a biologist who is trained to perform the given task; such a person is, more specifically, a fisheries biologist, wildlife biologist, botanist, or ecologist. Training must be in the specific field to which the task is related. For example, a botanist may not perform work that may take a covered species unless the individual is also competent in implementing the task associated with a particular covered species.

If the task has the potential to result in take of covered species, the biologist must be approved by USFWS following a review of qualifications consistent with the current Section 10(a)(1)(A) review process. Take coverage for monitoring (if needed) is provided under this HCP and its permits (i.e., a separate Section 10(a)(1)(A) permit is not required to perform monitoring required by this HCP). Once approved, MCWRA will maintain a list of pre-approved qualified biologists and the tasks that they are approved to perform for a 5-year period.

If the task has the potential to result in take of non-covered listed species, the qualified biologist must obtain or be covered under a Section 10(a)(1)(A) permit for those non-covered listed species.

5.2.4 Adaptive Management

The HCP Handbook describes adaptive management as, "a strategy for addressing uncertainty associated with an HCP's conservation program, particularly uncertainty that poses a significant risk to the covered species (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016)." For the purposes of this Plan, adaptive management is a decision-making process used to examine alternative strategies to meet the biological goals and objectives and, if necessary, adjust future management actions based on new information. Monitoring the outcomes of management actions is the foundation of an adaptive approach, and thoughtful monitoring can guide iterative modifications to management actions (Williams et al. 2007).

Adaptive management is most often applied to changes in management actions that may be described in the HCP or in a subsequent management plan. However, it may require changes to biological objectives or conservation measures described in the conservation strategy to best achieve the biological goals. Changes to this HCP's biological objectives or conservation measures needed to accomplish the biological goal of enhancing habitat for covered species in the HCP permit area will not require an HCP amendment as long as MCWRA and USFWS agree on the proposed change and the regulatory assurances of the HCP are maintained.

MCWRA will oversee the adaptive management process. MCWRA will also coordinate and share the results of monitoring, as appropriate, with other HCPs, and other regional conservation and restoration programs that may benefit from information gathered through this program.

Adaptive management actions will likely take place at the following junctures.

- When new information from the literature or other relevant research indicates that a feasible and superior alternative method for achieving the biological goals and objectives exists.
- When monitoring indicates that the expected or desired result of a management action did not take place.
- When take of western snowy plover or tidewater goby approaches permitted levels, AMMs may need to be revised. If this occurs, MCWRA and USFWS will meet and confer to determine if the HCP AMMs need to be improved. If measures are determined to be inadequate, or if new techniques are available to more effectively avoid and minimize take, then revisions to the AMMs will be made as soon as practicable.
- When MCWRA identifies threats to restoration efforts that require a new or unique response.
- When the results of directed studies indicate that new methods of restoration or management would benefit the covered species.

Chapter 6
Plan Implementation

6.1 Responsible Parties

This section describes how MCWRA will implement the HCP and the roles, functions, and responsibilities of those parties involved in its implementation. This chapter also outlines the regulatory assurances sought by MCWRA and the changed and unforeseen circumstances that define those assurances.

6.1.1 Monterey County Water Resources Agency

As the Permittee, MCWRA will be responsible for HCP implementation, including undertaking administrative responsibilities for the HCP. MCWRA is also responsible for execution of the HCP's conservation measures (Chapter 5, *Conservation Strategy*,) and the monitoring and adaptive management program (Section 5.3). The Permittee will track and document compliance with the conservation measures and will be responsible for preparing compliance reports to be submitted to USFWS as described in Section 6.2, *Reporting*.

6.1.2 U.S. Fish and Wildlife Service

USFWS is the regulatory agency that issues the federal ITP and will oversee implementation of the HCP. USFWS will receive reports submitted by the Permittee and will have an opportunity to review and comment on these reports. If USFWS determines upon review of these reports that the Permittee is not in compliance with the terms of the HCP, it is USFWS's responsibility to inform the Permittee of their responsibility to reestablish compliance with the HCP.

6.2 Reporting

When facilitated lagoon breaching is implemented, MCWRA will provide an after-action report to USFWS within 45 days of conducting sandbar management activities. This report will serve as the annual report documenting compliance with the HCP and ITP in years when facilitated lagoon breaching occurs. MCWRA will deliver the report as an electronic file in PDF format. The after-action report will summarize the breach event's covered activities and implementation of conservation measures. If facilitated breaching is required again within the same year, the after-action report will be revised with an addendum describing the new event's covered activities and implementation of conservation measures, as well as any additional new information.

After-action reports will be submitted to USFWS and be made available to the public through posting on MCWRA's website. The purpose of the after-action report is as follows.

- To provide the information and data necessary to document Plan implementation, in compliance with all requirements of the HCP and ITP.
- To disclose any issues with Plan implementation that need to be addressed in partnership with USFWS.

After-action reports will include the following information.

- Summary of all covered activities conducted, locations where activities occurred, and the total acreage of disturbed land resulting from these activities.
- Any impacts on covered species habitat observed as a result of the covered activities.
- Summary of the avoidance and minimization measures and BMPs implemented during the covered activities.
- Representative photos of affected areas.
- The number of covered species observed killed or harmed through implementation of covered activities.
- Summary of the mitigation measures implemented to date, including any recommended changes to increase the efficacy of the measures.
- An assessment of the progress towards meeting the biological goals and objectives to date.
- Assessment of the efficacy of the monitoring program and conservation measures, and recommended changes to the program (adaptive management) based on interpretation of monitoring results and findings, if applicable.
- HCP amendments (if any).

In years when no facilitated breach events occur, MCWRA will submit an annual report describing all activities undertaken during the reporting period to maintain compliance with the HCP and ITP, including implementation of mitigation actions and progress toward meeting the biological goals and objectives of the HCP. The reporting period will be the same as the water year (October to September) and annual reports will be submitted no later than November 15, delivered as an electronic file in PDF format.

Non-breach year annual reports will include the following information.

- Summary of the mitigation measures implemented, including any recommended changes to increase the efficacy of the measures.
- An assessment of the progress towards meeting the biological goals and objectives.
- Assessment of the efficacy of the monitoring program and conservation measures, and recommended changes to the program (adaptive management) based on interpretation of monitoring results and findings, if applicable.
- HCP amendments (if any).

6.3 No Surprises Assurances

No Surprises Assurances[8] will provide assurances to MCWRA (as the Permittee) that as long as MCWRA properly implements the HCP and ITP, no additional commitment of land, water, or financial compensation will be required with respect to minimization and mitigation, and no restrictions on the use of land, water, or other natural resources will be imposed beyond those

[8] 50 CFR 17.3, 17.22(b)(5), and 17.32(b)(5)

specified in the HCP without the consent of MCWRA. The No Surprises Assurance has two major components: changed circumstances and unforeseen circumstances.

Changed circumstances are defined in the No Surprises rule as "changes in circumstances affecting a species or geographic area covered by a conservation plan or agreement that can reasonably be anticipated by plan or agreement developers and the Service and that can be planned for (e.g., the listing of new species, or a fire or other natural catastrophic event in areas prone to such events)" (50 CFR 17.3). It is important to identify all reasonably foreseeable changed circumstances that may occur during the permit term and feasible responses to them. If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances, and such measures are provided for in the HCP, MCWRA will implement such measures if a changed circumstance occurs.[9] If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances, but such measures were not provided for in the HCP, USFWS will not require any additional measures beyond those provided for in the HCP, without the consent of MCWRA, provided the HCP is being properly implemented.[10] A plan is considered properly implemented if its "commitments and provisions have been or are being fully implemented by the permittee" (50 CFR 17.3).

Unforeseen circumstances are "changes in circumstances affecting a species or geographic area covered by a conservation plan or agreement that could not reasonably have been anticipated by plan or agreement developers and the Service at the time of the conservation plan's or agreement's negotiation and development, and that result in a substantial and adverse change in the status of the covered species" (50 CFR 17.3). USFWS bears the burden of demonstrating that unforeseen circumstances exist using the best available scientific and commercial data available while considering certain factors.[11] If unforeseen circumstances occur, USFWS will not require MCWRA to commit additional resources or measures beyond those included in the HCP, unless MCWRA consents.

6.3.1 Changed Circumstances

As described in Section 6.2.1, *No Surprises Assurances*, USFWS will not require any additional conservation or mitigation to address changed circumstances that are not identified in this section without the consent of MCWRA as long as the HCP is being properly implemented. Accordingly, this HCP identifies the following changed circumstances and the specific response to each circumstance. MCWRA must implement these remedial measures in response to a changed circumstance. If additional or alternative conservation measures are proposed or deemed necessary by USFWS to respond to changed circumstances, and such measures are not described in this section, USFWS and MCWRA may work together to shift priorities to best meet goals and objectives within the original resource commitments in the HCP.

Should a changed circumstance occur, MCWRA will work with USFWS to respond as described below to the extent necessary and reasonable. MCWRA understands that No Surprises Assurances are contingent on the proper implementation of the HCP and ITP. The expected costs to implement remedial measures in response to changed circumstances are accounted for in the contingency funds described in Chapter 7, *Cost and Funding*.

[9] 50 CFR 17.22(b)(5)(i) and 17.32(b)(5)(i)

[10] 50 CFR 17.22(b)(5)(ii) and 17.32(b)(5)(ii)

[11] 50 CFR 17.22(b)(5)(iii)(C) and 17.32(b)(5)(iii)(C)

The following changed circumstance can be reasonably anticipated to the degree defined, after which the circumstances would be considered unforeseen. Given the limited geographic scope of this HCP and its short permit term of five years, only one changed circumstance has been identified as being reasonably anticipated.

- Listing of a non-covered species or discovery of an additional federally listed species within the permit area.

Any other change in circumstance during the permit term would be considered unforeseen.

6.3.1.1 Listing of a Non-Covered Species or Discovery of an Additional Federally Listed Species within the Permit Area

Over the course of HCP implementation, USFWS may list a species under the ESA that is present within the HCP permit area, but not covered by the HCP. Alternatively, species surveys may identify another federally listed plant or wildlife species in the permit area that is not covered under the HCP. Given the short timeframe of the HCP and its limited geographic scope, both occurrences are considered unlikely. However, if either occurs, the following responsive actions will be taken by MCWRA.

