

June 2022

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Executive Summary

This document provides the findings of a Biological Resources Assessment prepared by Rincon Consultants, Inc. for the Moran Lake County Park Improvement Project (Project). This report documents existing conditions at the Project site and provides an assessment of potential impacts to sensitive biological resources based upon proposed Project plans.

The Project is located in Moran Lake County Park, in the unincorporated Live Oak area of Santa Cruz County, California. The Project will restore and enhance wetland habitat function and water quality in Moran Lagoon, enhance climate change resilience of Moran Lagoon and the surrounding area, maintain and enhance existing monarch overwintering habitat, and improve public access and urban green space within Moran Lake County Park.

Rincon assessed the potential for 95 special-status species (49 plant species and 46 wildlife species) to occur within the Project Area. No special-status plant species are expected to occur. Twenty-one special-status wildlife species have some potential to occur within the Project Area. The northern tidewater goby (*Eucyclogobius newberryi*, federally endangered) was observed within Moran Lagoon during an aquatic survey conducted in fall 2021. The northern tidewater goby will be referred to as tidewater goby throughout the remainder of this document. The monarch butterfly (*Danaus plexippus*, federal candidate), American white pelican (*Pelecanus erythrorhynchos*, State species of special concern), and double-crested cormorant (*Phalacrocorax auratus*, State watchlist) were also observed on site during biological surveys; however, no nesting colonies of pelicans or cormorants were detected. The California red-legged frog (*Rana draytonii*, federally threatened), Monterey hitch (*Lavinia exilicauda harengus*, State species of special concern), southwestern pond turtle (*Actinemys pallida*, State species of special concern), northern California legless lizard (*Anniella pulchra*, State species of special concern), tricolored blackbird (*Agelaius tricolor*, State threatened), western snowy plover (*Charadrius nivosus*, federally threatened, State species of special concern), black swift (*Cypseloides niger*, State species of special concern), bank swallow (*Riparia*, State threatened), California least tern (*Sterna antillarum browni*, federally endangered, State endangered, State fully protected), pallid bat (*Antrozous pallidus*, State species of special concern), and Townsend's big-eared bat (*Corynorhinus townsendii*, State species of special concern) all have a low potential to occur on site. The white-tailed kite (*Elanus leucurus*, State fully protected), American peregrine falcon (*Falco peregrinus anatum*, State fully protected), and osprey (*Pandion haliaetus*, State watchlist) have a moderate potential to occur. The Cooper's hawk (*Accipiter cooperii*, State watchlist), California brown pelican (*Pelecanus occidentalis californicus*, State fully protected), and yellow warbler (*Setophaga petechia*, State species of special concern) have a high potential to occur within the Project Area. Nesting special-status bird species and/or nesting birds protected under the Migratory Bird Treaty Act and California Fish and Game Code also have potential to occur throughout the Project Area during the nesting season (February 1 through September 15).

As a result of implementation of the Project, special-status species (including nesting birds) within the Project Area could be impacted by the loss of/injury to individuals, disturbance of breeding activities, disturbance to habitat, and/or construction noise and other human disturbances. These impacts could be potentially significant but can be reduced to less than significant through implementation of recommended avoidance and minimization measures. Additional measures may also be required by resource agency permits and agreements.

Moran Lake County Park Improvement Project

One sensitive plant community occurs within the Project Area: Pickleweed Mats. Environmentally Sensitive Habitat Areas within the Project Area include: Moran Lagoon and its associated wetlands; Moran Creek and its associated riparian corridor; eucalyptus groves that provide overwintering habitat for monarch butterflies; and marine and estuarine habitat below the high tide line of the Pacific Ocean. Jurisdictional waters and wetlands within the Project Area include Moran Lagoon and its associated wetlands, Moran Creek and its associated riparian corridor, and the Pacific Ocean. Potential impacts to these sensitive biological resources within the Project Area could include grading within wetland areas, changes to water quality, sediment disturbance, and/or the introduction of sediment or pollutants. These impacts could be potentially significant but can be reduced to less than significant through implementation of recommended avoidance and minimization measures. The Project will involve restoration efforts that will result in overall improvements to water quality and wetland habitat within Moran Lake County Park.

Project activities will not have a significant impact on wildlife movement, nor will they conflict with any local or State policies, ordinances, or plans.

1 Introduction

Rincon Consultants, Inc. (Rincon) has prepared this Biological Resources Assessment (BRA) on behalf of Balance Hydrologics, Inc. (Balance) and Santa Cruz County Department of Parks, Open Space, and Cultural Services (County Parks) for the Moran Lake County Park Improvement Project (Project). The Project will restore and enhance wetland habitat function and water quality in Moran Lagoon¹, enhance climate change resilience of Moran Lagoon and the surrounding area, maintain and enhance existing monarch overwintering habitat, and improve public access and urban green space within Moran Lake County Park. This BRA documents existing biological conditions within Moran Lake County Park and provides an assessment of potential impacts to sensitive biological resources that could result from Project activities.

1.1 Project Location

The Project is located in Moran Lake County Park, in the unincorporated Live Oak area of Santa Cruz County (County), California, approximately 0.25 mile west of Soquel Point and directly north of the Pacific Ocean (Figure 1). The Project is surrounded by residential neighborhoods to the west, north, east, and south, as well as Moran Lake Beach to the southwest (Figure 2). Moran Lake County Park includes the following Assessor's Parcel Numbers (APNs): 028-45-101, 028-29-157, 028-29-121, 028-29-149, 028-28-132, 028-48-101, 028-48-102, 028-48-106, and 028-30-204. The Project is depicted on the *Soquel, California* United States Geological Survey (USGS) 7.5-minute topographic quadrangle map and is located in Township 11 South, Range 1 West, Section 21.

1.2 Project Background and Goals

Moran Lagoon is a brackish, coastal lagoon with connectivity to the Pacific Ocean. In the early 1960's, dredge material removed from Wood's Lagoon for the development of the Santa Cruz Yacht Harbor (located approximately 1.4 miles northwest of Moran Lagoon) was deposited in the southern end of Moran Lagoon, effectively reducing the approximately eight-acre surface water area by three acres (Stern and Courter 1980). During this time, a seven-foot diameter drainage culvert was installed at the lagoon outlet approximately five feet above the mean high tide line (HTL). The installation of this culvert effectively cut off connectivity of seawater into the lagoon and transformed the coastal lagoon into an inland lake. In 1981, the seven-foot diameter culvert was replaced with the existing box culvert beneath East Cliff Drive. The bottom of the box culvert is set at one foot below mean sea level, which allows for tidal influence within the lagoon. The culvert and roadbed have stabilized the lagoon inlet, preventing the natural migration of the inlet channel and altering circulation, as well as the timing, frequency, and duration of breach/flushing events in the lagoon. Combined with extensive urban development inland of the lagoon, the engineered outlet structure has resulted in degraded water quality and aquatic habitat conditions in Moran Lagoon (John Gilchrist & Associates and Fall Creek Engineering 2005).

¹ The name "Moran Lagoon" will be used throughout this report to refer to the body of water within the Project Area. While "Moran Lagoon" more accurately describes the coastal brackish water body with connectivity to the ocean, "Moran Lake County Park" is the official name of the Park and "Moran Lake" has been used to refer to the water body since the early 1960's (particularly during the period between the 1960's and 1981 when the lagoon mouth was blocked and replaced with a one-directional culvert that did indeed create a freshwater impoundment). Box culvert construction in 1981 restored connectivity to the ocean and effectively returned lagoon dynamics,

Figure 1 Regional Location



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★ Project Location

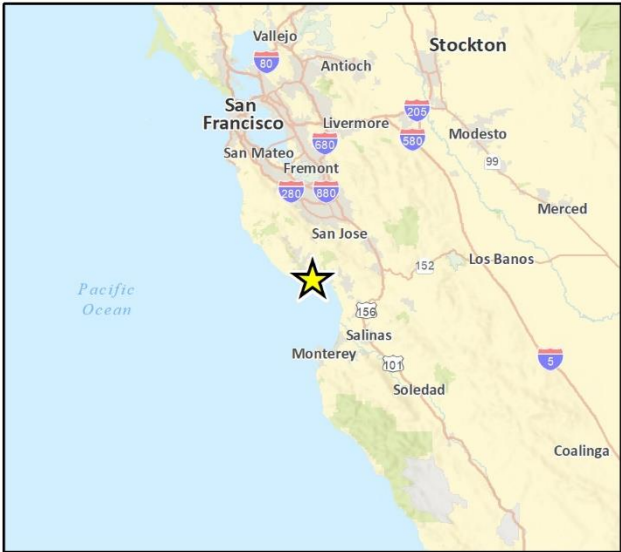


Fig 1 Regional Location

Figure 2 Project Area



Project goals include the following:

- To restore and enhance the wetland habitat function and water quality of Moran Lagoon. The Project seeks to address known problems of degraded habitat and water quality by recontouring, stabilizing, and planting native vegetation along currently eroding banks, restoring wetland habitat, removing non-native vegetation, and implementing biofiltration stormwater Best Management Practices (BMPs) to treat local runoff before it enters the lagoon;
- To enhance climate change resilience of Moran Lagoon and surrounding areas. Lagoons are inherently sensitive to changes in sea level and climate. In order to enhance climate resilience, a targeted set of studies have been proposed to assess existing lagoon hydrodynamics, model lagoon conditions under sea level rise scenarios, and monitor water quality, species, and habitat condition of the site. An improved understanding of existing and future conditions will provide the technical basis for revising site plans and for planning future modifications of the culvert and East Cliff Drive;
- To maintain and enhance the existing monarch butterfly overwintering habitat that exists within eucalyptus groves in Moran Lake County Park; and
- To enhance and improve public access and urban green space for neighboring communities. Moran Lake County Park is for the people, and the Project seeks to engage the public through educational signage, improvements to trails and facilities, and improvements to accommodations for persons with disabilities.

