INITIAL STUDY/
NEGATIVE DECLARATION

PESCADERO LAGOON INTERIM MANAGEMENT PROJECT

August 2014

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558

NEGATIVE DECLARATION

PROJECT: **PESCADERO LAGOON INTERIM MANAGEMENT PROJECT**

LEAD AGENCY: California Department of Fish and Wildlife

AVAILABILITY OF DOCUMENTS: The Initial Study/Negative Declaration is available for review at:

California Department of Fish and Wildlife
Bay Delta Region
7329 Silverado Trail
Napa, CA 945589

California Department of Fish and Wildlife website:
https://www.wildlife.ca.gov/

PROJECT DESCRIPTION:

This Initial Study/Negative Declaration (IS/ND) has been prepared by the California Department of Fish and Wildlife (CDFW) to evaluate the potential environmental effects of the National Oceanic and Atmospheric Administration (NOAA) Restoration Center's proposed Pescadero Lagoon Interim Management Project (Project) located at the Pescadero Marsh Natural Preserve (Preserve; Figure 1) within the Pescadero State Beach. Pescadero State Beach is located in the town of Pescadero, San Mateo County, California. The NOAA Restoration Center proposes to manually breach the Pescadero Lagoon sandbar two to three times per year for approximately two to three years and potentially up to five years. The work will consist of excavating a channel through the sandbar at the mouth of Pescadero Creek (Figure 1). The Project is designed to reduce Delta-Butano Marsh inundation prior to a natural breach event to avoid decreased water quality within Pescadero Lagoon and reduce the likelihood of a fish kill upon opening of the lagoon.

The Project will excavate a shallow channel across the sandbar at the mouth of Pescadero Creek approximately 300 feet long, 4 feet wide, and 3 to 4 feet below the lagoon water surface elevation. The channel will extend from the edge of the lagoon to the ocean. Excavated sand (approximately 200-800 cubic yards) will be deposited on the beach. Since the location and timing of sandbar formation varies year-to-year, specific excavation locations, sizes and volumes may vary and will be determined following a site-specific evaluation of conditions (size and volume of the lagoon, water quality levels in the lagoon, marsh inundation, fish migration needs, and inflow and tidal regimes) prior to implementation. Historically, the sandbar has formed anywhere from 200 feet west to 100 feet east of the Highway 1 Bridge and Project activities will occur within that area (Figure 1).

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

Scott Wilson, Bay Delta Regional Manager
California Department of Fish and Wildlife
7329 Silverado Trail
Napa, CA 945589
Telephone: (707) 944-5500
Fax: (707) 944-5563

Pursuant to Section 21082.1 of the California Environmental Quality Act (CEQA), the California Department of Fish and Wildlife (CDFW) has independently reviewed and analyzed the Initial Study and Negative Declaration for the proposed Project and finds that these documents reflect the independent judgment of CDFW. CDFW, as the State lead agency for this federal Project, also confirms that the Project requirements and avoidance measures detailed in these documents are feasible and will be implemented as stated in the Negative Declaration.

By [signature] - for

Scott Wilson
Regional Manager, Bay Delta Region

August 12, 2014
Date

Table of Contents

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION AND REGULATORY GUIDANCE

This Initial Study/Negative Declaration (IS/ND) has been prepared by the California Department of Fish and Wildlife (CDFW) to evaluate the potential environmental effects of conducting the proposed Pescadero Lagoon Interim Management Project (Project) located within the Pescadero Marsh Natural Preserve at Pescadero State Beach, San Mateo County, California. This document has been prepared in accordance with all applicable law, inlcuding but not limited to the California Environmental Quality Act (CEQA), Public Resources Code §21000 *et seq*., and the State CEQA Guidelines, Title 14 of the California Code of Regulations (CCR) §15000 *et seq*. The National Oceanic and Atmospheric Administration (NOAA) Restoration Center is implementing the Project, and as a Federal agency, is not subject to Fish and Game Code §1601.

An Initial Study is conducted by a lead agency to determine if a project may have a significant effect on the environment [CEQA Guidelines §15063(a)]. If there is substantial evidence supporting a fair argument that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) must be prepared, in accordance with CEQA Guidelines §15064(a). However, if the lead agency determines that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, a Negative Declaration may be prepared instead of an EIR [CEQA Guidelines §15070(a)]. The lead agency prepares a written statement describing the reasons a proposed project would not have a significant effect on the environment and, therefore, why an EIR need not be prepared. This IS/ND conforms to the content requirements under CEQA Guidelines §15071.

The NOAA Restoration Center is proceeding with the Project under the "Supplemental Programmatic Environmental Assessment of NOAA Fisheries' Implementation Plan for the Community Based Recreation Program" (2006) which meets National Environmental Policy Act (NEPA) compliance requirements.

1.2 LEAD AGENCY

As the State trustee agency for fish and wildlife resources, CDFW is assuming the role of the CEQA lead agency for the proposed Project. In accordance with CEQA Guidelines §15051(d), CDFW was designated as the lead agency by agreement with California Department of Parks and Recreation (DPR). CDFW is assuming the role of the CEQA lead agency to facilitate timely CEQA review of the Project and Project implementation beginning in 2014 due to the Project's benefits to fish and wildlife resources, and CDFW's assistance to NOAA with data collection and Project monitoring.

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

Scott Wilson, Regional Manager
California Department of Fish and Wildlife
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
(707) 944-5500 Tel; (707) 944-5563 Fax

Submissions must be in writing and postmarked or received by fax no later than 45 days after the start of the public review period (estimated date of September 30, 2014). The originals of any faxed document must be received by regular mail within ten working days following the deadline for comments, along with proof of successful fax transmission. Fax submissions must include full name and address.

1.3 PURPOSE AND DOCUMENT ORGANIZATION

The purpose of this document is to evaluate the potential environmental effects of the proposed Project to manage the Pescadero Lagoon on an interim basis.

This document is organized as follows:

- Chapter 1 - Introduction.
  This chapter provides an introduction to the Project and describes this document's purpose and organization.

- Chapter 2 - Project Description.
  This chapter describes the reasons for the Project, scope of the Project, and Project objectives.

- Chapter 3 - Environmental Setting, Impacts, Project Requirements and Avoidance Measures
  This chapter identifies the significance of potential environmental impacts, explains the environmental setting for each environmental issue, and evaluates the potential impacts identified in the CEQA Environmental (Initial Study) Checklist. More specifically, this chapter identifies the potential environmental impacts (by environmental issue) and a brief discussion of each impact resulting from the proposed Project's implementation. Project requirements and avoidance measures are incorporated, where appropriate, to avoid potential impacts.

- Chapter 4 - Mandatory Findings of Significance
  This chapter identifies and summarizes the overall significance of any potential impacts of the Project to natural and cultural resources, as well as cumulative impacts and impacts to humans, as identified in the Initial Study.

- Chapter 5 - Summary of Conditions, Project Requirements and Avoidance Measures.
  This chapter summarizes the conditions, requirements and avoidance measures incorporated into the Project as a result of the Initial Study.

- Chapter 6 - References.
  This chapter identifies the references and sources used in the preparation of this IS/ND.

- Chapter 7 - Report Preparation
  This chapter provides a list of those involved in the preparation of this document.

1.4 SUMMARY OF FINDINGS

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

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

CHAPTER 2
PROJECT DESCRIPTION

2.1 INTRODUCTION

This IS/ND has been prepared by CDFW to evaluate the potential environmental effects of the proposed Project located at Pescadero State Beach, San Mateo County, California. The NOAA Restoration Center is proposing to mechanically breach the Pescadero Lagoon sandbar with an excavator up to three times per year for approximately two or three years and potentially up to five years. The work will consist of excavating a channel through the sandbar at the mouth of Pescadero Creek designed to reduce Delta-Butano Marsh inundation prior to a natural breach event to avoid reduced water quality in the lagoon and reduce the likelihood of a fish kill that has been observed for several years when the lagoon breaches naturally. Additionally, as part of Project implementation, water quality and management data will be obtained that may be helpful in working towards the conservation and recovery of listed species and other aquatic biota dependent on the aquatic ecosystem within the Pescadero Marsh complex.

2.2 PROJECT LOCATION

Pescadero State Beach is located on the central California coast, 17 miles south of Half Moon Bay in San Mateo County. This State park unit contains sandy beaches and coastal dunes. The State beach also contains Pescadero Marsh Natural Preserve (Preserve) which is a coastal wetland complex that includes a lagoon at the confluence of Pescadero and Butano Creeks, fresh and brackish water marshes (Butano Marsh, Delta Marsh and North Marsh), and brackish water ponds (including North Pond) (Figure 2). The Project area is located on the beach where Pescadero Creek enters the ocean. Public facilities are limited to day use.

2.3 BACKGROUND AND NEED FOR THE PROJECT

Pescadero Lagoon is unique compared to other central California coastal lagoons for a variety of reasons. Pescadero Lagoon is one of the largest lagoons within the region, and there is relatively little permanent infrastructure (hardscape) within the historical tidal prism. The lagoon is within the range of the Central California Coast (CCC) steelhead trout (*Oncorhynchus mykiss*) Distinct Population Segment (DPS), and CCC coho salmon (*Oncorhynchus kisutch*) Evolutionarily Significant Unit. Fish kills have been observed in the last two decades during lagoon breaching.

The first reported fish kill occurred in 1995. Since then, there have been 14 years (out of 19 years) in which a fish kill occurred, including 11 years in a row [2001-2011 (1995, 1997, 2001-2011, 2013[1])]. There has been a wide range in the number of reported steelhead carcasses observed following the fall breaches, from zero to as few as 4-8, to

[1] The sandbar breached in February 2014, but the lagoon was closed during fall/early winter.

several hundred. Following the 2011 breach, 235 dead steelhead were collected (Huber 2012, unpublished data). Following the February 2014 breach, 263 dead steelhead were collected (Huber 2014, unpublished data). While there is no evidence that these fish kill events have a significant effect on the population of steelhead within the Pescadero Marsh Natural Preserve system, the NOAA Restoration Center considers the Project an urgent matter due in part to the status of the steelhead as a threatened species under the federal Endangered Species Act (ESA) and the fact that over 85% of the returning adults generally come from individuals that have spent time rearing in the lagoon.

NOAA's National Marine Fisheries Service (NMFS) also considers the Project an urgent matter. The importance of improving the impaired conditions of the Pescadero Lagoon for the benefit of coho salmon is documented in NMFS' *Central California Coast Coho Salmon Recovery Plan* (NMFS 2012).

Past fish kills have followed the initial fall breach (i.e., fish kills have been observed following a 34-day closure and up to 153-day closure). Degraded water quality that occurs in the fall appears to be associated with the amount of time the lagoon is closed and the Delta-Butano Marsh complex is inundated, low freshwater inflow to the lagoon, rapid mixing-induced hypoxia upon sandbar breach and chemical oxygen demand (COD) of re-suspended sediment.

2.4 PROJECT OBJECTIVES

The Project objective is to reduce the likelihood of a fish kill and provide fish passage by conducting appropriately-timed manual breaches of the sandbar at the mouth of Pescadero Creek until a long-term action is designed and implemented to avoid water quality impacts in the lagoon. In addition, information obtained from this Project, including water quality data (see *Data Collection* section below) may be useful in developing long-term restoration and/or management actions that enhance function and contribute to the conservation and recovery of sensitive species in, and dependent on, the Preserve.

2.5 PROJECT DESCRIPTION

Sandbar Breaching

The NOAA Restoration Center is proposing to breach the sandbar that forms the Pescadero Lagoon with an excavator generally once per year, but potentially up to three times per year, as necessary to reduce a fish kill and provide fish passage, for approximately three years from 2014 through 2017, until long-term restoration and/or management actions at the Preserve are implemented. If a long-term action cannot be implemented by 2017, then the Project may be extended by up to two years.

The staging area for the Project will be at the north parking lot located on the west side of Highway 1. All vehicles will be parked within the staging area and Project personnel

and the excavator will access the breach site and sandbar from the north side of the Highway 1 Bridge. The excavator will be used to dig a shallow channel across the sandbar at the mouth of Pescadero Creek approximately 300 feet long, 4 feet wide, and 3-4 feet below the lagoon water surface elevation. The channel will extend from the edge of the lagoon to the ocean. Excavated sand (approximately 200 cubic yards) will be deposited on the beach along the length of the excavated channel. Since the location and timing of sandbar formation varies year-to-year, specific excavation locations, sizes and volumes may vary and will be determined following a site-specific evaluation of conditions prior to implementation. Historically, the sandbar has formed anywhere from 200 feet west to 100 feet east of the Highway 1 Bridge and breaching activities will occur within that area (see Figure 1).

The timing of breach implementation will be determined by lagoon and tidal conditions. Breaching activities may occur as soon as 30 days following inundation of the Delta-Butano Marsh after lagoon closure. It is anticipated that breach actions will occur in late summer or fall; however the timing of a breach will be determined by a coincidence of conditions that include water quality, time of inundation, fish passage needs or immediacy of an expected natural breach event. These conditions are more specifically described: 1- monitoring of the water column profile indicates that the lagoon is stratified with dissolved oxygen (DO) in the lower portion of the water column approaching, or at, anoxic conditions; 2- water stage level has inundated the Delta-Butano Marsh plain, tide and inflow conditions are determined adequate for successful implementation; and, 3- action is deemed necessary to prevent a fish kill or provide fish passage. Importantly, these environmental conditions tend to reflect typical late summer or fall conditions, which is when breach would naturally occur. However it is possible that, in exceptional circumstances, the environmental conditions that would normally coincide in late summer or fall would instead occur in spring or early summer; consequently, a proposed breach would occur earlier. Because the timing of breach is determined by the environmental conditions, even if the breach occurs in spring or early summer, with the addition of avoidance or minimization measures, CDFW does not expect the Project's environmental impacts to differ materially from when the Project occurs in late summer or fall.

By timing a breach to a period generally in the fall, prior to seasonal rains, to reduce lagoon water elevation such that the Delta-Butano Marsh is not inundated at the time of natural sandbar breaching, it is expected that a single manual breach annually may be sufficient to avoid conditions that lead to the fish kills that have historically occurred following a natural breach event. However, in certain years, and in exceptional circumstances, as mentioned above, lagoon conditions may necessitate two or possibly three manual breaching actions to avoid fish kill conditions or to allow trapped smolts and kelts to volitionally enter the ocean (for life history traits of steelhead, see the section *Animal Species Potentially Occurring Within the Project Area*).

The sandbar will be breached during an incoming mean high-high tide to maintain a low head differential between the lagoon and the ocean. Breaching under these tidal conditions will reduce scour and facilitate a managed reduction of water volume in the

lagoon. Breaching will occur during daylight hours (in the morning or early afternoon) when surface DO is at its highest and when wind conditions are calm.

Approximately 10-15 people, including NOAA Restoration Center staff, assisted by NMFS staff, CDFW staff, and NOAA volunteers will be participating in and/or monitoring the sandbar breaching activities, conducting water quality sampling in the lagoon, and conducting pre-Project species' surveys upstream in the lagoon and in the marsh complex.

Data Collection

Aquatic Monitoring

The water depth and water surface elevation of the lagoon will be measured at specific locations before, during, and after Project implementation (Figure 3). A Stadia rod will be used to measure water depth at the Butano Channel footbridge (BChB) but will not be referenced to a tidal datum.

Water quality (DO, salinity, temperature, and depth) in the lagoon will be monitored before, during, and after Project implementation. When feasible, water quality will be measured with the use of continuous monitoring devices, such as Sonde units. When this is not feasible, water quality measurements will be collected using a hand-held YSI. Water quality data will be collected at ten locations: Butano Creek at DPR staff gauge (BC1); Butano Channel adjacent to BC1 (BCh1); beneath the pedestrian bridge crossing Butano Channel (BChB); Butano Creek at the bend upstream of the confluence (BC2); Pescadero Creek at the third bend upstream of the confluence (PC); below the Pescadero/Butano Creek confluence (CONF); at the neck of the main embayment (NCK); under the Highway 1 crossing (HO); the channel between Pescadero Creek and North Pond (PCh); North Pond at the pedestrian bridge (NP) (Figure 3). Water quality measurements will begin prior to the breaching activity and will continue during and after Project implementation. The measurements will be taken in the form of vertical profiles from the surface to the bottom at 0.25-meter increments twice per week during the morning hours. Post-Project water quality monitoring will continue two times per week until the sandbar has reformed, after which water quality will be monitored once per week until the sandbar breaches naturally.

Water surface elevations will be measured before and after breaching at several of the water quality sites.

Aquatic species will be monitored via beach seining effort pre and post breach to determine change in species composition and relative abundance and size/age classes of fish present.

Vegetation Data Collection

Vegetation composition and photographic monitoring were conducted within the Preserve in 1985, 1986, 1987 and 1990 in order to monitor effects of restoration efforts and management practices (DPR 1986) (Figure 4). In 2002, the same transects were

monitored with the same protocol (ESA 2003). The protocol consisted of staking, mapping and monitoring ten 50-meter transects.

Vegetation monitoring may be conducted concurrent with Project implementation to further document vegetation patterns found within the Preserve's marsh and pond habitat types. Data collection is expected to assist in determining any changes in vegetational patterns during the period of the Project and may provide information to assist the development of restoration and/or management actions at the Preserve.

Avoidance and minimization measures
The proposed Project has been designed with the following avoidance and minimization measures which are further described in Chapter 3, under Section *IV. Biological Resources*:

- Water quality will be monitored to ensure a breach is not conducted if water quality is so poor that it would adversely affect the lagoon biota.

- The sandbar will be breached during an incoming mean high-high tide. This is expected to maintain a low head differential between the lagoon and the ocean, and therefore reduce the scouring effect; and minimize loss of water volume in the lagoon. Depending on tides and water quality conditions, breaching during an incoming mean high-high tide that is followed by a mean low-low tide will be avoided.

- Mechanical breaching will occur during daylight hours (in the morning or early afternoon) when surface DO is at its highest and when wind conditions are calm to ensure wind mixing has not caused the bottom of the lagoon to mix and/or turnover into the water column. These measures are expected to maintain DO in the estuary above or near hypoxic levels following the breach.

- The NOAA Restoration Center and CDFW staff will be on-site during the breach activity to supervise work crews and to conduct pre-construction monitoring via instruments and observation. U.S. Fish and Wildlife Service (USFWS) staff will also be on-site to monitor and relocate tidewater goby (*Eucyclogobius newberryi*).

- A qualified biologist will conduct pre-construction surveys for California red-legged frog (*Rana draytonii*) eggs within the North Pond and marshes to determine if they may become stranded with a decreased level of inundation in the marsh complex. Egg masses may be relocated to suitable habitat with adequate water levels.

- A qualified biologist will conduct pre-construction surveys for western snowy plover (*Charadrius nivosus nivosus*) in suitable beach nesting and foraging habitat.

- The NOAA Restoration Center, USFWS, CDFW staff and appropriate biological monitors will remain on-site during Project activities to ensure disturbance to bird nesting habitat and other terrestrial habitat is minimized.

- No vehicles except the excavator will be driven on the beach. A biological monitor will walk in front of the excavator while it is driven on the beach during the western snowy plover breeding season if the species has been documented within the Project area.

- No trash will be left on-site.

- Only the minimum amount of the sandbar will be disturbed to create the breach.

- Direct access routes, staging area limits, and total area of construction activities will be limited to the minimum necessary to implement Project activities. Vehicles will be parked in disturbed or paved areas only.

- Prior to the start of work activities, all Project personnel will undergo training in the identification of listed and special-status species and sensitive habitats, and required avoidance measures to be implemented.

2.6 Project Implementation

The NOAA Restoration Center will implement the Project approximately 30 days after the lagoon is closed due to sandbar formation and is expected to be conducted two to three times per year, most likely in fall (but see description of the timing of breaching under *Sandbar Breaching* above). The actual date(s) for the manual breach(es) is dependent upon water quality levels in the lagoon, marsh inundation, and inflow and tidal regimes. Each breaching event will not take more than one day to complete. During this time, the State beach will remain open, although access to the work areas will be restricted to authorized personnel only.

2.7 Visitation to Pescadero State Beach

Each year, approximately 400,000 visitors use the three parking lots that serve the coastal portion of Pescadero State Beach. An estimated 20,000 school children visit the Preserve each year as students in organized environmental education classes. Park staff estimate two-thirds of visitors spend their time at the beach. Those who enter the marsh, for activities such as bird-watching and environmental education, tend to congregate along its western edge, which has maintained trails.

2.8 Consistency with Local Plans and Policies

The Project is consistent with local plans and policies. For more information, see Chapter 3, Section IX, *Land Use and Planning*.

2.9 DISCRETIONARY APPROVALS

The following permits and consultations also may be required before Project work can begin:

- Federal Endangered Species Act Section 7 Consultation between USFWS and NOAA Restoration Center and between NOAA Restoration Center and NOAA Fisheries.
- US Army Corps of Engineers Section 404 permit.
- San Francisco Bay Regional Water Quality Control Board Section 401 certification.
- California Department of Parks and Recreation Right of Entry permit.
- Coastal Development Permit or Federal Consistency Determination.

  The NOAA Restoration Center has determined that this Project is in accordance with the Federal Coastal Zone Management Act of 1972 as amended, Section 307c(1), and the goals of the Project are consistent with Section 303(1) and 309(a)1 of the Act which includes restoration of resources in the nation's coastal zone. NOAA has determined, therefore, that a consistency determination or Coastal Development Permit is not required.

2.10 RELATED PROJECTS

No related projects are currently anticipated or planned for Pescadero State Beach.

In August 2012, a Negative Declaration for the Pescadero State Beach Lagoon Ecological Function Project was approved. This project allowed up to three breaching events in 2012, however, only two breaches occurred.

CHAPTER 3
ENVIRONMENTAL CHECKLIST

PROJECT INFORMATION

1.	Project Title:	Pescadero Lagoon Interim Management Project
2.	Lead Agency Name & Address:	California Department of Fish and Wildlife
3.	Contact Person & Phone Number:	Scott Wilson, Regional Manager (707) 944-5500
4.	Project Location:	Pescadero State Beach, San Mateo County
5.	Project Sponsor Name & Address:	California Department of Fish and Wildlife Bay Delta Region 7329 Silverado Trail Napa, CA 94558
6.	General Plan Designation:	Public Recreation
7.	Zoning:	Planned Agricultural Development
8.	Description of Project:	Refer to Chapter 2, Section 2.5 of this document
9.	Surrounding Land Uses & Setting:	Refer to Chapter 3 of this document (Section IX, Land Use Planning)
10.	Approval Required from Other Public Agencies	Refer to Chapter 2, Section 2.9

1. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

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

☐ Aesthetics	☐ Agricultural Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology/Soils
☐ Hazards & Hazardous Materials	☐ Hydrology/Water Quality	☐ Land Use/Planning
☐ Mineral Resources	☐ Noise	☐ Population/Housing
☐ Public Services	☐ Recreation	☐ Transportation/Traffic
☐ Utilities/Service Systems	☐ Mandatory Findings of Significance	☒ None

DETERMINATION

On the basis of this initial evaluation:

I find that the proposed project **COULD NOT** have a significant effect on the environment and a **NEGATIVE DECLARATION** will be prepared. ☒

I find that, although the original scope of the proposed project **COULD** have had a significant effect on the environment, there **WILL NOT** be a significant effect because revisions/mitigations to the project have been made by or agreed to by the applicant. A **MITIGATED NEGATIVE DECLARATION** will be prepared. ☐

I find that the proposed project **MAY** have a significant effect on the environment and an **ENVIRONMENTAL IMPACT REPORT** or its functional equivalent will be prepared. ☐

I find that the proposed project **MAY** have a "potentially significant impact" or "potentially significant unless mitigated impact" on the environment. However, at least one impact has been adequately analyzed in an earlier document, pursuant to applicable legal standards, and has been addressed by mitigation measures based on the earlier analysis, as described in the report's attachments. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the impacts not sufficiently addressed in previous documents. ☐

I find that, although the proposed project could have had a significant effect on the environment, because all potentially significant effects have been adequately analyzed in an earlier EIR or Negative Declaration, pursuant to applicable standards, and have been avoided or mitigated, pursuant to an earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project, all impacts have been avoided or mitigated to a less-than-significant level and no further action is required. ☐

Dy Mitchell for

Scott Wilson
Regional Manager

August 12, 2014

Date

EVALUATION OF ENVIRONMENTAL IMPACTS

1. A brief explanation is required for all answers, except "No Impact", that are adequately supported by the information sources cited. A "No Impact" answer is adequately supported if the referenced information sources show that the impact does not apply to the project being evaluated (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on general or project-specific factors (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2. All answers must consider the whole of the project-related effects, both direct and indirect, including off-site, cumulative, construction, and operational impacts.

3. Once the lead agency has determined that a particular physical impact may occur, the checklist answers must indicate whether that impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate when there is sufficient evidence that a substantial or potentially substantial adverse change may occur in any of the physical conditions within the area affected by the project that cannot be mitigated below a level of significance. If there are one or more "Potentially Significant Impact" entries, an Environmental Impact Report (EIR) is required.

4. A "Mitigated Negative Declaration" (Negative Declaration: Less Than Significant with Mitigation Incorporated) applies where the incorporation of mitigation measures, prior to declaration of project approval, has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact with Mitigation." The lead agency must describe the mitigation measures and briefly explain how they reduce the effect to a less than significant level.

5. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR (including a General Plan) or Negative Declaration [CCR, Guidelines for the Implementation of CEQA, § 15063(c)(3)(D)]. References to an earlier analysis should:

   a) Identify the earlier analysis and state where it is available for review.

   b) Indicate which effects from the environmental checklist were adequately analyzed in the earlier document, pursuant to applicable legal standards, and whether these effects were adequately addressed by mitigation measures included in that analysis.

   c) Describe the mitigation measures in this document that were incorporated or refined from the earlier document and indicate to what extent they address site-specific conditions for this project.

6. Lead agencies are encouraged to incorporate references to information sources for potential impacts into the checklist or appendix (e.g., general plans, zoning ordinances, biological assessments). Reference to a previously prepared or outside document should include an indication of the page or pages where the statement is substantiated.

7. A source list should be appended to this document. Sources used or individuals contacted should be listed in the source list and cited in the discussion.

8. Explanation(s) of each issue should identify:
   a) the criteria or threshold, if any, used to evaluate the significance of the impact addressed by each question **and**
   b) the mitigation measures, if any, prescribed to reduce the impact below the level of significance.

ENVIRONMENTAL ISSUES

I. AESTHETICS

ENVIRONMENTAL SETTING

Pescadero State Beach is located on the central California coast, 17 miles south of Half Moon Bay, in San Mateo County. This State park unit contains sandy beaches and coastal dunes. The State beach also contains Pescadero Marsh Natural Preserve (Preserve), a coastal wetland complex that includes a lagoon at the confluence of Pescadero and Butano Creeks, fresh and brackish water marshes, and brackish water ponds. The proposed Project is located on a sandbar at the mouth of Pescadero Creek within the Preserve.

The California Legislature initiated the California Scenic Highway Program in 1963, with the goal of preserving and protecting the state's scenic highway corridors from changes that would reduce their aesthetic value. The State Scenic Highway System consists of eligible and officially designate routes. A highway may be identified as eligible for listing as a state scenic highway if it offers travelers scenic views of the natural landscape, largely undisrupted by development. Eligible routes advance to officially designated status when the local jurisdiction adopts ordinances to establish a scenic corridor protection program and receives approval from the California Department of Transportation. Highway 1 is Officially Designated or Eligible State Scenic Highways in at this location (California Department of Transportation 2009).

The Visual Resources Component of the 1998 Local Coastal Program (LCP) Policies for San Mateo County calls for the preservation of scenic resources and views. The applicable LCP policies include the following:

> 8.6 Streams, Wetlands, and Estuaries
>
> d. Retain wetlands intact except for public accessways designed to respect the visual and ecological fragility of the area and adjacent land.

The proposed Project is within a Scenic Corridor, as defined in Section 8.28 of the San Mateo County 1998 Local Coastal Program. The Project area will be visible from Highway 1 and as well as visible to visitors to this portion of Pescadero State Beach.

WOULD THE PROJECT:	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and	☐	☐	☐	☒

historic buildings within a state scenic highway?				
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

DISCUSSION

a) As stated in the Environmental Setting above, the Project is located within a Scenic Corridor as defined in the San Mateo County LCP. The breach will result in a lowering of the water level in Pescadero Lagoon from pre-breach conditions but will not significantly affect scenic resources at the site. Currently, the sandbar breaches annually, typically in the fall months, without interference so the proposed Project will not result in significant deviation from existing dynamic processes and the timing of those processes at the site. No impact.

b) The Project does not affect trees, rock outcroppings, buildings, or other fixed resources along Highway 1. No impact.

c) See discussion item a) above. The Project will not substantially degrade the existing visual character or quality of the site and its surroundings. No impact.

d) No light sources will be installed at the Project site. The brief project implementation period will take place during the day. No impact.

II. AGRICULTURAL RESOURCES

ENVIRONMENTAL SETTING

The Project area is not farmland. Some areas of Pescadero State Beach were formerly used for agricultural purposes; agricultural use was halted before the State purchased the land. Land adjoining the State beach to the southeast is privately owned and is still used for agricultural purposes. The State beach itself has a planning designation of "Recreation" and is zoned "Planned Agricultural District."

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT*:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use or	☐	☐	☐	☒

a Williamson Act contract?