- The potential impacts of covered activities on the listed species will be evaluated, including an assessment of the presence of suitable habitat in impact areas.
- If covered activities could cause take of the listed species, MCWRA will, in consultation with USFWS, develop measures to avoid take of the listed species. If take cannot be avoided, MCWRA will work with USFWS to develop an application to amend the HCP to cover this species or seek alternative compliance with the ESA such as through a Section 7 consultation.

Procedures for modifications and amendments to the HCP are outlined below.

6.4 Modifications to the Plan

The HCP and ITP can be modified in accordance with federal regulations. HCP modifications are not anticipated to occur on a regular basis. Modifications may be requested by MCWRA or by USFWS, but only MCWRA may propose wording of modifications for approval by USFWS. Modifications will fall into one of three categories: administrative changes, minor modifications, and amendments, each of which is described below.

6.4.1 Administrative Changes

Administrative changes are changes or corrections to the HCP that do not require authorization from USFWS. MCWRA will document administrative changes in writing. These administrative changes are defined as those that will not trigger the need for additional NEPA or California Environmental Quality Act (CEQA) compliance. USFWS will be provided a summary of administrative changes in each annual report. Examples of administrative changes are listed below.

- Corrections of errors in the HCP that do not change the intended meaning or obligations.
- Clarification to address small errors, omissions, inconsistencies, or language that may be too general or too specific for practical application.

- Minor changes to survey or monitoring protocols, including BMPs, that are not proposed in response to adaptive management.[12]
- Changes to monitoring survey frequency based on new and better information.
- Adoption of new monitoring protocols that may be promulgated by USFWS in the future.

6.4.2 Minor Modifications

Minor modifications are changes that do not affect the impact assessment or conservation strategy described in the HCP and do not affect the ability of MCWRA to achieve the biological goals of the HCP. Minor modifications do not require an amendment to the permit, but they do require written approval by USFWS before being implemented. Minor modifications will not involve changes that would adversely affect covered species, the level of take, or the obligations of the permittee; therefore, these modifications are defined as not triggering additional NEPA or CEQA compliance.

To modify the HCP without amending the ITP, MCWRA will submit a written description of the proposed change to USFWS as well as an explanation of why its effects are not believed to be significantly different from those described in the original HCP. If USFWS concurs with the proposal, they will authorize the modification in writing, and the modification to the HCP will be considered effective on the date of the written authorization. Examples of minor modifications are listed below.

- Modification of biological objectives or conservation measures, or adoption of additional conservation measures to improve the likelihood of achieving biological objectives.
- Revisions to or discontinued implementation of conservation measures if they are shown to be ineffective.
- Modification of existing or adoption of new performance indicators or standards if results of monitoring and research, or new information developed by others, indicate that the initial performance indicators or standards are inappropriate measures of success for the applicable conservation measures.
- Modification of existing or adoption of additional biological objectives for covered species where such changes are consistent with achieving existing biological goals and objectives and overall HCP goals.
- Minor changes to the annual reporting requirements.
- Other changes that do not result in adverse effects on covered species beyond those analyzed in the conservation strategy and that do not limit the ability of MCWRA to achieve the biological goals and objectives of the HCP.

6.4.3 Amendments

An amendment is a change in the HCP that may affect the impact analysis or conservation strategy in the HCP. Amendments to the HCP may require an amendment to the ITP through generally the same formal review process as the original HCP and ITP, including NEPA review, *Federal Register* notices, and an internal ESA Section 7 consultation with USFWS. To obtain USFWS's approval of a proposed amendment, MCWRA must submit the proposed amendment to USFWS in a report that includes a

[12] Such changes are subject to the federal No Surprises Regulation.

description of the need for the amendment, an assessment of its impacts, and any alternatives by which the objectives of the proposal might be achieved. Upon submission of a completed application package, USFWS will publish a notice of the proposed application in the *Federal Register*, initiating the NEPA and HCP amendment review process. After public comment, USFWS may approve or deny the HCP amendment application.

Examples of changes that would require an amendment include, but are not limited to, those listed below.

- Revising the HCP plan area boundary.
- Adding or removing covered species from a permit.
- Increasing the allowable take limit for existing covered activities or adding new covered activities to the HCP.
- Modifying any important action or component of the conservation strategy that may substantially affect levels of authorized take, effects of the covered activities, or the nature or scope of the conservation strategy.
- Any change to the biological goals or a major change to the biological objectives if monitoring or research indicates that they are not attainable.
- Extending the ITP term beyond 5 years unless this is the only change proposed (see next section for details).

6.4.4 Permit Renewal

It is the intention of MCWRA, after five years or less, to replace this HCP with the Salinas River Operations HCP that will address the long-term management of the Salinas River and its tributaries. However, if completion of the Salinas River Operations HCP takes longer than anticipated, MCWRA may need to renew this permit until it is completed.

Take authorization for all covered activities will expire at the end of the permit term unless the permit is renewed or replaced. Near the end of the permit term, MCWRA will determine whether and how to extend the term of the permit. Ideally, the permit will no longer be needed due to the completion and approval of the Salinas River Operations HCP which will provide take coverage for these covered activities.

If MCWRA determines that there is a continued need to maintain the permit, MCWRA may choose to apply to USFWS to only renew the permit duration. A relatively simple amendment process applies when a permittee applies for a permit renewal that only changes the expiration date of the HCP and permit. A permit renewal cannot change the amount of authorized take or any other components of the HCP or ITP. If MCWRA determines take limits have not been reached and a permit renewal is desired because of a delay in the issuance of the Salinas River Operations HCP take permits, MCWRA will contact USFWS to request a renewal at least 30 days prior to permit expiration. USFWS (50 CFR 13.22) regulations allow an ITP to remain in effect while the agency considers a renewal request so long as the request is received at least 30 days before ITP expiration. No federal notice is required for a permit renewal, nor is NEPA compliance required.

6.4.5 Suspension and Revocation

USFWS may suspend or revoke the ITP if the Permittee fails to implement the HCP in accordance with the terms and conditions of the permit or if suspension or revocation is otherwise required by law. Suspension or revocation of the Section 10(a)(1)(B) permit, in whole or in part, by USFWS will be in accordance with 50 CFR Sections 13.27–29, 17.32(b)(8).

Chapter 7
Cost and Funding

In order to issue an ITP under the ESA Section 10(a)(2)(B), USFWS must find that "the applicant will ensure that adequate funding for the plan will be provided." To identify adequate funding, the HCP applicant must first estimate the costs of implementing the HCP.

This chapter presents estimates of costs to implement the Salinas River Lagoon and Sandbar HCP, describes the methods used to estimate the costs, and identifies the proposed funding for all HCP costs, both before and after the permit term.

7.1 Estimated Costs for Plan Implementation

Estimating the full costs of implementing the HCP is an essential step to demonstrate "adequate funding." The cost assumptions described in this chapter are based on the conservation strategy described in Chapter 5, *Conservation Strategy*; the monitoring and adaptive management program outlined in Section 5.3, *Monitoring and Adaptive Management*; potential remedial actions necessary to address changed circumstances in Chapter 6, *Plan Implementation*; and the level of effort needed to administer the HCP, also described in Chapter 6. Three major cost categories are listed below and described in detail in the following subsections.

- Plan Administration
- Conservation Strategy Implementation
- Monitoring and Adaptive Management (per breach)

MCWRA estimates the cost of HCP implementation at approximately $322,400 (Table 7-1) over the course of the permit term.

Table 7-1. Estimated Implementation Costs for the Habitat Conservation Plan

Category	Average Annual Cost	Total Permit Term Cost
Plan Administration		
Administration	$10,620	$53,100
Reporting	$6,195	$30,975
Conservation Strategy Implementation		
Tidewater Goby	$16,800	$84,000
Western Snowy Plover	$2,640	$20,200*
Monterey Spineflower	$3,550	$17,750
Monitoring and Adaptive Management		
Costs per breach	$12,655	$63,275
Reporting	$10,620	$53,100
Total	**$63,080**	**$322,400**

*Total Permit Term mitigation cost for western snowy plover includes a one-time cost for captive rearing of up to six (6) eggs or chicks.

7.1.1 Plan Administration

Plan administration costs are the expenses for MCWRA staff (e.g., administrative, planning) and any third party (e.g., consultants) contracted by MCWRA to carry out HCP administration tasks. MCWRA staffing needs for implementation include assumptions that at least an analyst (which may consist of either a Biologist or Water Resources Engineer depending on the tasks), database/GIS manager, and finance staff will support HCP implementation. This effort is not expected to require a full time equivalent (FTE) position but would require some portion of an FTE for these different skills.

7.1.2 Conservation Strategy Implementation

Implementation of the conservation strategy includes funding support for State Parks' existing western snowy plover management and public outreach program, and existing invasive species removal program implemented on Salinas State Beach for the benefit of Monterey spineflower. MCWRA will also fund focused research studies on tidewater goby in the Salinas River Lagoon and broader Salinas Valley region. Additionally, targeted survey and monitoring activities are identified that will help to fill important information gaps related to covered species populations in the HCP permit area. Research, survey, and monitoring activities will be implemented by a consultant(s) hired by MCWRA.

7.1.3 Monitoring and Adaptive Management

Compliance and effectiveness monitoring required for implementation of the HCP is described in Section 5.3. It is expected that MCWRA will contract qualified biologists with the availability for on-call emergency work to implement the monitoring program.

7.2 Funding Assurances

Costs to implement the management actions described in the HCP will be borne through the MCWRA Administration Fund. MCWRA operates on a July 1 through June 30 fiscal year and only

authorizes budgets on an annual basis. Accordingly, specific monetary commitments for the MCWRA budget are subject to approval through the annual process as defined by Monterey County policy. However, MCWRA is committed to the success of this HCP and will guarantee that it will allocate sufficient funding in the Recommended Budget on an annual basis to properly implement the HCP and fulfill the terms and commitments of the ITP. In the event of a changed circumstance that requires additional funds above the annual allocation, MCWRA will seek HCP funding augmentation via discretionary reallocation of funds. If additional funds are needed, MCWRA could pursue discretionary reallocation of funds already allocated to the agency or request a budget amendment for approval by the Monterey County Water Resources Board of Supervisors. To demonstrate its ability to cover the costs of fulfilling the HCP obligations, the following table from MCWRA's Administration Fund annual budget is provided.