1.3 Project Description

The approximately 19-acre Project Area includes: Moran Lagoon and its associated wetlands; a portion of Moran Creek and its associated riparian corridor; County parking areas and buildings (including the D.A. Porath Sanitation Facility); the open space, trails, and eucalyptus groves surrounding Moran Lagoon and the D.A. Porath Sanitation Facility; and a portion of Moran Lake Beach southwest of East Cliff Drive. A small rectangular parcel at 40 Moran Way is also included in the Project Area (Figure 2). The defined Project Area is extensive enough to include all project components, including anticipated Project options, access points, staging areas, and permanent and temporary disturbance sites. The approximate center of the Project Area is located at latitude 36.958676°N and longitude 121.975499°W (WGS-84 datum).

The Conceptual Site Plan for the Project, dated May 14, 2022, includes the following components:

- Removing non-native plant species around the freshwater lagoon inlet and revegetating with appropriate native riparian plant species;
- Recontouring lagoon banks in several eroded areas, removing non-native plant species from the lagoon bank, and revegetating with appropriate native wetland species;
- Upgrading the existing parking lot layout and paving, including stormwater treatment for the paved area;
- Installing a stormwater treatment area to receive adjacent urban runoff;
- Upgrading a portion of the pedestrian path to an accessible and permeable surface such as permeable concrete or GraniteCrete, locating the stormwater treatment area adjacent to the pedestrian path, shifting the layout of the path away from the lagoon bank edge, and incorporating accessible and informal seating opportunities along the path;

- Keeping a portion of the existing pedestrian path layout and surface (e.g., leaves, wood chips, soil) uncompacted and natural to allow for better drainage and healthier soils around the lagoon;
- Installing nectar/pollinator gardens along the upgraded pedestrian path;
- Maintaining and improving existing monarch overwintering habitat, which may include the following strategies: removal of dead and downed eucalyptus trees, planting of replacement eucalyptus trees and/or native trees strategically for wind protection around known monarch aggregation sites, irrigation for replacement trees to ensure establishment and growth;
- Installing footbridge, culvert, or ford-type crossings over the stormwater treatment areas;
- Strategically installing new native plants throughout the site (including trees, low shrubs, and grasses);
- Strategically installing logs taken from on site for delineation of park areas, animal habitat, and informal seating;
- Installing new informational signage, wayfinding signage/trail markers, and a new park monument sign;
- Replacing existing restroom with updated prefabricated restroom, outdoor shower, drinking fountain, and waste and recycling receptacles;
- Installing new bicycle parking, ADA-compliant benches, and improved beach access with a marked crosswalk and flashers; and
- Installing native plantings at the 40 Moran Way parcel and possibly improve parking, pathways, crosswalks, and signage.

The following construction equipment and methods are likely to be used during Project implementation:

- An excavator will be used to demolish the existing pavement and restroom facilities;
- A dozer will be used to regrade the parking lot and walkways;
- An excavator will be used to install bioretention facilities;
- A sheepsfoot roller and drum roller will be used to compact the base materials and graded areas;
- Mechanical asphalt paving equipment will be utilized for paving at the site;
- A dump truck will be used to transport materials on and off the site;
- The trail paralleling Moran Lagoon will be improved through a combination of hand labor and mechanical equipment;
- A small excavator may be used to grade the drainage features;
- Puncheons will be installed with hand labor and possibly a small excavator for the footings;
- Paver-Liner fords (if any) will be installed with both hand labor and mechanical equipment.
- An excavator, located on the top of the bank, will be used for recontouring eroded lagoon banks and upslope areas prior to revegetation. No recontouring will occur in wetted portions of the lagoon and soil will be pulled back away from the water's edge;
- Invasive plant species removal will be conducted with hand tools and/or a small excavator; and
- Native plantings will be installed with hand tools.

1.4 Regulatory Overview

Regulated or sensitive resources studied and analyzed herein include special-status plant and wildlife species, nesting birds and raptors, sensitive plant communities, jurisdictional waters and wetlands, wildlife movement, regionally protected resources (e.g., from Habitat Conservation Plans [HCPs] and Natural Community Conservation Plans [NCCPs]), and locally protected resources, such as protected trees. Regulatory authority over biological resources is shared by federal, State, and local authorities. Primary authority for regulation of general biological resources lies within the land use control and planning authority of local jurisdictions (in this instance, the County of Santa Cruz).

1.4.1 Definition of Special-status Species

For the purposes of this report, special-status species include:

- Species listed as threatened or endangered under the Federal Endangered Species Act (FESA), including proposed and candidate species;
- Species listed as candidate, threatened, or endangered under the California Endangered Species Act (CESA);
- Species designated as Fully Protected by the California Fish and Game Code (CFGC), and Species of Special Concern or Watch List by the California Department of Fish and Wildlife (CDFW);
- Native Plant Protection Act (NPPA) – State Rare (SR); and
- California Native Plant Society (CNPS) California Rare Plant Ranks (CRPR) 1A, 1B, 2A and 2B, per the following definitions:
 - **Rank 1A** = Presumed extirpated in California and rare or extinct elsewhere
 - **Rank 1B** = Rare, threatened, or endangered in California and elsewhere
 - **Rank 2A** = Presumed extirpated in California but common elsewhere
 - **Rank 2B** = Rare, threatened or endangered in California, but common elsewhere

CRPR 3 and 4 plant species are typically not considered for analysis under the California Environmental Quality Act (CEQA) except where they are designated as rare or otherwise protected by local governments, or where cumulative impacts could result in population-level effects. The County does not provide additional protection for CRPR 3 and 4 plants.

Special-status species and sensitive natural communities are ranked globally (G) and subnationally (S) based on NatureServe (2010) methodologies, as follows:

- **G1 or S1** - Critically Imperiled Globally or State-wide
- **G2 or S2** - Imperiled Globally or State-wide
- **G3 or S3** - Vulnerable to extirpation or extinction Globally or State-wide

1.4.2 Environmental Statutes

For the purpose of this report, potential impacts to biological resources were analyzed based on the following statutes (Appendix A):

- CEQA
- FESA and CESA
- Federal Clean Water Act (CWA)
- California Fish and Game Code (CFGF)
- Migratory Bird Treaty Act (MBTA)
- The Bald and Golden Eagle Protection Act
- Porter-Cologne Water Quality Control Act
- California Coastal Act
- County of Santa Cruz General Plan and Local Coastal Plan

1.4.3 Guidelines for Determining CEQA Significance

The following threshold criteria, as defined by the CEQA Guidelines Appendix G Initial Study Checklist, were used to evaluate potential environmental effects. Based on these criteria, the proposed Project would have a significant effect on biological resources if it would:

- a) *Have substantial adverse effects, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or 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, and regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service.*
- c) *Have a substantial adverse effect on state or federally protected wetlands (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.*

2 Methodology

2.1 Literature Review

Rincon reviewed the CDFW California Natural Diversity Database (CNDDDB) (CDFW 2022a) and the CNPS Online Inventory of Rare and Endangered Plants of California (CNPS 2022) for special-status species with documented occurrences within the *Soquel, California* USGS 7.5-minute quadrangle and surrounding six quadrangles (*Santa Cruz, Felton, Laurel, Loma Prieta, Moss Landing, and Watsonville West*)². In addition, Rincon reviewed the Biogeographic Information and Observation System (BIOS) (CDFW 2022b), the USFWS Information for Planning and Consultation (IPaC) (USFWS 2022a), and the USFWS Critical Habitat Portal (USFWS 2022b) for the Project Area and regional vicinity.