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

* In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997), prepared by the California Department of Conservation as an optional model for use in assessing impacts on agricultural and farmland.

DISCUSSION

a-c) As noted in the Environmental Setting above, Pescadero State Beach is zoned "Recreation" and does not support any agricultural operations or farmland. The Project area contains no component that will interfere with the use of or result in the conversion of agricultural land to a non-agricultural use. Although some land adjoining the park is used for agricultural purposes, as defined by the United States Department of Agriculture land inventory and monitoring criteria, as modified for California, the Project will have no effect on any category of California Farmland, conflict with any existing zoning for agricultural use or Williamson Act contract, or result in the conversion of farmland to non-agricultural use. No impact.

III. AIR QUALITY

ENVIRONMENTAL SETTING

Pescadero State Beach is located in San Mateo County, within the southwestern portion of the San Francisco Bay Area Air Basin (SFBAAB), and falls under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD) and United States Environmental Protection Agency (US EPA) Region IX.

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

Both the State and Federal governments have established health-based Ambient Air Quality Standards (AAQS) for seven air pollutants: ozone (O_3), particulate matter (PM_{10}, or particulate matter less than 10 microns in diameter), fine particulate matter ($PM_{2.5}$, or particulate matter less than 2.5 microns in diameter), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and lead (Pb). These seven pollutants are known to have adverse effects on human health and the environment. In addition, the State has set standards for sulfates, hydrogen sulfide (H_2S), vinyl chloride (VC), and visibility-reducing particles (VRPs).

The Bay Area Air Quality Management District (BAAQMD) measures four air pollutants in San Mateo County at a test site in Redwood City. These are: ozone, carbon monoxide, nitrogen dioxide (O_3), and fine particulate matter ($PM_{2.5}$). The major pollutants of concern in the San Francisco Bay Area Air Basin include ozone (O_3), suspended particulate matter (PM_{10}), and carbon monoxide (CO).

SAN FRANCISCO BAY AREA AIR BASIN AIR QUALITY DESIGNATIONS

An area is designated in attainment if the State or Federal standard for the specified pollutant was not violated at any site during a 3-year period. An area is designated in nonattainment if there was at least one violation of a State or Federal standard for the specified pollutant within the area boundaries. An area is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.

Ozone (O_3)

Ozone results from a chemical reaction that takes place in the atmosphere between nitrogen dioxide (NO_2), and reactive organic gases under the photochemical influence of sunlight. While ozone (O_3) in the upper atmosphere is beneficial and helps reflect radiation away from the Earth's surface, it is an irritant to people's eyes and lungs when it exists in the lower atmosphere.

The SFBAAB continues to experience violations of both the State and Federal ozone standards and these violations pose challenges to State and local air pollution control agencies (ARB Almanac, 2009). California's standards for ozone are more stringent than Federal standards. The California 8-hour standard for ozone is 0.070 parts per million (ppm) compared to the federal 8-hour standard of 0.075 ppm. Emissions of ozone precursors have generally decreased in the SFBAAB for both mobile and stationary sources, despite a significant increase in vehicle miles traveled (VMT), but overall ozone concentrations have flattened out since 2000 (ARB Almanac 2009). San Mateo County experiences relatively few days on which ozone levels exceed state or federal standards (Community Assessment, 2008). According to the 2008 Bay Area Air Pollution Summary, the Redwood City test station did not record any days that exceeded either the State or Federal ozone standards. However, the County's cleaner air may be largely due to prevailing winds that carry pollution elsewhere (Community Assessment, 2008). As of 2012, the SFBAAB was in nonattainment with respect to state and federal standards for ozone.

Particulate Matter (PM_{10})

Particulate matter (PM_{10}) is a major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, or mists. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to enter the air sacs deep in the lungs where they may be deposited and result in adverse health effects. Smoke, composed of carbon and other products of incomplete combustion, is the most obvious form of particulate pollution. PM_{10} also causes visibility reduction. PM_{10} levels are reported as 24-hour average concentrations in $\mu g/m^3$ (weight of particles in micrograms per one cubic meter of air).

California's standards for particulate matter are more stringent than federal standards. The California standard for suspended particulate matter is 50 micrograms per cubic meter ($\mu g/m^3$) compared to the Federal standard of 150 $\mu g/m^3$). The annual mean concentration of PM10 in the SFBAAB has been declining since 1988, except for a spike in 2006 (ARB Almanac, 2009). San Mateo County has not exceeded the Federal standard for PM_{10} since 1991. As of 2012, the SFBAAB was in nonattainment with respect to State standards for PM_{10} and unclassified with respect to Federal standards.

Carbon Monoxide (CO)
State and federal carbon monoxide (CO) AAQS have not been exceeded in San Mateo County since 1991. Because there were no violations of the state or federal CO standard during a continuous three-year period, the BAAQMD granted attainment status in 1995 for CO. The current State CO Standards are 20 ppm for 1 hour and 9.0 ppm for 8 hours while the National CO Standards are 35 ppm for 1 hour and 9ppm for 8 hours.

Other Pollutants
The SFBAAB is in attainment with California standards for sulfates and unclassified for hydrogen sulfide (CARB Area Designations Maps, 2012). According to the California Air Resources Board (2012), all areas in the State are in attainment for nitrogen dioxide, sulfur dioxide, lead, and are either in attainment or unclassified under state standards for visibility reducing particles. All areas in the State are either in attainment or unclassified for federal standards for nitrogen dioxide and sulfur dioxide.

WOULD THE PROJECT*:	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
a) Conflict with or obstruct implementation of the applicable air quality plan or regulation?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☒
d) Expose sensitive receptors to substantial pollutant concentrations (e.g., children, the elderly, individuals with compromised respiratory or immune systems)?	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

* Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied on to make these determinations.

DISCUSSION

a) Work proposed as part of the Project, and any associated emissions, will not conflict with or obstruct the implementation of any applicable air quality management plan. No change to greenhouse gas emissions, and no contribution to global climate change will occur as a result of the Project. The Project will not be impacted by projected sea level rise. No impact.

b,c) The Project will not emit contaminants at levels that would violate any air quality standard, or contribute to a permanent or long-term increase in any air contaminant. The Project will be conducted using an excavator; however, it will only take a few hours to breach the lagoon and will happen generally once per year, but potentially up to three times per year for approximately three years. Less than Significant Impact.

d) The Project is not located near any known sensitive receptors, such as a school, hospital, or residential area. The nearest residences are over one mile away on Water Lane, adjacent to agricultural fields that are regularly tilled. No impact.

e) The Project will not result in the generation of odors. No impact.

IV. BIOLOGICAL RESOURCES

ENVIRONMENTAL SETTING

Pescadero State Beach contains sandy beaches and coastal dunes. The State beach also contains Pescadero Marsh Natural Preserve (Preserve), a coastal wetland complex that includes a lagoon at the confluence of Pescadero and Butano Creeks, fresh and brackish water marshes, and brackish water ponds. The Project area is located on a sandbar at the mouth of Pescadero Creek within the Preserve.

The highly diverse habitats of Pescadero State Beach support a diversity of fish, wildlife, and plant species. The beach includes designated critical habitat for the federally threatened and State Species of Special Concern, California red-legged frog, and is a target unit for the recovery of the federal and State endangered, and State fully protected, San Francisco garter snake *(Thamnophis sertalis tetrataenia*). Several other special-status species are found within the Project area and surrounding areas, and are discussed further in this chapter.

VEGETATION

The Project area is located on a sandbar that forms, breaches, and reforms on an annual basis at the mouth of Pescadero Lagoon. The sandbar itself is not vegetated. Sensitive natural habitats are located immediately adjacent to the Project area that could be indirectly affected by implementation of the Project, and include coastal beach and dunes, coastal salt marsh/brackish marsh and coastal freshwater wetland plant communities.

Coastal Beaches/ Dunes

Coastal beach and dune species occur on sandy substrate along the immediate coast. The active beach contains natural beach wrack and abundant driftwood. There are well developed dunes at Pescadero State Beach; Highway 1 cuts through the dunes and forms a barrier to dune migration. The back beach, dunes, and sandy margins of the lagoon contain common native species including coastal sagewort (*Artemisia pycnocephala*), salt grass (*Distichlis spicata*), beach-bur (*Ambrosia chamissonis*), yellow sand verbena (*Abronia latifolia*), beach morning-glory (*Calystegia soldanella*) and beach strawberry (*Fragaria chiloensis*). The dunes contain the native American dune grass (*Elymus mollis*) and non-native European beachgrass (*Ammophila arenaria*). Other common non-native species include sea rocket (*Cakile maritima*) and sea-fig (*Carpobrotus edulus* and *C. chilensis*).

Coastal Salt and Brackish marshes

Distribution of plant species within the coastal salt and brackish marshes is typically determined by elevation, salinity and inundation. Species found within Pescadero Marsh may shift between areas with changes in these factors. Closer to the ocean, the wetlands are influence by salt water, and contain more salt-tolerant species, such as salt marsh pickleweed (*Salicornia pacifica*), alkali heath (*Frankenia salina*), marsh jaumea (*Jaumea caranosa*), and saltgrass (*Distichlis spicata*). Salt marsh often grades into brackish marsh, with species such as gumplant (*Grindelia camporum*), marsh baccharis *(Baccharis glutinosa*)*,* southern bulrush (*Schoenoplectus californicus*) and Pacific silverweed (*Potentilla anserina* ssp. *pacifica*)*.*

Coastal Freshwater Wetland

Coastal freshwater wetland habitat exists along the creek corridors, in more inland portions of the marshes, and along some of the natural and constructed channels around the lagoon. Common native plants include cattail (*Typha angustifolia* and *T. latifolia*), southern bulrush (*Schoenoplectus californicus*), giant horsetail (*Equisetum telmateia* ssp. *braunii*), Pacific silverweed (*Potentilla anserina* ssp. *pacifica*), California blackberry (*Rubus ursinus*), large monkey flower (*Mimulus guttatus*), and spreading rush (*Juncus patens*).

SPECIAL-STATUS SPECIES

Sensitive biological resources that occur or potentially occur within, or near, the Project area are discussed in this section. Sensitive biological resources include the plants and animals that have been given special recognition by federal, State, or local resource agencies and organizations. Also considered are habitats that are listed as critical for the survival of a listed species or have special value for wildlife, and plant communities that are unique or of limited distribution. Specific information on the biological resources is provided along with potential impacts to those resources from the proposed breach of the sandbar at the mouth of Pescadero Lagoon.

The USFWS website (2014) provided an official list of sensitive species that may be present within the Project area or may be affected by the Project. Sensitive species includes threatened and endangered plant and wildlife species, and California Species of Special Concern (species that receive protection because of declining populations, limited ranges, or

continuing threats that make them vulnerable to extinction). All sensitive species and their habitats were evaluated for potential impacts by the Project. A query of CDFW's Natural Diversity Data Base (CNDDB 2014) was conducted for locations of sensitive species and habitats within the San Gregorio 7.5-minute U.S. Geological Survey (USGS) quadrangle map. Special-status plant species potentially occurring in the San Gregorio quadrangle map were derived from the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California (online version, 2010).

THREATENED AND ENDANGERED SPECIES AND SPECIES OF SPECIAL CONCERN

The CNDDB, CNPS, and USFWS have identified the following species as occurring, or potentially occurring, within the USGS quadrangle encompassing the proposed Project area and adjacent habitats: 8 special-status plant species; 10 wildlife species, 3 stream corridors, and 1 plant community appear on the species lists for the San Gregorio USGS quadrangle map.

Plant Species Potentially Occurring Within the Project Area

Coastal marsh milkvetch (*Astragalus pycnostachyus* var. *pycnostachyus*) – This species is designated by CNPS as rank 1B.2. The species is present at Pescadero State Beach and locations were surveyed and mapped in 2004 (DPR 2004). Known occurrences are located adjacent to the sand dunes, at the margins of wetlands and along trails and levees within the Preserve. The plant may occur within the vegetated areas located adjacent to the north parking lot where equipment will be staged during Project breaching activities.

Some of the plant locations could be affected by the drop in water level that would result from implementation of the Project. The Project could potentially increase tidal intrusion and result in impacts by changing the marsh and wetland ecosystem and ecological function. Brackish marsh and the coastal wetland habitats can become more saline and turn slowly into saltmarsh with vegetation composition changing to reflect plants that are suitable for a more saline environment. However, the proposed mechanical breach would occur usually during the time period a natural breach occurs. Since the Project will be implemented on an interim basis, occurring usually one time per year and potentially up to three times per year, the effects resulting from Project implementation are expected to be similar to what occurs on the site as a result of existing dynamics. Therefore, the impacts of the Project on the milkvetch will be less than significant.

Implementation of **Avoidance and Minimization Measure BIO-1** below and **BIO-9** will ensure that the coastal milkvetch is protected during Project activities and impacts remain less than significant.

Avoidance and Minimization Measure BIO-1: Surveys for Coastal marsh milkvetch individuals will be conducted within vehicle access routes and staging areas, and surrounding areas, prior to Project breaching activities. Any Coastal marsh milkvetch individuals will be mapped and protected by establishing a 50-foot buffer which will be avoided by equipment and

personnel during breaching events.

Round-leaved filaree (*California macrophyllum*) – This CNPS Rank 1B.1 species occurs in central western California below 3,500 feet in elevation. It is found on open sites in grassland and shrubland, and blooms from March to May. This species has not been documented at Pescadero State Beach and suitable habitat for the species will not be affected by Project implementation. No impact.

Fragrant fritillary (*Fritillaria liliacea*) – This CNPS Rank 1B.2 species occurs in central western California. It is found in cismontane woodlands, coastal prairies, coastal scrub, and valley and foothill grasslands. It requires heavy soils and moist areas, and blooms from February to April. It has not been documented at Pescadero State Beach and suitable habitat for the species will not be affected by Project implementation. No impact.

San Francisco gumplant (*Grindelia hirsutula* var. *maritima*) – This CNPS Rank 3.2 species occurs in coastal bluff scrub, coastal scrub, and valley and foothill grassland. This small gumplant blooms from June to September. It requires sandy or serpentine soil. This species has not been documented at Pescadero State Beach and suitable habitat for the species will not be affected by Project implementation. No impact.

Perennial goldfields (*Lasthenia californica ssp. macrantha*) – This CNPS Rank 1B.2 species occurs in coastal bluff scrub, coastal dunes, and coastal scrub. It blooms from January to November. Potentially suitable habitat for the species will not be affected by Project implementation. No impact.

Rose leptosiphon (*Leptosiphon rosaceus*) – This CNPS Rank 1B.1 species occurs in coastal bluff scrub and blooms from April to July. It is thought to be extirpated in the San Gregorio quadrangle. It has not been documented at Pescadero State Beach and suitable habitat for the species will not be affected by Project implementation. No impact.

Marsh microseris (*Microseris paludosa*) – This CNPS Rank 1B.2 species is found in closed-cone coniferous forest, cismontane woodlands, coastal scrub, and valley and foothill grasslands. It blooms from April to June. Found along the central coast, it is thought to be extirpated in the San Gregorio quadrangle. It has not been documented at Pescadero State Beach and suitable habitat for the species will not be affected by Project implementation. No impact.

Choris' popcorn-flower (*Plagiobothrys chorisianus var. chorisianus*) – This CNPS Rank 1B.2 species blooms from March to June and occurs in chaparral, coastal prairie, and coastal scrub. Potentially suitable habitat for the species will not be affected by Project implementation. No impact.

Animal Species Potentially Occurring Within The Project Area

Coho Salmon (*Onchorhynchus kisutch*). Coho salmon, as noted by Moyle (1976), Laufle et al. (1986), and Anderson (1995) are medium to large salmon, with spawning adults typically 40 to 70 cm (15.8 to 27.6 inches) fork length (FL) and weighing 3 to 6 kg (6.6 to 13.2 lbs). Coho salmon as large as 80 cm (31.5 inches) and 10 kg (22 lbs) have been caught in California. Adult coho salmon enter fresh water from September through January in order to spawn. In the short coastal streams of California, migration usually begins between mid-November and mid-January. Coho salmon move upstream after heavy rains have opened the sand bars that form at the mouths of many California coastal streams. Females usually choose spawning sites near the head of a riffle, just below a pool, where the water changes from a laminar to a turbulent flow and there is a medium to small gravel substrate. The female digs a redd (nest) by turning partly on her side and using powerful, rapid movements of the tail to dislodge the gravels, which are transported a short distance downstream by the current. Repeating this action creates an oval-to-round depression at least as deep and as long as the fish. Eggs and milt (sperm) are released into the redd, where, because of the hydrodynamics of the redd, they tend to remain until they are buried.

Approximately one hundred or more eggs are deposited in each redd. The fertilized eggs are buried by the female digging another redd just upstream. The flow characteristics of the redd location usually ensure good aeration of eggs and embryos, and the flushing of waste. In California, eggs incubate in the gravels from November through April. The incubation period is inversely related to water temperature. California coho salmon eggs hatch in about forty-eight days at 48°F, and thirty-eight days at 51.3°F. After hatching, the alevins (hatchlings) are translucent in color. This is the coho salmon's most vulnerable life stage, during which they are susceptible to siltation, freezing, gravel scouring and shifting, desiccation, and predation. Alevins remain in the interstices of the gravel for two to ten weeks until their yolk sacs have been absorbed, at which time their color changes to that more characteristic of fry. The fry are silver to golden with large, vertical, oval, dark parr marks along the lateral line that are narrower than the spaces between them.

Fry emerge from the gravel between March and July, with peak emergence occurring from March to May, depending on when the eggs were fertilized and the water temperature during development. They seek out shallow water, usually moving to the stream margins, where they form schools. As the fish feed heavily and grow, the schools generally break up and individual fish set up territories. At this stage, the fish are termed parr (juveniles). As the parr continue to grow and expand their territories, they move progressively into deeper water until July and August, when they inhabit the deepest pools. This is the period when water temperatures are highest, and growth slows. Food consumption and growth rate decrease during the winter months of highest flows and coldest temperatures (usually December to February). By March, parr again begin to feed heavily and grow rapidly.

Rearing areas used by juvenile coho salmon are low-gradient coastal streams, lakes, sloughs, side channels, estuaries, low-gradient tributaries to large rivers, beaver ponds, and large slackwaters. The most productive juvenile habitats are found in smaller streams with low-

gradient alluvial channels containing abundant pools formed by large woody debris. Adequate winter rearing habitat is important to successful completion of coho salmon life history.

After one year in fresh water, smolts begin migrating downstream to the ocean in late March or early April. In some years emigration can begin prior to March and can persist into July. Peak downstream migration in California generally occurs from April to early June. The amount of time coho salmon spend in estuarine environments is variable, and the time spent there is less in the southern portion of their range. Upon entry into the ocean, the immature salmon remain in inshore waters, congregating in schools as they move north along the continental shelf. Most remain in the ocean for two years; however, some return to spawn after the first year, and these are referred to as grilse or jacks. Data on ocean distribution of California coho salmon are sparse, but it is believed that the coho salmon scatter and join schools from Oregon and possibly Washington.

Status of Coho Salmon Within the Project Area

Coho salmon have not been confirmed within the Pescadero Marsh Natural Preserve. Coho salmon previously found in the Pescadero Creek watershed belong to the Central California Coast evolutionarily significant unit (ESU) (NMFS 2012), which is listed as endangered under both the Federal ESA and the California Endangered Species Act (CESA) (NMFS 2005). In a status review of the ESU based on all available biological information, Spence and Williams (2011) concluded that the Pescadero coho salmon population is currently at extreme risk of extirpation, and presently, the watershed is not believed to support a viable self-sustained population of coho salmon (Anderson 1995). However, coho salmon could potentially re-establish a population within the watershed.

Steelhead Trout (*Onchorhynchus mykiss*). Steelhead trout is an anadromous form of O. mykiss, spending some time in both freshwater and saltwater. Steelhead young usually rear in freshwater for one to three years before migrating to the ocean as smolts, but rearing periods of up to seven years have been reported. Migration to the ocean usually occurs in the spring. Steelhead may remain in the ocean for one to five years (one to three years is most common) before returning to their natal streams to spawn (Busby et al. 1996). The distribution of steelhead in the ocean is not well known. Coded wire tag recoveries indicate that most steelhead tend to migrate north and south along the continental shelf (Barnhart 1986).

Steelhead can be divided into two reproductive ecotypes, based upon their state of sexual maturity at the time of river entry and the duration of their spawning migration: stream maturing and ocean maturing. Stream maturing steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn, whereas ocean maturing steelhead enter fresh water with well-developed gonads and spawn shortly after river entry. These two reproductive ecotypes are more commonly referred to by their season of freshwater entry (*i.e.*, summer [stream maturing] and winter [ocean maturing] steelhead). The timing of upstream migration of winter steelhead is correlated with higher flow events, such as freshets or sandbar breaches. Adult summer steelhead migrate upstream from March through

September. In contrast to other species of *Oncorhynchus*, steelhead may spawn more than one season before dying (iteroparity); although one-time spawners represent the majority. Survival to emergence of steelhead embryos is inversely related to the proportion of fine sediment in the spawning gravels. However, steelhead are slightly more tolerant than other salmonids, with significant reductions in survival when fine materials of less than 0.25 inches in diameter comprise 20 to 25 percent of the substrate. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986).

Upon emerging from the gravel, fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Older fry establish territories which they defend. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris. Suspended sediment concentrations, or turbidity, can influence the distribution and growth of steelhead (Bell 1973, Sigler *et al*. 1984, Newcombe and Jensen 1996). Bell (1973) found suspended sediment loads of less than 25 milligrams per liter (mg/L) were typically suitable for rearing juvenile steelhead.

Water temperature can influence the metabolic rate, distribution, abundance, and swimming ability of rearing juvenile steelhead (Barnhart 1986, Bjornn and Reiser 1991, Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 10 and 20 degrees (°) Celsius (C) (Hokanson *et al.* 1977, Wurtsbaugh and Davis 1977, Myrick and Cech 2005). Fluctuating diurnal water temperatures are also important for the survival and growth of salmonids (Busby *et al.* 1996). Because rearing juvenile steelhead can reside in freshwater all year, adequate flow and temperature are important to the population at all times.

Outmigration of steelhead appears to be more closely associated with size than age. In Waddell Creek, Shapovalov and Taft (1954) found steelhead juveniles migrating downstream at all times of the year, with the largest numbers of young-of-year (YOY) and age 1+ steelhead moving downstream during spring and summer.

Population Status of Steelhead Trout

Historically, approximately 70 populations[2] of steelhead existed in the CCC steelhead DPS (Spence *et al.* 2008). Many of these populations (about 37) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts (Bjorkstedt *et al.* 2005). The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability

[2] Population as defined by Bjorkstedt *et al*. 2005 and McElhaney *et al*. 2000 as, in brief summary, a group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group. Such fish groups may include more than one stream. These authors use this definition as a starting point from which they define four types of populations (not all of which are mentioned here).

(McElhaney *et al*. 2000; Bjorkstedt *et al*. 2005).

While historical and present data on abundance are limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River – the largest population within the DPS (Busby *et al.* 1996). Near the end of the 20th Century, McEwan (2001) estimated the wild run population in the Russian River Watershed was between 1,700-7,000 fish. Abundance estimates for smaller coastal streams in the DPS indicate low but variable levels with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vicente, Soquel, and Aptos creeks) of individual run sizes of 500 fish or less (62 FR 43937). For more detailed information on trends in CCC steelhead abundance, see: Busby *et al*. 1996 and NMFS 1997.

Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt *et al.* 2005). Reduced population sizes and fragmentation of habitat in San Francisco streams has likely also led to loss of genetic diversity in these populations. CCC steelhead have experienced a serious decline in abundance and long-term population trends suggest a negative growth rate. This indicates the DPS may not be viable in the long term. DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead have maintained a wide distribution throughout the DPS, roughly approximating the known historical distribution, CCC steelhead likely possess a resilience that is likely to slow their decline relative to other salmonid DPSs or ESUs in worse condition. Data from the 2008/09 and 2009/2010 adult CCC steelhead returns indicate a decline in returning adults across their range compared to other recent returns (*e.g.,* 2006/2007, 2007/2008) (Jeffrey Jahn, NMFS, personal communication, August 2011). The most recent status update concludes that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Williams *et al.* 2011), as new and additional information available since the previous status review (Good *et al.* 2005) does not appear to suggest a change in extinction risk. On August 15, 2011, NMFS chose to maintain the threatened status of the CCC steelhead DPS (76 FR 50447).

Some juvenile steelhead migrate downstream at all times of the year, but the largest numbers migrate in the spring and summer, with a secondary migration in the late fall or early winter (Shapovalov and Taft 1954). Hayes *et al*. (2011) observed many summer recruits in Scott Creek lagoon retreating upstream into the watershed when estuarine water quality declined in the fall. During the most recent summers within the Pescadero Marsh Natural Preserve, the lagoon has closed early due to drought conditions while normal water-year conditions result in late summer/early fall sandbar formation. Pescadero lagoon is used heavily by steelhead for rearing despite its shallowness and warm summer water (Smith 1990).

Status of Steelhead Trout Within the Project Area

Recent population estimates of the Pescadero Creek steelhead run have ranged from a low of

109 fish in 2011-2012 (Jankovitz 2012) to a high of 1,407 (95% C.I. 0-2843) in 2012-2013 (Jankovitz 2013). Historically, Pescadero Creek was one of four "A-1" streams noted in San Mateo County in a 1912 CDFW letter [then named California Department of Fish and Game (DFG)] and appears to have supported the largest steelhead run in the county historically (DFG 1912, *in* Becker *et al*., 2010). In a 1967 report, the annual steelhead run of Pescadero Creek was estimated to consist of 1,500 spawning adults (DFG 1967, *in* Becker *et al*., 2010). The system undoubtedly supported many more steelhead (and coho salmon) before any major degradation of the stream drainage began. There were reports that in 1870 a commercial fishery existed where a wagon load of steelhead and coho weighing 1-14 kg each was taken daily from Pescadero Creek between October and March (Skinner 1962, *in* Titus *et al.,* 2010).

Status of Critical Habitat for Coho Salmon and Steelhead Trout

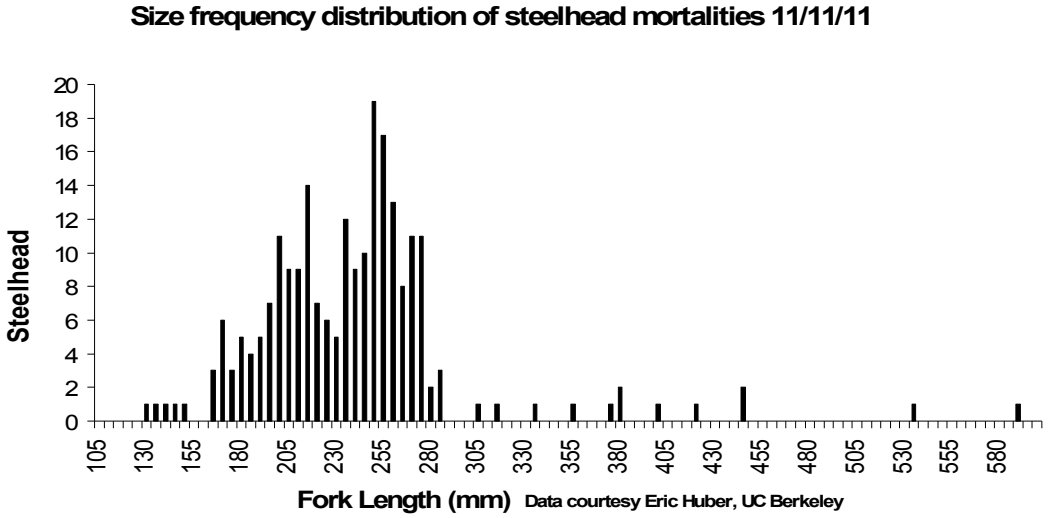
The condition of CCC coho salmon and CCC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable populations. NMFS has determined that currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agriculture, mining, urbanization, stream channelization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Impacts of concern include impairment or loss of Primary Constituent Elements (PCE) and essential features such as altered stream bank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation (lost migration PCEs), impaired gravel and wood recruitment from upstream sources, degraded water quality, lost riparian vegetation, and increased erosion into streams from upland areas (Weitkamp *et al*. 1995; Busby *et al*. 1996; 64 FR 24049; 70 FR 37160; 70 FR 52488). Furthermore, diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle degrading migration and rearing PCEs in many of the streams within the DPS and ESU. Altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish.

NMFS cites many reasons (primarily anthropogenic) for the decline of steelhead (Busby *et al*. 1996; Good *et al.* 2005). The foremost reason for the decline in these anadromous populations is the degradation and/or destruction of freshwater and estuarine habitat, including critical habitat, caused by (as described briefly above) anthropogenic disturbances such as urban development, agriculture, logging, water resource development, and dams. Additional factors contributing to the decline of salmonid populations include: poor estuary/lagoon management (Smith 1990, Bond 2006; Hayes *et al.* 2008; Hayes *et al.* 2011), commercial and recreational bycatch and harvest, artificial propagation (Waples 1991), natural stochastic events , marine mammal predation (Hanson 1993, NMFS 1999), reduced marine-derived nutrient transport (Bilby *et al.* 1996; Bilby *et al.* 1998; Gresh *et al.* 2000), and most recently poor ocean conditions (Lindley *et al.* 2009).