Table 7-2. Monterey County Water Resource Agency Administrative Fund Fiscal Year Appropriations

Fiscal Year	2022/2023 Adopted	2021/2022 Actual	2020/2021 Actual
Budget	$4,429,019	$4,142,998	$4,422,428

The above reflects MCWRA's allocation of budget dollars for the last three fiscal years and is indicative of the trend for future fiscal years, reflecting budgeted dollars that can be used for the purposes of meeting MCWRA's obligations under this HCP, should the annual allocation intended for the project be insufficient. The revenue identified to fund the implementation of this HCP is Ad Valorem taxes and Table 7-3 reflects actual revenues of the last two years and estimates for fiscal year 2022/2023.

Table 7-3. Monterey County Water Resource Agency Administrative Fund Fiscal Year Ad Valorem Revenues

Fiscal Year	2022/2023 Adopted	2021/2022 Actual	2020/2021 Actual
Revenue	$2,553,771	$2,676,082	$2,549,764

MCWRA employs permanent full-time Water Resources Engineers, Hydrologists, and Biologists who are qualified and responsible for organizing and implementing activities to preserve and protect the resources within the HCP area. MCWRA's staff will organize and implement the work necessary to fulfil the requirements of the HCP. MCWRA staff will consult or contract with qualified experts as needed to fulfill requirements under the HCP. In conjunction with the annual monitoring report, MCWRA will prepare an annual budget for the upcoming implementation year. The budget will account for MCWRA's planned activities, including those related to the implementation of conservation measures expected during the upcoming year. The budget will set out projected expenditures and the funding for those expenditures. The information in the budget along with the Annual Report will contain sufficient information to demonstrate MCWRA's ability to meet its financial obligations under the HCP. If funding for implementation of the HCP conservation measures is considered insufficient to meet the commitments outlined in the HCP or to properly implement the HCP, MCWRA will consult with USFWS to determine what actions may be necessary with respect to meeting the commitments of the permit or avoiding the risk of taking covered

animal species. MCWRA understands that failure to provide adequate funding and consequent failure to implement the terms of this HCP in full could result in temporary permit suspension or permit revocation.

Chapter 8
Alternatives to Take

8.1 Endangered Species Act Requirement

The ESA requires that Section 10 permit applicants specify in an HCP what alternative actions to the take of federally listed species were considered and the reasons why those alternatives were not selected. The HCP Handbook (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016) identifies two types of alternatives commonly used in HCPs: (1) an alternative that would reduce take below levels anticipated under the HCP and (2) an alternative that would avoid take and, hence, not require a permit from USFWS. These two options were considered when developing the alternatives to take described in this chapter.

8.2 Take Alternatives

This chapter identifies alternatives to take that would reduce or avoid the potential for take of species covered in the HCP. Due to the nature of the covered activities, there were no alternatives identified that could avoid or reduce take, and only the no-action alternative is addressed in this chapter.

This alternative is assessed in relation to the effects on covered species described in Chapter 4, *Effects of Covered Activities*, for the proposed covered activities and conservation strategy.

8.2.1 No HCP Alternative

The Applicant has a statutory responsibility (California Water Code, Appendix 52) as a public flood control and water agency in Monterey County and is unable to cease management of the Salinas River Lagoon and sandbar due to the risk of flooding to adjacent uplands, which in addition to negatively impacting high-value agricultural lands and private homes, may result in adverse effects to nesting western snowy plover (E. Krafft, pers. comm. 2021). The Applicant is also unable to develop and implement a method to manage the Salinas River Lagoon and sandbar without the risk of taking federally listed species. Covered activities will require some ground disturbance in habitat suitable for the covered species.

The No HCP Alternative would maintain the status quo of lagoon and sandbar operations being performed without an ITP, leaving MCWRA with a potential for increased risk and liability under the ESA, and reduce or eliminate potential benefits to covered species. This no-action alternative was rejected because there is a strong desire by MCWRA to receive incidental take authorization for lagoon and sandbar management operations and improve conditions for listed species.

Chapter 9
References

9.1 Printed References

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti, and D. H. Wilken (eds). 2012. *The Jepson Manual: Vascular Plants of California*, second edition, revised. Berkeley: University of California Press.

California Department of Fish and Wildlife 2021. California Natural Diversity Database (CNDDB). RareFind. V.5.2.14. Available: https://apps.wildlife.ca.gov/rarefind/view/RareFind.aspx.

California Invasive Plant Council. 2011. *Arundo donax*. Distribution and impact report. March. Agreement No. 06-374-559-0 State Water Resources Control Board. Available: https://www.cal-ipc.org/wpcontent/uploads/2017/11/Arundo_Distribution_Impact_Report_Cal-IPC_March-2011_small.pdf.

California Native Plant Society. 2021. Inventory of Rare and Endangered Plants (online edition, v9-01 0.0). Sacramento, CA. Available: http://www.cnps.org/inventory.

Central Coast Wetlands Group and Coastal Conservation and Research. 2021. Salinas River State Beach Dune Restoration and Management Plan. Developed in partnership with California Department of Parks and Recreation. Available: https://mlml.sjsu.edu/ccwg/wp-content/uploads/sites/23/2022/01/SRSB-Dune-Restoration-and-Management-Plan_Final2021.pdf. Accessed October 2022.

EMC Planning Group and EDAW. 1997. Fort Ord Reuse Plan Environmental Impact Report. Prepared for the Fort Ord Reuse Authority. SCH No. 96013022. June.

Entrix, Inc. 2001. Biological Assessment for the Salinas River Mouth Breaching Program. Prepared for U.S. Army Corps of Engineers and Monterey County Water Resources Agency. Walnut Creek, CA.

Hagar Environmental Science. 2010. Salinas River Lagoon Sandbar Management Report 2009-2010. Annual Report prepared for the Monterey County Water Resources Agency. July.

Hagar Environmental Science. 2015. Salinas River Lagoon Monitoring Report 2014. Annual Report prepared for the Monterey County Water Resources Agency. June.

Hellmair, M., G. Goldsmith, and A. P. Kinziger. 2011. Preying on Invasives: The Exotic New Zealand Mudsnail in the Diet of the Endangered Tidewater Goby. Biological Invasions 13:2197–2201. doi:10.1007/s10530-011-0054-3.

Hellmair, M., and A. P. Kinziger. 2014. Increased Extinction Potential of Insular Fish Populations with Reduced Life History Variation and Low Genetic Diversity. PLoS ONE 9(11):e113139. doi:10.1371/journal.pone.0113139.

Hellmair, M., D. Lee, and D. Demko. 2018. Salinas River Lagoon Fish Distribution Study: Summary of Recent Tidewater Goby Surveys. Report prepared for the Monterey County Water Resources Agency. November. Prepared by FISHBIO, Oakdale, CA.

Hellmair, M., D. Lee, and D. Demko. 2020. Salinas River Lagoon Fish Distribution Study: 2020 Summary of Tidewater Goby Surveys. Prepared for Monterey County Water Resource Agency. Prepared by FISHBIO, Oakdale, CA.

Hellmair, M. and D. Lee. 2022. Salinas River Lagoon Fish Distribution Study: 2022 Summary of Tidewater Goby Surveys. Prepared for Monterey County Water Resource Agency. May. Prepared by FISHBIO, Oakdale, CA.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Prepared for the California Department of Fish and Game, Nongame-Heritage Program and Natural Diversity Database, Sacramento, CA.

Kinziger, A. P., M. Hellmair, W. T. McCraney, D. K. Jacobs, and G. Goldsmith. 2015. Temporal genetic analysis of the endangered tidewater goby: extinction-colonization dynamics or drift in isolation? Molecular Ecology 24:5544–5560

Lafferty, K. D., C. C. Swift, and R. F. Ambrose. 1999a. Extirpation and recolonization in a metapopulation of an endangered fish, the tidewater goby. Conservation Biology 13:1447–1453.

Lafferty, K. D., C. C. Swift, and R. F. Ambrose. 1999b. Postflood persistence and recolonization of endangered tidewater goby populations. North American Journal of Fisheries Management 19:618–622.

Mayer, K. E. and W. F. Laudenslayer, Jr. 1988. A guide to wildlife habitats of California. California Department of Forestry and Fire Protection, Sacramento, CA.

McCraney, W. T., G. Goldsmith, D. K. Jacobs, and A. P. Kinziger. 2010. Rampant drift in artificially fragmented populations of the endangered tidewater goby (*Eucyclogobius newberryi*). Molecular Ecology 19:3315–3327.

Monterey County Water Resources Agency. 1997. Salinas River Lagoon Management and Enhancement Plan. Prepared with assistance from John Gilchrist & Associates, Habitat Restoration Group, Phillip Williams & Associates, and Wetland Research Associates. March.

Monterey County Water Resources Agency. 2014. Salinas River Stream Maintenance Program Revised Final Environmental Impact Report. June. State Clearing House #2011041066.

Monterey County Water Resources Agency. 2021. Salinas River Sandbar Management Activities Conducted on January 29, 2021. Technical Memorandum.

Monterey County Water Resources Agency. 2022. Salinas River Sandbar Management Activities December 27, 2021. Technical Memorandum.

Monterey County Water Resources Agency and State Coastal Conservancy. 2019. Salinas River Long-Term Management Plan. February 2019. Salinas, California and Oakland, California.

Moyle, P.B. 2002. Inland Fishes of California. University of California Press, Oakland.

National Weather Service. 2022. California Nevada River Forecast Center, Monthly Precipitation Summary Water Year 2022. Watsonville, CA. Available: http://www.cnrfc.noaa.gov/monthly_precip.php.

Neuman, K. K., L. E. Stenzel, J. C. Warriner, C. Eyster, B. Barbaree, D. Dixon, E. Haile, A. Palkovic and C. Hickey. 2019. Reproductive Success and Breeding Population Size of Snowy Plovers in the Monterey Bay Region, 2018. Point Blue Conservation Science. Petaluma, CA.

Neuman, K., L. Stenzel, C. Eyster, B. Barbaree, E. Haile, D. Dixon, J. C. Warriner, C. Hickey, and A. Palkovic. 2020. Reproductive Success and Breeding Population Size of Snowy Plovers in the Monterey Bay Region, 2019. Point Blue Conservation Science. Petaluma, CA.

Neuman, K., L. Stenzel, C. Eyster, B. Barbaree, E. Haile, D. Dixon, C. Hickey, and A. Palkovic. 2021a. Reproductive Success and Breeding Population Size of Snowy Plovers in the Monterey Bay Region, 2020. Point Blue Conservation Science. Petaluma, CA.