Rincon also reviewed the following documents and websites for information on sensitive biological resources with the potential to occur within the Project Area: the County General Plan and Local Coastal Program (County of Santa Cruz 1994), the CDFW Special Animals List (CDFW 2022c), the CDFW Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2022d), the CDFW Wildlife Habitat Relationship System (Zeiner et al. 1988), All About Birds (Cornell Lab of Ornithology 2022a) and eBird (Cornell Lab of Ornithology 2022b). Additionally, Rincon reviewed the following databases for information on existing conditions within the Project Area: United States Department of Agriculture, Natural Resources Conservation Service (USDA, NRCS) Web Soil Survey (USDA, NRCS 2022a) and USFWS National Wetlands Inventory (NWI) Mapper (USFWS 2022c).

The review also included peer-reviewed journal articles, previous biological studies conducted for Moran Lake County Park (e.g., Sutter 2018, Stern and Courter 1980, Santa Cruz County Parks 2010), standard reference materials (e.g., Bowers et al. 2004, Sawyer et al. 2009, Stebbins 2003), and agency and public databases. Aerial photographs, topographic maps, soil survey maps, geologic maps, and climatic data for the Project Area and vicinity were also reviewed. Preliminary desktop mapping of land cover types was completed based on the review of background literature and aerial imagery and was verified during field surveys.

Rincon compiled the results of the literature review and database queries into a preliminary list of special-status species with potential to occur within the Project Area, which was then reviewed by Rincon's regional biological experts for accuracy and completeness. The list of special-status biological resources evaluated as part of the BRA was determined based on documented occurrences in the seven-USGS quadrangle search area and species known to occur in the region based on the expert opinions of local biologists. The results and analysis of the database queries were compiled into a potential to occur table presented as Appendix D and are discussed in detail in this report.

² A seven-USGS quadrangle search was conducted instead of a standard nine-quadrangle search due to the oceanic location of the remaining two quadrangles surrounding the Project location.

2.2 Reconnaissance-level Field Survey

Rincon Senior Biologist Samantha Kehr conducted a reconnaissance-level field survey of the Project Area on November 11, 2021. Ms. Kehr conducted a pedestrian survey of the perimeter of the lagoon and all terrestrial portions of the Project Area to assess the habitat suitability for the potential for special-status flora and fauna to occur, and to document all plant and wildlife species observed. Binoculars (10 X 42) were used to aid in identification and to achieve visual coverage of the entire Project Area.

Photographs were taken to document existing conditions, vegetation communities, species sign, or other notable biological resource observations. Representative site photographs are included in Appendix B. A complete list of all plant and wildlife species observed during the field reconnaissance survey is included in Appendix C.

2.3 Focused Surveys

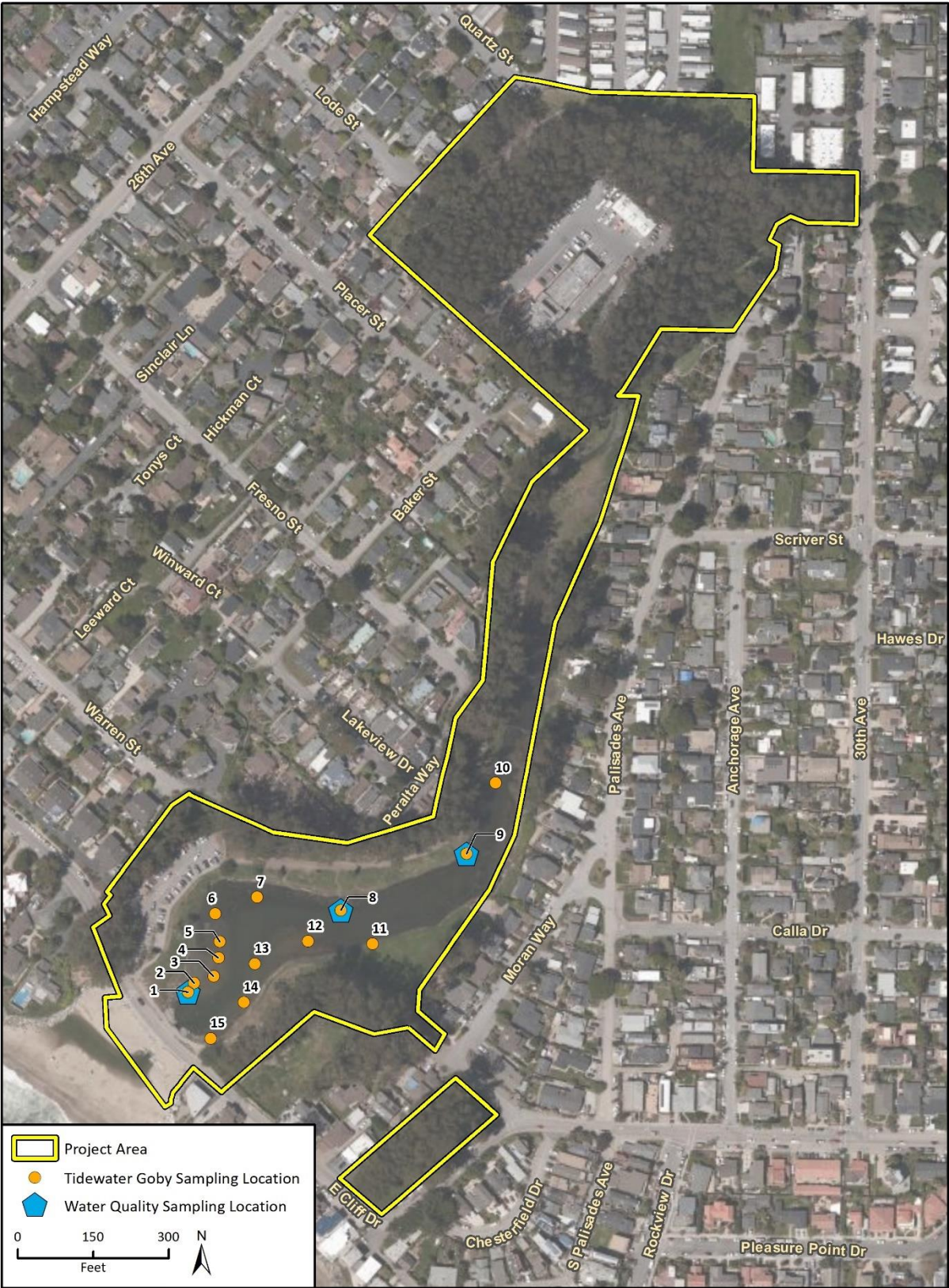
Targeted surveys were conducted by Rincon biologists for special-status aquatic or plant species within appropriate habitat throughout the Project Area. A jurisdictional delineation was also performed to determine the extent of jurisdictional waters and wetlands within the Project Area. The methods of each of these surveys are described in detail below.

2.3.1 Aquatic Survey

A survey for special-status aquatic species was conducted within Moran Lagoon on November 11, 2021 by Rincon Senior Fisheries Biologist Steve Howard and Rincon Biologists Charleen Rode and Heather Price Curran. Mr. Howard holds a 10(a)(1)(A) permit³ from the USFWS to capture and handle tidewater goby. A 20-foot long by 4-foot-wide brailed seine net with 1/8-inch stretch mesh was used by Rincon biologists to sample the lagoon for aquatic species. Fifteen separate seine hauls were conducted at various locations throughout the lagoon (Figure 3). All fishes observed were counted and identified to the nearest taxonomic group possible. Following identification, all fishes were returned to the lagoon in an aerated 5-gallon bucket filled with lagoon water. The survey was conducted in general accordance with the Tidewater Goby Survey Protocol, outlined in Appendix F of the Recovery Plan for the Tidewater Goby (USFWS 2005). As part of the aquatic survey, water quality measurements (salinity, temperature, dissolved oxygen [DO], conductivity, pH, and turbidity) were taken at three locations within the lagoon using a YSI ProDSS Water Quality Meter (Figure 3) to document habitat suitability for special-status aquatic species. Photographs taken during the aquatic survey are included in Appendix B. Aquatic survey datasheets, which include species counts, sampling locations, and water quality measurements, are included as Appendix E.