Effects of Fish Kills in Pescadero Lagoon

As described above, the first reported fish kill upon sandbar breaching occurred in 1995.

Since then, there have been 14 years (out of 19 years) in which a fish kill occurred, including 11 years in a row (2001-2011 [1995, 1997, 2001-2011, 2013[3]]). During the February 2014 fish kill event, the total number of dead steelhead observed was 271. In 2011, Huber (unpublished data 2012) collected the dead steelhead he could find (n = 235) and the data are presented in the table below.



Marine survival measured in the Scott Creek watershed (a 27-square-mile watershed approximately 18 miles south of Pescadero) and across the steelhead range appears to be influenced by size at ocean entry, and generally fish smaller than 150 mm are unlikely to survive (Ward *et al*. 1989, Bond 2006). The southern coastal estuaries that form lagoons provide the opportunity for fish to achieve the necessary size for marine survival, which heavily influences adult escapement and possibly defines adult production from the watershed (Hayes *et al*. 2011). Based on the data presented in the table above, all but four of the dead fish collected were larger than 150 mm, the typical ocean entry size (Hayes *et al*. 2011).

In addition, estuary-reared fish show a large survival advantage and comprise 85 percent of the returning adult population despite being between eight and 48 percent of the juvenile population. Although estuaries may comprise a very small portion of a watershed area, they can be critical nursery habitat, as estuary-reared juveniles make a disproportionate contribution to the spawning adult pool (Bond 2006). In Pescadero, Smith (1990) collected scale samples from 27 returning adults and scale analysis showed that at least 70 percent of those fish had reared in the lagoon.

Thus, based on the size of dead fish collected in 2011, fish that are likely to enter the ocean, are likely to survive in the ocean, and likely make a significant contribution to the spawning adult pool, died during the November 11, 2011 fish kill. The sizes of the dead steelhead collected in November 2011 compare favorably to the steelhead Smith (1990) collected in Pescadero lagoon in 1989 in that all of them (25) were larger than 150 mm.

[3] The sandbar breached in February 2014, but the lagoon was closed during fall/early winter.

Effects of the Proposed Project on Steelhead

The Project is proposed to reduce the likelihood of steelhead dying from a natural breach which occurred 11 years in a row and in 14 of the last 19 years. The Project is expected to improve water quality and habitat conditions for steelhead following the mechanical breach(es), therefore, the impacts of the Project on steelhead are less than significant. Implementation of **Avoidance and Minimization Measures BIO-2, BIO-3 and BIO-4** below will ensure Project impacts to steelhead remain less than significant.

Avoidance and Minimization Measure BIO-2: The Project is designed to be implemented to avoid impacts to steelhead, including breaching during tidal and instream flow conditions so velocity of flow is not too great to flush out fish to the ocean. The outflow velocity during the breach is expected to be less than swimming speed threshold of juvenile steelhead rearing in the lagoon.

Avoidance and Minimization Measure BIO-3: During Project breaching activities, the excavator/backhoe will be stationed outside of the lagoon. Only the bucket of the excavator/backhoe may operate in the lagoon. At no time shall the main body of the excavator/backhoe enter the lagoon.

Avoidance and Minimization Measure BIO-4: A CDFW and USFWS-approved biological monitor shall be on-site during all breaching activities to determine if the excavator is working sufficiently to mechanically breach at the rate to avoid swift velocities of water flowing to the ocean.

Effects to Lagoon Volume

The proposed Project may temporarily affect water quality and juvenile steelhead rearing habitat (see section on *Effects to Lagoon Water Quality* below). The Project is also expected to reduce the volume of water in the lagoon. The expectation is based on the breach occurring during an incoming high tide. The lagoon is expected to drain slowly because the difference in elevation of the lagoon water surface and the ocean (i.e., head pressure) will be minimized. A main factor causing scour appears to be the hydraulic head, which is a function of the difference in elevation between the rocky sill that controls the elevation of the lagoon, and the elevation of the surface of the lagoon itself (ESA 2008). Because head pressure will be minimized, the velocity and resultant scour in the marsh is expected to be reduced. Less scour and lower velocity of lagoon water during the proposed breach is not expected to result in a fish kill.

The proposed breach(es) will be scheduled to occur earlier than what has typically occurred in the past. For instance, the average number of days the lagoon is closed in the fall, before there is a breach, is approximately 69 days. The proposed breach(es) may occur approximately as early as 30 days after closure depending on conditions. Shorter closure time is expected to result in less lagoon volume when the sandbar is mechanically breached - the longer the lagoon is closed, the more volume of water in the lagoon. Under existing

conditions, scour and velocity of lagoon water during the fall breach is maximized, efficiently facilitating the re-suspension of sediment. Chemical oxygen demand (COD) of re-suspended sediment is the likely direct cause of the fish kill (Smith, K. 2009). The sandbar is expected to reform following the mechanical breach, but it is not possible to quantify how long the mouth will stay open. The expectation that the sandbar will reform is based on the breach occurring during incoming high tide and when stream flow in Pescadero and Butano Creeks is low. Although it is not known precisely when breaching activities will occur, they will most likely occur during the fall period, if the last 9 of 10 years of data are any indication. The mean monthly discharge at USGS gage on Pescadero for October and November is 5.2 and 12 cfs, respectively. Stream flow is expected to be lower in early November than later November, based on the increase in discharge from October to February.

Inlet closure typically results from the inability of the current in the inlet to erode and remove sediment being deposited in the inlet channel, a condition caused be weakening river flows, an inadequate tidal prism, an increase in frictional losses in the inlet channel, or by an increase in the rate of sediment deposit (Behrens *et al*. 2009). In the Russian River, sandbar closures normally occurred during periods of high waves and low tide ranges, with waves playing the dominant role (Behrens *et al*. 2009). In addition to waves and tides, streamflow itself has to be low enough such that it cannot scour the mouth of the creek at low tide (ESA 2008). At Pescadero, ESA (2008) estimated that a discharge of about 7 cfs at the USGS gage in Pescadero Creek (equivalent to 11 cfs at the mouth of the creek according to ESA [2008]) is sufficient flow to scour the mouth of the creek, even during a time of low tidal velocity.

As described above, it is likely the sandbar will be manually breached in the fall, when the mean monthly discharge is 5 cfs. This will likely facilitate the reformation of the sandbar. Although the sandbar might be breached when streamflow at the U.S. Geological Survey (USGS) gage on Pescadero Creek is greater than 7 cfs, conducting the manual breach during an incoming high tide and when waves are high are expected to facilitate sandbar closure.

Implementation of **Avoidance and Minimization Measure BIO-5** below will ensure Project impacts to lagoon volume remain less than significant:

Avoidance and Minimization Measure BIO-5: Depending on tides and water quality conditions, breaching during an incoming mean high-high tide that is followed by a mean low-low tide will be avoided. The breach will occur during a reduced tide range, further facilitating bar closure and minimizing impacts from reduced lagoon inundation on rearing habitat.

Effects to Lagoon Water Quality

The sandbar may be mechanically breached approximately 30 days post-closure or longer depending on water quality parameters. The mechanical breach may result in a reduction of freshwater in the lagoon. Artificial breaching at San Gregorio lagoon (approximately four miles north of Pescadero lagoon) caused the draining of the less-dense freshwater layer from the lagoon into the ocean (Atkinson 2010). The reduction of freshwater in the lagoon, and loss of volume, may reduce the quantity of rearing habitat, but not significantly affect the quality of

rearing habitat. Smith (1990), Atkinson (2010), and Huber (unpublished data 2012) all reported steelhead growing large when the mouth of the lagoon is open. The expressed purpose of the Project is to avoid conditions that deteriorate water quality within the marsh to benefit steelhead.

The Project is intended to prevent a fish kill. With this goal achieved and with implementation of **Avoidance and Minimization Measures BIO-2, BIO-3, BIO-4 and BIO-5,** the Project will have a less than significant impact on salmonid rearing habitat.

Tidewater goby (*Eucyclogobius newberryi*) – Tidewater goby is an endemic California fish species that is listed as federally endangered and designated as a California Species of Special Concern. Tidewater goby occurs in coastal lagoons, estuaries, backwater marshes and freshwater tributaries associated with brackish conditions (USFWS 2011). Habitats that occur with seasonal sandbar formations and lagoon impoundments are the most prolifically utilized by the goby. Tidewater goby is a small benthic fish (rarely >5cm) that are weak swimmers. Despite the name, tidewater gobies do not thrive in tidewater, rather they prefer calm to slow moving aquatic environments. Typically gobies only live for a year and can reproduce nearly year-round if conditions allow; however peaks in breeding behavior occur during spring and summer (Swenson 1999). The goby utilizes vertical nest burrows constructed by the males in sandy substrate to attract females and harbor incubating eggs. The goby exhibits rapid reproduction with females producing 6-12 clutches of 300- 500 eggs per year (Swift et al. 1989, Swenson 1999). The eggs are guarded by the male for 9 to 11 days during incubation until they hatch (USFWS 2005). Upon hatching, larvae are planktonic and enter the water column near submerged vegetation for 1-3 days before becoming benthic (USFWS 2005). Tidewater goby provides forage for piscivorous fish and bird species, and are considered an important portion of the estuarine food web dynamics (Swenson and McCary 1996).

There is one PCE identified for critical habitat designated for tidewater goby. PCE 1 consists of persistent, shallow (in the range of about 0.3 to 6.6 feet), still-to-slow-moving, lagoons, estuaries, and coastal streams ranging in salinity from 0.5 parts per thousand (ppt) to about 12 ppt, which provides adequate space for normal behavior and individual and population growth that contain: (a) substrates suitable for the construction of burrows for reproduction (e.g., sand, silt, mud); (b) submerged and emergent aquatic vegetation, 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.

The tidewater goby is known to be widely distributed throughout the Preserve. The goby was identified in August 2012 via seine netting in the North Pond, Butano Creek, Butano Channel, and near the Butano-Pescadero confluence. The goby is presumably utilizing similar areas of the lagoon as in 2012 due to the similar dry water year, early closure phase, and lack of habitat altering hydrology. Due to the extended closure period of the Pescadero lagoon during 2013-2014, and the brief opening periods, it is presumed the goby population is currently at a relatively high abundance with a large dispersal. Velocity refuge habitat in the form of

backwaters, isolated ponded areas, submerged vegetation and debris is ample within the Preserve. The refuge habitat acts to sustain the population in the system during scouring, tidal, and high flow events.

The artificial breaching of the sandbar affects the mouth and estuary of Pescadero Creek which lies within the proposed Critical Habitat Unit SM-3 Pescadero-Butano Creek for the tidewater goby (USFWS 2011). The sandbar across the mouth of the Pescadero lagoon closes or partially closes the lagoon and thereby provides relatively stable conditions (PCE 1c). PCEs 1a and 1b occur throughout this unit, although their precise location during any particular time period may change in response to seasonal fluctuations in precipitation and tidal inundation.

Effects of the Proposed Project on Tidewater Goby

The Project may result in impacts to tidewater goby from being flushed out to the ocean during breaching actions. Protective measures including, but not limited to, personnel training, implementation monitoring, partial draining of the lagoon, and minimizing the total area disturbed by breaching activities, will avoid or minimize potential impacts to the goby. Gradually breaching the sandbar artificially will further reduce the likelihood of sweeping gobies out to sea. Water quality monitoring will involve access to the lagoon at fixed points accessed by trails thereby minimizing the potential for take. Any loss of gobies from breaching during this time period will not likely be greater than losses that will occur from natural winter storm breaches. Because the goby occurs in a system that breaches and flushes naturally, it is not expected this population will be extirpated by mechanically breaching the lagoon. Furthermore, since the goby exhibits an extended breeding season, high fecundity, rapid reproduction cycle, and a relatively short larval stage the species recruitment potential is high. The goal of artificial breaching, to prevent poor water quality conditions that lead to a fish kill, will likely benefit tidewater goby as well. According to Chamberlain (2006), the most susceptible life stages to changes in habitat conditions due to a breaching event are planktonic larval and eggs.

The artificial breaching event is within designated critical habitat for tidewater goby (Unit SM-3). Breaching will not result in the permanent loss of aquatic habitat for the goby. However, implementation of artificial breaching may result in temporary loss of access to aquatic habitat through subsequent drawdown of water throughout the lagoon. The proposed Project mimics natural breach events and is not designed to drain all aquatic habitat. Additionally, the goal of preventing poor water quality conditions from developing to such a level that steelhead and other fish species are killed is likely to benefit tidewater goby. The cumulative effects of multiple breaches are not expected to diminish the quality of critical habitat. During the 2012 artificial breach, the USFWS expected that the PCE Unit SM-3 would remain intact, contributing to the high conservation value of the unit as a whole, and sustaining the unit's role in the conservation and recovery of the species. This expectation was met.

Avoidance and Minimization Measure BIO-6: A qualified biologist will seine the lagoon west of the Highway 1 Bridge for tidewater goby prior to the breach. Any tidewater gobies collected

will be relocated upstream before the breach to allow gobies to find refuge in slow moving water.

The Project is expected to prevent a fish kill. With this goal achieved and with implementation of **Avoidance and Minimization Measures BIO-2, BIO-3, BIO-4, BIO-5 and BIO-6,** the Project will have a less than significant impact on tidewater goby.

California red-legged frog (*Rana draytonii*) – The California red-legged frog is a Species of Special Concern and listed as a threatened species under the ESA on May 23, 1996 (61 FR 25813) (Service 1996). Critical habitat was designated for this species on April 13, 2006 (71 FR 19244) (Service 2006a) and revisions to the critical habitat designation were published on March 17, 2010 (75 FR 12816) (Service 2010). A recovery plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The historic range of the CRLF extended from the vicinity of Elk Creek in Mendocino County, California, along the coast inland to the vicinity of Redding in Shasta County, California, and southward to northwestern Baja California, Mexico (Fellers 2005; Jennings and Hayes 1985; Hayes and Krempels 1986). The species was historically documented in 46 counties but the taxa now remains in 238 streams or drainages within 23 counties, representing a loss of 70 percent of its former range (Service 2002). The California red-legged frog is still locally abundant within portions of the San Francisco Bay area and the Central California Coast. Isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse Ranges. The species is believed to be extirpated from the southern Transverse and Peninsular ranges, but is still present in Baja California, Mexico (CDFG 2012).

California red-legged frogs predominately inhabit permanent water sources such as streams, lakes, marshes, natural and man-made ponds, and ephemeral drainages in valley bottoms and foothills up to 4,921 feet in elevation (Jennings and Hayes 1994, Bulger *et al.* 2003, Stebbins 2003). However, they also inhabit ephemeral creeks, drainages and ponds with minimal riparian and emergent vegetation. The species breeds from November to April, although earlier breeding records have been reported in southern localities. Breeding generally occurs in still or slow-moving water often associated with emergent vegetation, such as cattails, tules, or overhanging willows (Storer 1925, Hayes and Jennings 1988). Female frogs deposit egg masses on emergent vegetation so that the egg mass floats on or near the surface of the water (Hayes and Miyamoto 1984).

Habitat includes nearly any area within 1-2 miles of a breeding site that stays moist and cool through the summer including vegetated areas with coyote brush, California blackberry thickets, and root masses associated with willow and California bay trees (Fellers 2005). Sheltering habitat for California red-legged frog potentially includes all aquatic, riparian, and upland areas within the range of the species and includes any landscape feature that provides cover, such as animal burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris. Agricultural features such as drains, watering troughs, spring

boxes, abandoned sheds, or hay stacks may also be used. Incised stream channels with portions narrower and depths greater than 18 inches also may provide important summer sheltering habitat. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting frog population numbers and survival.

The California red-legged frog does not have a distinct breeding migration (Fellers 2005). Adults are often associated with permanent bodies of water. Some individuals remain at breeding sites year-round, while others disperse to neighboring water features. Dispersal distances are typically less than 0.5 mile, with a few individuals moving up to 1-2 miles (Fellers 2005). Movements are typically along riparian corridors, but some individuals, especially on rainy nights, move directly from one site to another through normally inhospitable habitats, such as heavily grazed pastures or oak-grassland savannas (Fellers 2005).

In a study of California red-legged frog terrestrial activity in a mesic area of the Santa Cruz Mountains, Bulger *et al.* (2003) categorized terrestrial use as migratory and non-migratory. The latter occurred from one to several days and was associated with precipitation events. Migratory movements were characterized as the movement between aquatic sites and were most often associated with breeding activities. Bulger *et al.* (2003) reported that non-migrating frogs typically stayed within 200 feet of aquatic habitat 90 percent of the time and were most often associated with dense vegetative cover, i.e., California blackberry, poison oak and coyote brush. Dispersing frogs in northern Santa Cruz County traveled distances from 0.25 mile to more than 2 miles without apparent regard to topography, vegetation type, or riparian corridors (Bulger *et al.* 2003).

In a study of California red-legged frog terrestrial activity in a xeric environment in eastern Contra Costa County, Tatarian (2008) noted that a 57 percent majority of frogs fitted with radio transmitters in the Round Valley study area stayed at their breeding pools, whereas 43 percent moved into adjacent upland habitat or to other aquatic sites. Her study reported a peak seasonal terrestrial movement occurring in the fall months associated with the first 0.2 inch of precipitation and tapering off into spring. Upland movement activities ranged from 3 to 233 feet, averaging 80 feet, and were associated with a variety of refugia including grass thatch, crevices, cow hoof prints, ground squirrel burrows at the base of trees or rocks, logs, and under man-made structures; others were associated with upland sites lacking refugia (Tatarian 2008). The majority of terrestrial movements lasted from 1 to 4 days; however, one adult female was reported to remain in upland habitat for 50 days (Tatarian 2008). Upland refugia closer to aquatic sites were used more often and were more commonly associated with areas exhibiting higher object cover, e.g., woody debris, rocks, and vegetative cover. Subterranean cover was not significantly different between occupied upland habitat and unoccupied upland habitat.

California red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and Miyamoto 1984). Egg masses containing 2,000 to 5,000 eggs are attached to vegetation below the surface and hatch after 6 to 14 days (Storer 1925, Jennings and Hayes 1994). In coastal lagoons, the most significant

mortality factor in the pre-hatching stage is water salinity (Jennings *et al.* 1992). Eggs exposed to salinity levels greater than 4.5 parts per thousand resulted in 100 percent mortality (Jennings and Hayes 1990). Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3½ to 7 months following hatching and reach sexual maturity 2 to 3 years of age (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1985, 1990, 1994). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings *et al.* 1992). California red-legged frogs may live 8 to 10 years (Jennings *et al.* 1992). Populations can fluctuate from year to year; favorable conditions allow the species to have extremely high rates of reproduction and thus produce large numbers of dispersing young and a concomitant increase in the number of occupied sites. In contrast, the animal may temporarily disappear from an area when conditions are stressful (e.g., during periods of drought, disease, etc.).

The diet of the California red-legged frog is highly variable and changes with the life history stage. The diet of the larvae is not well studied, but is likely similar to that of other ranid frogs which feed on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005; Kupferberg 1996a, 1996b, 1997). Hayes and Tennant (1985) analyzed the diets of California red-legged frogs from Cañada de la Gaviota in Santa Barbara County during the winter of 1981 and found invertebrates (comprising 42 taxa) to be the most common prey item consumed; however, they speculated that this was opportunistic and varied based on prey availability. They ascertained that larger frogs consumed larger prey and were recorded to have preyed on Pacific chorus frogs, three-spined stickleback, and, to a limited extent, California mice, which were abundant at the study site (Hayes and Tennant 1985, Fellers 2005). Although larger vertebrate prey was consumed less frequently, it represented over half of the prey mass eaten by larger frogs suggesting that such prey may play an energetically important role in their diets (Hayes and Tennant 1985). Juvenile and subadult/adult frogs varied in their feeding activity periods; juveniles fed for longer periods throughout the day and night, while subadult/adults fed nocturnally (Hayes and Tennant 1985). Juveniles were significantly less successful at capturing prey and all life history stages exhibited poor prey discrimination, feeding on several inanimate objects that moved through their field of view (Hayes and Tennant 1985).

Habitat loss, non-native species introduction, and urban encroachment are the primary factors that have adversely affected the California red-legged frog throughout its range. Several researchers in central California have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquito fish (Moyle 1976; Barry 1992; Hunt 1993; Fisher and Schaffer 1996). This has been attributed to predation, competition, and reproduction interference. Twedt (1993) documented bullfrog predation of juvenile northern red-legged frogs, and suggested that bullfrogs could prey on subadult frogs as well. Bullfrogs may also have a competitive advantage over California red-legged frogs. For instance, bullfrogs are larger and possess more generalized food habits (Bury and Whelan 1984). In addition, bullfrogs have an extended breeding season (Storer 1933) during which an individual

female can produce as many as 20,000 eggs (Emlen 1977). Furthermore, bullfrog larvae are unpalatable to predatory fish (Kruse and Francis 1977). Bullfrogs also interfere with California red-legged frog reproduction by eating adult male frogs. Both California and northern red-legged frogs have been observed in amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990; Twedt 1993; Jennings 1993). Thus bullfrogs are able to prey upon and out-compete California red-legged frogs, especially in sub-optimal habitat.

The urbanization of land within and adjacent to California red-legged frog habitat has also affected the threatened amphibian. These declines are attributed to channelization of riparian areas, enclosure of the channels by urban development that blocks dispersal, and the introduction of predatory fishes and bullfrogs. Diseases may also pose a significant threat, although the specific effects of disease on the California red-legged frog are not known. Pathogens are suspected of causing global amphibian declines (Davidson *et al.* 2003). Chytridiomycosis and ranaviruses are a potential threat because these diseases have been found to adversely affect other amphibians, including the listed species (Davidson *et al.* 2003; Lips *et al.* 2006). Mao *et al.* (1999 cited in Fellers 2005) reported northern red-legged frogs infected with an iridovirus, which was also presented in sympatric threespine sticklebacks in northwestern California. Non-native species, such as bullfrogs and non-native tiger salamanders that live within the range of the California red-legged frog have been identified as potential carriers of these diseases (Garner *et al.* 2006). Humans can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (i.e., contaminated boots, waders or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in the listed species being more susceptible to the effects of disease.

California Red-legged Frog Critical Habitat

The USFWS designated critical habitat for the California red-legged frog on April 13, 2006 (71 FR 19244) (Service 2006a) and a revised designation to the critical habitat was published on March 17, 2010 (75 FR 12816) (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al*. 2010). Critical habitat is defined in Section 3 of the Act as: (1) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. In determining which areas to designate as critical habitat, the Service considers those physical and biological features that are essential to a species' conservation and that may require special management considerations or protection (50 CFR 424.12(b)). The USFWS is required to list the known PCEs together with the critical habitat description. Such physical and biological features include, but are not limited to, the following:

1. Space for individual and population growth, and for normal behavior;
2. Food, water, air, light, minerals, or other nutritional or physiological requirements;

3. Cover or shelter;
4. Sites for breeding, reproduction, rearing of offspring, or dispersal; and
5. Generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

The PCEs defined for the California red-legged frog were derived from its biological needs. The area designated as revised critical habitat provides aquatic habitat for breeding and non-breeding activities and upland habitat for shelter, foraging, predator avoidance, and dispersal across its range. The PCE's and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of California red-legged frog ecology. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PCEs essential to the conservation of the California red-legged frog are:

1. *Aquatic Breeding Habitat.* Standing bodies of fresh water (with salinities less than 7.0 parts per thousand), including: natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

2. *Non-Breeding Aquatic Habitat*. Freshwater and wetted riparian habitats, as described above, that may not hold water long enough for the subspecies to hatch and complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult frogs. Other wetland habitats that would be considered to meet these elements include, but are not limited to: plunge pools within intermittent creeks; seeps; quiet water refugia during high water flows; and springs of sufficient flow to withstand the summer dry period.

3. *Upland Habitat.* Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of 1 mile in most cases and comprised of various vegetation series such as grasslands, woodlands, wetland, or riparian plant species that provide the frog shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the wetland or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources, and provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat should include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), as well as small mammal burrows and moist leaf litter.

4. *Dispersal Habitat.* Accessible upland or riparian dispersal habitat within designated units and between occupied locations within a minimum of 1 mile of each other that allow for

movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers (e.g., heavily traveled road without bridges or culverts) to dispersal. Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large reservoirs over 50 acres in size, or other areas that do not contain those features identified in PCEs 1, 2, or 3 as essential to the conservation of the subspecies. With the revised designation of critical habitat, the Service intends to conserve the geographic areas containing the physical and biological features that are essential to the conservation of the species, through the identification of the appropriate quantity and spatial arrangement of the PCEs sufficient to support the life-history functions of the species. Because not all life-history functions require all the PCEs, not all areas designated as critical habitat will contain all the PCEs. Please refer to the final designation of critical habitat for CRLF for additional information (75 FR 12816).

Status of California Red-legged Frog Within the Project Area

Comprehensive surveys for this species were conducted in the 1990's (Jennings and Hayes, 1990 and; Smith and Reis 1997). Jennings and Hayes described the Preserve as having "probably the largest, if not the largest, extant population of California red-legged frogs in the State." At the time of the species' listing, the Preserve was one of only three locations thought to support over 350 adults (Federal Register, 1996). Smith and Reis (1997) conducted California red-legged frog and other species' surveys and stated there was extensive habitat for California red-legged frog in the North Marsh and Butano Marsh.

Effects of the Proposed Project on the California Red-legged Frog

If present, California red-legged frog individuals could be injured or killed by large equipment and Project personnel foot traffic. The potential for injury and mortality will likely be from crushing by personnel associated with Project-associated monitoring. Trash left during or after Project activities could attract predators to work sites, which could subsequently harass or prey on the frog. For example raccoons, crows, and ravens are attracted to trash and also prey opportunistically on amphibians. Various conservation measures including, but not limited to, a Project personnel training program, Project-associated monitoring, and minimizing the total area disturbed by Project activities, will reduce the likelihood of mortality, injury, or harassment. Additionally, the main Project component, breaching the sandbar, will involve foot access to the sandbar, staging on paved surfaces and the excavator driving on the road and on the beach where frogs are not found. Fish sampling efforts will be focused in the lagoon main embayment where water salinity and the presence of steelhead trout make the occurrence of California red-legged frog less likely. Water quality monitoring will involve access to the lagoon at fixed points accessed by trails thereby minimizing impacts.

There is a possibility that personnel working on the site, particularly the on-site biologist, could introduce amphibian diseases to habitat used by the California red-legged frog. The chance of a disease, including the chytrid fungus, being introduced into a new area is greater today than in the past due to the increasing occurrences of disease throughout amphibian populations in

California and elsewhere in the United States. It is possible that chytrid fungus may exacerbate the effects of other diseases on amphibians or increase the sensitivity of the amphibian to environmental changes (*e.g.*, water pH) that reduce normal immune response capabilities (Bosch *et al.* 2000). Implementation of measures contained in the *Declining Amphibian Populations Task Force Fieldwork Code of Practice* during any handling or aquatic activity will likely prevent transfer of diseases through contaminated equipment or clothing.

Mechanically breaching the lagoon several times throughout the year has the potential to temporary impact California red-legged frog habitat for eggs and rearing. Breaching the lagoon multiple times within one year could potentially reduce the likelihood of converting the lagoon to freshwater and parts of the marsh may be more brackish to saline. It will reduce the inundation time of freshwater in the marsh which temporarily reduces backwater habitat used by California red-legged frog for breeding, rearing and foraging. The Project could potentially temporarily degrade habitat used by California red-legged frog by increasing the tidal influence which increases the salinities in the marsh to greater than optimal for California red-legged frog eggs and larvae. Smith and Reiss (1997) found that after sandbar formation, the lagoon, both Butano Marsh and Delta Marsh were fresh and salinities increased when the sandbar was open. They also recommended that keeping the marsh fresher and wetter longer in the summer would increase California red-legged frog larval survival. However, the goal of artificial breaching, i.e. to prevent poor water quality conditions that lead to a fish kill, will also likely benefit frogs due to the fact that the lagoon will be breached near or close to the time of natural breaches (for timing of breaching, refer to section on *Sandbar Breaching*) and will not result in the complete draining of aquatic non-breeding and breeding habitats. The impacts of the Project on California red-legged frog are less than significant.

Avoidance and Minimization Measure BIO-7: A qualified biologist will conduct pre-Project surveys for the California red-legged frog and other special-status species within the Project area, along equipment access routes and within staging areas within 24 hours prior to the planned start of breaching activities.

Avoidance and Minimization Measure BIO-8: If breaching will occur during the California red-legged frog breeding season (November 1 to May 30), a qualified biologist will conduct focused survey in areas containing emergent vegetation for egg masses prior to breaching. If egg masses are found, the biologist will move egg masses to a location that will not be impacted by Project activities. Project personnel will avoid entering frog breeding habitat to avoid dislodging the egg masses.

Avoidance and Minimization Measure BIO-9: During breaching activities, the excavator will not be driven or used in any sensitive wetland features except at the lagoon mouth. These features include swales, seasonal pools, emergent vegetation, and riparian areas. Any wetland features within 50 feet of the Project area will be clearly flagged by the approved biologist to prevent work crews from entering and disturbing the areas.

Avoidance and Minimization Measure BIO-10: If California red-legged frogs are

documented within the Project area, including equipment access routes, a biological monitor will walk in front of the equipment as it drives along the path to ensure frogs are not in harm's way.