Neuman, K., L. Stenzel, C. Eyster, B. Barbaree, E. Haile, C. Hickey, A. Palkovic, and C. Caris. 2021b. Reproductive Success and Breeding Population Size of Snowy Plovers in the Monterey Bay Region, 2021. Point Blue Conservation Science. Petaluma, CA

Page, G. W., J. S. Warriner, J. C. Warriner, and P. W. C. Paton. 2009. Snowy plover (*Charadrius alexandrinus*). In A. Poole and F. Gill (eds.). The Birds of North America. No. 154. Version 2. The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, DC. 24 pp.

Page, G. W., K. K. Neuman, J. C. Warriner, C. Eyster, J. Erbes, D. Dixon, A. Palkovic, and L. E. Stenzel. 2014. Nesting of the Snowy Plover in the Monterey Bay Area, California in 2013. Point Blue Conservation Science. Petaluma, CA.

San Francisco Estuary Institute. 2009. Historical Ecology Reconnaissance for the Lower Salinas River. Prepared for The Nature Conservancy Monterey County Project. August 2009. Available: http://www.sfei.org/projects/lower-salinas-river-historical-ecology-reconnaissance#sthash.AmbvCtsW.dpbs.

Sutter, M. and A. P. Kinziger. 2019. Rangewide tidewater goby occupancy survey using environmental DNA. Conservation Genetics 20:597–613. doi: 10.1007/s10592-019-01161-9.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2022a. WETS Table documentation for Salinas No. 2 station (CA 04), California. Available: http://www.wcc.nrcs.usda.gov/climaste/navigate_wets.html. Accessed September 2022.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2022b. Web Soil Survey. Web application. Available: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed September 2022.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for Seven Coastal Plants and the Myrtle's Silverspot Butterfly. September. Prepared by U.S. Fish and Wildlife Service, Ventura and Sacramento, CA.

U.S. Fish and Wildlife Service. 2005. Recovery Plan for the Tidewater Goby (*Eucyclogobius newberryi*). U.S. Fish and Wildlife Service, Portland, OR.

U.S. Fish and Wildlife Service. 2007a. Tidewater Goby (*Eucyclogobius newberryi*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office, Ventura, CA.

U.S Fish and Wildlife Service. 2007b. Recovery Plan for the Pacific Coast Population of the Western Snowy Plover (*Charadrius alexandrinus nivosus*). U.S. Fish and Wildlife Service, Sacramento, CA.

U.S. Fish and Wildlife Service. 2009. Monterey Spineflower (*Chorizanthe pungens* var. *pungens*) 5-Year Review Summary and Evaluation. Ventura Fish and Wildlife Office. Ventura, CA.

U.S. Fish and Wildlife Service. 2019. 5-Year Review Western Snowy Plover [Pacific Coast Distinct Population Segment] (*Charadrius nivosus nivosus*). Arcata Fish and Wildlife Office. Arcata, CA.

U.S. Fish and Wildlife Service. 2020. Monterey Spineflower (*Chorizanthe pungens* var. *pungens*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office. Ventura, CA.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2016. Habitat Conservation Planning and Incidental Take Permit Processing Handbook. December.

U.S. Geological Survey. 2022. National Hydrography Dataset, Watershed Boundaries. Available: https://www.usgs.gov/core-science-systems/ngp/national-hydrography/watershed-boundarydataset?qt-science_support_page_related_con=4#qt-science_support_page_related_con. Accessed September 2022.

U.S. National Vegetation Classification System. 2021. United States National Vegetation Classification Database. V2.01. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. Available at: http://usnvc.org/explore-classification.

Williams, B.K., Szaro, R.C., Shapiro, C.D., 2007. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

9.2 Personal Communications

Demers, Jason, Monterey County Water Resources Agency. 2022. Email communication with Bernadette Clueit, ICF.

Krafft, Elizabeth, Monterey County Water Resources Agency. 2021. Communication with Bernadette Clueit, ICF.

Lee, Dana, Fisheries Biologist, FISHBIO. 2021. Email communication with Kathryn Gaffney, ICF.

Palkovic, Amy, California Department of Parks and Recreation. 2022. Email communication with Bernadette Clueit, ICF.

Appendix A

Evaluation of Federally Listed Species with Potential to Occur in the Plan Area

Table A-1. Evaluation of Federally Listed Species with Potential to Occur in the Plan Area

Species Name	Status[a]		Criteria[b]				Proposed for Coverage[c]	Notes
	State	Federal	Occur	Status	Impact	Data		
Plants								
Contra Costa goldfields *Lasthenia conjugens*	E	E	N	Y	N	Y	N	Vernal pools, swales, low depressions in open grassy areas. Vernal pool habitat does not occur in the plan area.
Marsh sandwort *Arenaria paludicola*	E	E	N	Y	N	Y	N	Known only from reintroduced populations in two locations in Golden Gate National Recreation Area, Marin County, and in the Sweet Springs Nature Preserve at the southern end of Morro Bay; the remaining native population is from the northwestern shore of Oso Flaco Lake in the Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County (U.S. Fish and Wildlife Service 2020a).
Menzies' wallflower *Erysimum menziesii*	E	E	N	Y	N	Y	N	Historically occurred south of Salinas River, this occurrence was extirpated in 1980 due to storm waves and migration of the river mouth (California Department of Fish and Wildlife 2021).
Monterey gilia *Gilia tenuiflora* ssp. *arenaria*	T	E	N	Y	N	Y	N	Coastal dunes, coastal scrub, chaparral (maritime), cismontane woodland; bare, wind–sheltered areas often near dune summit or in the hind dunes; two records from Pleistocene inland dunes; 0–800 feet. One occurrence located just northeast of the plan area at Mulligan Hill (California Department of Fish and Wildlife 2021).
Monterey spineflower *Chorizanthe pungens* var. *pungens*	-	T	Y	Y	Y	Y	Y	Coastal dunes, chaparral, cismontane woodland, and coastal scrub; sandy soils in coastal dunes or more inland within chaparral or other habitats; 10–1,500 feet. Known from one occurrence in the plan area in the Salinas River NWR (California Department of Fish and Wildlife 2021). Also recently found in the vicinity of the beach access route used during sandbar management activities.

Species Name	Status[a] State	Federal	Criteria[b] Occur	Status	Impact	Data	Proposed for Coverage[c]	Notes
Santa Cruz tarplant *Holocarpha macradenia*	E	T	N	Y	N	Y	N	Coastal prairie, coastal scrub, valley and foothill grasslands; light, sandy soil or sandy clay. Only one population occurs in Monterey County, just south of the Santa Cruz County line and the City of Watsonville (U.S. Fish and Wildlife Service 2014a). No records in plan area.
Yadon's piperia *Piperia yadonii*	-	E	N	Y	N	Y	N	Closed-cone coniferous forest, maritime chaparral, and coastal bluff scrub; 30-2,400 feet; blooms: February-August. Occurs northeast of Elkhorn Slough and on Fort Ord. No occurrences in the plan area.
Invertebrates								
Vernal pool fairy shrimp *Branchinecta lynchi*	-	T	N	Y	N	Y	N	Alkali wetlands/drainages, ponds and vernal pool habitat do not occur in the plan area.
Smith's blue butterfly *Euphilotes enoptes smithi*	-	E	N	Y	N	Y	N	Most commonly associated with coastal dunes and coastal sage scrub plant communities in Monterey and Santa Cruz Counties. Hostplants *Erigonum latifolium* and *Erigonum parvifolium* are utilized as both larval and adult food plants. Suitable habitat near Salinas River Lagoon. Last detected at Salinas River NWR south of the plan area in 1986 (California Department of Fish and Wildlife 2021).
Fishes								
South-Central California Coast steelhead *Oncorhnchus mykiss*	-	T	Y	Y	N	Y	N	Cool, clear, fast–flowing rivers and streams containing numerous riffles and cover. While these waterways are generally forested, snow–fed streams, steelhead are also found in rain–fed, intermittent streams. Known to occur in the Salinas River and Lagoon in the plan area.
Tidewater goby *Eucyclogobius newberryi*	E	E	Y	Y	Y	Y	Y	Found primarily in waters of coastal lagoons, estuaries, and marshes. Critical habitat occurs in the plan area. Known to occur in the Salinas River Lagoon and in the OSR (Hellmair et al. 2018).
Amphibians								

Species Name	Status[a] State	Federal	Criteria[b] Occur	Status	Impact	Data	Proposed for Coverage[c]	Notes
California tiger salamander *Ambystoma californiense*	T	T	N	Y	N	Y	N	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for breeding; rodent burrows, rock crevices, or fallen logs for upland cover during dry season. Known to occur in Fort Ord and Elkhorn Slough. Does not occur in the plan area.
California red-legged frog *Rana draytonii*	-	T	N	Y	N	Y	N	Permanent and semi–permanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation; may aestivate in rodent burrows or cracks during dry periods. Not known to occur in the plan area, but known from the Salinas River and Elkhorn Slough north of the plan area (California Department of Fish and Wildlife 2021).
Santa Cruz long-toed salamander *Ambystoma californiense*	E	E	N	Y	N	Y	N	Wet meadows near sea level in a few restricted locales in Santa Cruz and Monterey Counties; aquatic larvae prefer shallow (less than twelve inches) water, using clumps of vegetation or debris for cover; adults use mammal burrows. Current populations are known from north of Castroville within and near Elkhorn Slough and Struve Slough. No occurrences in the plan area.
Birds								
California Ridgway's (=clapper) rail *Rallus obsoletus (=longirostris) obsoletus*	T	E	N	Y	N	Y	N	Occurs in tidal salt and brackish marsh habitats of the San Francisco Bay Area (U.S. Fish and Wildlife Service 2020b). Last observed in the area of Elkhorn Slough in 1978 (California Department of Fish and Wildlife 2021).
California condor *Gymnogyps californianus*	E	E	N	Y	N	Y	N	Forages in open savannah, grasslands, chaparral. Requires deep canyons with clefts in rocky walls for roosting and nesting. Range is expanding from reintroduction sites in southern and central California at Pinnacles National Monument, Ventana Wilderness, and Bitter Creek (U.S. Fish and Wildlife Service 2013). No occurrences in plan area.