³ Permit number: TE99057B-0

Figure 3 Tidewater Goby Sampling Locations



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Fig 3 Tidewater Goby Sampling Locations

2.3.2 Jurisdictional Delineation

Current federal and State methods and guidelines were used to identify and delineate aquatic features (Appendix A). Potential wetland features were evaluated for presence of wetland parameters, specifically including positive indicators for hydrophytic vegetation, hydric soils, and wetland hydrology, according to routine delineation procedure (USACE 1987, 2008a). The *Western Mountains, Valleys, and Coast 2020 Regional Wetland Plant List* (Lichvar et al. 2020), used in determining the wetland indicator status of the examined vegetation, uses the following indicator status categories: Upland (UPL), Facultative Upland (FACU), Facultative (FAC), Facultative Wetland (FACW), and Obligate (OBL) (USACE 2020). The Project Area was surveyed for any streams or other drainages that might exhibit positive indicators for an ordinary high-water mark (OHWM) or HTL and which might constitute waters of the U.S. (USACE 2004, 2005, 2008b, 2010), as well as having a defined channel, bed and banks and any adjacent riparian habitat that could be subject to CDFW jurisdiction under the CFGC. The Project Area was also surveyed for indicators of coastal wetland features that could be subject to California Coastal Commission (CCC) jurisdiction, based on the one-parameter CCC wetland definition (Appendix A).

The delineation study began with a literature review of aerial photos and other data sources. After completion of the literature review, a field delineation was completed to identify, describe, and map all potential jurisdictional waters within the Project Area. Fieldwork for this evaluation was conducted by Principal and Senior Ecologist Colby Boggs on November 11, 2021.

The Project Area was surveyed on foot for all aquatic and riparian resources, including potential wetland and non-wetland jurisdictional areas, streambeds, and riparian habitat. General site characteristics and vegetation were documented. Extents of potential jurisdictional features, existing culvert locations, sample points, and photo locations were mapped using a Trimble Geo 7X Global Positioning System (GPS) unit with sub-meter accuracy and were also plotted on aerial photographs.

2.3.3 Botanical Survey

Botanical surveys to detect special-status plant species were conducted within the Project Area on April 1, 2022 and June 8, 2022 by Rincon biologist Casey Clark. The botanical surveys were conducted in general accordance with survey guidelines outlined within the CNPS Botanical Survey Guidelines (CNPS 2001), Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFW 2018), and Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants (USFWS 1996), which state the following:

- Surveys should be conducted at the proper time of year when the species are both evident and identifiable.
- Surveys must be floristic in nature, meaning each species, subspecies, or variety must be identified for every observed plant to determine its rarity status.
- Surveys must be conducted in a manner that is consistent with conservation ethics and accepted plant collection and documentation techniques.

Mr. Clark utilized systematic field techniques and walked the entire Project Area closely examining all suitable special-status plant species habitat (e.g., vegetation community interfaces, areas with unique soils) to ensure thorough coverage. A list of all species observed during the surveys is provided in Appendix C. Plants of uncertain identity were collected and subsequently identified

from keys, descriptions, and illustrations in The Jepson Manual: Vascular Plants of California, Second Edition (Baldwin et al. 2012). If a special-status plant species was observed, its location would be logged individually as a point using a submeter-accurate GPS unit. Larger occurrences or populations would be mapped as polygons. Plant species scientific nomenclature and taxonomy follow the treatments within Baldwin et al. (2012). Common names of plant species follow the Jepson naming convention when available, and Calflora (2022) when Jepson naming information is unavailable.

2.4 Impact Evaluation

Impacts are defined as project-related activities that destroy, damage, alter, or otherwise affect biological resources. This may include injury or mortality to plant or wildlife species, effects on an animal's behavior (such as through harassment or frightening off an animal by construction noise), as well as the loss, modification, or disturbance of natural resources or habitats. Impacts are defined as either direct or indirect, and either permanent or temporary. Rincon analyzed potential impacts to biological resources based on current Project plans and proposed construction methods. A summary of these potential impacts, as well as recommended avoidance and minimization measures, is included in Section 5.

3 Existing Conditions

3.1 Physical Characteristics

3.1.1 Climate, Topography, and Setting

The Project Area is located within the Central Coast geographic subregion of California (Baldwin et al. 2012) in the County of Santa Cruz. The climate in this region is characterized by warm, dry summers and mild, wet winters. The average high temperature during summer months (June through September) is 75 degrees Fahrenheit (°F) and the average low temperature is 50 °F. The average high temperature during the winter months (December through March) is 62 °F and the average low temperature is 40 °F. Average annual precipitation is 29.3 inches, with the majority of rainfall occurring during November through March (Western Regional Climate Center 2022). Topography within the Project Area is generally flat, with elevations ranging from approximately 10 to 50 feet above mean sea level.

The Project Area is located at Moran Lake County Park, and includes the coastal lagoon and associated wetlands, a paved parking lot, restroom, picnic tables, trails, blue-gum eucalyptus (*Eucalyptus globulus*) groves, a portion of sandy beach, a portion of East Cliff Drive, and a portion of Peralta Drive. Buildings and a parking area associated with the D.A. Porath Sanitation Facility are also present in the northwest corner of the Project Area. The facility is the site for all maintenance on the County sewer system and serves as the primary pumping station between the City of Santa Cruz treatment plant and the eastern portion of the County. The facility is surrounded by eucalyptus trees that serve as a monarch butterfly overwintering site. The Project Area also includes a small rectangular parcel at 40 Moran Way, which contains additional eucalyptus grove habitat.

3.1.2 Watershed and Drainages

The Project Area is located within the larger Monterey Bay Watershed (Hydrologic Unit Code 180600150305) (US Environmental Protection Agency [US EPA] 2021). The local watershed that drains directly to Moran Lagoon encompasses approximately 620 acres within the cities of Santa Cruz and Capitola. The watershed extends southward from Soquel Drive in the north to the Monterey Bay National Marine Sanctuary in the south and is bounded by Twenty-sixth and Thirtieth Avenues in the west and by Forty-first Avenue in the east. Moran Creek, an intermittent stream, conveys stormwater runoff from the surrounding neighborhood to the lagoon and flows into the Project Area through a culvert beneath Thirtieth Avenue. The watershed has undergone extensive development and urbanization within the past four decades, leading to a significant increase in impervious surface area. Coupled with the anthropogenic impacts that have limited connectivity with the ocean, this has led to serious runoff, erosion, and pollution issues for Moran Lagoon (Santa Cruz County Parks 2010). A formal jurisdictional delineation of waters and wetlands within the Project Area was performed on November 11, 2021, the results of which are summarized in Section 4.3 and detailed in a Jurisdictional Delineation Report submitted under separate cover (Rincon 2022).

3.1.3 Soils

The USDA, NRCS Web Soil Survey identifies three soil map units within the Project Area: Watsonville loam, 0 to 2 percent slopes; Watsonville loam, thick surface, 0 to 2 percent slopes; and Watsonville loam, thick surface, 2 to 15 percent slopes. Watsonville loam soils are derived from alluvium and formed on marine terraces from 0 to 1,200 feet in elevation. The depth to the water table is more than 80 inches, the frequency of flooding and ponding is none, the available water supply is very low (about 2.9 inches), and the soils are somewhat poorly drained (USDA, NRCS 2022a). Watsonville loam soils are included on the NRCS list of hydric soils (USDA, NRCS 2022b).

3.2 Vegetation Communities and Other Land Cover

Vegetation community characterizations for this analysis were based on the classification system presented in *A Manual of California Vegetation*, Second Edition (MCV2; Sawyer et al. 2009)⁴ but have been modified slightly to most accurately reflect existing site conditions. Preliminary Descriptions of the Terrestrial Natural Communities of California (Holland 1986) is still used for reference and historical perspective, though its classifications are no longer supported by the State of California and have been superseded by Sawyer et al. 2009. Plant species scientific nomenclature and taxonomy follow the treatments within Baldwin et al. (2012). Common names of plant species follow the Jepson naming convention when available, and Calflora (2022) when Jepson naming information is unavailable.

The Project Area includes a coastal lagoon and surrounding wetlands that have been heavily modified by urban development and the introduction of non-native plant species. The following vegetation communities and land cover types exist within the Project Area: pickleweed mats, disturbed riparian scrub, ice plant mats, sandy beach, eucalyptus groves, annual grassland, ruderal, and developed (Figure 4). Representative photographs of the Project Area are included as Appendix B and a complete list of all plant species observed during the biological surveys can be found in Appendix C.