Avoidance and Minimization Measure BIO-11: If any California red-legged frog enter the equipment access or travel routes, all work will stop until the animal leaves on its own. Only a biologist permitted by the USFWS and approved by CDFW for this Project to handle California red-legged frogs is authorized to handle and relocate individuals.

Avoidance and Minimization Measure BIO-12: In order to prevent the movement of invasive plant and animal species, fungi, and other biotic agents from external ecological regions, all ground-disturbing equipment and Project personnel clothing will be washed prior to entry and staging onto construction sites and the "Declining Amphibian Populations Task Force Fieldwork Code of Practice" procedures shall be followed.

Any equipment that will enter the water during construction will be decontaminated before and after construction to prevent the spread of aquatic diseases, such as ranavirus, and invasive aquatic species, such as quagga mussel. Workers will also decontaminate waders, boots and other clothing that will come in direct contact with the water. Decontamination of clothing and equipment will be done, before entering the boundaries of Pescadero State Beach and the Preserve, through one or more of the following methods:

- Drying equipment in an upland location following last aquatic use. If average daytime temperatures exceed 80^{o} F, drying times shall be at least 7 days. If average daytime temperatures are below 80^{o} F, drying times shall be at least 30 days;
- Scalding water wash (at least 140^{o} F) with varying high and low pressure spray to dislodge pathogens, vegetation, and contaminated sediment;
- Freezing at a temperature of less than 32^{o} F for more than 72 hours; and/or
- Soaking in a hospital-grade disinfectant solution for at least two minutes (or longer, based on product directions). To avoid harm to non-target species, disinfected clothing and equipment shall be thoroughly rinsed in a water bath before entering onto State Park property.

Repeat decontamination is required only if the equipment/clothing is removed from the site, used within a different waterbody, and returned to the project site. Decontamination will take place in an upland location outside of State Park boundaries, and any chemicals used during decontamination will be prevented from entering water bodies or stormwater drains.

Avoidance and Minimization Measure BIO-13: A qualified biologist will conduct an education session on special-status species that may be present within the Project area. The training will consist of basic identification of the species, their basic habits, how they may be

encountered in the work area, and procedures to follow when they are encountered. Any personnel joining the work crew later will receive the same training before beginning work.

San Francisco garter snake (*Thamnophis sertalis tetrataenia*) – The San Francisco garter snake is a federal and State endangered species, and is fully protected under Section 5050 of the Fish and Game Code. It is found largely in San Mateo County. The historic range of the snake extended from just north of the San Francisco-San Mateo County line near Merced Lake south along the base of the Santa Cruz Mountains to Waddell Creek (USFWS 1985). Within this area, San Francisco garter snake populations may have principally occupied the Buri Buri Ridge along the San Andres Rift and south in an arc from the San Gregorio-Pescadero highlands west to Tunitas Creek. From here, San Francisco garter snake populations extended along the west coastline of the Peninsula to Ano Nuevo State Reserve, which is the southernmost location of the species' historic range. An intergrade zone comprised of San Francisco garter snake-red sided garter snake hybrids stretched from Palo Alto north to the Pulgas region near Upper Crystal Springs Reservoir (Barry 1994).

A population at San Bruno Mountain may have once represented the extreme northeastern portion of San Francisco garter snake's range, though it may now be extirpated (Barry 1994). However, the San Bruno Mountain population may have been the result of the translocation of individuals from other locations to San Bruno Mountain by amateur herpetologists in order to protect them from development occurring elsewhere on the Peninsula (Barry 1994). Barry (1994) suggested similar methods were employed farther south as well, resulting in the current populations at Half Moon Bay. He did not discuss when, and for how long, these activities were performed. Regardless of its origin, the San Francisco garter snake is extant in Half Moon Bay (McGinnis 1988). Additionally, the historic range of the species may have extended as far south as Stanford in northern Santa Clara County, based on hybrids between San Francisco garter snake and other garter snake species collected from this location (Barry 1975).

In addition to these historic records, the USFWS believes that additional coastal property on the west side of the Santa Cruz Mountains may be inhabited by the San Francisco garter snake. However, because much of this property is privately owned, surveys are not available. Recent surveys reveal that there has likely been very little decrease in the overall historic range of the San Francisco garter snake; however, the snake has been extirpated from individual locales within that range (CNDDB 2006). Through trapping and monitoring, the USFWS has been working with its partners to develop improved estimates of the current population trend. However, this process is ongoing and has not yet been completed due to limited funding and the time needed to conduct population studies.

When the San Francisco Garter Snake Recovery Plan (USFWS 1985) was published, little was known regarding the extent to which snakes utilized upland habitat. It is now known that essential habitat for a breeding San Francisco garter snake population includes open grassy uplands and shallow marshlands with adequate emergent vegetation, and the presence of both Pacific tree frog (*Pseudacris regilla*) and California red-legged frog breeding populations (McGinnis 1987). Uplands may be essential to the snake's survival (S. Barry in litt. 2006b).

Flora composition in the upland habitat sites includes, but is not limited to, coyote bush (*Bachari pillularis*), wild oat (*Avena fatua*), wild barley (*Hordeum* spp.), and various brome species (*Bromus* spp.) (Larsen 1994). Barry (1994) observed that snakes may prefer a grassland/shrub matrix with brush densities ranging from one average-sized bush/30 square meters to 1 large bush/ 20 square meters. By maintaining these ratios, there is sufficient cover from predators, while allowing for exposed surfaces to facilitate thermoregulation (Barry 1994).

The San Francisco garter snake also may depend on ground burrowing rodents for survival. Larsen (1994) found that rodent burrows in upland areas provide hibernacula for snakes during the winter months. These burrows also may provide cover for the snake throughout the rest of the year (H. McQuillen, pers. comm.). Additionally, there is some evidence that gophers are important in maintaining the dynamic open grasslands required by the snake. In a recent study conducted in Monterey County, gopher burrowing activities that moved nitrogen poor subsoils to the surface were shown to stimulate early successional conditions within a grassland system and may be able to substitute in this role for larger grazing species (Stromberg and Griffin 1996). The presence of burrowing mammals can therefore be beneficial for the San Francisco garter snake.

In addition to upland areas, the San Francisco garter snake requires fresh water marsh habitat with a diversity of habitat components. Generally, individuals have been observed in habitat that contains a variety of emergent vegetation such as cattails (*Typha* spp.), spike rush (*Eleocharis* spp.), and water plantain (*Alisma* spp.) (Larsen 1994). Barry (1994) has observed that, in areas where marsh vegetation does not exist, the snake inhabits aquatic habitats surrounded by willows (*Salix* spp.) and various members of *Rubus* spp., indicating that these species may act as substitutes for traditional wetland plants. However, these substitute species' ability to function in this capacity is contingent on there being minimal clearance between the overhanging vegetation and the ground (Barry 1994).

An open water component to the wetland also is important to the San Francisco garter snake. This may be due to the anuran prey base that requires sufficient quantities of open water be present throughout the spring and summer in order prevent the desiccation of egg masses or loss of tadpoles. Premature water reductions may result from uptake and storage by cattails, and sedimentation levels may rise due to the presence of dense vegetative stands that trap soil from upland flows (S. Larsen, pers. comm.). However, the requirement for open water habitat should not be confused with deep water habitat. The need for shallow water near the shore line is especially important from May to July, in order to ensure the successful hatching and metamorphosis of snake prey items (S. McGinnis, pers. comm.). Shallow water is also directly important to the snake since the species, which is adapted to more terrestrial habitats, has been shown to be unable to effectively capture prey in water deeper than 5 cm (Larsen 1994). Further, shallow water allows for greater exposure of rocks, alga mats and floating vegetation along pond edges, all of which have been observed serving as basking sites for San Francisco garter snake (Freel and Giomi 1994). These components may provide similar benefits to Pacific tree frogs and California red-legged frogs, allowing for greater accessibility of San Francisco garter snake to these prey species.

Research conducted since the issuance of the USFWS recovery plan indicates that the San Francisco garter snake prefers habitat consisting of densely vegetated ponds near open hillsides (DFG 2005). The snake may prefer slopes with southern or western facing exposures, which receive increased levels of solar radiation, due to the enhanced ability for thermoregulation at these sites (McGinnis 1991). For much of the winter, snakes retreat to hibernacula (shelters where they spend their dormant time during the winter). However, unlike other snake species found in the central regions of the United States, snakes have been observed emerging from hibernacula to bask at various times throughout the winter. This indicates that the snake may not enter into true hibernation (S. Larsen, pers. comm.). Larsen (1994) hypothesized that this behavioral difference between garter snake species could be attributed to the relatively temperate climate of the San Francisco Bay area. When San Francisco garter snakes do retreat to upland habitat refugia, the upland areas often chosen include rodent burrows and thick mats of grass near ponds (Larsen 1994). Mature snakes were recaptured near the same burrows in several studies conducted at various locations, indicating that snakes possess relatively small home ranges (Larsen, 1994, McGinnis et al. 1987).

Mating activities are conducted during both the spring and fall, but principally during the first few warm days of March (Fox 1955 in Freel and Giorni 1994). The augmented frequency in spring mating is thought to be due to the increased likelihood of encountering a mate as individuals emerge from hibernacula and concentrate near aquatic hunting grounds (Larsen 1994). Peak activity for the species occurs between March and July (Freel and Giorni 1994). These observed movements may correspond with the predicted behavior associated with mating and foraging activities. For the remainder of the year, Larsen observed that most individuals at the West of Bayshore property in South San Francisco remained within a relatively small area (Larsen 1994).

During the spring and early summer, feeding occurs near or within ephemeral ponds inhabited by Pacific tree frogs, the primary food source for San Francisco garter snakes during this time (Freel and Giorni 1994). Although juvenile snakes may initially capture and consume Pacific tree frog metamorphs in upland habitat, they have principally been observed moving back to aquatic sites to feed on the young-of-year frogs once these wetter areas begin to dry up and the tree frogs begin to disperse (S. Barry in litt. 2006c; S. Larsen, pers. comm.). Mature individuals prey on Pacific tree frogs as well, although they also eat California red-legged frogs during the late summer months (S. Larsen, pers. comm.). Tadpole California red-legged frogs develop throughout the spring and summer allowing for their full metamorphosis in July and August. The late emergence of California red-legged frogs allows for a necessary second cycle of feeding by adult snakes after the Pacific tree frogs have retreated from the drying wetlands to upland aestivation areas (McGinnis 2002). In late summer and early fall, post-metamorphic California red-legged frog populations disperse from wetlands as well, moving into nearby rodent burrows in upland areas (Freel and Giorni 1994) or to new aquatic habitats in neighboring streams or permanent ponds (H. McQuillen, pers. comm.). This distribution of food resources may explain the high level of snake movement activity later in the summer months (Larsen 1994).

San Francisco garter snakes appear to remain in close proximity to suitable aquatic habitat. Radio tracking studies of snakes at Ano Nuevo State Reserve and Pearson Ranch indicate that most individuals remain within one to two hundred meters of pond foraging habitats and wintering upland sites (McGinnis 2002). Larsen (1994) reported similar findings at the West of Bayshore site though she did record a travel distance of 671 meters for one female and 632 meters for one male. Although snakes do not appear to move distances greater than a kilometer, as has been observed for many other garter snake species, their anuran food base frequently moves up and down riparian corridors, traveling over two kilometers from pond habitat (McGinnis 2002). San Francisco garter snakes may follow or disperse to new areas in pursuit of their prey. This dispersal in pursuit of prey is one reason that the snake may be adversely affected by creek channelization, excessive vegetation removal, and other flood control measures implemented in riparian areas. Additionally, this may also allow for the interference and elimination of dispersal of snakes and their prey to new areas as a result of new urban infrastructure (McGinnis 2002).

The presence of habitat conditions that encourage viable breeding populations of Pacific tree frogs and California red-legged frogs is crucial to the survival of the San Francisco garter snake. Laboratory feeding experiments performed with natal snakes from the West of Bayshore site indicate that Pacific tree frogs elicit the highest response rate over numerous tested items common in the diet of other garter snake species (Larsen 1994). Barry (1994) found that individuals under 500 mm snout-to-vent length (SVL) require Pacific tree frogs in various stages of metamorphosis, while individuals over 500 mm SVL can subsist on tadpoles and adults of Pacific tree frogs, California red-legged frogs, and bullfrogs (*Rana catesbeiana*).

San Francisco garter snakes may be able to consume certain fish species if it is able to capture them in shallow areas. However, because of the snake's terrestrial adaptations, it may be difficult for the snake to effectively hunt under water (Larsen 1994). Additionally, breeding populations of San Francisco garter snake are unknown in locations where the amphibian prey is absent (Barry 1978 in Freel and Giorni 1994).

Some amphibian populations fluctuate between drought and flood years (Blaustein et al. 2001, Skelly et al. 1999) and some anuran species may play a key role in determining San Francisco garter snake predator-prey cycles. Larsen (1994) observed that newly metamorphosed frog numbers decreased during drought years at the West of Bayshore site, and noted a subsequent decrease in juvenile snake survival. This indicates that the dependence of San Francisco garter snake on anuran species may be so strong that the snake may be unable to switch to more available food (Larsen 1994; Barry 1994). Although California red-legged frog and Pacific tree frog are known to be key components in the diet of San Francisco garter snakes, Barry (in litt. 2006c) states that bullfrogs may also serve as appropriate San Francisco garter snake prey. Bullfrogs are habitat generalists and can survive in areas that have been degraded by humans or other disturbance. Therefore, Barry (in litt. 2006c) believes that bullfrogs may facilitate the recolonization or persistence of San Francisco garter snake in areas that are not inhabited by red-legged frogs and Pacific tree frogs, which require the more specialized habitat components previously addressed. Research however has shown that, although mature snakes may prey on bullfrogs in a captive setting, they often immediately

regurgitate the amphibian (Larsen 1994). The San Francisco garter snake, therefore, may not be able to properly digest bullfrogs, which would preclude its suitability as a prey item for snakes in the wild (Larsen 1994).

Status of San Francisco Garter Snake Within the Project Area

According to Larsen (pers. comm.), San Francisco garter snakes within the Preserve area match the phenotype of the holotype (the single specimen that was chosen as a representative type by the author when establishing the taxonomic group) more closely than any other population on the Peninsula. The snakes were found in the eastern portions of the marsh, as well as in several artificial ponds adjacent to originally inhabited areas (McGinnis 2002). However, much of the marsh remains brackish (J. Smith, pers. comm.), with salinities unsuitable for the various frog species that comprise the snake's diet (C. Atkinson, pers. comm.; P. Keel, pers. comm.). The population of the San Francisco garter snake within the Preserve is listed as significant in the species recovery plan (Service 1985).

Effects of the Proposed Project on San Francisco Garter Snake

The Project is not expected to result in impacts to San Francisco garter snake due to the fact that breaching activities will occur on beach habitat where the snake does not occur. However, trash left during or after Project activities could attract predators to work sites, which could subsequently harass or prey on the snake. For example raccoons, crows, and ravens are attracted to trash and also prey opportunistically on reptiles. Various avoidance measures including, but not limited to, implementing a Project personnel training program, monitoring, and minimizing the total area disturbed by Project activities, will reduce the likelihood of injury or harassment. Additionally, the main Project component, breaching the sandbar, will involve foot access to the sandbar, staging on paved surfaces and the excavator driving on the road and on the beach where snakes are not found. Fish sampling efforts will be focused in the lagoon main embayment where water salinity likely precludes the occurrence of San Francisco garter snake. Water quality monitoring implemented as part of the Project will involve access to the lagoon at fixed points accessed by trails thereby avoiding or minimizing the potential for impacts.

Breaching the lagoon up to three times within one year could potentially reduce backwater habitat and increase salinities within the Preserve marsh. San Francisco garter snakes depend on freshwater marsh habitat and marsh vegetation for survival. The presence of habitat conditions that encourage viable breeding populations of Pacific tree frogs and California red-legged frog is crucial to the survival of the snake. With the potential reduced amount of breeding and rearing habitat for frogs, this could potentially limit prey items of snakes and impact snakes. However, the Project proposes to breach the lagoon near or close to the time that natural breaches occur, and is not expected to drain all aquatic non-breeding and breeding habitats for frogs. Thus, the temporary impact of the Project to frogs is not expected to impact the San Francisco garter snake.

With implementation of the **Avoidance and Minimization Measure BIO-7, BIO-9, BIO-12,**

BIO-13 above and **BIO-14** below, impacts of the Project on San Francisco garter snake are less than significant.

Avoidance Measure BIO-14: The San Francisco garter snake is protected under FGC Section 5050. Under this statute, take of a fully protected species may not occur except for scientific or recovery purposes. Catch, pursue, capture or attempt to catch, pursue and capture is considered take as defined in Section 86 of the FGC. Because of this, any San Francisco garter snake encountered in the work area will not be handled and will be left alone until it leaves the area on its own. If San Francisco garter snakes are found within the Project area, all Project activities will cease and CDFW will be notified immediately. Activities will not resume until measures to avoid take of San Francisco garter snakes are adopted.

Western pond turtle (*Actinemys marmorata*) – The western pond turtle is the only native turtle in California and is listed as a State Species of Concern. The western pond turtle historically occurred in Washington, Oregon and Baja California with the major portion of its range located in a relatively continuous distribution in California, mainly west of the Sierra-Cascade crest (Stebbins 2003, Germano and R.B. Bury 2001). Although the western pond turtle occurs throughout much of its historical range, the species populations are currently at a fraction of their historical levels (Reese and Welsh 1997, Germano and Bury 2001, Stebbins 2003).

Western pond turtles inhabit a variety of aquatic and terrestrial habitat types. They can be found in permanent and intermittent aquatic habitats including rivers, streams, lakes, ponds, marshes, vernal pools, drainage ditches and man-made ponds associated with agricultural, wastewater and logging activities. A variety of sites are used for basking such as rocks, mud, downed logs, and emergent or submergent aquatic vegetation (Hayes et al 1999). Habitats with abundant basking sites, underwater cover, and standing or slow moving water are preferred aquatic habitats.

Although considered aquatic, they may spend considerable time on land every year. Radio tracking studies in California found that turtles remained in upland habitat seven months out of the year (Reese 1996, Rathbun *et al*. 2002). Terrestrial habitat is used for basking, overwintering, nesting and traveling between ephemeral sources of water (Reese 1996). The habitat for upland refuge and basking sites is typically covered with dense leaf litter produced by an overstory of woody vegetation such as riparian willow thickets and oak woodland habitats. Solar heating of upland basking areas appear to be an important factor in site location by turtles (Rathbun et al. 2002).

Western pond turtles overwinter from mid-October or November to March or April but timing appears to be highly variable (Rathbun *et al* 2002). In ponded habitat, Rathbun *et al* (1993) noted movement to upland areas by turtles were rare except to nest while in stream habitats, movement time and distance to upland habitat were variable. Individuals nested, overwintered or aestivated in upland habitat a few meters away from water's edge while other turtles moved up to 350 meters away from the water. Reese and Welsh (1997) reported travel to overwintering sites as far as 500 m (0.3 mi) from a California river, and speculated that overwintering away from the river may have been an adaptation to avoid winter flooding.

When overwintering on land, turtles will burrow under leaf litter or soil. Radio-telemetry studies have shown individuals often return to the same terrestrial over-wintering site each fall (Reese 1996). During terrestrial over-wintering, turtles may emerge to bask on sunny days, and may even move to new over-wintering sites (Reese 1996).

Status of the Western Pond Turtle in the Project Area

Western pond turtles are known to occur in Pescadero Creek, approximately 0.5 miles upstream of the lagoon in an area known as Turtle Bend. Suitable breeding, overwintering and foraging habitat also exists within the Preserve in the creeks and upland areas, and potentially in the marshes, but does not exist within the Project area where breaching activities will occur.

Effects of the Proposed Project on Western Pond Turtle

The western pond turtle, if present in the lagoon area during the proposed breach(es), could be swept out to the ocean. However, the lagoon breaches naturally almost every year after the sandbar forms in the late summer/early fall and may often breach with swift-moving water flowing to the ocean. The proposed Project will not have a greater impact to the western pond turtle than natural breaching events. Furthermore, the manual breaches proposed include measures that are expected to result in a more gradual breach than occurs naturally, thus allowing turtles the possibility of moving upstream or out onto banks.

Breaching the lagoon multiple times within one year could potentially reduce the likelihood of converting the lagoon to freshwater. Parts of the marsh may remain brackish to saline. Breaching reduces the inundation time of freshwater in the marsh which reduces backwater habitat that may be used by western pond turtle for breeding, rearing and foraging. Therefore, the Project could potentially degrade habitat used by western pond turtle by increasing the tidal influence which increases the salinities in the marsh to greater than optimal for rearing and foraging western pond turtle. The Project may also result in the temporary loss of the aquatic habitat utilized by all life stages of the western pond turtle. However, the Project will not result in the permanent loss of this habitat given the natural dynamics of the lagoon and marsh system. As previously stated, the Project closely coincides with the timing of natural breaching events; therefore, the impacts of the Project are considered less than significant. The implementation of **Avoidance and Minimization Measures BIO-7, BIO-9, BIO-12, BIO-13** above, and **BIO-15** described below, will ensure that impacts of the Project on the western pond turtle will remain less than significant.

Avoidance and Minimization Measure BIO-15: A qualified biologist will conduct a survey for the western pond turtle within the Project area, equipment access routes and staging areas within 48 hours of the planned start of a breaching event. If the turtle is documented within any of these areas, CDFW will be notified immediately, and individual(s) will be left alone to move out of the area. If an individual does not move on its own, it may be relocated by the biologist to suitable habitat located at least 300 feet away from Project activities.

Western snowy plover (*Charadrius alexandrinus nivosus*) – The Pacific coast population of the western snowy plover is federally listed as threatened under the Endangered Species Act of 1973 and is a State Species of Special Concern. The Pacific coast population of the snowy plover is defined as those individuals that nest adjacent to tidal waters of the Pacific Ocean, and includes all nesting birds on the mainland coast, peninsulas, offshore islands, adjacent bays, estuaries, and coastal rivers (USDI Fish and Wildlife Service 2004). Snowy plovers that nest at inland sites are not considered part of the Pacific coast population, although they may migrate to coastal areas during winter months.

The Pacific coast population of the western snowy plover breeds on the Pacific coast from Damon Point in southern Washington to southern Baja California, Mexico (USFWS 2006). The western snowy plover nests primarily above the high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries (Wilson 1980). Wintering birds may remain at their breeding sites or move along the Pacific coast north or south from Washington to Baja California to other wintering sites on beaches, salt-ponds, mud flats and estuaries.

Nesting western snowy plovers at coastal locations consist of both year-round residents and migrants (Warriner *et al*. 1986). Migrants begin arriving at breeding areas in central California as early as January, although the nesting season is typically from early March through late September (Page *et al*. 1995a). Since some individuals nest at multiple locations during the same year, birds may continue arriving through June (Stenzel *et al*.1994). Egg-laying occurs from mid-February/early March through the third week of July (Wilson 1980, Warriner *et al*. 1986). Hatching lasts from early April through mid- August, with chicks reaching fledging age approximately 28-33 days after hatching (Powell *et al*. 1997, Warriner *et al*. 1986). Nesting activities are usually comprised of: scraping in conjunction with courtship and mating for approximately three days up to one month; egg-laying for approximately 4 to 5 days; and incubation of eggs for 26-31 days with an average of 27 days (Warriner, *et.al.* 1986). The usual clutch size is three with a range from two to six (Warriner *et al.*1986, Page *et al.*1995a). Both sexes incubate the eggs, with the female tending to incubate during the day and the male at night (Warriner *et al*. 1986). Fledging of late-season broods may extend into the third week of September throughout the breeding range.

Adult western snowy plovers frequently will attempt to lure people and predators from hatching eggs with alarm calls and distraction displays, and signal with vocalizations to chicks to crouch down. Usually though, the incubating adult will run away from the eggs without being seen. Western snowy plovers will re-nest after loss of their eggs (Wilson 1980, Warriner *et al*. 1986). Re-nesting occurs 2 to 14 days after failure of a clutch, and up to five re-nesting attempts have been observed for a pair (Warriner *et al*.1986). Double brooding with polyandry (meaning the female successfully hatches more than one brood in a nesting season with different mates) is common in coastal California (Warriner *et al*. 1986) and Oregon (Wilson-Jacobs and Meslow 1984). On the California coast, the breeding season is long enough for some females to triple brood and for some males to double brood (Page *et al*.1995a). When double brooding, western snowy plovers may re -nest at the same site or move up to several hundred kilometers to nest at other sites (Stenzel *et al*.1994, Powell *et al*.1997). The first chick hatched

remains in or near the nest until other eggs hatch. The adult western snowy plover, while incubating the eggs, also broods the first chick. The non- incubating adult also may brood the firstborn chick a short distance from the nest. If the third egg of a clutch is 24 to 48 hours behind the others in hatching, it may be deserted.

Western snowy plover chicks are precocial, leaving the nest within hours after hatching to search for food. Western snowy plover broods may travel along the beach as far as 6.4 kilometers (4 miles) from their natal area (Casler *et al*. 1993) and rarely remain in the nesting area until fledging (Warriner *et al*. 1986, Stern *et al*. 1990).

Adult western snowy plovers do not feed their chicks, but lead them to suitable feeding areas. Western snowy plovers are primarily visual foragers, using the run-stop-peck method of feeding typical of *Charadrius* species. They forage on invertebrates in the wet sand and in the kelp within the intertidal zone, in dry sand areas above the high tide, and along the edges of salt marshes, salt ponds, and lagoons. They sometimes probe for prey in the sand and pick insects from low-growing plants. At the Bolsa Chica wetlands in California, western snowy plovers have been observed pecking small, flying insects from mid-air and shaking one foot in very shallow water to agitate potential prey (Fancher *et al*. 1998). Western snowy plover food consists of immature and adult forms of aquatic and terrestrial invertebrates. Little quantitative information is available on food habits.

The western snowy plover faces multiple threats throughout its Pacific coast range. The reasons for decline and degree of threats vary by geographic location; however, the primary threat is habitat destruction and degradation. Habitat loss and degradation can be primarily attributed to human disturbance, urban development and loss of nesting habitat due to introduction of non-native European beachgrass (*Ammophila arenaria*). Human disturbance on the west coast, such as walking, jogging, dogs on the beach, horseback riding and vehicle use, is at its peak Memorial Day through Labor Day which coincides with the breeding season of the western snowy plover. Intensive beach use by humans may result in abandonment of nest sites, reductions in nest density, and reductions in nesting success.

Status of the Western Snowy Plover Within the Project Area

The western snowy plover is likely to be found wintering on Pescadero Beach and potentially nesting on the beach. One plover nest was established and hatched successfully in June 2012. This was the first nest documented in approximately 25 years. However, in 2013 and 2014, western snowy plovers did not appear to nest at Pescadero State Beach (J. Kerbavaz, pers. comm.). It is also likely that the birds occasionally forage at the lagoon edge to the east of the Highway 1 Bridge.

Effects of the Proposed Project on Western Snowy Plover

Activities associated with breaching the lagoon may temporarily displace foraging or wintering western snowy plovers and other shorebirds, flush foraging adult shorebirds from optimal habitat into less than suitable habitat, and/or affect young shorebirds or chicks as they leave

protected areas or cover to forage on the beach and near the lagoon. It is likely that the effects to wintering birds will be limited to the temporary displacement of birds during breaching activities.

If breaching activities occur during March through September 15, which coincides with the breeding season of western snowy plover, direct impacts to adults and young could occur. The sudden presence of Project crew and an excavator on the beach may disturb the nesting birds resulting in nest abandonment. Brooding adults could fly off the nest allowing the eggs or chicks to become chilled or vulnerable to predation and exposure. Even though Pescadero State Beach is used often by school groups and other visitors, the birds could be disturbed by the sudden, loud noise of large equipment and vibrations caused by the equipment. Birds that are acclimated to one set of circumstances can become very anxious and disturbed by a change in that circumstance. For example, a nesting pair of peregrine falcons who were acclimated to large construction equipment driving in close proximity to the nest site and visible to the nesting birds became agitated and showed signs of disturbance by flying off the nest, calling out and looking around when people walked on the same path as the large equipment (pers. obs. Suzanne DeLeon, CDFW).

Project personnel and large equipment accessing the beach, sand bar and lagoon have the potential to crush western snowy plover eggs and chicks. Trash left during or after Project activities could attract predators to work sites, which could subsequently harass or prey on the plover. For example raccoons, crows, and ravens are attracted to trash and also prey opportunistically on birds.

The exact location of the western plover nest in 2012 was not determined at the time of nesting, however, adults with chicks were observed on the beach between the north (beach access) parking lot and the river mouth by State Park biological monitors.

With implementation of avoidance and minimization measures **BIO-16** and **BIO-17**, and including **BIO-13**, Project impacts to western snowy plover are less than significant.

Avoidance and Minimization Measure BIO-16: If Project activities are scheduled during the breeding season for western snowy plovers which is from March 1 until September 14, a qualified biologist will conduct pre-construction surveys for active snowy plover nests. Surveys will be conducted in all suitable habitat present within the Project area, including the beach, beach access sites, and along large equipment transportation and access routes. An active nest is defined as a nest having eggs or chicks present, or a nest that adult birds have staked a territory and are displaying, scraping, or constructing a nest. If a lapse in Project-related work of 15 days or longer occurs, another focused survey will be conducted before breaching is reinitiated. If an active nest is found, consultation will occur with CDFW and the USFWS regarding appropriate action to comply with the Migratory Bird Treaty Act of 1918 and the FGC.