Species Name	Status[a] State	Federal	Criteria[b] Occur	Status	Impact	Data	Proposed for Coverage[c]	Notes
California least tern *Sterna antillarum browni*	E	E	N	Y	N	Y	N	Nests along the coast; colonial breeder on bare or sparsely vegetated flat substrates, such as sand beaches, alkali flats, landfills, or paved areas. Known as an occasional spring migrant in the Salinas River Lagoon; last nesting pair observed in plan area in the 1930s (U.S. Fish and Wildlife Service 2002). No known occurrences in the plan area (California Department of Fish and Wildlife 2021).
Least Bell's vireo *Viero bellii pusillus*	E	E	N	Y	N	Y	N	Riparian thickets either near water or in dry portions of river bottoms. Known as a rare summer resident in the Salinas River watershed. No records in the plan area (California Department of Fish and Wildlife 2021)
Marbled murrelet *Brachyramphus marmoratus*	E	T	N	Y	N	Y	N	Feeds near-shore, nests in old-growth redwood dominated forests up to 6 miles inland, often in Douglas fir. The breeding range in California extends from the Oregon border to Monterey Bay, with small numbers of non-breeding birds known to occur off the coast of southern California (U.S. Fish and Wildlife Service 2019).
Short-tailed albatross *Phoebastria (=Diomedea) albatrus*	-	E	N	Y	N	Y	N	Pelagic species that breeds on Pacific atolls. No records in the plan area.
Southwestern willow flycatcher *Empidonax traillii extimus*	E	E	N	Y	N	Y	N	Breeds in riparian woodlands; primary occupied drainages in California include the Kern, Owens, San Luis Rey, Santa Ana, and Santa Margarita River drainages (U.S. Fish and Wildlife Service 2014b). No records in plan area.
Western snowy plover *Charadrius nivosus nivosus*	-	T	Y	Y	Y	Y	Y	Coastal beaches above the normal high tide limit in flat, open areas with sandy or saline substrates; vegetation and driftwood are usually sparse or absent. Known from mouth of the Salinas River and along sand bars of the Salinas River Lagoon in addition to surrounding coastal dune and beach

Species Name	Status[a] State	Federal	Criteria[b] Occur	Status	Impact	Data	Proposed for Coverage[c]	Notes
								areas managed on state and federal park lands (California Department of Fish and Wildlife 2021). Critical habitat occurs in the plan area.
Mammals								
Southern sea otter *Enhydra lutris nereis*	-	T	N	Y	N	Y	N	Nearshore marine environments. Needs canopies of giant kelp and bull kelp for rafting and feeding. Prefers rocky substrates with abundant invertebrates. Known from coastal waters of Monterey Bay including Elkhorn Slough, Moro Cojo Slough, and Moss Landing Harbor (U.S. Fish and Wildlife Service 2015).

[a] **Status:**
E = Endangered.
T = Threatened.
[b] **Criteria:**
Occur: The species is known to occur or likely to occur based on the extent, quality, and distribution of suitable habitats within project vicinity.
Y = Yes, expected to occur
N = No, not expected to occur
Status: The species is currently listed as threatened or endangered. Y = Yes, N = No
Impact: The species will or could be adversely affected by covered activities. Y = Yes, N = No
Data: Sufficient data exist on the species' life history and habitat requirements to evaluate impacts on the species adequately and develop conservation measures to mitigate impacts. Y = Yes, N = No
[c] **Proposed Coverage**
Y = coverage recommended.
N = no coverage recommended.
Source: Information for Planning and Consultation (IPaC) Resource List. July 19, 2021.

A.1 Printed References

California Department of Fish and Wildlife 2021. California Natural Diversity Database (CNDDB). RareFind. V.5.2.14. Available: https://apps.wildlife.ca.gov/rarefind/view/RareFind.aspx.

Hellmair, M., D. Lee, and D. Demko. 2018. Salinas River Lagoon Fish Distribution Study, Summary of Recent Tidewater Goby Surveys. Report prepared for the Monterey County Water Resources Agency. November.

U.S. Fish and Wildlife Service. 2002. Salinas River National Wildlife Refuge Comprehensive Conservation Plan Summary. Sacramento, CA. December.

U.S. Fish and Wildlife Service. 2013. California Condor (*Gymnogyps californianus*) 5-Year Review Summary and Evaluation. Pacific Southwest Region. Sacramento, CA.

U.S. Fish and Wildlife Service. 2014a. *Holocarpha macradenia* (Santa Cruz tarplant) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office. Ventura, CA.

U.S. Fish and Wildlife Service. 2014b. Southwestern Willow Flycatcher (*Empidonax traillii extimus*) 5-Year Review: Summary and Evaluation. Arizona Ecological Services Office. Phoenix, AZ.

U.S. Fish and Wildlife Service. 2015. Southern Sea Otter (*Enhydra lutris nereis*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office. Ventura, CA.

U.S. Fish and Wildlife Service. 2019. Marbled Murrelet (*Brachyramphus marmoratus*) 5-Year Status Review. Washington Fish and Wildlife Office. Lacey, WA.

U.S. Fish and Wildlife Service. 2020a. Marsh sandwort (*Arenaria paludicola*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office. Ventura, CA.

U.S. Fish and Wildlife Service. 2020b. 5-Year Review California Clapper Rail (*Rallus longirostris obsoletus*). San Francisco Bay-Delta Fish and Wildlife Office. San Francisco, CA.

U.S. Fish and Wildlife Service. 2021. Information for Planning and Consultation (IPaC) Resource List. July 19, 2021.

Appendix B

Evaluation of South-Central California Coast Steelhead in the Plan Area

B.1 Overview

Based on the presence of suitable lagoon habitat and known occurrences of South-Central California Coast steelhead (*Oncorhynchus mykiss;* hereafter, steelhead) within the permit area, there is potential for steelhead to be affected by covered activities described in Chapter 3, *Covered Activities* of the Salinas River Lagoon and Sandbar Management Low Effect Habitat Conservation Plan (HCP). However, migration to and from the ocean is required for steelhead to complete their life cycle and lagoon breaching events are not expected to result in take of the species or loss of its habitat.

The Salinas River, like most central California coastal river systems, becomes hydrologically disconnected from the ocean at times due to a naturally occurring sandbar that separates the Salinas River from the ocean when river flow is insufficient to maintain connectivity, and creates what is known as the Salinas River Lagoon. Winter storms can lead to high flow events that have the potential to raise the surface elevation of the lagoon to a point high enough to breach the sandbar and reconnect the river to the ocean. This occurs naturally in coastal lagoons across California and provides a mosaic of dynamic habitats within the estuarine ecosystem for adult and juvenile steelhead.

Steelhead have been observed in the Salinas River Lagoon infrequently but are known to use the habitat as a migration corridor and possibly as a rearing location. The quantity and quality of Salinas River estuary habitat has been severely reduced compared to historic conditions (prior to basin-wide agricultural development), and there is a limited understanding of current estuary habitat dynamics and how this may affect steelhead occupancy. There have been only five steelhead observed in the lagoon since 2002, and the full extent of lagoon habitat use remains unknown.

Steelhead are adapted to the annual cycle of the coastal lagoons in which they live, and they require breaching events to complete their life cycle. Since facilitated breaching of the Salinas River Lagoon is performed in response to storm events, the natural behavioral response of steelhead to the rain event and associated high flows will not be disrupted. The Salinas River Lagoon has been managed to prevent upland flooding by facilitated breaching since approximately 1910. The lagoon breached eight times between 2011 and 2021 (Appendix C), and during this same time period surveys documented steelhead occupancy of the lagoon as well as an annually fluctuating run of migratory adults ranging from zero to 43 individuals (Monterey County Water Resources Agency 2011; 2012; 2014a; 2014b). It should be noted that adult migration monitoring did not occur in every year and that monitoring was only conducted during the primary migratory months (i.e., December–March) and therefore may have missed some individuals. However, this monitoring data, along with historical evidence and knowledge of the species' life history expression in other coastal basins, suggests that the population is resilient to the current management practices of facilitated breaching.

B.2 Legal Status and Critical Habitat

All steelhead (the anadromous form of *Oncorhynchus mykiss*) in the permit area belong to the South-Central California Coast steelhead (SCCCS) distinct population segment (DPS), which is listed as threatened (62 Federal Register [FR] 43937; updated 79 FR 20802) under the federal Endangered Species Act (ESA). The SCCCS DPS includes all naturally spawned anadromous steelhead populations below natural and human-made impassable barriers in streams from the Pajaro River (inclusive) in

the north to, but not including, the Santa Maria River in the south. The DPS has been further divided into four biogeographic population groups (BPGs): Interior Coast Range, Carmel Basin, Big Sur Coast, and San Luis Obispo Terrace. The Salinas River watershed, which lies within the Interior Coast Range BPG, can be further subdivided into three distinct populations in Gabilan Creek, Arroyo Seco River, and the upper Salinas River, which includes the Nacimiento and San Antonio Rivers (Boughton et al. 2006). Critical habitat for SCCCS within the Salinas River watershed ranges from the mouth of the Salinas River upstream to 7.5 miles below Santa Margarita Lake, and also includes the Arroyo Seco River, Nacimiento River (below the Nacimiento Dam), San Antonio River (below the San Antonio Dam), and the upper Salinas River tributaries (70 FR 52488–52627). The Salinas River Lagoon, as well as the Old Salinas River (OSR) channel, is included in this designation, and the permit area includes approximately 118 acres of designated critical habitat.

B.3 Geographic Distribution

Steelhead are currently found throughout coastal California; however, there is a limited distribution within central and southern California coastal streams and many populations of the anadromous life history form have been extirpated or are present only as remnant populations with occasional runs of diminished size (National Marine Fisheries Service 2012). The Salinas River watershed is the largest coastal watershed contained entirely within California and is estimated to provide approximately 55 stream miles of habitat for steelhead (Becker et al. 2010). The highest quality and most accessible habitat exists in the Arroyo Seco River, the tributary with the shortest migration distance from the marine environment and the only major tributary without a dam. However, steelhead may be found, albeit rarely, further upstream in the Salinas River basin (Titus et al. 2002; California Department of Fish and Wildlife 2020).

B.4 Status in Permit Area

Estimates of steelhead abundance within the Salinas River watershed are limited; however, there appears to have been a long-term population decline, most notably in the tributaries (i.e., San Antonio and Nacimiento Rivers) and mainstem of the upper Salinas River (Titus et al. 2002; National Marine Fisheries Service 2007). Steelhead abundance may have been further reduced by recent drought conditions from 2012 to 2016 and again from 2020 until the present (National Marine Fisheries Service 2013; National Marine Fisheries Service 2016). The population may be currently supported by both resident fish and straying anadromous individuals from other watersheds (National Marine Fisheries Service 2007).