Pickleweed Mats

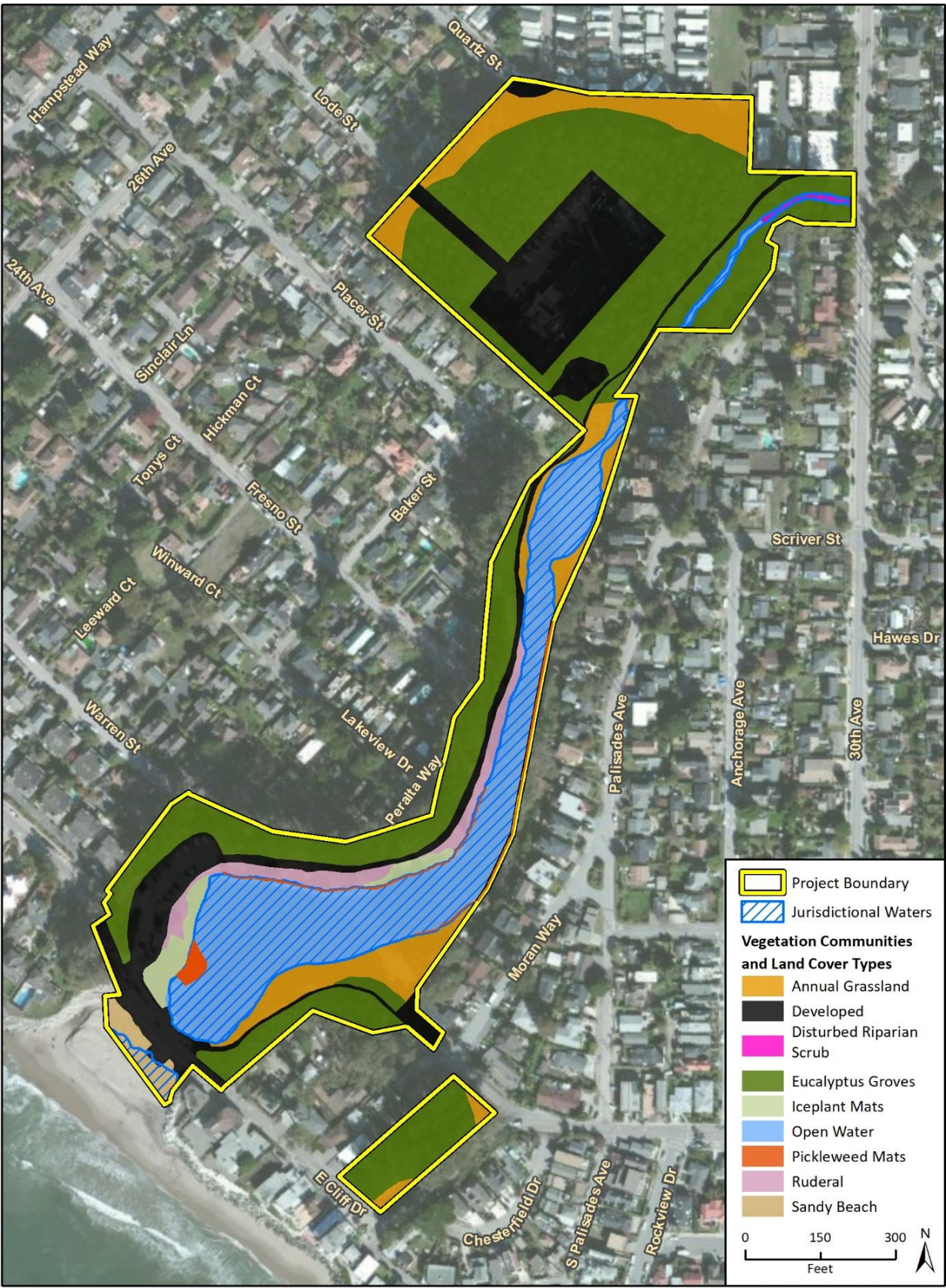
Saline emergent wetland vegetation is present around the perimeter of Moran Lagoon. This community most closely aligns with the Pickleweed Mats (*Salicornia pacifica*⁵ [*Salicornia depressa*]) Herbaceous Alliance (G4/S3), and the *Salicornia pacifica* – *Jaumea carnosa* - *Distichlis spicata* Association (G3/S3) described by Sawyer et al. 2009. This association is considered vulnerable to extirpation and extinction globally and State-wide and is listed on the CDFW Sensitive Natural Communities List (CDFW 2021). Pickleweed mats consist of native halophytic vegetation and occur in coastal salt marshes and alkaline flats at elevations of 0 to 7 feet.

Within the Project Area, this community is comprised primarily of pickleweed, with some marsh jaumea (*Jaumea carnosa*), saltgrass (*Distichlis spicata*), and alkali heath (*Frankenia salina*)

⁴ The online version of *A Manual of California Vegetation*, 2nd edition (MCV2, Sawyer et al. 2009) was referenced for this analysis. The online version is updated by CDFW VegCAMP, hosted by CNPS, and available at <http://vegetation.cnps.org/>.

⁵ *Sarcocornia pacifica* and *Salicornia pacifica* are alternate scientific names for the same species of pickleweed. The Manual of California Vegetation refers to *Sarcocornia pacifica* but *Salicornia pacifica* is used in this report.

Figure 4 Vegetation Communities and Land Cover Types



interspersed. This community forms a narrow fringe near the lagoon OHWM⁶ throughout brackish portions of the lagoon. Pickleweed mats occur in areas that are periodically inundated with brackish water and cover approximately 0.18 acre within the Project Area. It is likely that this community was once much more extensive around Moran Lagoon and restoration efforts associated with this Project are intended to expand this community of native salt marsh plants along the lagoon banks.

Disturbed Riparian Scrub

This community occurs in the northeastern portion of the Project Area, near Thirtieth Avenue, and surrounds Moran Creek, the freshwater stream inlet to Moran Lagoon. This community most closely resembles the Himalayan blackberry – rattlebox – edible fig (*Rubus armeniacus* – *Sesbania punicea* – *Ficus carica*) Shrubland Semi-Natural Alliance and *Rubus armeniacus* association described by Sawyer et al. 2009. This alliance is dominated by non-native plants and can occur in a variety of disturbed landcover types, including pastures, mesic disturbed sites, and stream sides. Within the Project Area, this community covers approximately 0.05 acre and is dominated by invasive Himalayan blackberry (*Rubus armeniacus*), with invasive elmleaf blackberry (*Rubus ulmifolius*), cape ivy (*Delairea odorata*), and French broom (*Genista monspessulana*) present as codominant species. Several native coast live oak (*Quercus agrifolia*) and California bay laurel (*Umbellularia californica*) trees are also present in this community, near the Thirtieth Avenue culvert outlet.

Iceplant Mats

This vegetation type most closely resembles the Ice Plant Mats (*Mesembryanthemum* spp. – *Carpobrotus* spp.) Herbaceous Semi-Natural Alliance described by Sawyer et al. (2009). Ice plant mats can occur in bluffs, disturbed land, and coastal sand dunes and consist of non-native, perennial, ground-hugging succulents that form large monospecific mats.

Within the Project Area, this vegetation type is dominated by iceplant (*Carpobrotus edulis*), and occurs along the sandy banks of the lagoon, upslope of the OHWM, covering approximately 0.33 acre. *Carpobrotus edulis* has a California Invasive Plant Council (Cal-IPC) rating of ‘High’ and spreads readily from landscaped areas into adjacent habitats, outcompeting native species for space, nutrients, and moisture. Restoration efforts associated with the Project will involve removal of iceplant from the banks surrounding Moran Lagoon.

Sandy Beach

This land cover type covers approximately 0.24 acre within the Project Area and consists of unvegetated sand between East Cliff Drive and the Pacific Ocean. This area is part of Moran Lake Beach, which is owned by the County and managed for recreational use.

Eucalyptus Groves

The eucalyptus groves within the Project Area most closely resemble the *Eucalyptus* spp. Woodland Semi-Natural Alliance (*Eucalyptus globulus* Association) described by Sawyer et al. (2009). Eucalyptus trees are dominant in this alliance and preclude most other plant species from growing in the understory. Eucalyptus groves were planted as windbreaks throughout California and have also been naturalized in many areas adjacent to streams and lakes.

⁶ Moran Lagoon does experience tidal influence during extreme high tide and storm events. However, due to the installation of the box culvert beneath East Cliff Drive, the lagoon is generally isolated from tidal influence. Therefore, ordinary high-water mark will be used in reference to the lagoon instead of high tide line throughout this report.

Eucalyptus groves cover approximately 8.18 acres within the Project Area, with dense stands growing in the northern portion of the park surrounding the D.A. Porath Sanitation Facility, along the western edge of the lagoon near the center of the Project Area, along the southeastern corner of the lagoon, and within the 40 Moran Way Parcel in the easternmost portion of the Project Area. The understory of the eucalyptus groves is generally scarce due to the allelopathic nature of eucalyptus trees. Poison oak (*Toxicodendron diversilobum*) dominates the shrubby understory, forming low density and coverage thickets and the herbaceous understory is generally absent. Although eucalyptus groves are non-native, they do provide habitat for a variety of native wildlife species, including monarch butterflies, which are known to overwinter in the groves on site (Xerces 2022).

Annual Grassland

This community most closely resembles the *Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance described by Sawyer et al. (2009). Non-native introduced grass species are dominant in this alliance, though species composition in this community is highly variable and may contain occasional native or ornamental trees and shrubs.