If an active nest is found within 600 feet of the Project area, including access sites and transportation routes for the Project personnel and excavator, the preferred option will be to

wait until the young have fledged to start breaching activities. If waiting until the end of the nesting season is not possible, an approved biologist will be onsite during all Project activities. The approved biologist will clearly mark/flag or erect temporary fencing (symbolic fencing) to designate the work area and to delineate the nest areas that will be avoided. Flagging and or temporary construction fencing will be removed immediately after the completion of breaching activities. The approved biologist will monitor the behavior of the birds (adults and young, when present) at the nest site to ensure that they are not disturbed by Project activities. Nest monitoring will continue during all breaching activities until the young have fully fledged or have left the nest site, as determined by the biologist. All breaching activities will stop if western snowy plover adults or chicks are showing signs of distress, agitation or disturbance.

Avoidance and Minimization Measure BIO-17: To avoid attracting predators of western snowy plover, the Project area will be maintained trash-free and food refuse will be contained in secure bins and removed daily.

Great blue heron (*Ardea herodias*) – The great blue heron is not listed as a special-status species; however, heron rookeries are considered sensitive resources by CDFW. The great blue heron gather in colonies where they court, nest, and raise young. Pair bonding between the great blue heron occurs from mid-February to early March in areas where they live year-round and mid-March to early April where they migrate in for the spring and summer (Johnson).

The heron is monogamous and elaborate courtship rituals are performed by both males and females. Colonies of herons may have a few to hundreds of breeding pairs and are located usually in the top of groves of trees and riparian forests or large snags that are within a couple of miles of the birds' main feeding area and relatively inaccessible to humans and land predators. The females lay three to seven eggs on a large nest, sometimes up to three feet in diameter and 20 inches thick, made with stick and twigs lined with moss and lichens. Typically four eggs are laid and less than two chicks on average fledge (COSEWIC 2008). Herons usually return to the same nesting site year after year and may even use the same nest.

Rookery habitat is declining and adult nesting herons are susceptible to human disturbance. Sudden loud noises can cause the adult herons to abandon their nests. Herons abandon rookery sites in California due to tree cutting for development, water recreation activities and wetland reduction. Reduced nesting habitat may be limiting the size of the heron population. Habitat destruction in south-coastal British Columbia has resulted in the abandonment of at least 21 colonies from 1972 to 1985 and from 1998 to 1999 (COSEWIC 2008). Draining and filling wetland areas destroys the heron's hunting grounds, reducing their supply of food. The number of young birds which can survive to breeding age depends upon the amount of food available in the nesting areas.

<u>Status of the Great Blue Heron Within the Project Area</u>

A great blue heron rookery is present within the large *Eucalyptus* grove along the North Marsh.

Effects of the Proposed Project on the Great Blue Heron

The effect of draining the lagoon has the potential to indirectly impact individual great blue herons. The Project entails partial draining of the lagoon and reducing the volume of water, thereby potentially decreasing prey items in areas where herons feed. However, the Project is designed as an interim project to avoid decreased water quality in the lagoon estuary and to reduce the likelihood of a fish kill during breaches. If the water quality is maintained, this will aid in higher productivity in the lagoon and potentially contribute to increase in prey items for the herons. Project activities are expected to occur mostly outside the heron breeding and nesting season. If Project activities occur within the heron breeding and nesting season, activities will be located at a sufficient distance away – approximately 0.5 miles away – from the heron rookery site to prevent disturbance to adults and nestlings. Therefore, there will be a less than significant impact to the great blue heron.

Saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*) –The saltmarsh common yellowthroat, which is a State Species of Special Concern, is found in freshwater marshes, coastal swales, swampy riparian vegetation, brackish and saline marshes and edges of disturbed grasslands that are in close proximity to wetland habitats. Nur *et al.* (1997) studied the distribution of the species and found a strong affinity of the birds to specific plant species. The yellowthroats abundance were positively correlated for Scirpus, perennial pepperweed, juncus and cattail and negatively correlated to pickleweed (*Salicornia* sp.). Yellowthroats frequently use borders between various plant communities, and territories often straddle the interface of riparian corridors or the ecotones between freshwater or tidal marsh and upland vegetation (Shuford 1993). In San Francisco, 60% breed in brackish marsh habitat, 20% in riparian woodland and swampy habitat and the rest in freshwater marsh, saline marsh and upland vegetation. Salt marsh common yellowthroats nest in a variety of habitats around San Francisco Bay wetlands and adjacent uplands and moisture appears to be the factor common to all types of breeding habitat. Outside of the breeding season, some populations of salt marsh common yellowthroat shift habitat use from brackish or freshwater marshes to more saline marshes dominated by pickelweed or cordgrass (*Spartina* sp.).

Male yellowthroats begin establishing territories in mid-March and the nesting season lasts until July. Second clutches can occur until August. Nesting occurs in areas in or next to wet ground or above water on dense vegetation including grass tufts, low herbaceous vegetation, cattails and tules (Hobson *et al*. 1986). Clutch size is 3-5 eggs. Incubation occurs for 12 days and the young remain in the nest for 10 days and are fed by both parents for at least two weeks after fledging. Yellowthroats are primarily insectivores and forage by gleaning insects low in dense vegetation or on or near the ground.

The main threat to the yellowthroat is loss of habitat and cover due to development and urbanization. The decrease of cover habitat, especially in drought years, can increase predation. Predators typically include raccoons, opossums, foxes, rats, crows, ravens and raptors.

Status of the Saltmarsh Common Yellowthroat Within the Project Area

The saltmarsh common yellowthroat has been observed in riparian woodlands dominated by willow, blackberries and cattails along Butano Creek within Pescadero Marsh Natural Preserve (CNDDB 2014). The Preserve supports more individuals in winter than during summer breeding season. At the preserve, saltmarsh common yellowthroats tend to nest in willow stands that have a thick undergrowth of herbaceous plants.

Effects of the Proposed Project on Saltmarsh Common Yellowthroat

The breaching activities will not have an impact on breeding saltmarsh common yellowthroat. The staging area will be located in the middle parking lot on the west side of Highway 1 which is highly disturbed and typically has a lot of human activity and does not have habitat supporting the bird. Project personnel and the excavator will access the sandbar by commuting across the Highway 1 Bridge to the beach. The breaching will likely mostly occur in fall, outside of the breeding season and after the young have fledged which will avoid disturbance to nesting adults and young. The decrease in the inundated areas in the creeks and marsh could potentially reduce foraging and cover habitat. However, as stated above, in winter in the San Francisco Bay area, it appears the saltmarsh common yellowthroat shift habitat use from brackish or freshwater marshes to more saline marshes dominated by pickelweed or cordgrass. There is an abundance of several habitat types utilized by the birds in the Pescadero Marsh Natural Preserve. Project impacts to saltmarsh common yellowthroat habitat, such as reduced inundation of the lagoon, creeks and marshes, will be less than significant.

California brackishwater snail (*Tryonia imitator*) – California brackishwater snail was listed as a category 2 candidate species by the USFWS in 1994, but is no longer considered a federal candidate species. The snail historically ranged in coastal lagoons and marshes of central and southern California to northern Baja California. It was thought to be once widely distributed, but is thought to be now absent from most of its historic range (Hersheler et. Al. 2007) and is more likely to occur in the southern part of its range (Kellogg 1980, as stated in Harland Bartholomew).

California brackishwater snail inhabits coastal lagoons, estuaries and salt marshes. It lives subtidally and is tolerant to a wide daily variation in salinity (Harland 1996). It is usually associated with relatively slow moving brackishwater areas with floating algae or other aquatic vegetation. California brackishwater snail is preyed upon by various bird species and by small fishes such as threespine stickleback.

Status of the California Brackishwater Snail Within the Project Area

A small population of California brackishwater snail was found at the mouth of Butano and Pescadero creeks in 1980 and was also found in a ditch between Butano Creek, Delta Marsh and Delta Marsh in 2004 (CNDDB 2014). However, a lack of information exists on this species within or surrounding the Project area.

Effects of the Proposed Project on the California Brackishwater Snail

The California brackishwater snail, if in the lagoon area during the proposed breach, could be swept out to the ocean with the fast moving water of a typical breach. However, the lagoon breaches naturally almost every year after the sandbar forms in the late summer/early fall and most likely breaches dramatically with swift moving water flowing to the ocean. The proposed Project will not have a greater impact to the snail than what naturally occurs. Furthermore, the mechanical breach proposed includes measures that will potentially make it a more gradual breach than would naturally occur, minimizing the rapid sudden loss of water in the lagoon. Implementation of artificial breaching may result in temporary loss of access to aquatic habitat through subsequent drawdown of water throughout the lagoon. The Project mimics natural breach events and is not designed to drain all aquatic habitat. Additionally, the goal of preventing poor water quality conditions from developing to such a level that steelhead and other fish species are killed is likely to benefit the snail, therefore, the impacts of the Project on California brackishwater snail are less than significant.

Implementation of **Avoidance and Minimization Measures BIO-2, BIO-3, BIO-4, BIO-5 and BIO-7** will ensure that the Project impacts on the California brackishwater snail remain less than significant effect.

Other listed species – The following species were included on the USFWS list, but are not discussed in this section because these species are found in the ocean, or, in the case of the bird species, are at most transitory throughout the area. The Project will not have an impact on each of the following species:

Black abalone (*Haliotes cracherodii*)
White abalone (*Haliotes sorenseni*)
Delta smelt (*Hypomesus transpacificus*)
Marbled murrelet (*Brachyramphus marmoratus*)
California brown pelican (*Pelecanus occidentalis californicus*)
California least tern (*Sternula antillarum (=Sterna, =albifrons) browni*)
Guadalupe fur seal (*Arctocephalus townsendi*)
Sei whale (*Balaenoptera borealis*)
Blue whale (*Balaenoptera musculus*)
Finback (*Balaenoptera physalus*)
Southern sea otter (*Enhydra lutris nereis*)
Right whale (*Eubalaena (=Balaena) glacialis*)
Steller (=northern) sea-lion (*Eumetopias jubatus*)
Sperm whale (*Physeter catodon (=macrocephalus)*)

SENSITIVE NATURAL COMMUNITIES

Sensitive natural communities are plant or aquatic communities that are regionally uncommon or unique, unusually diverse, or of special concern to local, state, and federal agencies. Removal or substantial degradation of these plant communities constitutes a significant adverse impact under CEQA.

The CNDDB record search produced a list of four sensitive natural communities for the San Gregorio 7.5-minute USGS quadrangle map: Northern California Coast California Roach/Stickleback/Steelhead Stream, North Central Coast Steelhead/Sculpin Stream, Sacramento-San Joaquin Coastal Lagoon, and Valley Needlegrass Grassland.

Northern California Coast California Roach/Stickleback/Steelhead Stream – This community is found along the entire reach of Pescadero Creek, from its headwaters to its confluence with Butano Creek upstream of the project area. Species known to occupy this type of freshwater system include steelhead, coho salmon, pacific lamprey, California roach, threespine stickleback, and prickly and riffle sculpin. The Project is designed to improve water quality to prevent a fish kill that naturally occurs which will ultimately benefit these species.

North Central Coast Steelhead/Sculpin Stream – Species known to occupy this freshwater system include steelhead, pacific lamprey, threespine stickleback, and sculpin species. While these species are found in Pescadero Creek, the more inclusive Northern California Coast California Roach/Stickleback/Steelhead Stream classification is used for this stream.

Sacramento-San Joaquin Coastal Lagoon – This community is found in the lower reaches of Pescadero and Butano Creeks near the ocean. Species known to occupy this brackish marsh system type are tidewater goby, steelhead, coho salmon, threespine stickleback, pacific lamprey, and prickly and riffle sculpin. The Project is designed to improve water quality to prevent a fish kill that naturally occurs which will ultimately benefit these species.

Valley Needlegrass Grassland – Patches of grassland containing purple needlegrass are found within a matrix of coastal scrub on the slopes surrounding North Pond. The Project will not impact this plant community.

WETLANDS AND WATERS OF THE UNITED STATES

Waters of U.S. are defined as all waters used in interstate or foreign commerce, waters subject to the ebb and flow of the tide, all interstate waters including interstate wetlands and all other waters such as: intrastate lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, and natural ponds. Waters of the U.S. are under the U.S. Army Corps of Engineers (USACE) jurisdiction.

The USACE defines wetlands as lands inundated or saturated by surface or groundwater at a frequency and duration sufficient to support vegetation adapted for life in saturated soil conditions. Typically, USACE jurisdictional wetlands meet three criteria: they have hydrophytic vegetation, hydric soils, and wetland hydrology.

The California Coastal Commission defines wetlands as all “lands which may be covered periodically or permanently with shallow water…” (Section 30121, Coastal Act). The presence of only one of the three wetland parameters (i.e., soils, vegetation, or hydrology) that are needed to meet the USACE definition of a wetland is needed to meet the criteria for a Coastal Commission wetland.

Both Coastal Commission-defined wetlands and USACE-jurisdictional wetlands and waters of the U.S. are present at Pescadero State Beach and within the Project area.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Have a substantial adverse effect, either directly or through habitat modification, on any species identified as a sensitive, candidate, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or the U.S. Fish and Wildlife Service?	☐	☐	☒	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☐	☒	☐
c) Have a substantial adverse effect on federally protected wetlands, as defined by §404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

DISCUSSION

a) Eight CNPS-listed plant species have reported occurrences within the San Gregorio USGS 7.5-minute quadrangle. Based on plant habitat requirements, past agricultural use, and surveys of the site, only one of the listed plant species, coastal marsh milkvetch, is known to occur within the Project area (see *Plant Species Potentially Occurring Within the Project Area*). Other aquatic and terrestrial sensitive species known to occur within the Project area are described in *Animal Species Potentially Occurring Within the Project Area* above and include: steelhead; tidewater goby; California red-legged frog; San Francisco Garter Snake; western pond turtle; western snowy plover; great blue heron rookery; saltmarsh common yellowthroat; and California brackishwater snail.

Many of the proposed Project's adverse environmental effects are temporary and are similar in impact to natural processes already occurring. In compliance with CEQA, environmental protection measures have been incorporated into the proposed Project to ensure that all potential adverse impacts to water quality, sensitive species and other biological and natural resources remain less than significant. Potential impacts and specific avoidance and minimization measures that are proposed to avoid detrimental impacts to biological resources are listed below.

Impacts to the coastal marsh milkvetch as a result of Project implementation are determined to be less than significant. The proposed mechanical breach will mostly occur during the time period that a natural breach occurs (late summer/fall). Equipment will avoid the coastal marsh milkvetch population. Implementation of **Avoidance and Minimization Measure BIO-1** will ensure that impacts of the Project remain less than significant.

Steelhead, tidewater goby and California brackishwater snail are known to occupy the lagoon habitat that will be affected by the Project. Western pond turtle is known to occur within 0.5 miles of the Project area, and suitable habitat for the turtle is present within the lagoon area. NOAA Fisheries, CDFW and USFWS have concluded that the Project has a less than significant impact to these sensitive species, given that the gradual breach design will reduce outflow velocity thus preventing individuals of these species from being flushed out to the ocean. Furthermore, natural breach events exhibit variability in flow velocities. Implementation of **Avoidance and Minimization Measures BIO-2** through **BIO-8**, and **BIO-13** and **BIO-15** will ensure that impacts of the Project on these species remain less than significant.

Project implementation is not likely to result in impacts to California red-legged frog, San Francisco garter snake and western snowy plover. **Avoidance and Minimization Measures BIO-2** through **BIO-5**, **BIO-7** through **BIO-14, BIO-16 and BIO-17** will ensure that impacts of the Project are less than significant.

Habitats used for foraging, rearing and breeding by the species listed above and by saltmarsh common yellowthroat and great blue heron are expected to be temporarily impacted by the reduction of water level inundation. Reduced inundation may result in temporary loss of access to aquatic habitat in all areas of the marsh through subsequent drawdown of water throughout the lagoon. With implementation of **Avoidance and Minimization Measures BIO-1 through BIO-17,** and the fact that the Project mimics natural breach events and is not designed to drain all aquatic habitat, these impacts are less than significant.

b) The Project will not have an adverse effect on any riparian habitat or other sensitive community, including the Northern California Coast California Roach/Stickleback/Steelhead Stream, North Central Coast Steelhead/Sculpin Stream, and Sacramento-San Joaquin Coastal Lagoon. The Project is designed to improve water quality which will have a positive impact to this community.

c) The Project will mostly occur during late summer/fall which coincides with the typical time period of natural breach occurrences. Indirect impacts to wetlands could occur if Project implementation resulted in significantly lower water levels and drier or more saline conditions in those wetlands for a prolonged period of time. However, the Project is proposed to be implemented on an interim basis, at approximately the same time of year as the naturally-occurring sandbar breach, and is not expected to result in a prolonged period of drier conditions within wetlands. Potential impacts of the Project on wetlands are, therefore, less than significant.

d) The Project will have no adverse effect on migratory movements of native fish or wildlife species. However, Project implementation (post-breach) is likely to result in reduction of the lagoon size and this will result in less habitat available for rearing fish species and migratory waterfowl. The Project is proposed to be implemented one to three times per year at the same time of year as the naturally-occurring sandbar breach, therefore the impacts will be less than significant.

e,f) The Project does not conflict with any local ordinances, adopted conservation plans, or policies. No impact.

V. CULTURAL RESOURCES

ENVIRONMENTAL SETTING

Information about the historic environmental setting of the San Francisco Bay area and peninsula coast indicates that the native people lived in a landscape of great ecological diversity. Their environment brought them within close proximity to marine, sandy beach, rocky shore, tidal and freshwater marsh, grassland prairie, and oak grassland savanna, riparian, chaparral, mixed hardwood, and evergreen forest habitats, which frequently converged in geographically narrow areas. The mosaic distribution of environmental zones and productive biological communities gave a significant advantage to the ancestral Ohlone Indians by enabling them to formulate alternative subsistence strategies such as co-harvesting, long-term storage, and exchange systems. Enhancing vegetal productivity through the application of fire, along with institutionalized leadership roles and kinship/alliance systems served to ameliorate episodes of scarcity, and the effects of resource over-exploitation (Basgall 1987; Bean and Lawton 1973; Bean and King 1974; Blackburn and Anderson 1993; Chagnon 1970; Fages 1937; Lewis 1973; Milliken 1983; Simons 1992).

Kinship data derived from Spanish Mission records show that coastal communities ultimately assimilated into the larger Bay Shore alliance network (King 1994; Milliken 1983, 1991). At the time of first European contact in the fall of 1769, a small tribal community called the *Quiroste* controlled the vicinity of Pescadero and Año Nuevo. This group was one of over fifty politically autonomous tribal groups composing what ethnographers have called the Costanoan cultural division (Levy 1978). This term was derived from the Spaniards' designation of the coastal tribes as c*osteños,* meaning coastal people. Brown (1994) has discussed the later popularity of the term *Ohlone*, which is currently used to describe those tribes from the Big Sur coast northward to San Francisco, and inland from Livermore southward to Soledad. The descendants of the Mission Period Native Americans of the Ohlonean cultural sphere usually refer to themselves collectively as the Ohlone, or by the newly organized band names that are emerging as the descendants regroup into "revitalized" communities (Leventhal, Field, Alvarez, and Cambra 1994).

Early explorers noted that the people seasonally relocated from the coastal terrace to residential locations in the nearby Santa Cruz Mountains (Palou, Vol. 3 in Bolton 1926; Crespi in Stanger and Brown 1969). In 1769, while visiting a large village near Point Año Nuevo, Father Juan Crespi commented that in its center was a "very large grass-roofed house, round like a half-orange, which by what we saw of it inside, could hold everyone in the whole village" (Crespi in Stanger and Brown 1969). Although most ethnohistoric accounts of the Ohlone describe pole framed dwellings thatched with tule reeds, Miguel Costanso observed that the village near Año Nuevo contained about 200 people who lived in small, pyramidal shaped split wood structures that surrounded the large house (Stanger and Brown 1969). Five years later, the Rivera expedition observed that near this same village "was planted a high pole, this being the monument used by the heathen for the sepulchers of the chief men of the village" (Bolton 1926).

Native life ways began to quickly transform after the arrival of the Spaniards. The Presidio of San Francisco and Mission Dolores were established in 1776 with the purpose of managing the native population and converting them to Christianity. Mission Santa Clara and the early Pueblo of San Jose de Guadalupe were established in 1777 and Spanish influence was soon extended to the coastal *Quiroste* Ohlone people who were brought into Mission Santa Clara from the "*San Bernardino District*." Even later, with the establishment of Mission Santa Cruz in 1797, *Quiroste* conversions were still occurring—an indication they were still maintaining some sort of indigenous community organization. Ultimately the goal was to bestow Spanish citizenship on the Indian neophytes and use them to create agricultural communities and thus prepare Upper California for colonization. Between the years of 1779 and 1805 several thousand coastal Ohlone were brought into the missions, but soon thereafter most died upon exposure to foreign diseases, abuse and malnutrition (Cook 1976; Milliken 1991).

The vicinity of Año Nuevo State Reserve was referred to as "*el Rancho Del Punta de Año Nuevo*" and Pescadero Marsh was known as "*Rancho San Antonio*." Both areas functioned as pasture lands for Mission Santa Cruz (Stanger 1963). The need to acquire pasturage lead to the reach of Mission Santa Cruz up as far as "*Rancho San Gregorio*" to the north of Pescadero, where by 1810 a sheep ranch was established. Some surviving *Quiroste* members are noted as having been employed at the mission cattle ranches as late as 1823.

During the 1820s, after the Mexican Revolution divested Spain of its title to the lands, more settlers moved into the coastal area as ranches continued to expand. Former mission lands were parceled out to petitioners among the citizenry and military as the new regime sought to "secularize" the mission system. In 1833, *Rancho San Antonio* was granted to Juan Jose Gonzales, a former foreman at Mission Santa Cruz. Interestingly, he was assisted in acquiring the lands by the padres from the mission during its secularization. His new grant was titled "*el Rancho Pescadero"* (or Ranch at the Fishing Place) and consisted of approximately 3,282 acres. His adobe house was near Pescadero Creek at the site of the present town of Pescadero. Eventually, the mission ranch at Año Nuevo and the lands between the point and *Rancho Pescadero* were partitioned into two land grants; one was referred to by the same name and the other was called *Rancho Butano,* which was granted to Ramona Sanchez in 1838.

Between 1840 and 1850, increasing numbers of American settlers arrived on the coast and encroached on the large Mexican ranchos as they set up small communities focused on the newly developed logging industry. After the Mexican-American War ended in 1848, the Treaty of Guadalupe Hidalgo guaranteed the property rights of the Mexican ranchers, but Congress later required that individual Mexican land grants be approved by a United States Land Commission through judicial proceedings. After California Statehood in 1850, many of the Hispanic ranchers lost title to their lands, and like the Indians before them, lost their property (Harlow 1989).

Bartlett Weeks, who had arrived in Santa Cruz two years before the Gold Rush, was the first American settler at Pescadero. He soon sold his property to Alexander Moore whose house still stands close to town. By 1860 Pescadero was a prosperous town surrounded by farms

and lumber mills and was becoming a popular summer resort frequented by people from San Francisco. Pescadero Creek became a favorite fishing stream for sports anglers. By 1884 a published description of coast side hotels spoke highly of Pebble Beach where visitors crowded to collect water polished agates and opals. A hotel established by John Coburn near the mouth of the Creek adjacent to the marsh upset the local town's people who were restricted from trespassing to gain access to the beach. This lead to a legal conflict, which Coburn eventually won. Nonetheless, his hotel lost popularity and ultimately burned to the ground, and the court later reversed its decision. Construction of Highway 1 removed remnants of the once famous hotel. Agriculture, logging, and fishing continued to dominate the area's development and many of the levees constructed in the marsh date to the 1920s and 30s. By 1958, Pescadero Beach was acquired by the state from San Mateo County.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Cause a substantial adverse change in the significance of a historical resource, as defined in §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource, pursuant to §15064.5?	☐	☐	☐	☒
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

DISCUSSION

a,b) The Project, as proposed, will not adversely affect archaeological resources. Several prehistoric Native American archaeological sites, and at least one historical site, have been identified within the State Park, however, the Project is designed to avoid all known sites. No impact.

c) No human remains have been recorded or reported within the specific Project area, and there is negligible potential for human remains in the remains within the Project area. Standard Project requirement Cult-2 provides for the unlikely event that human remains are found. No impact.

Avoidance and Minimization Measure Cult-1: In the unlikely event that the Project inadvertently encounters prehistoric or historic archaeological artifacts or features, all work at the location of the find must temporarily cease until a qualified archaeologist has evaluated the significance of the find and provided detailed recommendations leading to the mitigation of the finds.

Avoidance and Minimization Measure Cult-2: If human remains are found, the Project manager will immediately notify the San Mateo County Coroner's Office and consult with that office in regards to appropriate disposition of the remains per Public Health and Safety regulation and Public Resources Code 5097.

In the unlikely event that the Project inadvertently encounters prehistoric or historic archaeological artifacts or features, all work at the location of the find must temporarily cease until a qualified archaeologist has evaluated the significance of the find and provided detailed recommendations leading to the mitigation of the finds. If human remains are found, the Project manager will immediately notify the San Mateo County Coroner's Office and consult with that office in regards to appropriate disposition of the remains per Public Health and Safety regulation and Public Resources Code 5097.

VI. GEOLOGY AND SOILS

ENVIRONMENTAL SETTING

TOPOGRAPHY

The Project site at Pescadero State Beach is located on the sandbar that forms at the mouth of Pescadero Creek.

GEOLOGY

Pescadero State Beach is located in the Coast Ranges Geomorphic Province, a northwest-trending chain of mountains that formed primarily due to movement along the San Andreas Fault and associated faults. Regionally, the igneous, metamorphic, and sedimentary basement rocks are part of the Jurassic to Cretaceous aged Salinian Block, a tectonic block bounded to the east by the San Andreas Fault. These rocks originated some 350 miles to the south and began moving north during the Miocene (26 to seven million years ago) as the San Andreas Fault developed. The Salinian Block (a sliver of the Pacific Plate) continues to move in a north westerly direction along the northwest trending San Andreas Fault Zone.

The Project area is located on a barrier beach which is a seasonal geomorphic feature, built by ocean waves, and the consequence of reduced stream flows at the end of summer and early fall.

SOILS

Active dune land occurs at the mouth of Pescadero Creek. It is a miscellaneous land type that consists of loose, shifting sand. Permeability is very rapid.

SEISMICITY

The Project site is located in the seismically active Central California Coast region. The closest major active (Holocene to Recent) fault, which runs less than a mile from the Project site, is the San Gregorio Fault, which is considered a segment of the San Andreas Fault. Pescadero State Beach is about 13 miles west of the San Andreas Fault.

LESS THAN

WOULD THE PROJECT:	POTENTIALLY SIGNIFICANT IMPACT	SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area, or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable, as a result of the project and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1997), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste disposal systems, where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site, or unique geologic feature?	☐	☐	☐	☒

DISCUSSION

a) The Project area is located within the seismically active Central California coastal region, within the San Gregorio Fault Zone. The chance of the rupture of a known earthquake fault, strong seismic ground-shaking, or seismic-related ground failure is possible within this area. The Project will not increase the risk to structures because no structures are planned. The Project will not increase the risk to visitors or employees in a seismic event. No impact.

b) The Project will disturb sand at the mouth of Pescadero lagoon. The small size of the Project footprint, the fact that all surface disturbance will be similar to that which occurs

naturally, and that the Project occurs on a beach where movement of sand occurs all the time, and the incorporation, in the Project design, of Avoidance and Minimization Measures to breach slowly, will ensure that surface erosion will be minor. No impact.

c-e) This Project will not affect visitors or employees beyond the implementation period. Any geological hazards occurring at the project site would be natural in origin. No structures, utilities, or people will be affected. No impact.

f) The Project will not destroy any paleontological or geological features. No impact.

VII. GREENHOUSE GAS EMISSIONS

ENVIRONMENTAL SETTING

Greenhouse Gases

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

Climate Change and Sea Level Rise

Greenhouse gases are considered a potential cause of climate change. One of the effects that climate change models project for coastal California is a sea level rise of from 17 to 66 inches by 2100. The proposed Project is interim in nature, and will not contribute to climate change or be effected by sea level rise.

WOULD THE PROJECT:	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☐	☒
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

DISCUSSION

a) The Project could encourage a small amount of additional automobile travel for both implementation and monitoring, and an excavator will be used to breach the lagoon, but this will not result in a significant increase in traffic or associated combustion of fossil fuels. Any additional greenhouse gas emissions from this will be negligible. No Impact.

b) There will be no conflict with existing plans, policies and regulations. No Impact.

VIII. HAZARDS AND HAZARDOUS MATERIALS

ENVIRONMENTAL SETTING

The proposed Project was part of a saline or brackish marsh prior to European occupation. The general area was utilized by Native Americans and was later settled by European-American farmers. During the ranch era, the surrounding land use was agricultural. There has been no industrial use or construction of buildings on the parcel that could have been a source of hazardous materials.