Adult escapement monitoring in the lower Salinas River has revealed a modest, but persistent number of migrating steelhead. Since 2011, between zero and 43 fish have returned each year, although sampling did not cover the entire migration window and did not occur every year (Monterey County Water Resources Agency 2011; 2012; 2014a; 2014b). Migration timing of steelhead was highly variable from year to year, occurring as early as the first half of December and as late as the end of March. Typically, adult migration coincided with or occurred after periods of increased flow, and only in years the lagoon was connected to the ocean.

In the Biological Opinion for the Salinas Valley Water Project (National Marine Fisheries Service 2007), NMFS concluded that the Salinas River run of steelhead had likely declined to approximately

50 adult fish per year (EDAW 2001; National Marine Fisheries Service 2007). It was suggested that the population was at increased risk of extinction due to genetic bottlenecking and environmental stochasticity (e.g., drought, disease, wildfire) (Gilpin and Soule 1986; Pimm et al. 1988; McElhany et al. 2000).

Since sampling began in 2002, only five steelhead have been observed in the lagoon and all of them were observed within the 3-year period from 2011-2013. Recent surveys in October 2020, April 2021, and May 2022 failed to detect any steelhead. However, water quality data collected during these sampling events indicated that abiotic factors were not limiting for rearing juvenile steelhead, as temperatures and dissolved oxygen levels remained within a suitable range (FISHBIO 2021). The potentially large size and strong swimming ability of rearing steelhead suggests they may easily avoid capture by beach seine and their true abundance in the system remains unknown (Eilers et al. 2010).

B.5 Life History and Habitat Requirements

With upwards of 32 known life history patterns, steelhead life history strategies are the most variable of all salmonids (Thorpe et al. 2007; Hodge et al. 2016). Most individuals spend 1–3 years in fresh water and 1–4 years in the ocean before returning to fresh water to spawn (Shapovalov and Taft 1954; Barnhart 1986; Busby et al. 1996; McEwan 2001). While in the ocean, steelhead probably do not migrate too far from the coast, although ocean catch data are limited (Moyle 2002). Most anadromous salmonids (e.g., Chinook salmon [*O. tshawytscha*]) die after spawning, but steelhead are iteroparous, meaning they may survive to spawn more than once. This flexibility allows steelhead populations to be more resilient to environmental stochasticity than other Pacific salmonids.

In California, adult steelhead migrate to fresh water between November and June, with migratory numbers often peaking in February. Escapement monitoring in the Salinas River watershed has revealed highly variable timing of upstream migration, which has occurred as early as the first half of December and as late as the end of March. Adult migration generally occurs after periods of high flow, and only when the sandbar has breached. Spawning begins shortly after adult fish reach spawning areas. Most if not all of the spawning in the Salinas River watershed occurs in the tributary rivers and streams.

After a period of one or more years, juvenile steelhead begin the smoltification process sometime in mid- to late winter prior to ocean entry in the spring. In California, the outmigration of steelhead smolts typically begins in March and ends in late May or June (Satterthwaite et al. 2009). Younger juveniles and those that have not undergone smoltification may disperse downstream and rear in mainstem, estuarine, and lagoon habitats, leading to significant percentages of the juvenile population rearing in coastal lagoons and estuaries of some systems (Bjornn 1971; Shapovalov and Taft 1954; Zedonis 1992; Hayes et al. 2008). This adaptation of rearing in coastal lagoons and estuaries prior to smoltification is thought to be an important component of steelhead life history at a time when physiological adaptation, foraging, and refugia from predators are critical (Healey 1982; Simenstad et al. 1982).

Downstream outmigration monitoring in the Salinas River watershed has revealed that juvenile outmigration peaks as a result of increased stream flow and turbidity associated with storm events. This relationship is particularly apparent on the Arroyo Seco River, owing to the larger number of downstream migrants in that system relative to trapping locations near the other tributaries

(Monterey County Water Resources Agency 2011; 2012; 2014a; 2014c). Notably, it appears that juvenile steelhead in the Salinas River watershed are able to initiate downstream migration in response to increases in flow, irrespective of month. To cope with the challenge of a dynamic hydrograph, steelhead in the Salinas River watershed appear to respond rapidly to environmental cues, though these cues may occur outside the monitoring timeframe. Outmigration monitoring using a rotary screw trap has typically taken place from early March until late May, and inspection of annual flow and migration patterns, particularly in the Arroyo Seco River, reveals that emigration is likely to occur before and after this period (as evidenced by documentation of steelhead as early as the first day of monitoring and as late as the last day of monitoring; Monterey County Water Resources Agency 2011; 2012; 2014a; 2014c).

Age and growth analysis of captured individuals in the Arroyo Seco provides evidence that juvenile production can occur even in years (winters) when connectivity to the marine environment does not occur (i.e., no breaching of the lagoon's sandbar). Three individuals collected in spring 2017 were determined to belong to year classes 2015 (n=1) and 2016 (n=2). This is a clear indication that *O. mykiss* in the Salinas River basin may exhibit a resident or partially migratory life history, permitting population persistence during extended (multi-year) periods of isolation from the marine environment.

To complete the migratory phase of their life cycle, steelhead require connectivity with the ocean. Like virtually all lagoons, habitat conditions in the Salinas River Lagoon are not suitable for steelhead spawning or egg incubation but potentially support juvenile rearing. When the sandbar is breached, the lagoon is tidally influenced and saline, and migration to and from the ocean is possible. When the sandbar is closed, the lagoon is typically characterized by low salinity, and adequate water quality conditions, particularly when Salinas River inflow is adequate. However, during semi-lentic periods (when water is hardly flowing) and particularly during summer, stratification of the lagoon may occur, forming a solute-rich (high in salt and dissolved organic compounds) and oxygen-depleted stratum of water on the bottom of the lagoon (hypolimnion), which is not suitable for rearing juveniles. When the water in the estuary is stratified, the water in the top layer (epilimnion) may provide available rearing habitat for steelhead.

Steelhead exhibiting ocean-run life history traits opportunistically enter the lagoon when it is connected to the ocean and commence upstream migration after a staging period in the lagoon that may last up to several weeks (D.W. Alley and Associates 2014). Escapement monitoring has revealed that adult steelhead migration into the lagoon coincides with or occurs after periods of increased flow, and only in years the lagoon is connected to the ocean. However, a prolonged period of time can lapse between the lagoon disconnecting from the ocean and the first migratory adult steelhead observed at the weir (located at river mile 2.75), resulting in uncertainty about the timing of adult steelhead migration. Notably, in 2011–2012, the lagoon was closed during the period of weir operation, but it remained open the previous summer until September 21, 2011. It is unknown if steelhead passages in early 2012 are attributable to fish that reared in the lagoon environment, fish that had entered the lagoon from the ocean before the sandbar closed, or fish that entered the lagoon through the OSR channel.

Steelhead have rarely been detected in the lagoon, appearing in only five of the past 22 surveys that have occurred between 2002 and 2022 (FISHBIO 2021). They were last detected during the seining effort in October 2013, and they have not been captured in either of the seining efforts conducted in 2020 and 2021. When the species has been detected in the lagoon, the catch per unit effort has never exceeded 0.1 individuals per seine haul and no more than one individual has ever been

captured during any one survey. This may suggest that when they do occur, they are present in very low densities, and/or alternatively that beach seining is not efficient at capturing them. Water quality data collected during recent surveys (i.e., since 2020) suggest that abiotic factors such as dissolved oxygen and water temperature have remained within a range suitable for rearing juvenile steelhead, and as such, are likely not responsible for the absence of the species from the lower river (see *Threats and Stressors* section below).

The Salinas River watershed subpopulation of steelhead occurs in an inland ecoregion, which is typified by drier and warmer conditions than the coastal region. This population also experiences long migration routes and an erratic hydrograph, which confer unique selective regimes that likely supported and may still support unique life history traits that have allowed this population to persist. The Salinas River watershed subpopulation of steelhead thus likely displays increased expression of resident life history types, as this permits them to better survive periodic drought conditions when reduced flows in the mainstem prevent migration to and from the ocean.

B.6 Threats and Stressors in the Salinas Lagoon

The populations of steelhead in the permit area face several threats and stressors that may prevent them from completing their migratory life history. A major challenge to their natural migration between freshwater and the marine environment is a naturally forming sandbar at the mouth of the Salinas River. This sandbar, present in the earliest-known historical maps of the river, requires fish to enter the system when the sandbar has been breached. The sandbar is closed throughout much of the year and in some years does not open at all. For example, the sandbar remained closed between January 2013 and January 2017, preventing ocean-maturing steelhead from entering the river and juveniles from leaving the watershed for a period of four years (Monterey County Water Resources Agency and California State Coastal Conservancy 2019). While the sandbar remains closed, movement into and out of the river is prohibited[13] and may expose individuals already present in the system to increased risk of predation, cause depletion of energy reserves, or increase straying rates of adults into other watersheds (Clemento et al. 2009; Pearse et al. 2009). If the sandbar is breached naturally or through facilitated breaching, steelhead can enter and exit the Salinas River.

The Salinas River Lagoon is a dynamic system that is subject to sudden, dramatic shifts in depth, discharge, and water quality, and associated shifts in the composition of the aquatic community. Historically, this system had an extensive floodplain that would be seasonally inundated, and estimates suggest that the area of open water in the lagoon may have been approximately 340 acres in 1910 (National Marine Fisheries Service 2007). This expansive wetland may have provided rearing habitat for juvenile steelhead throughout the year. Disconnection of this former wetland habitat, management of the lagoon surface water elevation to protect agricultural fields and residences, reductions in river flows due to water operations, and the introduction of invasive predators (e.g., striped bass [*Morone saxatilis*]) have reduced the suitability of the Salinas River Lagoon for rearing juvenile steelhead.