Within the Project Area, this vegetation type occurs in open spaces surrounding the lagoon and eucalyptus groves and covers approximately 2.30 acres. Annual grassland within Project Area is codominated by non-native grasses, including wild oats (*Avena fatua* and *Avena barbata*), ripgut brome (*Bromus diandrus*), kikuyu grass (*Pennisetum clandestinum*), foxtail barley (*Hordeum murinum*), and Italian rye (*Festuca perennis*).

Ruderal

Ruderal areas consist of vegetation that has been heavily disturbed or altered such that native plant communities have largely been removed and non-native plants species are dominant. Ruderal areas are not described in the Holland (1986) or Sawyer et al. (2009) classification systems. Ruderal portions of the Project Area cover approximately 0.41 acre and occur along the periphery of the paved parking area and existing trails. This vegetation type within the Project Area is associated generally with non-native and invasive herbaceous plants such as storks bill (*Erodium* spp.), foxtail barley, English plantain (*Plantago lanceolata*), charlock (*Raphanus* sp.), and burclover (*Medicago* sp.).

Developed

Developed areas are not naturally occurring and are not described in the Holland (1986) or Sawyer et al. 2009 classification systems. Developed portions of the Project Area cover approximately 3.76 acres and include the paved parking lot, existing bathrooms, a portion of East Cliff Drive, paved and unpaved pedestrian trails, and buildings and infrastructure associated with the D.A. Porath Sanitation Facility.

3.3 Reconnaissance-level Field Survey Results

The reconnaissance-level field survey was conducted between 0930 and 1500 on November 11, 2021. Weather conditions were clear and sunny, with temperatures ranging from 65°F to 71°F, and 3 to 10 mile per hour winds. No special-status plant species were observed, though this survey was not a protocol-level botanical survey and was not conducted during the bloom periods of most special status plant species. Special-status wildlife species observed during the survey included monarch butterfly (*Danaus plexippus*), American white pelican (*Pelecanus erythrorhynchos*), double-crested cormorant (*Phalacrocorax auritus*), and tidewater goby (*Eucycloglobius newberryi*) (as described further in Sections 3.4.1 and 4.1.2). A variety of native bird species were observed within the Project Area, including snowy egret (*Egretta thula*), mallard (*Anas platyrhynchos*), black phoebe (*Sayornis nigricans*), chestnut-backed chickadee (*Poecile rufescens*), and red-tailed hawk (*Buteo jamaicensis*). Potentially suitable nesting habitat for these and many other bird species occurs within the Project Area. Habitats within the Project Area have been largely disturbed by human development and introduction of non-native plant species; however, populations of monarch butterfly and tidewater goby are present, and potentially suitable habitat also exists for other special-status wildlife species, including southwestern pond turtle (*Actinemys pallida*) and Cooper's hawk (*Accipiter cooperii*). Section 4.1 describes all special-status plant and wildlife species with potential to occur on-site. Appendix D includes an analysis of the potential for regionally occurring special-status species to be present within the Project Area.

3.4 Focused Survey Results

Focused biological surveys were conducted by Rincon biologists for special-status aquatic and plant species within appropriate habitat throughout the Project Area. The results of each of these surveys are described in detail below.

3.4.1 Aquatic Survey Results

The aquatic survey was conducted within Moran Lagoon between 0900 and 1600 on November 11, 2021. Weather conditions at the time of the survey were clear and sunny, with temperatures ranging from 63 °F and 71 °F and winds from 3 to 10 miles per hour. A total of 636 federally endangered tidewater goby (*Eucycloglobius newberryi*) and 421 partially armored threespine stickleback (*Gasterosteus aculeatus*) were collected, observed, and released during the fifteen seine hauls conducted during the survey (Figure 3). No other fish species were observed, and no fish mortality occurred. The shells of multiple marine invertebrates were also observed within and around the lagoon during the survey, including black-clawed crab (*Lophopanopeus bellus*), purple shore crab (*Hemigrapsus nudus*), and California mussel (*Mytilus californicus*). Table 1 presents the water quality data collected at three locations within the lagoon during the survey (Figure 3). Aquatic survey datasheets are included as Appendix E.

Table 1 Water Quality Data

Date	Time	Haul	Location	DO (mg/L)	Conductivity (μ S/cm)	pH	Salinity (ppt)	Turbidity (ntu)	Temperature (°C)
11/11/21	0940	1	36.95657°N, -121.97772° W	6.78	11080	7.23	7.14	5.72	14.2
11/11/21	1125	8	36.95703°N, -121.97671° W	8.70	8200	7.41	7.00	8.71	13.8
11/11/21	1145	9	36.95735°N, -121.97586° W	8.61	8188	7.74	5.88	11.40	14.0

3.4.2 Botanical Survey Results

Eighty-eight plant species were observed during the botanical survey. Of the eighty-eight species observed, 50 are herbs, 10 are grasses, 15 are shrubs or vines, and 13 are trees. Approximately 69 of the 88 species are introduced with approximately 35 of those species being considered invasive by the Cal-IPC. No special-status plant species were observed during the botanical surveys. A complete inventory of all plant species observed during the botanical surveys is provided in Appendix C.

4 Sensitive Biological Resources

This section discusses special-status species and sensitive biological resources observed within the Project Area and evaluates the potential for the Project Area to support additional sensitive biological resources. Assessments for the potential occurrence of special-status species are based upon known ranges, habitat preferences for the species, species occurrence records from the CNDDDB and other sources, species occurrence records from other sites in the vicinity of the survey area, previous reports for the Project site, and the results of surveys of the Project Area. The potential for each special status species to occur in the Project Area was evaluated according to the following criteria:

- **No Potential.** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime), and species would have been identifiable on the site if present (e.g., oak trees). Protocol surveys (if conducted) did not detect species.
- **Low Potential.** Few of the habitat components (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site. Protocol surveys (if conducted) did not detect species.
- **Moderate Potential.** Some of the habitat components (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- **High Potential.** All the habitat components (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- **Present.** Species is observed on the site or has been recorded (e.g., CNDDDB, other reports) on the site recently (within the last 5 years).

4.1 Special-status Species

Rincon evaluated forty-nine special-status plant species and forty-six special-status wildlife species for their potential to occur within the Project Area (Appendix D). A list of all wildlife and plant species observed during the biological surveys can be found in Appendix C.

4.1.1 Special-status Plant Species

Forty-nine special-status plant species were evaluated for their potential to occur within the Project Area (Appendix D). Based on the absence of suitable habitat and/or soils; the generally developed and disturbed nature of the site; and the results of the two botanical surveys conducted on site (in April and June 2022), no special-status plant species are expected to occur within the Project Area.

4.1.2 Special-status Wildlife Species

Rincon evaluated forty-six special-status wildlife species for their potential to occur within the Project Area (Appendix D), twenty-one of which have some potential to occur on site based upon direct observation of the species or the presence of suitable habitat. Table 2 lists each of these species, their status, and their potential to occur within the Project Area. The remaining twenty-five special-status wildlife species are not expected to occur in the Project Area or immediate vicinity based on the absence of intact riparian, grassland, woodland, chaparral, coastal scrub, vernal pool, or other suitable natural habitats or vegetation communities, and/or because the known range of the species does not overlap with the Project Area.

Table 2 Special-status Wildlife Species with Potential to Occur within the Project Area

Scientific Name	Common Name	Status	Potential to Occur
Invertebrates			
<i>Danaus plexippus</i> pop. 1	monarch butterfly	FC	Present
Fish			
<i>Eucycloglobius newberryi</i>	tidewater goby	FE	Present
<i>Lavinia exilicauda harengus</i>	Monterey hitch	SSC	Low Potential
Amphibians			
<i>Rana draytonii</i>	California red-legged frog	FT	Low Potential
Reptiles			
<i>Actinemys pallida</i>	southwestern pond turtle	SSC	Low Potential
<i>Anniella pulchra</i>	northern California legless lizard	SSC	Low Potential
Birds			
<i>Accipiter cooperii</i>	Cooper's hawk	WL	High Potential
<i>Agelaius tricolor</i>	tricolored blackbird	ST	Low Potential (non-nesting)
<i>Charadrius nivosus</i>	western snowy plover	FT/SSC	Low Potential (non-nesting)
<i>Cypseloides niger</i>	black swift	SSC	Low Potential (non-nesting)
<i>Elanus leucurus</i>	white-tailed kite	FP	Moderate Potential (non-nesting)
<i>Falco peregrinus anatum</i>	American peregrine falcon	FD/SD/FP	Moderate Potential (non-nesting)
<i>Pandion haliaetus</i>	osprey	WL	Moderate Potential
<i>Pelecanus erythrorhynchos</i>	American white pelican	SSC (nesting colony)	Present (non-nesting)
<i>Pelecanus occidentalis californicus</i>	California brown pelican	FD/SD/FP	High Potential (non-nesting)
<i>Phalacrocorax auritus</i>	double-crested cormorant	WL (nesting colony)	Present (non-nesting)
<i>Riparia riparia</i>	bank swallow	ST	Low Potential (non-nesting)
<i>Setophaga petechia</i>	yellow warbler	SSC	High Potential
<i>Sterna antillarum browni</i>	California least tern	FE/SE/FP	Low Potential (non-nesting)
Mammals			
<i>Antrozous pallidus</i>	pallid bat	SSC	Low Potential
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	SSC	Low Potential
FE = Federally Endangered FC = Federal Candidate SE = State Endangered ST = State Threatened SSC = CDFW Species of Special Concern FP = State Fully Protected WL = CDFW Watch List FD = Federally Delisted SD = State Delisted			

Special-status wildlife species that have a moderate or high potential to occur, or are present on site, are discussed in further detail below. State and/or federally listed species with a low potential to occur on-site will also be discussed in further detail. For the purposes of CEQA analysis, special-status species that are not state or federally listed and have a low potential to occur will not be addressed further in this section.