The Project area is not located within an airport land use zone, or within two miles of an airport. There are no functioning private airstrips in the vicinity of the park. The closest school is 1.5 miles away. The closest city is Half Moon Bay, located approximately 17 miles north.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials, substances, or waste into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites, compiled pursuant to Government Code §65962.5, and, as a result, create a significant hazard to the public or environment?	☐	☐	☐	☒
e) Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport? If so, would	☐	☐	☐	☒

	the project result in a safety hazard for people residing or working in the project area?				
f)	Be located in the vicinity of a private airstrip? If so, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h)	Expose people or structures to a significant risk of loss, injury, or death from wildland fires, including areas where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

DISCUSSION

a) Aside from fuel in vehicles, no hazardous materials will be transported, used, or disposed of. No impact.

b) There are no reasonably foreseeable conditions involving a significant hazard to the public. No impact.

c) As noted in the Environmental Setting, there are no schools in the general vicinity of the project or within one-quarter mile of the proposed Project site. No impact.

d) No part of Pescadero State Beach, including the Project area, is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5. No area within the project site is currently restricted or known to have hazardous materials present. No impact.

e,f) Pescadero State Beach is not located within an airport land use plan, within two miles of a public airport, or in the vicinity of a functioning private air strip. No impact.

g) All activities associated with the proposed Project will occur within the boundaries of Pescadero State Beach. Work will not restrict access to or block any public road. There will be no impact on any response or evacuation plans. No impact.

h) Project implementation will not expose people or structures to a significant risk from wild land fire. No impact.

IX. HYDROLOGY AND WATER QUALITY

ENVIRONMENTAL SETTING

The proposed Project is located at the mouth of Pescadero lagoon within Pescadero Marsh Natural Preserve.

WATERSHED

The Pescadero-Butano watershed is the largest coastal watershed between the Golden Gate and the San Lorenzo River. The watershed's two principal streams, Pescadero Creek and Butano Creek, have their confluence in the Pescadero Marsh Natural Preserve. These two perennial streams drain 81 square miles of the Santa Cruz Mountains and the coastal valleys, hills, and terraces around the town of Pescadero (ESA 2004). The California Department of Water Resources (DWR) defines the area for groundwater purposes as the Pescadero Valley groundwater basin (DWR 2003).

FLOODING

The Project will occur at the mouth of the Pescadero lagoon. The formation of the sand barrier is a natural and annual occurrence that plays an important role in the marsh ecosystem. The proposed Project is not intended to address flooding issues related to Pescadero, and is not expected to change the existing flood risk context. It is intended solely for the improve water quality for fish and to reduce the likelihood of a fish kill.

WATER QUALITY

The San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) regulates water quality in the region and provides water quality standards and management criteria as required by the Clean Water Act. These standards and criteria are presented in the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) (SFBRWQCB, 2011). The Basin Plan identifies the beneficial uses and water quality objectives for the San Francisco Bay region. The three surface water bodies within or adjacent to the project site are Pescadero Creek, Butano Creek, and the Pacific Ocean. Beneficial uses for Pescadero Creek are listed in the following table:

Beneficial Use	Pescadero Creek
Municipal and Domestic Supply	X
Agricultural Supply	X
Water Contact Recreation	X
Non-Contact Water Recreation	X
Wildlife Habitat	X
Cold Freshwater Habitat	X
Warm Freshwater Habitat	X
Migration of Aquatic Organisms	X
Spawning, Reproduction and/or Early Development for Fish	X
Rare, Threatened, and Endangered Species*	X

*Potential Species: Steelhead, Coho Salmon, California Red-Legged Frog, Western Pond Turtle, San Francisco Garter Snake, Tidewater Goby, California Brackishwater Snail

The Project proposes to use an excavator to mechanically breach the lagoon. Potential impacts to water quality are limited to the mechanical breaching events conducted with an excavator adjacent to the lagoon. This will be temporary and no impacts are expected after the breaching event is complete. With implementation of **Avoidance and Minimization Measure WQ-1**, this impact is less than significant.

Avoidance and Minimization Measure WQ-1: Any equipment driven and/or operated adjacent to the lagoon shall be checked and maintained daily to prevent leaks of materials that if introduced to water could be deleterious to aquatic life, wildlife or wetland habitat. Only the bucket will be allowed to enter the water. The excavator shall be moved off of the State to refuel.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	×	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, in a manner which would result in substantial on- or off-site erosion or siltation?	☐	☐	☐	☒
d) Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in on- or off-site flooding?	☐	☐	☐	☒
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Substantially degrade water quality?	☐	☐	☐	☒
g) Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map, or other flood hazard delineation map?	☐	☐	☐	☒
h) Place structures that would impede or redirect flood flows within a 100-year flood hazard area?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury, or death from flooding, including flooding resulting from the failure of a levee or dam?	☐	☐	☐	☒

j) Result in inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

DISCUSSION

a) The proposed Project will use an excavator to breach the lagoon but only the bucket will be allowed to enter the water. Fueling will be done away from the State beach and Project area. The Project will breach the sandbar at the mouth of Pescadero Creek in an effort to control the timing of the breach as well as to avoid decreased water quality in the lagoon for fish species. Less than significant impact.

b) The Project will not involve any increase in water use, and it will not deplete any local aquifer. No impact.

c,d) The Project will only change the timing of the annual breaching of the sandbar at the mouth of Pescadero Creek and will not result in substantially altering existing drainage patterns or substantially increasing the rate of surface runoff. No impact.

e) There are no existing or planned stormwater drainage systems in or downstream of the Project area. The Project will not create or contribute runoff water that will exceed the capacity of existing or planned stormwater drainage systems. No substantial additional sources of polluted runoff are expected from this project. No impact.

f) The Project will involve only minor soil disturbance, and does not have the potential to substantially degrade water quality. No impact.

g) The Project does not involve housing or any developments. No impact.

h) The Project will not place a structure above the 100 year flood hazard area. No structures are planned for this Project. No impact.

i) The Project will have no adverse effect on local flooding concerns. There are no inhabited structures at or downstream of the project site. No impact.

j) No mudflows are expected to occur at the Project site due to the low relief topography. Although the Project is located in an area that could be possibly inundated by either a seiche or a tsunami, the risk will be no more significant than in other areas of the state beach. No impact.

X. LAND USE AND PLANNING

ENVIRONMENTAL SETTING

Pescadero State Beach is located on the central California coast, 17 miles south of Half Moon Bay in San Mateo County. This park unit contains sandy beaches and coastal dunes, as well as a coastal wetland complex that includes a lagoon at the confluence of Pescadero and

Butano Creeks, fresh and brackish water marshes, and brackish water ponds. The proposed Project is located at the mouth of Pescadero lagoon within Pescadero Marsh Natural Preserve.

Facilities at the State Beach include three paved parking lots with vault toilets. Two additional unpaved parking lots are located in the state beach: one at the boat launch area, and another at the ranger station. Two interpretive signs and displays are located near the beach side of the state beach. Public facilities are restricted to day use.

California Department of Parks and Recreation (DPR) developed a General Plan for the San Mateo Coast Area, including Pescadero State Beach (DPR1979) to facilitate long-range planning at the park and to establish guidelines for the long-term use, management, and development. The General Plan (p. 39) calls for the protection of wetland and riparian areas; protection of the marsh from anthropogenic sedimentation; and restoration and establishment of the natural ecosystems in the formerly cultivated lands immediately adjacent to the wetlands of the marsh.

The proposed Project is within Pescadero Marsh Natural Preserve, a designated area of Pescadero State Beach. The purpose of Natural Preserves under the Public Resources Code (Sec 5019.71) is in part to preserve rare or unique natural features, and to allow natural dynamics of ecological interaction to continue without interference. Uses permitted within Natural Preserves include environmental education and nature study. Within a Natural Preserve, habitat manipulation may be permitted if found by scientific analysis to require manipulation to preserve the species or associations that constitute the basis for the establishment of the natural preserve (PRC 5019.71). The Project seeks to manipulate the sand bar lagoon barrier in order to test the hypothesis that the action will improve the habitat for steelhead.

Pescadero State Beach is located entirely within the coastal zone and is subject to the provisions of the San Mateo County LCP (San Mateo County 1998). The LCP calls for the protection of sensitive habitats, including riparian corridors and habitats that support rare, endangered, and unique species. The LCP designates Pescadero Marsh as a high priority resource management project. It specifies that DPR shall manage Pescadero Marsh in a manner to maximize its wildlife potential. Allowed uses within habitats of rare and endangered species include research, and fish and wildlife management to restore damaged habitats and to protect and encourage the survival of rare and endangered species. The State beach is located within the appeal jurisdiction of the California Coastal Commission.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with the applicable land use plan, policy, or regulation of any agency with jurisdiction over	☐	☐	☐	☒

the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

DISCUSSION

a) The proposed Project will not introduce a new land use nor substantially alter existing land uses at the site. The Project will be located entirely within the boundaries of Pescadero State Beach and will not divide an established community because none exists within the boundaries of the state beach. No impact.

b) The Project is consistent with the LCP section 7.16 "Permitted Uses in Wetlands" which permits diking, dredging, and filling only as it serves to maintain existing dikes and an open channel within the Pescadero Marsh Natural Preserve, where such activity is necessary for the protection of pre-existing dwellings from flooding, or where such activity will enhance or restore the biological productivity of the marsh, (7) diking, dredging, and filling in any other wetland only if such activity serves to restore or enhance the biological productivity of the wetland…"

The proposed Project is also consistent with the "Natural Preserve" designation, as it is an attempt to improve habitat for steelhead, a federally listed species. The data collected from the project are intended to inform management on the potential to improve survivorship of steelhead. The Project is determined to be not inconsistent with PRC 5019.71 regarding manipulations within a Natural Preserve. No impact.

c) There is no habitat conservation plan or natural community conservation plan that includes this California State Park unit. There is no impact.

XI. MINERAL RESOURCES

ENVIRONMENTAL SETTING

No significant mineral resources have been identified within the boundaries of the Project area at Pescadero State Beach. Mineral resource extraction is not permitted under the Resource Management Directives of DPR.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Result in the loss of availability of a known mineral resource that is or would be of value to	☐	☐	☐	☒

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

DISCUSSION

a) The Project will not result in the loss of availability of a known mineral resource because no known mineral resources exist within the Project boundary. No impact.

b) The Project will not result in the loss of availability of a locally important mineral resource recovery site because none exist within the project boundary. No impact.

XII. NOISE

ENVIRONMENTAL SETTING

The Project area at Pescadero State Beach is located adjacent to Highway 1. The existing noise environment is primarily influenced by natural sounds (ocean waves, wind, birds, etc.), with occasional noises from visitors and from vehicle traffic on Highway 1. The nearest sensitive receptors are residences adjacent to farming operations about a half mile to a mile away from the project. The closest school is over 1.5 miles away. The closest airport is at Half Moon Bay, about 20 miles north of Pescadero State Beach.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Generate or expose people to noise levels in excess of standards established in a local general plan or noise ordinance, or in other applicable local, state, or federal standards?	☐	☐	☐	☒
b) Generate or expose people to excessive groundborne vibrations or groundborne noise levels?	☐	☐	☐	☒
c) Create a substantial permanent increase in ambient noise levels in the vicinity of the project (above levels without the project)?	☐	☐	☐	☒
d) Create a substantial temporary or periodic increase in ambient noise levels in the vicinity of the project, in excess of noise levels existing without the project?	☐	☐	X	
e) Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport? If so,	☐	☐	☐	☒

would the project expose people residing or working in the project area to excessive noise levels?				
f) Be in the vicinity of a private airstrip? If so, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

DISCUSSION

a) Implementation of the Project will neither generate substantial noise levels nor expose people to high noise levels. No impact.

b) Implementation of the Project will be by an excavator, however, it will not t will not generate significant ground vibration or noise. No impact.

c) The Project will not result in a substantial permanent increase in ambient noise levels. No impact.

d) Only a very minimal increase in noise levels will be caused by implementation of this project for a short period during Project implementation. Less than Significant.

e) As noted in the Environmental Setting above, the nearest airport is more than 20 miles away. No impact.

f) The proposed Project area is not located in the vicinity of a known private airstrip. No impact.

XIII. POPULATION AND HOUSING

ENVIRONMENTAL SETTING

There is no housing within the boundaries of Pescadero State Beach. The State beach is both a local and regional recreational resource, used by the local population as well as tourists, but does not offer business or residential opportunities within its boundaries.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of	☐	☐	☐	☒

replacement housing elsewhere?

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

DISCUSSION

a-c) The Project does not have a housing or infrastructure component. All work will take place within the confines of the state beach boundaries. No new public or private projects are anticipated to be initiated as a result of this Project. No impact.

XIV. PUBLIC SERVICES

ENVIRONMENTAL SETTING

DPR provides law enforcement services within units of the State Park System. State Park Peace Officers with law enforcement authority patrol the park in vehicles and on foot, protect public safety, enforce California state laws, and guard against misuse of park property and resources. San Mateo County Sheriff's Department and the California Highway Patrol provide backup law enforcement services at Pescadero State Beach.

The California Department of Forestry and Fire Protection (CDF) provides fire protection services for the state beach. The CDF station is located on Pescadero Road off State Route 1, immediately adjacent to the state beach boundary and about a mile from the project site.

There are no schools within a mile of the State beach.

There are several other State parks located in the surrounding area, including Pomponio State Beach immediately to the north on Highway One, and San Gregorio State Beach less than five miles to the north on Highway One. Bean Hollow State Beach is about three miles to the south. All three of these state beaches are open for day use only. Butano State Park is located inland, approximate seven miles to the southeast, and allows overnight camping. San Mateo County Memorial Park is seven miles to the east and also offers day use and camping.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Result in significant environmental impacts from construction associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:	☐	☐	☐	☒

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

DISCUSSION

a) The proposed Project will only affect the Pescadero Lagoon and the sandbar that forms at the mouth of Pescadero Creek. The proposed Project will have no impact on other public services. The proposed Project will not result in an increase of visitation to the park, and the level of required fire or police services will not change as a result of the Project. The Project will not result in any change of use or introduce any new use at the park that will affect existing schools or require additional schools or school personnel. No impact.

XV. RECREATION

ENVIRONMENTAL SETTING

Pescadero State Beach is located on the central California coast, 17 miles south of Half Moon Bay in San Mateo County. This park unit contains sandy beaches and coastal dunes, as well as a coastal wetland complex that includes a lagoon at the confluence of Pescadero and Butano Creeks, fresh and brackish water marshes, and brackish water ponds. The proposed Project is located at the mouth of Pescadero lagoon within Pescadero Marsh Natural Preserve.

The majority of visitors spend their time at the beach. Those who enter the marsh on foot currently hike in to North Pond (from the North Pescadero parking lot), into the main lagoon area (from the Middle Pescadero Parking lot), or into the Butano Marsh area (from a parking area along the side of Pescadero Road). The marsh is a popular destination for short hikes and interpretive walks, and environmental education groups lead school field trips here. Bird watching, fishing, and kayaking are other popular activities.

Facilities at the State beach include three paved parking lots with vault toilets. Two additional unpaved parking lots are located in the state beach: one at the boat launch area off of Pescadero Road, and another at the ranger station on Water Lane. Two interpretive signs and displays are located near the beach side of the state beach.

There are several other recreation resources within ten miles of Pescadero State Beach. These include Pomponio, San Gregorio, and Bean Hollow State Beaches; Butano State Park; and San Mateo County Memorial Park.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities, such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

DISCUSSION

a) The proposed Project is intended to improve habitat within the lagoon for salmonids by controlling the timing of annual breaching of the sandbar. The Project will not affect recreational facilities at Pescadero State Beach and, thereby, will not increase the use of existing neighborhood or regional parks or other recreation facilities. No impact.

b) The Project does not include recreational facilities, will not displace any existing recreational facilities, or result in the need for the construction or expansion of existing recreational facilities. No impact.

XVI. TRANSPORTATION/TRAFFIC

ENVIRONMENTAL SETTING

ROADS AND HIGHWAYS

Regional access to the Project area is via State Route 1, a two-lane highway on a northwest-southeast alignment. State Route 1 at the Project site is designated as a State Scenic Highway, from the Santa Cruz County line south of the state beach to the southern city limit of Half Moon Bay to the north.

Project implementation and staging activities for the proposed project will take place entirely within the park boundaries. No lane or road closures are anticipated. The proposed Project will not change the Level of Service on State Route 1. In addition, no parking will change as a result of the Project.

PUBLIC TRANSIT

Public transit service within the County of San Mateo is provided by the San Mateo County Transit District (SamTrans). Route 15 provides limited service from Half Moon Bay to the city of Pescadero, within walking distance of the state beach. In 2001, the County of San Mateo

adopted Countywide Transportation Plan 2010, which includes policies for improving transportation within the County. It seeks to increase capacity of and demand for transit systems, and a decrease in traffic congestion.

BICYCLE AND PEDESTRIAN ACCESS

Bicyclists may use State Route 1. Because of the remote nature of the State beach, bicycle and pedestrian access is minimal for all but local users and some travelers on State Route 1.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Cause a substantial increase in traffic, in relation to existing traffic and the capacity of the street system (i.e., a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	☐	☐	☐	☒
b) Exceed, individually or cumulatively, the level of service standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Cause a change in air traffic patterns, including either an increase in traffic levels or a change in location, that results in substantial safety risks?	☐	☐	☐	☒
d) Contain a design feature (e.g., sharp curves or a dangerous intersection) or incompatible uses (e.g., farm equipment) that would substantially increase hazards?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Result in inadequate parking capacity?	☐	☐	☐	☒
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☐	☒

DISCUSSION

a) Project implementation and access to the Project area will not cause any increase in traffic. No impact.

b) Project implementation and access to the Project area will not create an increase in visitation and will not exceed service standards. No impact.

c) The Project area is not located within an airport land use plan, within two miles of a public airport, or in the vicinity of a private air strip, and does not serve as a normal reporting point

for air traffic in the area. The Project will not in any way affect or change existing air traffic patterns in the area. Therefore, no impact will occur as a result of the Project.

d) No portion of the Project design or implementation contains any element that will increase hazards to traffic or other forms of transportation. No impact.

e) All Project-related activities will occur within the boundaries of Pescadero State Beach. No emergency access will be affected. No impact.

f) The Project will not substantially increase the number of visitors to the Project area. It will not make any changes to existing parking areas. No impact.

g) The Project will not result in any changes regarding alternative transportation. The Project does not conflict with San Mateo County's Countywide Transportation Plan 2010. No impact.

XVII. UTILITIES AND SERVICE SYSTEMS

ENVIRONMENTAL SETTING

A DPR well provides water service to staff facilities at Pescadero State Beach, and drinking water is trucked through a commercial service. Sewage treatment for staff is provided via leach fields. There is no public access to water or restrooms at the ranger station. The three beach parking lots along Highway One have vault toilets, which are serviced by DPR staff. DPR staff also manages the collection and disposal of refuse. Pacific Gas and Electric (PG&E) supplies electricity and AT&T supplies phone service. The Project does not require access to or any change in existing utilities at the state beach.

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Exceed wastewater treatment restrictions or standards of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities?	☐ Yes	☒ **No**		
Would the construction of these facilities cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities?	☐ Yes	☒ **No**		

	Would the construction of these facilities cause significant environmental effects?	☐	☐	☐	☒
d)	Have sufficient water supplies available to serve the project from existing entitlements and resources or are new or expanded entitlements needed?	☐	☐	☐	☒
e)	Result in a determination, by the wastewater treatment provider that serves or may serve the project, that it has adequate capacity to service the project's anticipated demand, in addition to the provider's existing commitments?	☐	☐	☐	☒
f)	Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒
g)	Comply with federal, state, and local statutes and regulations as they relate to solid waste?	☐	☐	☐	☒

DISCUSSION

a) Pescadero State Beach is within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board. The Project will be in compliance with all applicable water quality standards and waste discharge requirements. No impact.

b-d) There is no water, wastewater, or stormwater drainage related to this Project. No impact.

e,f) Wastewater treatment services are provided by DPR personnel with DPR-owned facilities. The proposed work will not increase the park's wastewater or solid waste disposal needs. No impact.

g) The Project will comply with all federal, state, and applicable local statutes and regulations as they relate to solid waste. No impact.

CHAPTER 4
MANDATORY FINDINGS OF SIGNIFICANCE

	POTENTIALLY SIGNIFICANT IMPACT	LESS THAN SIGNIFICANT WITH MITIGATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
WOULD THE PROJECT:				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal?	☐	☐	☒	☐
b) Have the potential to eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☒
c) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means the incremental effects of a project are considerable when viewed in connection with the effects of past projects, other current projects, and probably future projects?)	☐	☐	☒	☐
d) Have environmental effects that will cause substantial adverse effects on humans, either directly or indirectly?	☐	☐	☐	☒

DISCUSSION

a) The Project has been designed to avoid impacts on natural resources, including sensitive species. The inclusion of avoidance and minimization measures will ensure that the risk of impacts to sensitive species, their habitats and sensitive natural communities will be at less than significant levels.

b) No examples of California history or prehistory in the Project area, so none will be eliminated by this project. No impact.

c) The potential negative impacts of the Project are minor. There are no additional projects planned in the vicinity. The risk of cumulatively considerable impacts from past and planned projects is less than significant.

d) The Project will not directly or indirectly have substantial adverse effects on humans. No impact.

CHAPTER 5
SUMMARY OF CONDITIONS

The following project requirements and avoidance measures will be implemented by the NOAA Restoration Center as part of the proposed Project.

AESTHETICS

- **NO MITIGATION MEASURES NEEDED**

AGRICULTURAL RESOURCES

- **NO MITIGATION MEASURES NEEDED**

AIR QUALITY

- **NO MITIGATION MEASURES NEEDED**

BIOLOGICAL RESOURCES

Project Requirements and Avoidance and Minimization Measures
Avoidance and Minimization Measure BIO-1: Surveys for Coastal marsh milkvetch individuals will be conducted within vehicle access routes and staging areas, and surrounding areas, prior to Project breaching activities. Any Coastal marsh milkvetch individuals will be mapped and protected by establishing a 50-foot buffer which will be avoided by equipment and personnel during breaching events. **Avoidance and Minimization Measure BIO-2:** The Project is designed to be implemented to avoid impacts to steelhead, including breaching during tidal and instream flow conditions so velocity of flow is not too great to flush out fish to the ocean. The outflow velocity during the breach is expected to be less than swimming speed threshold of juvenile steelhead rearing in the lagoon. **Avoidance and Minimization Measure BIO-3:** During Project breaching activities, the excavator/backhoe will be stationed outside of the lagoon. Only the bucket of the excavator/backhoe may operate in the lagoon. At no time shall the main body of the excavator/backhoe enter the lagoon. **Avoidance and Minimization Measure BIO-4:** A CDFW and USFWS-approved biological monitor shall be on-site during all breaching activities to determine if the excavator is working sufficiently to mechanically breach at the rate to avoid swift velocities of water flowing to the ocean.

Avoidance and Minimization Measure BIO-5: Depending on tides and water quality conditions, breaching during an incoming mean high-high tide that is followed by a mean low-low tide will be avoided. The breach will occur during a reduced tide range, further facilitating bar closure and minimizing impacts from reduced lagoon inundation on rearing habitat.

Avoidance and Minimization Measure BIO-6: A qualified biologist will seine the lagoon west of the Highway 1 Bridge for tidewater goby prior to the breach. Any tidewater gobies collected will be relocated upstream before the breach to allow gobies to find refuge in slow moving water.

Avoidance and Minimization Measure BIO-7: A qualified biologist will conduct pre-Project surveys for the California red-legged frog and other special-status species within the Project area, along equipment access routes and within staging areas within 24 hours prior to the planned start of breaching activities.

Avoidance and Minimization Measure BIO-8: If breaching will occur during the California red-legged frog breeding season (November 1 to May 30), a qualified biologist will conduct focused survey in areas containing emergent vegetation for egg masses prior to breaching. If egg masses are found, the biologist will move egg masses to a location that will not be impacted by Project activities. Project personnel will avoid entering frog breeding habitat to avoid dislodging the egg masses.

Avoidance and Minimization Measure BIO-9: During breaching activities, the excavator will not be driven or used in any sensitive wetland features except at the lagoon mouth. These features include swales, seasonal pools, emergent vegetation, and riparian areas. Any wetland features within 50 feet of the Project area will be clearly flagged by the approved biologist to prevent work crews from entering and disturbing the areas.

Avoidance and Minimization Measure BIO-10: If California red-legged frogs are documented within the Project area, including equipment access routes, a biological monitor will walk in front of the equipment as it drives along the path to ensure frogs are not in harm's way.

Avoidance and Minimization Measure BIO-11: If any California red-legged frog enter the equipment access or travel routes, all work will stop until the animal leaves on its own. Only a biologist permitted by the USFWS and approved by CDFW for this Project to handle California red-legged frogs is authorized to handle and relocate individuals.

Avoidance and Minimization Measure BIO-12: In order to prevent the movement of invasive plant and animal species, fungi, and other biotic agents from external ecological regions, all ground-disturbing equipment and Project personnel clothing will be washed prior to entry and staging onto construction sites and the "Declining Amphibian Populations Task Force Fieldwork Code of Practice" procedures shall be followed.

Any equipment that will enter the water during construction will be decontaminated before and after construction to prevent the spread of aquatic diseases, such as ranavirus, and invasive aquatic species, such as quagga mussel. Workers will also decontaminate waders, boots and other clothing that will come in direct contact with the water. Decontamination of clothing and equipment will be done, before entering the boundaries of Pescadero State Beach and the Preserve, through one or more of the following methods:

- Drying equipment in an upland location following last aquatic use. If average daytime temperatures exceed 80° F, drying times shall be at least 7 days. If average daytime temperatures are below 80° F, drying times shall be at least 30 days;
- Scalding water wash (at least 140° F) with varying high and low pressure spray to dislodge pathogens, vegetation, and contaminated sediment;
- Freezing at a temperature of less than 32° F for more than 72 hours; and/or
- Soaking in a hospital-grade disinfectant solution for at least two minutes (or longer, based on product directions). To avoid harm to non-target species, disinfected clothing and equipment shall be thoroughly rinsed in a water bath before entering onto State Park property.

Repeat decontamination is required only if the equipment/clothing is removed from the site, used within a different waterbody, and returned to the project site. Decontamination will take place in an upland location outside of State Park boundaries, and any chemicals used during decontamination will be prevented from entering water bodies or stormwater drains.

Avoidance and Minimization Measure BIO-13: A qualified biologist will conduct an education session on special-status species that may be present within the Project area. The training will consist of basic identification of the species, their basic habits, how they may be encountered in the work area, and procedures to follow when they are encountered. Any personnel joining the work crew later will receive the same training before beginning work.

Avoidance Measure BIO-14: The San Francisco garter snake is protected under FGC Section 5050. Under this statute, take of a fully protected species may not occur except for scientific or recovery purposes. Catch, pursue, capture or attempt to catch, pursue and capture is considered take as defined in Section 86 of the FGC. Because of this, any San Francisco garter snake encountered in the work area will not be handled and will be left alone until it leaves the area on its own. If San Francisco garter snakes are found within the Project area, all Project activities will cease and CDFW will be notified immediately. Activities will not resume until measures to avoid take of San Francisco garter snakes are adopted.

Avoidance and Minimization Measure BIO-15: A qualified biologist will conduct a survey for the western pond turtle within the Project area, equipment access routes and staging areas within 48 hours of the planned start of a breaching event. If the turtle is documented within any of these areas, CDFW will be notified immediately, and individual(s) will be left alone to

move out of the area. If an individual does not move on its own, it may be relocated by the biologist to suitable habitat located at least 300 feet away from Project activities.

Avoidance and Minimization Measure BIO-16: If Project activities are scheduled during the breeding season for western snowy plovers which is from March 1 until September 14, a qualified biologist will conduct pre-construction surveys for active snowy plover nests. An active nest is defined as a nest having eggs or chicks present, or a nest that adult birds have staked a territory and are displaying, scraping, or constructing a nest. If an active nest is found, consultation will occur with CDFW and the USFWS regarding appropriate action to comply with the Migratory Bird Treaty Act of 1918 and the FGC. Surveys will be conducted in all suitable habitat present within the Project area, including the beach, beach access sites, and along large equipment transportation and access routes

Avoidance and Minimization Measure BIO-16: If Project activities are scheduled during the breeding season for western snowy plovers which is from March 1 until September 14, a qualified biologist will conduct pre-construction surveys for active snowy plover nests. Surveys will be conducted in all suitable habitat present within the Project area, including the beach, beach access sites, and along large equipment transportation and access routes. An active nest is defined as a nest having eggs or chicks present, or a nest that adult birds have staked a territory and are displaying, scraping, or constructing a nest. If a lapse in Project-related work of 15 days or longer occurs, another focused survey will be conducted before breaching is reinitiated. If an active nest is found, consultation will occur with CDFW and the USFWS regarding appropriate action to comply with the Migratory Bird Treaty Act of 1918 and the FGC.

If an active nest is found within 600 feet of the Project area, including access sites and transportation routes for the Project personnel and excavator, the preferred option will be to wait until the young have fledged to start breaching activities. If waiting until the end of the nesting season is not possible, an approved biologist will be onsite during all Project activities. The approved biologist will clearly mark/flag or erect temporary fencing (symbolic fencing) to designate the work area and to delineate the nest areas that will be avoided. Flagging and or temporary construction fencing will be removed immediately after the completion of breaching activities. The approved biologist will monitor the behavior of the birds (adults and young, when present) at the nest site to ensure that they are not disturbed by Project activities. Nest monitoring will continue during all breaching activities until the young have fully fledged or have left the nest site, as determined by the biologist. All breaching activities will stop if western snowy plover adults or chicks are showing signs of distress, agitation or disturbance.