The Salinas River Lagoon is home to a number of nonnative predators and/or competitors which pose significant threats to juvenile steelhead rearing in the lagoon. Today, striped bass appears to be

[13] There is a possibility that adult steelhead can enter the Salinas River Lagoon via the OSR, the Potrero Road tide gates, and the OSR slidegate; however, this migration pathway has never been confirmed. Recent eDNA studies in the OSR did not identify steelhead presence.

the most abundant anadromous species in the river, and likely serves as the most significant remaining connection between the marine and freshwater food webs. Striped bass have been shown to be important predators of juvenile steelhead in other systems in California, and may occur at very high densities (e.g., 1,227 individuals per river kilometer; Michel et al. 2018). A striped bass mark-recapture study conducted in the lagoon in 2020, resulted in at least 237 unique individuals, with anglers capturing another 527 untagged fish (T. Williams, pers. comm. 2021). This abundance likely extends further upstream, as drying of the river between Chualar and Gonzales (approximately 29 miles upstream of the lagoon) for dam maintenance in 2012 revealed hundreds of striped bass (J. Demers, pers. comm. 2021). Although accurate estimates of the total striped bass population in the Salinas River are not currently available, the detection of hundreds of individuals in just the lower section of the river suggests that they are present in high densities. This abundance combined with the species' ability to rapidly adapt to new prey sources as they become available (Nobriga and Feyrer 2008) may play a role in limiting use of the lagoon by rearing juvenile steelhead. This idea is supported by evidence from the nearby Carmel River lagoon where 59% of sampled striped bass (n=22) were found to have steelhead DNA in their stomachs (Boughton and Ohms 2018).

Other nonnative species that seasonally appear in very high densities in the Salinas River Lagoon include threadfin shad (*Dorosoma petenense*) and inland silversides (*Menidia beryllina*), the latter of which first appeared in the lagoon sometime within the past five years. It is not known what impacts, if any, these species may have on juvenile steelhead, but their sheer abundance suggests that substantial shifts in the food web may have resulted from their presence. Whether they are competing with imperiled native species like steelhead, providing a valuable prey source for rearing juvenile steelhead, or some combination of these outcomes is unclear.

B.7 Project specific impacts

B.7.1 Sandbar management

Sandbar management activities are not expected to result in any impacts to steelhead as these activities do not occur in steelhead habitat. Excavation of the pilot channel is performed from the open beach, and construction equipment does not enter the lagoon at any time during this activity.

B.7.2 Lagoon breaching

Lagoon breaching is most likely to occur in conjunction with winter storms in November, December, or January. Facilitated breaching is typically undertaken by MCWRA during this period and is designed to closely mimic the conditions that would result from a naturally occurring (i.e., unassisted) breach event, but without the associated upland flooding. As such, facilitated lagoon breaching is considered a temporary effect to lagoon habitat. Wave and tidal action typically rebuild the sandbar at the mouth of the river, eventually disconnecting the river from the ocean and re-establishing the lagoon. Temporary effects to steelhead critical habitat caused by facilitated lagoon breaching are detailed below. Due to the short duration of covered activities, we consider the impacts to steelhead to be minimal, and likely beneficial, as connectivity to the marine environment is a natural component of the species' life history.

A rapid rise in lagoon stage within hours or days, followed by a tidally influenced hydrologic cycle, is expected to have very limited effects on steelhead rearing or staging in the lagoon. Steelhead are

highly mobile, and any that are present in the lagoon during breaching would be capable of occupying (or retreating from) newly inundated or dewatered areas at will. However, newly inundated habitat (particularly in the vicinity of the breaching location) often consists of sandy substrate and is devoid of any aquatic vegetation or riparian structure and is therefore unlikely to be utilized extensively by staging or rearing steelhead. In addition, steelhead in the lagoon during winter are physiologically adapted to survive across a range of salinities, which coupled with their ability to rapidly move between habitats, means they are likely able to cope with the dramatic salinity fluctuations that result from a breaching event (Bond et al. 2021). In summary, due to the low numbers of steelhead expected to occupy newly inundated habitat, their mobility, and the ability of the species to tolerate a wide range of water quality conditions, the risk of stranding or disruption in the natural behavior of the species is expected to be minimal.

The benefits of facilitated breaching for creating ocean connectivity and migratory opportunities is largely dependent on the timing of the activity. Since facilitated breaching is only conducted in response to storm events, and because both adult and juvenile steelhead in the Salinas River appear able to migrate and spawn over a wide temporal window, facilitated breaching during high-flow periods should coincide with the natural timing of steelhead migration during storm events and provide migration opportunities for the species regardless of the time of year.

Steelhead, like many spatially structured species, exhibits some degree of metapopulation dynamics, whereby gene flow occurs as a result of straying between nearby populations and productivity of any given local population may be the result of immigration from other populations in the metapopulation. For SCCCS subpopulations, straying between subpopulations is an important factor in maintaining metapopulation structure (Hill et al. 2002; Keefer and Caudill 2012). Facilitated breaching is expected to have a similar benefit to populations in the Salinas River and surrounding rivers as unassisted breaching by allowing a period of lagoon-ocean connectivity. Movement between subpopulations is an important factor affecting gene flow and recolonization potential (Good et al. 2005).

Steelhead life history is adapted to the hydrologic cycle of the coastal ecosystem in which they live, which is characterized by episodic rain events and stochastic connectivity to the ocean. There is no reason to believe that facilitated breaching of the Salinas River Lagoon performed in response to storm events would have any adverse effect on natural behavior or adversely affect the species in any way. All evidence to date suggests that the population opportunistically utilizes migration opportunities presented by connectivity with the ocean.

B.7.3 Critical Habitat

Facilitated breaching of the Salinas River Lagoon would not result in the lagoon's sandbar being open at times when it would otherwise have remained closed because these activities would only be undertaken in response to flow events that are likely to cause an unassisted breach. Therefore, any reduction in the stability of lagoon conditions due to a lagoon breach would be temporary and largely related to natural flow events. There may be some loss of lagoon substrate and aquatic vegetation in the permit area due to facilitated breaching and erosion of the breach channel. However, the permit area represents only a small percentage of available habitat in the Salinas River. In summary, there may be some minor effects to steelhead critical habitat, but they are expected to be very limited in geographic and temporal scope and are likely to be beneficial by providing connectivity between the ocean and the lagoon and thereby opportunity for steelhead to complete their migratory life history.

B.8 Printed References

Barnhart, R. 1986. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Pacific Southwest)—Steelhead. U.S. Fish and Wildlife Service Biological Report No. 82. U.S. Army Corps of Engineers Technical Report. EL-82-421.

Becker, G. S., K. M. Smetak, and D. A. Asbury. 2010. Southern Steelhead Resources Evaluation: Identifying Promising Locations for Steelhead Restoration in Watersheds South of the Golden Gate. Cartography by D. A. Asbury. Center for Ecosystem Management and Restoration. Oakland, CA.

Bjornn, T. C., 1971. Trout and Salmon Movements in Two Idaho Streams as Related to Temperature, Food, Stream Flow, Cover, and Population Density. Transactions of the American Fisheries Society 100:423–438.

Bond, R. M., J. D. Kiernan, A. M. K. Osterback, C. H. Kern, A. E. Hay, J. M. Meko, M. E. Daniels, and J. M. Perez. 2021. Spatiotemporal Variability in Environmental Conditions Influences the Performance and Behavior of Juvenile Steelhead in a Coastal California Lagoon. Estuaries and Coasts 2021:1-17.

Boughton, D., and H. A. Ohms. 2018. Fisheries River Steelhead Fishery Report 2018. Report to California American Water under Memorandum of Understanding between Cal Am Water and NMFS SWFSC, SWFSC Agreement No. SWC-156.

Busby, P. B., T. C. Wainwright, G. Bryant, L. J. Lierheimer, R. S. Waples, F. W. Waknitz, and I. V. Lagomarsino. 1996. Status Review: West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC TM-27.

California Department of Fish and Wildlife. 2020. California Natural Diversity Database (CNDDB). RareFind. V.5.2.14. Available: https://apps.wildlife.ca.gov/rarefind/view/RareFind.aspx. Accessed: September 08, 2020.

Clemento, A. J., E. C. Anderson, D Boughton, D. Girman, J. C. Garza. 2009. Population genetic structure and ancestry of *Oncorhynchus mykiss* populations above and below dams in southcentral California. Conservation Genetics 10: 1321.

Denise Duffy and Associates. 2015. Pure Water Monterey Groundwater Replenishment Project Final Environmental Impact Report. Available: http://purewatermonterey.org/reports-docs/cfeir. Accessed: January 11, 2019.

D.W. Alley and Associates. 2014. Fishery Analysis for The Carmel River Lagoon Biological Assessment Report. Prepared for Monterey County Resource Management Agency.

EDAW. 2001. Draft Environmental Impact Report/Environmental Impact Statement for the Salinas Valley Water Project. Prepared for Monterey County Water Resources Agency and the U.S. Army Corps of Engineers.

Eilers, C.D., J. Bergman, and R. Nelson. 2010. A comprehensive monitoring plan for steelhead in the California Central Valley. The Resources Agency: Department of Fish and Game: Fisheries Branch Administrative Report Number: 2010–2.

Gilpin, M. E. and M. E. Soulé. 1986. Minimum Viable Populations: Processes of Species Extinction. Pages 19–34 in M. E. Soulé (ed.). Conservation Biology: The Science of Scarcity and Diversity. Sinauer Associates, MA.

Good, T. P., R. S. Waples, and P. Adams (eds.). 2005. Updated Status of Federally Listed ESUs of West Coast Salmon and Steelhead. National Marine Fisheries Service, Northwest and Southwest Fisheries Science Centers. NOAA Technical Memorandum NMFS-NWFSC TM-66.

FISHBIO. 2021. Salinas Lagoon Seining Report: October 2020 – April 2021. Report submitted to Monterey County Water Resources Agency.

Hagar Environmental Science. 2015. Salinas River Lagoon Monitoring Report 2014. Annual Report prepared for the Monterey County Water Resources Agency. June.

Hayes, S. A., M. H. Bond, C. V. Hanson, E. V. Freund, J. J., Smith, E. C. Anderson, A. J. Ammann, and R. B. MacFarlane, 2008. Steelhead Growth in a Small Central California Watershed: Upstream and Estuarine Rearing Patterns. Transactions of the American Fisheries Society 137:114–128.

Healey, M. C. 1982. Juvenile Pacific Salmon in Estuaries: The Life Support System. In Estuarine Comparisons. Edited by V. S. Kennedy. Academic Press, New York, NY. pp. 315–342.

Hill, M. F., A. Hastings, and L. W. Botsford. 2002. The Effects of Small Dispersal Rates on Extinction Times in Structured Metapopulation Models. American Naturalist 160:389–402.

Hodge, B. W., M.A. Wilzbach, W.G. Duffy, R.M. Quiñones, and J.A. Hobbs. 2016. Life history diversity in Klamath River steelhead. Transactions of the American Fisheries Society 145: 227-238.