Monarch Butterfly

The monarch butterfly is a candidate species for federal listing. Monarchs overwinter in roost sites that extend along the Pacific coast from northern Mendocino County to Baja California, Mexico. Roosts are located in wind-protected tree groves (typically eucalyptus, Monterey pine, or Monterey cypress), with nectar and water sources nearby.

Wintering monarch habitat occurs around Moran Lagoon (Santa Cruz County Parks 2010, Xerces Society 2022), primarily within stands of blue gum eucalyptus, and the species typically roosts in the area from October through February. The monarch wintering habitat at Moran Lagoon supports the second largest population of wintering monarchs in Santa Cruz County (approximately 20%) and a considerable portion (approximately 5%) of the state-wide population (Santa Cruz County Parks 2010). There are twenty occurrences of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022a). Individuals were observed on site during the biological surveys in November and December 2021. Overwintering monarch butterflies are present within the Project Area. The forthcoming Monarch Management Plan Update for Moran Lake County Park will include recommendations for maintaining and improving the health of the eucalyptus groves on site to enhance monarch overwintering habitat.

Tidewater Goby

The tidewater goby is a federally endangered species known to occur along the California coast from the mouth of the Smith River in Del Norte County, south to Agua Hedionda Lagoon in San Diego County. In 2016, a study was published describing tidewater goby populations south of Aliso Creek in Orange County as a distinct species (*Eucyclogobius kristinae*) now referred to as the southern tidewater goby due to molecular distinctions as well as lineage separation and mitochondrial sequence divergence. The tidewater goby species from Santa Monica Artesian Springs (Los Angeles County) northward belong to *E. newberryi* (Swift et al. 2016) now referred to as the northern tidewater goby. Both species are federally listed as endangered. Tidewater gobies generally inhabit lagoons, estuaries, marshes, and coastal streams that are protected from the Pacific Ocean by sandbars creating cool, brackish water conditions, preferably with nearby emergent vegetation. Salinities under 10 parts per thousand (ppt) are favorable although this species has been found in the upper reaches of streams which are tributaries to brackish water. The species may occur in groups under a dozen or in large aggregations of several hundred. Habitat with sandy bottom substrate is preferred to allow subsurface burrowing by males prior to mate selection. Tidewater gobies complete life cycles annually with adults rarely exceeding two inches in length. Threats to the goby include sandbar breaching for tidal flushing, wetland draining, and pollutant accumulation in lagoons. Federally designated critical habitat for the tidewater goby exists approximately 0.35 mile northwest of Moran Lagoon, within Corcoran Lagoon (USFWS 2011). Moran Lagoon is not designated as critical habitat for this species.

Tidewater gobies were observed within Moran Lagoon during surveys in 1997 and 2001, as described in the Tidewater Goby Final Recovery Plan (USFWS 2005). The species was also observed within the lagoon during surveys conducted in 2014 and 2015 (Wasserman and Palkovacs,

unpublished data) and detected in the lagoon in an eDNA study conducted in 2016 (Sutter 2018). There are eight occurrences of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022a). As described in Section 3.4.1, 636 tidewater gobies were observed within Moran Lagoon during the aquatic survey conducted by Rincon biologists on November 11, 2021. The species is therefore present within the Project Area and is assumed to be breeding within Moran Lagoon. Salinity measurements within the lagoon taken during the aquatic survey ranged from 5.88 to 7.14 ppt, with water temperature ranging from 13.8 to 14.2 degrees Celsius (°C). These ranges represent preferable habitat conditions for the tidewater goby, though salinity and temperature within the lagoon fluctuate depending on precipitation, tidal conditions, and air temperature. Sandy substrates within Moran Lagoon provide favorable breeding habitat for the tidewater goby, though emergent wetland vegetation for use as cover is scarce and especially limited during low water conditions when the surface water level of the lagoon dips beneath the fringe of pickleweed mats.

California Red-legged Frog

The California red-legged frog (CRLF) is a federally threatened species and a State Species of Special Concern (SSC) that occurs in lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. It typically inhabits quiet pools of streams, marshes, and ponds. All life history stages are most likely to be encountered in and around breeding sites, which include coastal lagoons, marshes, springs, permanent and semi-permanent natural ponds, and ponded and backwater portions of streams, as well as artificial impoundments such as stock ponds, irrigation ponds, and siltation ponds. The CRLF can disperse up to two miles from breeding ponds. Eggs are typically deposited in permanent pools, attached to emergent vegetation. This species typically requires 11 to 20 weeks of permanent water for larval development and must have access to estivation habitat. Suitable upland habitat must provide sufficient moisture to prevent desiccation and sufficient cover to provide protection from predators. Typical upland habitat consists of densely vegetated areas, downed woody vegetation, leaf litter, small mammal burrows, and human-made structures (i.e., culverts, livestock troughs, spring-boxes, abandoned sheds) (USFWS 2002).

A limited amount of marginally suitable freshwater and riparian habitat for the species occurs in the northeastern portion of the Project Area, within Moran Creek and its associated riparian scrub. There are four occurrences of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022a), though all of these occurrences are in freshwater ponds near the UC Santa Cruz campus and are at least 4.5 miles west of Moran Lagoon. Due to the disturbed nature of the riparian and instream habitat and the isolation of the site due to urban development, there is only a low potential for the CRLF to occur on site.

Cooper's Hawk

The Cooper's hawk is a CDFW watchlist (WL) species that typically inhabits woodlands and forest edges but can also be found in urban parks and neighborhoods where trees are present. Nests are constructed 25-50 feet high in a variety of tree species, including pines, oaks, beeches, and spruces. Nests are made of sticks and are often lined with bark flakes and green twigs. Cooper's hawks are aerial predators that feed primarily on medium-sized birds, such as mourning dove (*Zenaidura macroura*), American robin (*Turdus migratorius*), California quail (*Callipepla californica*), and European starling (*Sturnus vulgaris*). In addition to preying on adult birds, Cooper's hawks will also occasionally rob nests and hunt rabbits, rodents, and bats (Cornell Lab of Ornithology 2022a).

Suitable foraging habitat for the species is present throughout the Project Area, and suitable nesting habitat for the species exists within eucalyptus, coast redwood, Monterey cypress, and other trees present within the Project Area. There are no occurrences of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022a). Multiple occurrences of the species are documented within one mile of the Project Area in eBird (Cornell Lab of Ornithology 2022b). The Cooper's hawk has a high potential to forage and nest within the Project Area.

Tricolored Blackbird

The tricolored blackbird is a State threatened species that is largely endemic to California and is most common in the Central Valley, though it also occurs in coastal areas. The species is highly colonial and historically nested in wetlands with cattails, bulrushes, and willows. Today, much of the wetland habitat in California has been converted to agriculture and the species nests primarily in triticale fields (Cornell Lab of Ornithology 2022a). Nesting colonies require open water, protected nesting substrate, and foraging areas with adequate insect prey within a few kilometers of the colony.

Suitable foraging habitat for the species occurs around Moran Lagoon, though no suitable cattail, agricultural field, or other dense vegetative nesting habitat is present. Two historic occurrences (in 1973 and 1987) of the species are documented in the CNDDDB approximately three miles west of the Project Area (CDFW 2022a). One occurrence of the species is documented within one mile of the lagoon in eBird (Cornell Lab of Ornithology 2022b). The tricolored blackbird has a low potential to fly over or forage within the Project Area but is not expected to nest on site.