Avoidance and Minimization Measure BIO-17: To avoid attracting predators of western snowy plover, the Project area will be maintained trash-free and food refuse will be contained in secure bins and removed daily.

CULTURAL RESOURCES

Project Requirement and Avoidance and Minimization MeasuresCult-1 and Cult-2
Avoidance and Minimization Measure Cult-1: In the unlikely event that the Project inadvertently encounters prehistoric or historic archaeological artifacts or features, all work at the location of the find must temporarily cease until a qualified archaeologist has evaluated the significance of the find and provided detailed recommendations leading to the mitigation of the finds. Avoidance and Minimization Measure Cult-2: If human remains are found, the Project manager will immediately notify the San Mateo County Coroner's Office and consult with that office in regards to appropriate disposition of the remains per Public Health and Safety regulation and Public Resources Code 5097. In the unlikely event that the Project inadvertently encounters prehistoric or historic archaeological artifacts or features, all work at the location of the find must temporarily cease until a qualified archaeologist has evaluated the significance of the find and provided detailed recommendations leading to the mitigation of the finds. If human remains are found, the Project manager will immediately notify the San Mateo County Coroner's Office and consult with that office in regards to appropriate disposition of the remains per Public Health and Safety regulation and Public Resources Code 5097.

GEOLOGY AND SOILS

- **NO MITIGATION MEASURES NEEDED**

GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

- **NO MITIGATION MEASURES NEEDED**

HAZARDS AND HAZARDOUS MATERIALS

- **NO MITIGATION MEASURES NEEDED**

HYDROLOGY AND WATER QUALITY

Project Requirement and Avoidance and Minimization Measure WQ-1
Any equipment driven and/or operated adjacent to the lagoon shall be checked and maintained daily to prevent leaks of materials that if introduced to water could be deleterious to aquatic life, wildlife or wetland habitat. The excavator shall be moved off of the State to refuel.

LAND USE AND PLANNING

- **NO MITIGATION MEASURES NEEDED**

MINERAL RESOURCES
- **NO MITIGATION MEASURES NEEDED**

NOISE
- **NO MITIGATION MEASURES NEEDED**

POPULATION AND HOUSING
- **NO MITIGATION MEASURES NEEDED**

PUBLIC SERVICES
- **NO MITIGATION MEASURES NEEDED**

RECREATION
- **NO MITIGATION MEASURES NEEDED**

TRANSPORTATION/TRAFFIC
- **NO MITIGATION MEASURES NEEDED**

UTILITIES AND SERVICE SYSTEMS
- **NO MITIGATION MEASURES NEEDED**

CHAPTER 6
REFERENCES

Introduction

Huber, E. 2014. February 9-10, 2014 Pescadero Lagoon Breach Fish Kill Report. Unpublished report. University of California, Berkeley. March 21, 2014.

ESA. 2003. Re-Survey of the 1987 Pescadero Marsh Cross-sections on Pescadero Creek. Department of Parks and Recreation, Bay Area District, San Francisco, CA. 14 pp.

National Oceanic and Atmospheric Administration (NOAA) Restoration Center. 2006. Supplemental Programmatic Environmental Assessment of NOAA Fisheries' Implementation Plan for the Community Based Recreation Program. Internet address: http://www.habitat.noaa.gov/pdf/s pea june 2006 final 62306.pdf Accessed August 7, 2012.

National Marine Fisheries Service. 2012. Final Recovery Plan for Central California Coast coho salmon Evolutionarily Significant Unit. National Marine Fisheries Service, Southwest Region, Santa Rosa, California. National Marine Fisheries Service. 2012

Aesthetics

California Department of Transportation. Officially Designated Scenic Highways. Internet Address: http://www.dot.ca.gov/hq/LandArch/scenic/schwy.htm

San Mateo County. 1998. Local Coastal Program, Environmental Services Agency, Planning and Building Division, San Mateo County, California. Internet address: http://www.co.sanmateo.ca.us/vgn/images/portal/cit_609/10073428lcp_1098.pdf

Agricultural Resources

California Department of Parks and Recreation. 1979. San Mateo Coast Area General Plan.

San Mateo County. 1986. General Plan Policies. Department of Environmental Management, Planning and Building Division, San Mateo County, California. Internet address: www.co.sanmateo.ca.us/vgn/images/portal/cit_609/10073472gp_polis.pdf

San Mateo County. 1999. Zoning Regulations. Department of Environmental Management, Planning and Building Division, San Mateo County, California. Internet address: www.co.sanmateo.ca.us/vgn/images/portal/cit_609/9441580Zregs-p.pdf

Air Quality and Climate Change

Bay Area Air Quality Management District, 2009. BAAQMD CEQA Guidelines - Assessing the Air Quality Impacts of Projects and Plans, San Francisco, California. Internet address: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

Bay Area Air Quality Management District (BAAQMD), 2012. Internet address: www.baaqmd.gov

California Air Resources Board (CARB), 2012. Area Designation Maps: State 2006-2009 data, 2011 map and National (current as of February 2011) Designations. Internet address: http://www.arb.ca.gov/desig/adm/adm.htm

California Air Resources Board, Planning and Technical Support Division. 2009. The 2009 Almanac of Emissions and Air Quality. Internet address: http://www.arb.ca.gov/aqd/almanac/almanac09/almanac2009all.pdf

Healthy Community Collaborative of San Mateo County. 2008. Community Assessment - Health and Quality of Life in San Mateo County. Internet address: www.plsinfo.org/healthysmc/pdf/2008FullReport_CommunityAssessment.pdf

Biological Resources

Anderson, K. R. 1995. A status review of the coho salmon (*Oncorhynchus kisutch*) in California sought of San Francisco Bay. Prepared for California Department of Fish and Game, Monterey.

Atkinson, K.A. 2010. Habitat conditions and steelhead abundance and growth in a California lagoon. Master's thesis. San Jose State University, San Jose, California.

Barnhart, R.A. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest) - Steelhead. U.S. Fish and Wildlife Service Biological Report 82(11.60):1-21.

Barry, S. 1992. Letter to Marvin L. Plenert, Regional Director, U.S. Fish and Wildlife Service, Portland, Oregon, regarding proposed listing.

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.

Behrens, D.K., F.A. Bombardelli, J.L. Largier, and E. Twohy. 2009. Characterization of time and spatial scales of a migrating rivermouth. Geophysical Research Letters, Vol 36, L09402.

Bell, M.C. 1973. Fisheries handbook of engineering requirements and biological criteria. State Water Resources Control Board, Fisheries Engineering Research Program, Portland, Oregon. Contract No. DACW57-68-C-006.

Bertin, X., E. Chaumillon, A. Sottolichio, and R. Pedreros. 2005. Tidal inlet response to sediment infilling of the associated bay and possible implications of human activities: The Marennes-Oléron Bay and the Masmusson Inlet, France. Continental Shelf Research 25(9): 1115-1131.

Bilby, R.E., B.R. Fransen, and P.A. Bisson. 1996. Incorporation of nitrogen and carbon from spawning coho salmon into the trophic system of small streams: evidence from stable isotopes. Canadian Journal of Fisheries and Aquatic Sciences 53:164-173.

Bilby, R.E., B.R. Fransen, P.A. Bisson, and J.K. Walter. 1998. Response of juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss*) to the addition of salmon carcasses to two streams in southwestern Washington, United States. Canadian Journal of Fisheries and Aquatic Sciences 55:1909-1918.

Bjorkstedt, E.P., B.C. Spence, J.C. Garza, D.G. Hankin, D. Fuller, W.E. Jones, J.J. Smith, and R. Macedo. 2005. An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the north-central California coast recovery domain. NOAA, National Marine Fisheries Service, Southwest Fisheries Science Center. 210 pp.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138 in W.R. Meehan, editor. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19. American Fisheries Society. Bethesda, MD. 751 pp.

Bond, M.H. 2006. Importance of estuarine rearing to Central California steelhead (*Oncorhynchus mykiss*) growth and marine survival. Master's thesis. University of California, Santa Cruz, Santa Cruz, California.

Bond, M.H., S.A. Hayes, C.V. Hanson, and R.B. MacFarlane. 2008. Marine survival of steelhead (Oncorhynchus mykiss) enhanced by a seasonally closed estuary. Can. J. Aquat. Sci. Vol. 65: 2242-2252.

Bosch J, Martinez-Solano I, Garcia-Paris M., 2000 Evidence of a chytrid fungus infection involved in the decline of the common midwife toad (*Alytes obstetricans*) in protected areas of central Spain. Biol Conserv 97:331-337.

Bulger, J. B., N. J. Scott Jr., and R. B. Seymour. 2003. Terrestrial activity and conservation of adult California red-legged frogs *Rana aurora draytonii* in coastal forests and grasslands. Biological Conservation 110:85-95.

Bury, R.B and J.A. Whelan. 1984. Ecology and management of the bullfrog. Fish and Wildlife Service Resource Publication 155.

Busby, P.J., T.C. Wainwright, G.J. Bryant, L. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC-27. NOAA, National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington. August, 1996.

California Department of Fish and Game (CDFG). 2012. RAREFIND. California Natural Diversity Data Base, Natural Heritage Division, Sacramento, California.

California Department of Fish and Wildlife (CDFW). 2014. California Native Diversity Data Base (CNDDB). Internet address: http://www.dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp

California Department of Parks and Recreation. 1978. Pescadero State Beach Inventory of Features.

California Native Plant Society (CNPS). 2010. Online Inventory of Rare and Endangered Plants, 7th Edition (v7-12may 5-15-12). Accessed on July 7, 2014. Internet address: http://www.rareplants.cnps.org/.

California Native Plant Society (CNPS). 2009. Inventory of Rare and Endangered Plants (online edition). Rare Plant Scientific Advisory Committee. California Native Plant Society. Sacramento, CA. Accessed on July 7, 2014. Internet address: http://www.rareplants.cnps.org/.

Casler, B.R., C.E. Hallett, and M.A. Stem. 1993. Snowy Plover nesting and reproductive success along the Oregon coast -1993. Unpublished report for the Oregon Department of Fish and WildlifeNongame Program, Portland, and the Coos Bay District Bureau of Land Management, Coos Bay.

Center for Ecosystem Management and Restoration. 2010. Considerations for Restoration of the Pescadero Marsh. A report based upon the proceedings of the December 2008 Public Forum Restoration of Pescadero Marsh: Identifying Problems and Exploring Solutions. Prepared for the Pescadero Marsh Working Group. Funding provided by the California Coastal Conservancy and the U.S. Fish and Wildlife Service. December 2010. 58 p.

Chang, H.H. 1997. Modeling fluvial process in tidal inlet. Journal of Hydraulic Engineering. Vol. 123, No. 12: 1161-1165.

Cooper, J.A.G. 2001. Geomorpholigical variability among microtidal estuaries from the wave-dominated South African coast. Geomorphology 40(1): 99-122.

Corelli, T. and Chandik, Z. 1995. The Rare and Endangered Plants of San Mateo and Santa Clara County. *Monocot Press: Half Moon Bay, CA.*

COSEWIC. 2008. COSEWIC assessment and update status report on the Great Blue Heron fannini subspecies Ardea herodias fannini in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 39 pp.

Crump, D. E. Jr. 2001. "Western Pond Turtle *(Clemmys marmorata pallida):* Nesting Behavior and Habitat Use." Master's Thesis, San Jose State University.

Curry, R., R. Houghton, T. Kidwell and P. Tang. 1985. Pescadero Marsh Management: A plan for persistence and productivity. Report to California State Parks and Recreation #4-823-4010. Santa Cruz, California; University of California.

Davis, C. J. 1998. "Western Pond Turtle *(Clemmys marmorata pallida):* Winter Habitat Use and Behavior." Master's Thesis, San Jose State University.

Davidson, E. W., M. Parris, J. P. Collins, J. E. Longcore, A. P. Pessier, J. Brunner. 2003. Pathogenicity and transmission of *Chytridiomycosis* in tiger salamanders (*Ambystoma tigrinum*). Copeia 2003(3):601–607.

Department of the Interior. 1994. "Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for the Tidewater Goby." *Federal Register,* Vol. 59, No.24, Feb. 2, 1994, pp-5494-5500.

Emlen, S. T. 1977. “Double Clutching” and its possible significance in the bullfrog. Copeia 1977(4):749-751.

ESA (Environmental Science Associates). 2008. Pescadero Marsh Restoration Assessment and Recommendations for Ecosystem Management. Prepared for California Department of Parks and Recreation. March 2008. 87p.

ESA PWA (Pacific Watershed Associates). 2011. Geomorphic evolution of Pescadero Marsh: 1987-2011. Results of field monitoring and data collection. Draft Report. Prepared for San Mateo County Resource Conservation District and California Department of Parks and Recreation. September 1, 2011. 75p.

Fancher, J., R. Zembal, L. Hays, and P. Knapp. 1998. Western snowy plover nesting at Bolsa Chica, Orange County, California, 1998. Fish and Wildlife Service, Carlsbad Office, October 1998.

Fellers, G. 2005. *Rana draytonii* Baird and Girard, 1852b California red-legged frog. Pages 552-554 *in* M. Lannoo (editor). Amphibian declines the conservation status of United States species. University of California Press. Berkeley, California.

Fisher, R. N., and H. B. Schaffer. 1996. The Decline of Amphibians in California's Great Central Valley. Conservation Biology 10(5):1387-1397.

Foster, M.L. 1977. Status of Salt Marsh Yellowthroat *(Geothlypis trichas sinuosa)* in the San Francisco Bay Area, California, 1975-76. California Department of Fish and Game. Internet Address: https://www.dfg.ca.gov/wildlife/nongame/publications/.../bm77.html

Garner, T. W. J., M. W. Perkins, P. Govindarajulu, D. Seglie, S. Walker, A. A. Cunningham, and M. C. Fisher. 2006. The Emerging Amphibian Pathogen *Batrachochytrium dendrobatidis* Globally Infects Introduced Populations of the North American Bullfrog, *Rana catesbeiana*. Biology Letters 2:455-459.

Germano, D.J. and R.B. Bury. 2001. Western pond turtles (*Clemmys marmorata*) in the Central Valley of California: status and population structure. Transactions of the Western Section of the Wildlife Society 37: 22-36.

Good, T.P., R.S. Waples, and P. Adams, editors. 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. NOAA Technical Memorandum NMFS-NWFSC-66. NOAA, National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington. June, 2005.

Gresh, T., J. Lichatowich, and P. Schoonmaker. 2000. An estimation of historic and current levels of salmon production in the northeast pacific ecosystem. Fisheries 15(1):15-21.

Harland Bartholomew and Associates, Inc (HBA). 1996. Santa Rosa Subregional Long-term Wastewater Project. Prepared for City of Santa Rosa and U.S. Army Corps of Engineers. Page 93-94.

Hanson, L.C. 1993. The foraging ecology of harbor seals, Phoca vitulina, and California sea lions, *Zalophus californianus*, at the mouth of the Russian River, California. Master of Arts thesis, Sonoma State University, Rohnert Park, CA.

Hayes, M. P., and M. R. Jennings. 1988. Habitat Correlates of Distribution of the California Red-Legged Frog (*Rana aurora draytonii*) and the Foothill Yellow-Legged Frog (*Rana boylii*): Implications for Management. Pages 144-158 in R. Sarzo, K. E. Severson, and D. R. Patton (technical coordinators). Proceedings of the Symposium on the Management of Amphibians, Reptiles, and Small Mammals in North America. United States Department of Agriculture, Forest Service, Rocky Mountain Range and Experiment Station, Fort Collins, Colorado. General Technical Report (RM-166): 1-458.

Hayes, M. P. and D. M. Krempels. 1986. Vocal Sac Variation among Frogs of the Genus Rana from Western North America. Copeia 1986(4):927-936.

Hayes, M. P. and M. M. Miyamoto. 1984. Biochemical, Behavioral and Body Size Differences between *Rana aurora aurora* and *R. a. draytonii*. Copeia 1984(4):1018-1022.

Hayes, M. P., and M. R. Tennant. 1985. Diet and Feeding Behavior of the California Red-Legged Frog, *Rana aurora draytonii* (Ranidae). Southwestern Naturalist 30(4): 601-605.

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.

Hayes, S.A., M.H. Bond, C.V. Hanson, A.W. Jones, A.J. Ammann, J.A. Harding, A.L. Collins, J. Perez, R.B. MacFarlane. 2011. Down, up, down and "smolting" twice? Seasonal movement patterns by juvenile steelhead (*Oncorhynchus mykiss*) in a coastal watershed with a bar closing estuary. Can. J. Fish. Aquat. Sci. Vol. 68: 1341-1350.

Hays, D., K.R. McAllister, S.A. Richardson, and D.W. Stinson. 1999. Washington State recovery plan for the western pond turtle. Washington Department of Fish and Wildlife, Olympia.

Hershler, R., C.L. Davis, C.L. Kitting and H. Liu. 2007. Discovery of Introduced and cryptogenic Cochliopid Gastropods in the San Francisco Estuary, California. Journal of Molluscan Studies Advance Access.

Hickman, J.C. Ed. 1993. *The Jepson Manual: Higher Plants of California.* University of California Press. Berkeley, CA.

Hobson, K., P. Perrine, E.B Roberts, M.L. Foster, and P. Woodin. 1986. A breeding season survey of Salt Marsh Yellowthroats (*Geothlypis trichas sinuosa*) in the San Francisco Bay region. San Francisco Bay Bird Observatory report to U.S. Fish & Wildl. Serv., Contract 84-57.

Hokanson, K. E. F., C. F. Kleiner, and T. W. Thorslund. 1977. Effects of constant temperatures and diel temperature fluctuations on specific growth and mortality rates of juvenile rainbow trout, *Salmo gairdneri*. Journal of the Fisheries Research Board of Canada 34:639-648.

Holland, D.C. 1994. "The Western Pond Turtle: Habitat and History." Final Report prepared for the U.S. Department of Energy, Bonneville Power Administration: Portland, OR.

Huber, E. and S. Carlson. 2012. Sink or swim: steelhead performance in a coastal marsh-bar built estuary wetland complex. University of California Berkeley, Department of Environmental Science, Policy & Management. Paper presented at the 30th Annual Salmonid Restoration Conference, Davis, California, April 4-7.

Jankovitz, J. 2012. 2011-2012 Escapement Estimates for Central California Coast Coho Salmon (*Oncorhynchus kisutch*) and Steelhead (*Oncorhynchus mykiss*) South of the Golden Gate. Unpublished Report.

Jankovitz, J. 2013. 2012-2013 Escapement Estimates for Central California Coast Coho Salmon (*Oncorhynchus kisutch*) and Steelhead (*Oncorhynchus mykiss*) South of the Golden Gate. Unpublished Report.

Jennings, M. R. 1992. "Final Report of Preliminary Studies on Habitat Requirements of the San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*) at Pescadero Marsh and Theodore J. Hoover Natural Preserves." California Academy of Sciences: San Francisco, CA.

Jennings, M. R., and M. P. Hayes. 1985. Pre-1900 overharvest of California red-legged frogs (*Rana aurora draytonii*): The inducement for bullfrog (*Rana catesbeiana*) introduction. Herpetological Review 31(1):94-103.

_____ 1990. Final report of the status of the California red-legged frog (*Rana aurora draytonii*) in the Pescadero Marsh Natural Preserve. Final report prepared for the California Department of Parks and Recreation, Sacramento, California, through Agreement (4-823-9018). Department of Herpetology, California Academy of Sciences, Golden Gate Park, San Francisco, California. 30 pages.

_____ 1994. Amphibian and reptile species of special concern in California. California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. 255 pages.

Jennings, M. R., M. P. Hayes, and D. C. Holland. 1992. A petition to the U.S. Fish and Wildlife Service to place the California red-legged frog (*Rana aurora draytonii*) and the western pond turtle (*Clemmys marmorata*) on the List of Endangered and Threatened Wildlife and Plants. 21 pages.

Johnson, C. Internet Address: http://northwestwildlife.com/wp-content/uploads/2013/12/Great-Blue-Heron.pdf.

Keel, P., McGinnis, S. M., and L. Smith. 1991. “Habitat Requirements and Population Estimate for the San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*) at Ano Nuevo State Reserve, San Mateo County, California.” A Study Conducted for the California Department of Parks and Recreation: Sacramento, CA.

Kellogg, M. G. 1980. Status of the California Brackishwater Snail, *Tryonia imitator,* in Central California. Inland Fisheries Endangered Species Program, Special Publication 80-3. California Department of Fish and Game: Sacramento, CA.

Kraus, N.C., A. Militello, and G. Todoroff. 2002. Barrier breaching processes and barrier spit breach, Stone Lagoon, California. Shore & Beach 70(4):21-28.

Kraus, N.C., K. Patsch, and S. Munger. 2008. Barrier beach breaching from the lagoon side, with reference to Northern California. Shore & Beach. Volume 76, No. 2. Spring 2008. 11p.

Kruse, K. C. and M. G. Francis. 1977. A predation deterrent in larvae of the bullfrog, *Rana catesbeiana*. Transactions of the American Fisheries Society 106(3):248-252.

Kupferberg, S. J. 1996a. Hydrologic and geomorphic factors affecting conservation of a river-breeding frog (*Rana boylii*). Ecological Applications 6: 1322-1344.

_____ 1996b. The ecology of native tadpoles (*Rana boylii* and *Hyla regilla*) and the impacts of invading bullfrogs (*Rana catesbeiana*) in a northern California river. PhD dissertation. University of California, Berkeley, California.

_____ 1997. Bullfrog (*Rana catesbeiana*) invasion of a California river: the role of larval competition. Ecology 78(6):1736-1751.

Larsen, S. 1994. Life history aspects of the San Francisco garter snake at the Millbrae habitat site. Unpublished Master's Thesis. California State University, Hayward.

Laufle, J.C., G.B. Pauley, and M.F. Shepard. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Northwest) - coho salmon. U.S. Fish Wildlife Serv. Biol. Rep. 82(11.48). U.S. Army Corps of Engineers, TREL-82-4.

Lindley, S. T., C. B. Grimes, M. S. Mohr, W. Peterson, J. Stein, J. T. Anderson, L.W. Botsford, D. L. Bottom, C. A. Busack, T. K. Collier, J. Ferguson, J. C. Garza, A. M. Grover, D. G. Hankin, R. G. Kope, P. W. Lawson, A. Low, R. B. MacFarlane, K. Moore, M. Palmer-Zwahlen, F. B. Schwing, J. Smith, C. Tracy, R. Webb, B. K. Wells, and T. H. Williams. 2009. What caused the Sacramento River fall Chinook stock collapse? Pre-publication report to the Pacific Fishery Management Council. March 18, 2009, 57 pp.

Lovich, J. Unknown date. Western Pond Turtle *Clemmys marmorata.* On Bureau of Land Management website. Internet address: http://www.ca.blm.gov/pdfs/cdd_pdfs/clemmys1.PDF

Mayer, Kenneth E. and William F. Laudenslayer, Jr., Editors. 1988. *A Guide to Wildlife Habitats of California.* California Department of Forestry and Fire Protection: Sacramento, CA.

Mao, J., D. E. Green, G. M. Fellers, and V. G. Chincar. 1999. Molecular characterization of iridoviruses isolated from sympatric amphibians and fish. Virus Research 6: 45-52.

McGinnis, S. M. 1984. "The Current Distribution and Habitat Requirements of the San Francisco Garter Snake *(Thamnophis sirtalis tetrataenia)* in Coastal San Mateo County." Final Report of Work Conducted Under Interagency Agreement C-673, prepared for the California Department of Fish and Game.

McGinnis, S. M., Keel, P., and E. Burko. 1987. "The Use of Upland Habitats by Snake Species at Ano Nuevo State Reserve." A Report Prepared for the California Department of Parks and Recreation: Sacramento, CA.

McGinnis, S. M. 1987. The distribution and feeding habitat requirements of the San Francisco garter snake (*Thamnophis sirtalis tetrataenia*). Final Report. Prepared for California Department of Fish and Game Interagency agreements C-673 and C-1376.

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. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-42.

McEwan, D. 2001. Central Valley steelhead. Pages 1-44 in R.L. Brown, editor. Contributions to the Biology of Central Valley Salmonids. Volume 1. California Department of Fish and Game Bulletin 179.

Meehan, W.R., and T.C. Bjornn. 1991. Salmonid distributions and life histories. Pages 47-82 in W.R. Meehan, editor. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19. American Fisheries Society, Bethesda, MD.

Menges, T. 1998. Common Yellowthroat (*Geothlypis trichas*). *In* The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. *California Partners in Flight.*

Myrick, C. A., and J. J. Cech. 2005. Effects of temperature on the growth, food consumption, and thermal tolerance of age-0 Nimbus-strain steelhead. North American Journal of Aquaculture 67:324–330.

Moyle, P. B. 1976. Inland fishes of California. University of California Press. Berkeley, CA. 405 pp.

NMFS (National Marine Fisheries Service). 1997. Status review update for deferred and candidate ESUs of West Coast Steelhead (Lower Columbia River, Upper Willamette River, Oregon Coast, Klamath Mountains Province, Northern California, Central Valley, and Middle Columbia River ESUs). U.S. Department of Commerce, NOAA. 62 pp.

NMFS. 1999. Report to Congress. Impacts of California sea lions and Pacific harbor seals on salmonids and West Coast ecosystems. Prepared by U.S. Department of

Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. February 10, 1999.

National Marine Fisheries Service. Final critical habitat designations for 19 West Coast salmon and steelhead ESUs. Federal Register 70:52488–52627. September 2, 2005.

NMFS. 2007. The Barrier Beach/Lagoon Management Paradox: Example from the Carmel River. In: Proceedings of the California Association of Estuarine Research Scientists, University of California at Davis, Bodega Marine Laboratory. March 18-20, 2007. Film and poster presentation.

NMFS. 2012. Multi-species recovery plan. Draft. National Marine Fisheries Service, Santa Rosa, California. June 2012.

NMFS. 2012a. Central California Coast coho salmon recovery plan. Final draft. National Marine Fisheries Service, Santa Rosa, California. June 2012.

Newcombe, C. P., and J. O. T. Jensen. 1996. Channel suspended sediment and fisheries: A synthesis for quantitative assessment of risk and impact, North American Journal of Fisheries Management 16:693-727.

Nur, N., S. Zack, J. Evens, and T. Gardali. 1997. Distribution, and Conservation of Five Category 2 Taxa. Draft Final Report of the Point Reyes Bird Observatory to the U.S. Geological Survey, Biological Resources Division.

Ornduff, R., Faber, P. M. & Keeler-Wolf, T. 2003. *Introduction to California Plant Life.* Revised edition. University of California Press

Rathbun, G.B., M.R. Jennings, T.G. Murphey, and N.R. Siepel. 1993. Status and ecology of sensitive aquatic vertebrates in lower San Simeon and Pico Creeks, San Luis Obispo County, California. Unpublished report, National Ecology Research Center. Piedras Blancas Research Station, San Simeon. California. 93452-0070. Cooperative Agreement 14-16-009-91-1909.

Rathbun, G.B., N.J. Scott, Jr., and T.G. Murphey. 2002. Terrestrial Habitat Use by Pacific Pond Turtles in a Mediterranean Climate. The Southwestern Naturalist, Vol. 47, No. 2, pp.225-235 Published by: Southwestern Association of Naturalists.

Reese, D. A. 1996. Comparative demography and habitat use of western pond turtle in northern California: the effects of damming and related alterations. Doctoral dissertation. University of California, Berkeley.

Reese, D. A. and Welsh, H. H. 1997. Use of Terrestrial Habitat by Western Pond Turtles, *Clemmys marmorata,* Implications for Management. In *Proceedings: Conservation, Restoration and Management of Tortoises and Turtles. An International Conference.*

Pp. 352-357. Held 1997 by the New York Turtle and Tortoise Society. Internet address:

Reis, D. K. 1999. "Habitat Characteristics of California Red-Legged Frogs (*Rana aurora draytonii):* Ecological Differences between Eggs, Tadpoles, and Adults in a Coastal Brackish and Freshwater System." Master's Thesis, San Jose State University.

San Mateo County. 1998. Local Coastal Program, Environmental Services Agency, Planning and Building Division, San Mateo County, California.

Shaffer, H. B., G.M. Fellers, S. R. Voss, C. Oliver, and G.B. Pauley. 2010. Species boundaries, phylogeography, and conservation genetics of the red-legged frog (*Rana aurora*/*draytonii*) complex. Molecular ecology 13: 2667-2677.

Shapovalov, L. and A.C. Taft. 1954. The life histories of the steelhead rainbow trout (Salmo gairdneri gairdneri) and silver salmon (*Oncorhynchus kisutch*) with special reference to Waddell Creek, California and recommendations regarding their management. State of California Department of Fish and Game. Fish Bulletin No. 98.

Shuford, W.D. 1993. The Marin County Breeding Bird Atlas: A Distributional and Natural History of Coastal California Birds. California Avifauna Series 1. Bushtit Books.

Sigler, J. W., T. C. Bjornn, and F.H. Everest. 1984. Effects of chronic turbidity on density and growth of steelheads and coho salmon. Transactions of the American Fisheries Society 113:142-150.

Sloan, R.M. 2006. Biological investigations of a fish kill in Pescadero Lagoon, California. Master's thesis. San Jose State University, San Jose, California.