Keefer, M. L., and C. C. Caudill. 2012. A Review of Adult Salmon and Steelhead Straying with an Emphasis on Columbia River Populations [online]. Technical Report 2012-6. Department of Fish and Wildlife Resources, College of Natural Resources, University of Idaho.

McElhany, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-42.

McEwan, D. 2001. Central Valley Steelhead. In R. L. Brown, Contributions to the Biology of Central Valley Salmonids, Volume 1, pp. 1–44. California Department of Fish and Game. Fish Bulletin 179.

Monterey County Water Resources Agency and State Coastal Conservancy. 2019. Salinas River Long-Term Management Plan. February. Salinas, California and Oakland, CA.

Michel, C. J., J. M. Smith, N. J. Demetras, D. D. Huff, and S. A. Hayes. 2018. Non-native fish predator density and molecular-based diet estimates suggest differing impacts of predator species on Juvenile Salmon in the San Joaquin River, California. San Francisco Estuary and Watershed Science 16.

Monterey County Water Resources Agency. 2011. Salinas Valley Water Project. Annual Fisheries Report for 2010. Monterey County Water Resources Agency, Salinas, CA.

Monterey County Water Resources Agency. 2012. Salinas Valley Water Project. Annual Fisheries Report for 2011. Monterey County Water Resources Agency, Salinas, CA.

Monterey County Water Resources Agency. 2014a. Salinas Valley Water Project. Annual Fisheries Report for 2013. Monterey County Water Resources Agency, Salinas, CA.

Monterey County Water Resources Agency. 2014b. Salinas Basin Adult Steelhead Escapement Monitoring. 2014 Annual Report. Monterey County Water Resources Agency, Salinas, CAa.

Monterey County Water Resources Agency. 2014c. Salinas Basin Juvenile *O. mykiss* Downstream Migration Monitoring. 2014 Annual Report. Monterey County Water Resources Agency, Salinas, CA.

Moyle, P. B. 2002. Inland fishes of California. Berkeley: University of California Press.

National Marine Fisheries Service. 2007. Biological Opinion for the Salinas River Diversion Facility. June. Southwest Region, Long Beach, CA.

National Marine Fisheries Service. 2012. Southern California Steelhead Recovery Plan. Southwest Region, Protected Resources Division, Long Beach, CA.

National Marine Fisheries Service. 2013. South-Central California Steelhead Recovery Plan. December. West Coast Region, Long Beach, CA.

National Marine Fisheries Service. 2016. 5-Year Review: Summary and Evaluation of South-Central California Coast Steelhead Distinct Population Segment. West Coast Region. California Coastal Office. Santa Rosa, CA.

Nobriga, Matthew & Feyrer, Frederick. (2008). Diet composition in San Francisco Estuary striped bass: Does trophic adaptability have its limits? Environmental Biology of Fishes. 83. 495-503. 10.1007/s10641-008-9376-0.

Pimm, S. L., H. L. Jones, and J. Diamond. 1988. On the Risk of Extinction. American Naturalist 132:757–785.

Pearse, D. E., Hayes, S. A., Bond, M. H., Hanson, C. V., Anderson, E. C., Macfarlane, R. B., & Garza, J. C. (2009). Over the falls? Rapid evolution of ecotypic differentiation in steelhead/rainbow trout (*Oncorhynchus mykiss*). Journal of Heredity, 100(5), 515-525.

Satterthwaite, W. H., M. P. Beakes, E. M. Collins, D. R. Swank, J. E. Merz, R. G. Titus, S. M. Sogard, and M. Mangel. 2009. Steelhead Life History on California's Central Coast: Insights from a State-Dependent Model. Transactions of the American Fisheries Society 138:532–548.

Shapovalov, L. and A. C. Taft. 1954. The Life Histories of Steelhead Rainbow Trout (*Salmo gairdneri*) and Silver Salmon (*Oncorhynchus kisutch*) with Special Reference to Waddell Creek, California and Recommendations Regarding their Management. California Department of Fish and Game. Bulletin 98.

Simenstad, C. A., K. L. Fresh, E. O. Salo. 1982. The Role of Puget Sound and Washington Coastal Estuaries in the Life History of Pacific Salmon: An Unappreciated Function. *In*: Kennedy, V.S. (ed.). Estuarine Comparisons. Academic Press, New York, NY, pp. 343–364.

Titus, R. G., D. C. Erman, and W. M. Snider. 2002. History and Status of Steelhead in California Coastal Drainages South of San Francisco Bay. July 5. Draft.

Thorpe, J. E. 2007. Maturation responses of salmonids to changing developmental opportunities. Marine Ecology Progress Series 335: 285-288.

U.S. Fish and Wildlife Service. 2007. Draft Biological Opinion on Issuance of Department of the Army Permits to the Monterey County Water Resources Agency for Construction of a Surface Water Diversion Structure in the Salinas River, Near the City of Salinas (Corps File Number 24976S) and for Breaching of the Salinas River Lagoon (Corps File Number 16798S) in Monterey County, California (1-8-06-F-54). July 2007.

Zedonis, P. A. 1992. The Biology of the Juvenile Steelhead (*Oncorhynchus mykiss*) in the Mattole River Estuary/Lagoon, California. Doctoral dissertation. Humboldt State University.

B.9 Personal Communications

Demers, Jason, Monterey County Water Resources Agency. 2021. Email communication with Jack Eschenroeder, FISHBIO.

Williams, Tommy, NOAA Southwest Fisheries Science Center. 2021. Email communication with Jack Eschenroeder, FISHBIO.

Appendix C

Historical Salinas River Lagoon Openings

Table C-1. Historical Salinas River Lagoon Openings

Water Year[a]	Date Sandbar Open[b]	Date Sandbar Closed	Duration of Lagoon Open to Ocean (days)
2021/2022	**12/27/21**	2/16/22	51
2020/2021	**1/29/21**	3/3/21	33
2019/2020	**4/7/20**	5/17/20	40
2018/2019	**1/19/19**	6/28/19	160
2017/2018	**3/25/18**	4/22/18	28
2017/2018	Open	10/2/17	1
2016/2017	**1/12/17**	Open	263
2015/2016	Lagoon did not open	Lagoon did not open	0
2014/2015	Lagoon did not open	Lagoon did not open	0
2013/2014	Lagoon did not open	Lagoon did not open	0
2012/2013	12/26/12	1/28/13	33
2012/2013	**12/4/12**	12/21/12	17
2011/2012	**4/13/12**	5/3/12	20
2010/2011	**12/25/10**	9/21/11	270
2009/2010	6/11/10	7/18/10	37
2009/2010	5/23/10	6/4/10	12
2009/2010	**1/21/10**	5/21/10	121
2008/2009	6/20/09	8/19/09	61
2008/2009	**¾/09**	6/17/09	106
2007/2008	**1/5/08**	5/28/08	145
2006/2007	**12/28/06**	1/26/07	30
2005/2006	**1/1/06**	7/24/06	205
2004/2005	**½/05**	7/19/05	199
2003/2004	2/25/04	3/25/04	30
2003/2004	**1/1/04**	1/10/04	10
2002/2003	**12/17/02**	2/18/03	64
2001/2002	12/24/01	2/18/02	57
2001/2002	**12/4/01**	12/11/01	8
2000/2001	**1/12/01**	4/30/01	109
1999/2000	**1/24/00**	1/31/00	8
1998/1999	**11/16/1998**	5/3/1999	169
1997/1998	**12/8/1997**	9/11/1998	278
1996/1997	**12/11/1996**	2/24/1997	76
1995/1996	**2/1/1996**	3/29/1996	58
1995/1996	Open	11/6/1995	37
1994/1995	1/10/1995	Open	252
1994/1995	1/9/1995	1/9/1995	1
1994/1995	1/8/1995	1/8/1995	1
1994/1995	**1/7/1995**	1/7/1995	1
1993/1994	**2/21/1994**	2/21/1994	1
1992/1993	**1/10/1993**	5/9/1993	120
1991/1992	3/9/1992	3/20/1992	12

Water Year[a]	Date Sandbar Open[b]	Date Sandbar Closed	Duration of Lagoon Open to Ocean (days)
1991/1992	**2/15/1992**	3/2/1992	17
1990/1991	**3/21/1991**	6/2/1991	74
1989/1990	Lagoon did not open	Lagoon did not open	0
1988/1989	Lagoon did not open	Lagoon did not open	0
1987/1988	Lagoon did not open	Lagoon did not open	0
1986/1987	**2/14/1987**	3/20/1987	35
1985/1986	2/14/1986	6/13/1986	120
1985/1986	**12/5/1985**	12/7/1985	3
1984/1985	**2/10/1985**	2/12/1985	3
1983/1984	11/26/1983	2/10/1984	77
1983/1984	**11/12/1983**	11/14/1983	3
1983/1984	Open	10/31/1983	31
1982/1983	Open	Open	365
1981/1982	1/6/1982	Open	248
1981/1982	**11/15/1981**	12/10/1981	26
1980/1981	**1/28/1981**	3/20/1981	52
1979/1980	**12/26/1979**	7/16/1980	204
1978/1979	Open	1/6/1979	98
1977/1978	**12/19/1977**	Open	292
1976/1977	Lagoon did not open	Lagoon did not open	0
1975/1976	**10/9/1975**	11/7/1975	30
1974/1975	**12/5/1974**	5/31/1975	178
1974/1975	Open	12/3/1974	64
1973/1974	**11/20/1973**	Open	315
1972/1973	1/18/1973	6/30/1973	164
1972/1973	**11/17/1972**	1/11/1973	56
1971/1972	**12/29/1971**	1/11/1972	14
1970/1971	**11/30/1970**	1/17/1971	49
1969/1970	**1/12/1970**	4/17/1970	96
1968/1969	**1/19/1969**	3/18/1969	59
1967/1968	**12/12/1967**	12/22/1967	11
1967/1968	Open	10/23/1967	23
1966/1967	**12/7/1966**	Open	298
1965/1966	2/7/1966	2/18/1966	22
1965/1966	1/14/1966	1/28/1966	15
1965/1966	**11/26/1965**	12/13/1965	18
1964/1965	**4/14/1965**	5/5/1965	22

[a] A water year is defined as October 1 through September 30.
[b] Dates in bold are initial breaches of the water year.
Source: Monterey County Water Resources Agency 2021.