Smith, J.J. 1990. The effects of sandbar formation and inflows on aquatic habitat and fish utilization in Pescadero, San Gregorio, Waddell and Pomponio Creek estuary/lagoon systems, 1985-1989. Department of Biological Sciences, San Jose State University, San Jose, California. Report prepared under Interagency Agreement 84-04-324, between Trustees for California State University and the California Department of Parks and Recreation. December 1990. 103p.

Smith, J. J. 2004. Sequence for fish kill at Pescadero Lagoon after sandbar breaching. Short report to Pescadero Marsh Technical Team.

Smith, J.J. 2008. Estuary/lagoons as habitat: implications for the Pescadero Creek Estuary complex. Oral presentation at the December 2008 Public Forum Restoration of Pescadero Marsh: Identifying Problems and Exploring Solutions.

Smith, J.J. 2009. The grow zone: ecology of central coast lagoons. Oral presentation at Salmonid Restoration Federation Conference, Santa Cruz, California. March 2009.

Smith, J.J. and D.K. Reis. 1997. Pescadero Marsh Natural Preserve salinity, tidewater goby and red-legged frog monitoring for 1995-1996. Department of Biological Resources, San Jose State University, San Jose, California. Report prepared for California Department of Parks and Recreation 3790-301-722(7).

Smith, K.A. 2009. Inorganic chemical oxygen demand of re-suspended sediments in a bar-built lagoon. Master's thesis. San Jose State University, San Jose, California.

Spence, B., G., E. P. Bjorkstedt, J. C. Garza, J. J. Smith, D. G. Hankin, D. Fuller, W. E. Jones, R. Macedo, T. H. Williams, and E. Mora. 2008. A framework for assessing the viability of threatened and endangered salmon and steelhead in the North-Central California Coast Recovery Domain. U.S. Department of Commerce, NOAA, National Marine Fisheries Service, Southwest Fisheries Science Center. 194 pp.

Stebbins, R. C. 2003. A field guide to western reptiles and amphibians. Third edition. Houghton Mifflin Company, Boston-New York.

Stern, M.A., J.S. McIver, and G.A. Rosenberg. 1990. Investigations of the western snowy plover at the Coos Bay North Spit and adjacent sites in Coos and Curry Counties, Oregon, 1990. Report to Oregon Department of Fish and Wildlife Nongame Program. 33 pp.

Stretch, D. and M. Parkinson. 2006. The breaching of sand barriers at perched, temporary open/closed estuaries – a model study. Coastal Engineering Journal 48(1): 13-30.

Storer, T. I. 1925. A synopsis of the amphibia of California. University of California Publications in Zoology 27:1-1-342.

_____ 1933. Frogs and their commercial use. California Department of Fish and Game 19(3):203-213.

Swenson, R.O. 1999. The ecology, behavior, and conservation of the tidewater goby, *Eucyclogobius newberryi*. Environmental Biology of Fishes. 55:99-114.

Swenson, R. O., and A. T. McCray. 1996. Feeding ecology of the tidewater goby. Transactions of the American Fisheries Society 125: 956-970.

Swift, C.C., J.L. Nelson, C. Maslow, and T. Stein. 1989. Biological and distribution of the tidewater goby, *Eucyclogobius newberryi*(Pisces: Gobiidae) of California. Contributions in Science. 404:1-19.

Tatarian, P. J. 2008. Movement patterns of California red-legged frogs (*Rana draytonii*) in an inland California environment. Herpetological Conservation and Biology 3(2):155-169.

Taylor, D. W. 1978. "The California Brackish-Water Snail, *Tryonio imitator.* Report Prepared for U.S. Army Corps of Engineers, Contract DACW09-78-M-1169.

Twedt, B. 1993. A comparative ecology of *Rana aurora* Baird and Girard and *Rana catesbeiana* Shaw at Freshwater Lagoon, Humboldt County, California. Master of Science thesis. Humboldt State University, Arcata, California. 53 pages plus appendix.

Titus, R. G., D. C. Erman, and W. M. Snider. 2011. History and status of steelhead in California coastal drainages south of San Francisco Bay. In prep. Ca. Dep. Fish and Game.

Unknown author. 1879. Salmon fishing on the Pacific. Forest and Stream; A Journal of Outdoor Life, Travel, Nature Study, Shooting…October 30, 1879.

U. S. Fish and Wildlife Service 1985. San Francisco garter snake recovery plan. Portland, Oregon. 77 pages.

_____ 1994. Endangered and threatened wildlife and plants; determination of endangered status for the tidewater goby; final rule. Federal Register 59:5494-5499.

_____ 1996. Endangered and threatened wildlife and plants; determination of threatened status for the California Red-Legged Frog. Federal Register 61:25813-25833.

_____ 2000. Endangered and threatened wildlife and plants; designation of critical habitat for the tidewater goby; final rule. Federal Register 65:69693-69717.

_____ 2002. Recovery plan for the California red-legged frog (*Rana aurora draytonii*). Portland, Oregon. 173 pages.

_____ 2005. Recovery plan for the tidewater goby (*Eucyclogobius newberryi*). U.S. Fish and Wildlife Service, Portland, Oregon. vi + 199 pp.

_____ 2006a. Endangered and threatened wildlife and plants; designation of critical habitat for the California red-legged frog (*Rana aurora draytonii*), and special rule exemption associated with final listing for existing routine ranching activities; final rule. Federal Register 71(71):19244-19346. April 13.

_____ 2006b. Endangered and threatened wildlife and plants; revised critical habitat for the tidewater goby (*Eucyclogobius newberryi*); proposed rule. Federal Register 71:68914-68995.

_____ 2006c. San Francisco Garter Snake 5-Year Review. Portland Oregon.

_____ 2006d. Western Snowy Plover – Pacific Coast Population 5-Year Review. Portland Oregon.

_____ 2007. Tidewater goby (*Eucyclogobius newberryi*) 5-year review. Portland Oregon.

_____ 2008. Endangered and threatened wildlife and plants; revised designation of critical habitat for the tidewater goby (*Eucyclogobius newberryi*); final rule. **Federal Register** 73:5919-6006.

_____ 2010. Endangered and threatened wildlife and plants: Revised designation of critical habitat for California red-legged frog; final rule. Federal Register 75(51):12816-12959. March 17.

_____ 2011. Endangered and Threatened Wildlife and Plants: Revised Designation of critical habitat for the tidewater goby: proposed rule. Federal Register 76:64996-65060

U.S. Geological Survey. 2012. Internet Address: http://nwis.waterdata.usgs.gov/ca/nwis/uv/?site_no=11162500&PARAmeter_cd=00065,00060.

Viollis, F.S. 1979. The evolution of Pescadero Marsh. Master's thesis. San Francisco State University, San Francisco, California.

Waples, R.S. 1991. Pacific Salmon, Oncorhynchus spp., and the definition of a species under the Endangered Species Act. Marine Fisheries Review 53:11-21.

Ward, B.R., P.A. Slaney, A.R. Facchin, and R.W. Land. 1989. Size-based survival in steelhead trout (*Oncorhynchus mykiss*): back-calculated lengths from adults' scales compared to migrating smolts at the Keogh River, British Columbia. Can. J. Fish. Aquat. Sci. 46(11): 1853-1858.

Warriner, J.S., J.C. Warriner, G.W. Page, and L.E. Stenzel. 1986. Mating system and reproductive success of a small population of polygamous snowy plovers. Wilson Bulletin 98(1):15-37.

Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. Status review of coho salmon from Washington, Oregon, California. National Marine Fisheries Service, Northwest Fisheries Science Center and Southwest Region. NOAA Technical Memorandum NMFS-NWFSC-24. September 1995.

Western Regional Climate Center. 2012. Internet Address: www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?cahalf+sfo.

Wharton, J. C. 1989. "Ecological and Life History Aspects of the San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*)." Master's Thesis, San Francisco State University.

Williams, J. 1990. Pescadero Marsh Natural Preserve Hydrological Enhancement Plan. Prepared for California Department of Parks and Recreation. Prepared by Philip Williams & Associates. August.

Williams, T.H. S.T. Lindley, B.C. Spence, and D. A. Boughton. 2011. Status Review Update for Pacific Salmon and Steelhead Listed Under the Endangered Species Act: Southwest 17 May 2011 – Update to 5 January 2011 Report. National Marine Fisheries Service Southwest Fisheries Science Center. Santa Cruz. CA.

Wright, A. H. and A. A. Wright. 1949. Handbook of Frogs and Toads of the United States and Canada. Comstock Publishing Company, Inc., Ithaca, New York. 640 pages.

Wurtsbaugh, W. A. and G. E. Davis. 1977. Effects of temperature and ration level on the growth and food conversion efficiency of *Salmo gairdneri*, Richardson. Journal of Fish Biology 11:87-98.

Federal Register Notices Cited

62 FR 43937: National Marine Fisheries Service. Final Rule Listing of Several Evolutionary Significant Units of West Coast Steelhead. Federal Register 62:43937-43954. August 18, 1997.

64 FR 24049: National Marine Fisheries Service. Final Critical Habitat Designated for Central California Coast and Southern Oregon/Northern California Coasts Coho Salmon. Federal Register 64:24049-24062. May 5, 1999.

70 FR 37160. National Marine Fisheries Service. Final Rule. Endangered and Threatened Species: Final Listing Determinations for 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. June 28, 2005.

70 FR 52488: National Marine Fisheries Service. Final critical habitat designations for 19 West Coast salmon and steelhead ESUs. Federal Register 70:52488–52627. September 2, 2005.

71 FR 834: National Marine Fisheries Service. Final Listing Determinations for Ten Distinct Population Segments of West Coast Steelhead; Final Rule. Federal Register 71:834-862. January 5, 2006.

76 FR 50447: National Marine Fisheries Service. Endangered and Threatened Species; 5-Year Reviews for 5 Evolutionarily Significant Units of Pacific Salmon and 1 Distinct Population Segment of Steelhead in California. Federal Register 76: 50447-50448. August 2011.

Cultural Resources

Basgall, Mark E. 1987. "Resource intensification among hunter-gatherers: Acorn economies in *prehistoric California."* Research in Economic Anthropology *9:21-52.*

Bean, Lowell J., and Thomas F. King. 1974. "Antap: California Indian political and economic organization." *Ballena Press Anthropological Papers* 2. Menlo Park, CA.

Bean, Lowell J., and Harry W. Lawton. 1973. "Some explanations for the rise of cultural complexity in Native California with comments on proto-agriculture and agriculture." In patterns of Indian burning in California: ecology and ethno-history, by Henry Lewis. *Ballena Press Anthropological Papers* 1 Pp. v-xlvii. Ramona, CA.

Blackburn, Thomas C., and Kat Anderson, editors. 1993. Before the wilderness: Environmental management by Native Californians. *Ballena Press Anthropological Papers No.*40. Thomas C. Blackburn, series editor. Menlo Park, CA: Ballena Press.

Bolton, Herbert E. 1926. *Historical memoirs of New California by Fray Francisco Palou, O.F.M.* Vols. 1-4. University of California Press, Berkeley.

Brown, Alan K. 1994. "The European contact of 1772 and some later documentation." In The Ohlone past and present: Native Americans of the San Francisco Bay region. Lowell John Bean editor. *Ballena Press Anthropological Papers,* No. 42. Menlo Park, CA.

Chagnon, Napoleon A. 1970. "Ecological and adaptive aspects of California shell money." *Annual Reports of the University of California Archaeological Survey* 12:1-15. Los Angeles.

Cook, Sherburn F. 1976. *The Population of California Indians, 1769-1770.* University of California Press, Berkeley.

Fages, Pedro. 1937. *A historical, political, and natural description of California (November 20, 1775).* H. E. Priestly, translator. University of California Press. Berkeley.

Harlow, Neal. 1989. California Conquered: The Annexation of A Mexican Province 1846-1850. *University of California Press, Berkeley.*

Hylkema, Mark. 2009. Site assessment by State Parks Archaeologist.

King, Chester. 1994. "Central Ohlone ethnohistory." In The Ohlone past and present: Native Americans of the San Francisco Bay region. Lowell John Bean editor. *Ballena Press Anthropological Papers,* No. 42. Menlo Park, CA.

Lewis, Henry T. 1973. "Patterns of Indian burning in California: Ecology and ethnohistory." Lowell Bean editor. *Ballena Press Anthropological Papers* No. 1. Ramona, CA.

Leventhal, Alan. 1993. "A reinterpretation of some Bay Area shell mound sites: A view from the mortuary complex from CA-ALA-329, the Ryan Mound." MA thesis. San Jose State University.

Levy, Richard. 1978. Costanoian. In, *Handbook of North American Indians; Volume 8, California.* Smithsonian Institution, Washington DC.

Milliken, Randall T. 1983. "The spatial organization of human populations on Central California's San Francisco Peninsula at the Spanish arrival." MA Thesis, Sonoma State University.

Milliken, Randall T. 1991. "An ethnohistory of the Indian people of the San Francisco Bay area from 1770 to 1810." PhD. dissertation, University of California, Berkeley.

Simons, Dwight D. 1992. Prehistoric mammal exploitation in the San Francisco Bay area. Essays on the prehistory of maritime California. Terry L. Jones, ed. *Center for Archaeological Research at Davis* 10. University of California at Davis.

Stanger, Frank M. 1963. South from San Francisco, San Mateo County, California: Its History and Heritage. *San Mateo County Historical Association Books.*

Stanger, F. M., and A. K. Brown. 1969. *Who Discovered the Golden Gate*? Publications of the San Mateo County Historical Association.

Viollis, Frank Salvatore. December 1979. "The Evolution of Pescadero Marsh." Master's Thesis, San Francisco State University.

Geology and Soils

Bergolar Geotechnical Consultants (BGC). 1988. Geotechnical Report: Pescadero Marsh. Report for the Office of the State Architect. Job. No. 1251.005.

California Department of Parks and Recreation. 1978. Pescadero State Beach Inventory of Features.

U.S. Department of Agriculture (USDA). 1961. Soil Survey, San Mateo Area, California.

Viollis, Frank Salvatore. December 1979. "The Evolution of Pescadero Marsh." Master's Thesis, San Francisco State University.

Hazards and Hazardous Materials

California Department of Parks and Recreation. 1979. San Mateo Coast Area General Plan.

Viollis, Frank Salvatore. December 1979. "The Evolution of Pescadero Marsh." Master's Thesis, San Francisco State University.

Hydrology and Water Quality

California Department of Parks and Recreation. 1978. Pescadero State Beach Inventory of Features.

San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). 2011. Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) (with amendments to 2011). Internet address: http://www.waterboards.ca.gov/sanfranciscobay/basin_planning.shtml

Department of Water Resources (DWR). 2003. California's Groundwater, Bulletin 118, Update 2003. Internet address: www.water.ca.gov/groundwater/**bulletin118**/update2003.cfm

Environmental Science Associates. 2004. "Pescadero-Butano Watershed Assessment. Final Report." Environmental Science Associates, San Francisco, CA.

Swanson Hydrology & Geomorphology. 2001. Report from Hydraulic Study of Lower Pescadero Creek. Swanson Hydrology & Geomorphology, Santa Cruz, CA.

Williams, J. 1990. Pescadero Marsh Natural Preserve Hydrological Enhancement Plan. Philip Williams & Associates, Ltd.

Land Use and Planning

California Department of Parks and Recreation. 1979. San Mateo Coast Area General Plan. Internet address: www.parks.ca.gov/7page id = 24668

San Mateo County. 1986. General Plan Policies. Department of Environmental Management, Planning and Building Division, San Mateo County, California. Internet address: http://www.co.sanmateo.ca.us/vgn/images/portal/cit_609/10073472gp_polis.pdf

San Mateo County. 1998. Local Coastal Program, Environmental Services Agency, Planning and Building Division, San Mateo County, California. Internet address: www.co.sanmateo.ca.us/vgn/images/portal/cit_609/10073428lcp_1098.pdf

San Mateo County. 1999. Zoning Regulations. Department of Environmental Management, Planning and Building Division, San Mateo County, California. Internet address: www.co.sanmateo.ca.us/vgn/images/portal/cit_609/9441580Zregs-wp.pdf

Recreation

California Department of Parks and Recreation. 1979. San Mateo Coast Area General Plan. Internet address: www.parks.ca.gov/7page id = 24668

Department of Parks and Recreation, California State Parks website, Pescadero State Beach. Internet address: http://www.parks.ca.gov/?page_id=522

Keel, Paul. California State Parks, Sector Superintendent, personal communication, 2009.

Transportation/Traffic

Caltrans, The California Scenic Highway System. Internet address: www.dot.ca.gov/hq/LandArch/scenic/cahisys.htm

County of San Mateo, Environmental Services Agency. 2001. Countywide Transportation Plan, Executive Summary. Internet address: www.co.sanmateo.ca.us/smc/department/home/0,,5557771_5558931_12037069,00.html

San Mateo County Transit District. Internet address: http://www.samtrans.com/

Utilities and Service Systems

Keel, Paul. California State Parks, Sector Superintendent, personal communication, 2009.

CHAPTER 7
REPORT PREPARATION

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Figure 1. Location of the Project Area (polygon outlined in black). The exact location of breaching activities will be dependent upon where the sand barrier forms.

Figure 2. Pescadero Marsh Natural Preserve showing Pescadero Lagoon, Pescadero Creek, Butano Creek, North Pond, North Marsh, Delta Marsh and Butano Marsh.

Figure 3. Water Quality Monitoring Stations

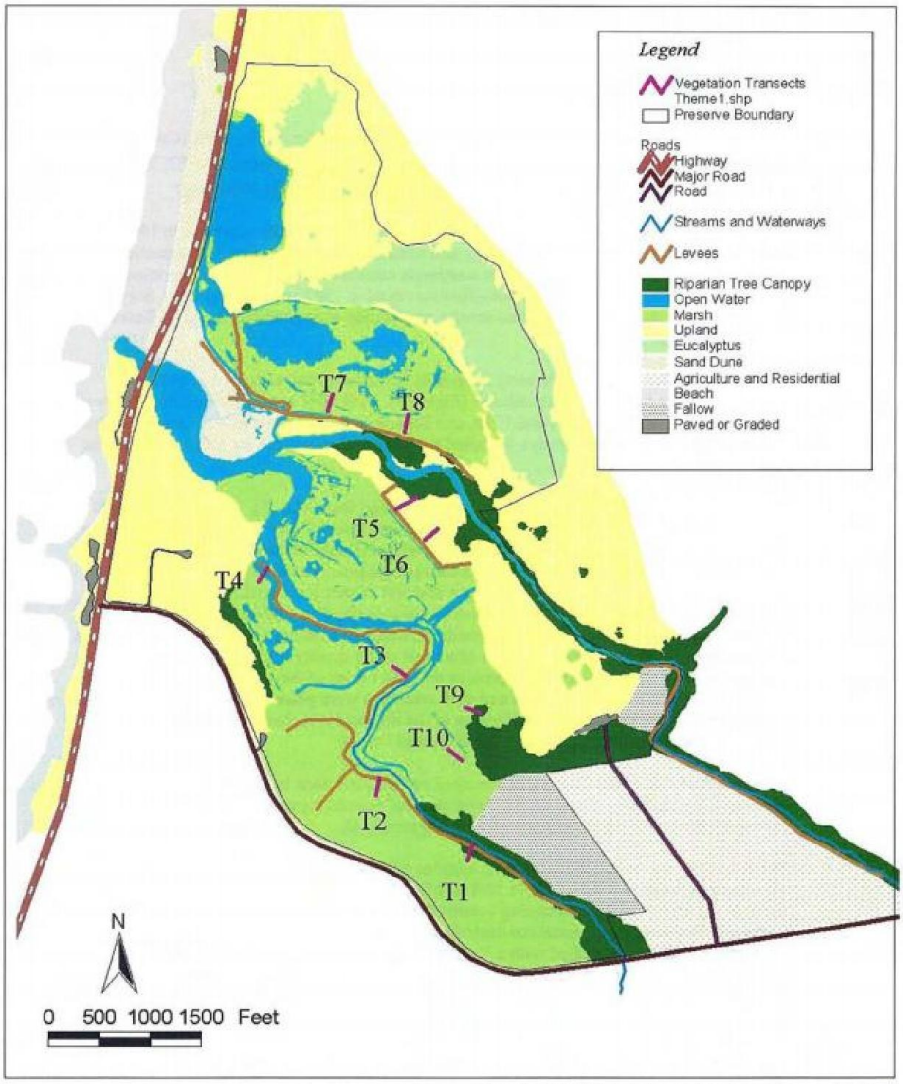

Figure 4. Vegetation Monitoring Stations

APPENDIX A.
SPECIAL STATUS SPECIES LISTS

California Department of Fish and Wildlife, Natural Diversity Database - Selected Elements by Scientific Name for Quadrangle, CA

	Scientific Name/Common Name	Element Code	Federal Status	State Status	DFGStatus	CNPSRank
1	*Ardea herodias* great blue heron	ABNGA04010				
2	*Astragalus pycnostachyus var. pycnostachyus* coastal marsh milk-vetch	PDFAB0F7B2				1B.2
3	*California macrophylla* round-leaved filaree	PDGER01070				1B.1
4	*Charadrius alexandrinus nivosus* western snowy plover	ABNNB03031	Threatened		SSC	
5	*Eucyclogobius newberryi* tidewater goby	AFCQN04010	Endangered		SSC	
6	*Geothlypis trichas sinuosa* saltmarsh common yellowthroat	ABPBX1201A			SSC	
7	*Lasthenia californica ssp. Macrantha* perennial goldfields	PDAST5L0C5				1B.2
8	*Leptosiphon rosaceus* rose leptosiphon	PDPLM09180				1B.1
9	*Microseris paludosa* marsh microseris	PDAST6E0D0				1B.2
10	N. Central Coast Calif. Roach/Stickleback/Steelhead Stream	CARA2633CA				
11	North Central Coast Steelhead/Sculpin	CARA2637CA				
12	*Oncorhynchus mykiss irideus* steelhead-central California coast ESU	AFCHA0209G	Threatened			
13	*Plagiobothrys chorisianus var. chorisianus* Choris' popcorn-flower	PDBOR0V061				1B.2
14	*Rana draytonii* California red-legged frog	AAABH01022	Threatened		SSC	
15	Sacramento-San Joaquin Coastal Lagoon	CALA1360CA				
16	*Thamnophis sirtalis tetrataenia* San Francisco garter snake	ARADB3613B	Endangered	Endangered	FP	
17	*Tryonia imitator* mimic tryonia (=California brackishwater snail)	IMGASJ7040				
18	Valley Needlegrass Grassland	CTT42110CA				

Key to CDFW Status and CNPS Rank

CDFW Status - Indicates whether the species has a special California Department of Fish and Wildlife designation. This applies to animals only. For the plant equivalent, see CNPS LIST.

CDFW Status	Description
FP	Fully Protected
SSC	Species of Special Concern
WL	Watch List

CNPS Rank *California Native Plant Society (CNPS) Rare Plant Rank* - This field applies to plants only. The California Native Plant Society currently tracks 2,281 plant species, subspecies, and varieties as rare in California. They are assigned to one of five "ranks" in an effort to categorize their degree of rarity and endangerment:

CNPSRank	Description
1A	Plants presumed extinct in California
1B	Plants rare, threatened, or endangered in California and elsewhere
2	Plants rare, threatened, or endangered in California, but more common elsewhere
3	Plants about which we need more information - a review list
4	Plants of limited distribution - a watch list

CNPS, 2001. Inventory of Rare and Endangered Plants of California (sixth edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, CA. Updated CNPS Lists to Rare Plant Ranks in 2011 – CNPS website http://www.cnps.org/cnps/rareplants/ranking.php (accessed June 8, 2012).

California Native Plant Society (CNPS) - Inventory of Rare and Endangered Plants found within the San Gregorio Quadrangle, CA

Scientific Name	Common Name	CNPS Rank	State Rank	Global Rank
Astragalus pycnostachyus var. pycnostachyus	coastal marsh milk-vetch	1B.2	S2.2	G2T2
California macrophylla	round-leaved filaree	1B.1	S2	G2
Fritillaria liliacea	fragrant fritillary	1B.2	S2	G2
Grindelia hirsutula var. maritima	San Francisco gumplant	3.2	S1	G5T1Q
Lasthenia californica ssp. macrantha	perennial goldfields	1B.2	S2.2	G3T2
Leptosiphon rosaceus	rose leptosiphon	1B.1	S1.1	G1
Microseris paludosa	marsh microseris	1B.2	S2.2	G2
Plagiobothrys chorisianus var. chorisianus	Choris' popcorn-flower	1B.2	S2.2	G3T2Q

Key to CNPS Rare Plant Ranks

1A Presumed Extinct in California
1B Rare or Endangered in California and Elsewhere
2 Rare or Endangered in California, More Common Elsewhere
3 Need More Information
4 Plants of Limited Distribution
  0.1: Seriously threatened in California
  0.2: Fairly threatened in California

Key to Global Ranking

The global rank (G-rank) is a reflection of the overall condition of an element throughout its global range.
Species or Community Level
G1 = Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals OR less than 2,000 acres.
G2 = 6-20 EOs OR 1,000-3,000 individuals OR 2,000-10,000 acres.
G3 = 21-80 EOs OR 3,000-10,000 individuals OR 10,000-50,000 acres.
G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.
GH = All sites are historic; the element has not been seen for at least 20 years, but suitable habitat still exists.
GX = All sites are extirpated; this element is extinct in the wild.
GXC = Extinct in the wild; exists in cultivation
G1Q = The element is very rare, but there are taxonomic questions associated with it

Subspecies Level

Subspecies receive a T-rank attached to the G-rank. With the subspecies, the G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety.

Key to State Ranking

The state rank (S-rank) is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank.

S1 = Less than 6 EOs OR less than 1,000 individuals OR less than 2,000 acres
  S1.1 = very threatened
  S1.2 = threatened
  S1.3 = no current threats known
S2 = 6-20 EOs OR 1,000-3,000 individuals OR 2,000-10,000 acres
  S2.1 = very threatened
  S2.2 = threatened
  S2.3 = no current threats known
S3 = 21-80 EOs or 3,000-10,000 individuals OR 10,000-50,000 acres
  S3.1 = very threatened
  S3.2 = threatened
  S3.3 = no current threats known
S4 = Apparently secure within California; this rank is clearly lower than S3 but factors exist to cause some concern; i.e. there is some threat, or somewhat narrow habitat. NO THREAT RANK.
S5 = Demonstrably secure to ineradicable in California. NO THREAT RANK.
SH = All California sites are historic; the element has not been seen for at least 20 years, but suitable habitat still exists.
SX = all California sites are extirpated; this element is extinct in the wild.

U.S. Fish & Wildlife Service - Sacramento Fish & Wildlife Office Species List of Federal Endangered and Threatened Species that occur or may be Affected by Projects in the San Gregorio 7 ½ minute Quad

Listed Species

Invertebrates
Haliotes cracherodii
black abalone (E) (NOAA FisheriesNOAA Fisheries)

Haliotes sorenseni
white abalone (E) (NOAA Fisheries)

Fish
Eucyclogobius newberryi
critical habitat, tidewater goby (X)
tidewater goby (E)

Hypomesus transpacificus
delta smelt (T)

Oncorhynchus kisutch
Coho salmon - central CA coast (E) (NOAA Fisheries)
Critical habitat, coho salmon - central CA coast (X) (NOAA Fisheries)

Oncorhynchus mykiss
Central California Coastal steelhead (T) (NOAA Fisheries)
Central Valley steelhead (T) (NOAA Fisheries)
Critical habitat, Central California coastal steelhead (X) (NOAA Fisheries)

Amphibians
Rana aurora draytonii
California red-legged frog (T)

Reptiles
Caretta caretta
loggerhead turtle (T) (NOAA Fisheries)

Chelonia mydas (incl. agassizi)
green turtle (T) (NOAA Fisheries)

Dermochelys coriacea
leatherback turtle (E) (NOAA Fisheries)

Lepidochelys olivacea
olive (=Pacific) ridley sea turtle (T) (NOAA Fisheries)

Thamnophis sirtalis tetrataenia
San Francisco garter snake (E)

Birds
Brachyramphus marmoratus
marbled murrelet (T)

Charadrius alexandrinus nivosus
western snowy plover (T)

Diomedea albatrus
short-tailed albatross (E)

Pelecanus occidentalis californicus
California brown pelican (E)

Sternula antillarum (=Sterna, =albifrons) browni
California least tern (E)

Mammals
Arctocephalus townsendi
Guadalupe fur seal (T) (NOAA Fisheries)

Balaenoptera borealis
sei whale (E) (NOAA Fisheries)

Balaenoptera musculus
blue whale (E) (NOAA Fisheries)

Balaenoptera physalus
finback (=fin) whale (E) (NOAA Fisheries)

Enhydra lutris nereis
southern sea otter (T)

Eubalaena (=Balaena) glacialis
right whale (E) (NOAA Fisheries)

Eumetopias jubatus
Steller (=northern) sea-lion (T) (NOAA Fisheries)

Physeter catodon (=macrocephalus)
sperm whale (E) (NOAA Fisheries)

Proposed Species
Amphibians
Rana aurora draytonii
Critical habitat, California red-legged frog (PX)

Key:

- (E) *Endangered* - Listed as being in danger of extinction.
- (T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
- (P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NOAA Fisheries) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- *Critical Habitat* - Area essential to the conservation of a species.
- (PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
- (C) *Candidate* - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) *Critical Habitat* designated for this species