Western Snowy Plover

The western snowy plover is federally threatened and a CDFW SSC. This small shorebird is about six inches long, with a thin dark bill, pale brown to gray upper parts, white or buff colored belly, and darker patches on its shoulders and head, and white forehead and eyebrow. The Pacific Coast population of the western snowy plover breeds primarily on coastal beaches from southern Washington to southern Baja California, Mexico. The population breeds 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 (USFWS 2022d).

Some suitable nesting habitat for the species occurs within the Project Area, including a small stretch of sandy beach in the southernmost portion of the site. However, Moran Lagoon and Moran Lake Beach are heavily impacted by recreational use and development and no longer provide suitable breeding habitat for the species. There are two historic occurrences (from 1878 and 1887) of the western snowy plover documented in the CNDDDB (CDFW 2022a) approximately two and four miles west of the Project Area. There are multiple occurrences documented in eBird within five miles of the Project Area (Cornell Lab of Ornithology 2022b), though none are documented within the Project Area. The western snowy plover has a low potential to occur within the Project Area, though the species is not expected to nest on site.

White-tailed Kite

The white-tailed kite is a State fully protected species that occurs in open grasslands, meadows, open woodlands, marshes, and cultivated areas. Nests are built near the top of dense-topped trees. Diet consists primarily of small mammals, and the species hunts by facing into the wind and hovering (or "kiting") above the ground while scanning the ground for movement (Cornell Lab of Ornithology 2022a).

The white-tailed kite has a moderate potential to fly over or forage within the Project Area, though it is not expected to nest within the Project Area due to the high level of human activity and surrounding urban development. Multiple occurrences of the species are documented within one mile of the Project Area in eBird (Cornell Lab of Ornithology 2022b).

American Peregrine Falcon

The American peregrine falcon is a federally and State delisted species and a State fully protected species that occurs in urban areas and open habitats, including coastlines, mudflats, lake edges, and mountain sides. American peregrine falcon populations were nearly exterminated from 1940-1970 due to wide-spread use of organochlorine pesticides. In 1970, the species was listed as federally endangered and conservation efforts began. Following the ban of the pesticide DDT and the implementation of captive breeding programs, American peregrine falcon populations have rebounded, and the species was delisted in 1999 (Center for Biological Diversity 2021). Prey includes a wide variety of bird species and nest sites are typically in rocky cliffs faces, but can also be located on transmission towers, skyscrapers, bridges, or other human-made structures (Cornell Lab of Ornithology 2022a).

Suitable cliffs or tall structures preferred by the species for nesting habitat are not present within the Project Area. Multiple occurrences of the species are documented within five miles of Moran Lake County Park in eBird (Cornell Lab of Ornithology 2022b) and there is a moderate potential for the species to fly over or forage in the Project Area.

Osprey

The osprey is a CDFW WL species that feeds on live fish and inhabits areas near large water bodies with adequate shallow fishing grounds, including oceans, rivers, lagoons, lakes, and marshes. Osprey nest in elevated, open sites (typically in trees) that are within twelve miles of water bodies with adequate fish supplies (Cornell Lab of Ornithology 2021a).

Trees within the Project Area provide suitable nesting habitat for ospreys that is within close proximity to suitable fishing grounds in the ocean. Multiple occurrences of the species are documented within one mile of the Project Area in eBird (Cornell Lab of Ornithology 2022b). There is a moderate potential for the species to forage and nest within the Project Area.

American White Pelican

The American white pelican is a CDFW SSC that nests primarily on isolated islands in freshwater lakes and feeds primarily on small fish. In the winter, the species favors coastal bays, estuaries, lagoons that provide shallow foraging habitat and exposed sandbars for resting (Cornell Lab of Ornithology 2022a).

American white pelicans were observed during the field reconnaissance survey on November 11, 2021. Multiple occurrences of the species are documented within five miles of the Project Area in eBird (Cornell Lab of Ornithology 2022b). Moran Lagoon and Moran Lake Beach provide suitable foraging habitat for the species, though no isolated islands within freshwater are present and the species is not expected to nest within the Project Area.

California Brown Pelican

The California brown pelican is a State fully protected species that was both federally and State delisted. The species lives year-round in estuaries and coastal marine habitats along the California

coast, and forage, rest, and roost on islands, offshore rocks, breakwaters and other humanmade structures, rocky intertidal areas, mudflats, and beaches. The species generally nests and breeds at offshore Islands in southern California. Diet includes mostly small fish that school near the surface of the water. Brown pelicans spot fish from the air and dive head-first from as high as 65 feet over the ocean before plunging into the water and expanding their throat patch to trap fish (Cornell Lab of Ornithology 2022a).

The Project Area is outside of the typical breeding range of the California brown pelican and the species is not expected to nest on site. However, multiple occurrences of the species are documented within and around Moran Lake County Park in eBird (Cornell Lab of Ornithology 2022) and the species has a high potential to fly through or forage within the Project Area.

Double-crested Cormorant

The double-crested cormorant is a CDFW WL species that forms breeding colonies in clusters of trees near large bodies of water. Diet consists primarily of fish, which they catch by diving and chasing their prey underwater with powerful propulsion from webbed feet. After fishing, the birds rest on high, airy perches to dry off and digest (Cornell Lab of Ornithology 2022a).

Double-crested cormorants were observed within the Project Area during the field reconnaissance survey on November 11, 2021 and have been frequently documented within Moran Lake County Park and the surrounding area in eBird (Cornell Lab of Ornithology 2022b). Suitable nesting habitat for the species is present in eucalyptus groves within the Project Area, no known cormorant rookeries occur on site.

Bank Swallow

The bank swallow is a State threatened species that inhabits low areas along rivers, streams, ocean coasts, and reservoirs. The species nests colonially on vertical banks or cliffs with fine-textured or sandy soils and forages in open areas. Diet includes insects, such as bees, wasps, ants, butterflies, and moths (Cornell Lab of Ornithology 2022a).

No suitable banks or cliffs for nesting occur within the Project Area. However, multiple occurrences of the species are documented within five miles of Moran Lake County Park in eBird (Cornell Lab of Ornithology 2022b) and there is a low potential for the species to fly through or forage within open portions of the Project Area.

Yellow Warbler

The yellow warbler is a CDFW SSC that inhabits riparian plant communities and is typically found in close proximity to water. The species frequently nests and forages in willow shrubs and thickets, and can also be found in other riparian trees, including cottonwoods, sycamores, ash, and alders. The yellow warbler also nests in montane shrubbery in open conifer forests in the Cascades and Sierra Nevada range. Diet consists primarily of insects picked from foliage or captured mid-air and can include midges, caterpillars, beetles, and wasps. Nests are built from grasses, bark, and broad leaves and are usually found in vertical forks of bushes and small trees about ten feet above ground. Clutch size is typically one to seven eggs, which are incubated for 10-13 days prior to a 9-12 day nestling period. Yellow warblers are still numerous, but their populations decreased by approximately 25% between 1966 and 2014, likely due to habitat loss (Cornell Lab of Ornithology 2022a).

Some marginally suitable nesting habitat for the species occurs within the disturbed riparian scrub in the northeast portion of the Project Area, though willows and other riparian trees are scarce.

There are multiple occurrences of the species documented within one mile of the Project Area in eBird (Cornell Lab of Ornithology 2021b). The yellow warbler has a high potential to fly through or forage within the Project Area and a low potential to nest on site.

California Least Tern

The California least tern is a federally endangered, State endangered, and State fully protected species that nests along the California coast from San Francisco Bay south to northern Baja California. The species is a colonial breeder on bare or sparsely vegetated, flat substrates, including sandy beaches, alkali flats, and occasionally landfills, agricultural fields, or paved areas. Diet consists almost entirely of small fish, which are caught by diving in shallow water after hovering briefly. Least terns will feed in almost any aquatic habitat with fish, including oceans, bays, rivers, marshes, ponds, and reservoirs (Cornell Lab of Ornithology 2022a).

While some suitable nesting habitat for the species is present, the California least tern is not known to nest within Moran Lake County Park, and due to the high level of human traffic, it is unlikely that the species would establish a nesting colony within the Project Area. Multiple occurrences of the species are documented in eBird within five miles of Moran Lake County Park (Cornell Lab of Ornithology 2022b). There is a low potential for the species to fly through and forage within the Project Area.

Nesting Birds

Migratory birds protected under the MBTA and nesting birds and raptors protected under CFGC Section 3503 have the potential to breed and forage throughout the Project Area. Nesting habitat could include eucalyptus trees, native trees such as coast redwood and Monterey cypress, shrubs, sedges, and other vegetation, human-made structures, and the ground surface.

4.2 Sensitive Plant Communities, Environmentally Sensitive Habitat Areas, and Critical Habitats

Plant communities are considered sensitive biological resources if they have limited distributions, have high wildlife value, include sensitive species, or are particularly susceptible to disturbance. Vegetation rarity ranking is based on a rank calculator developed by NatureServe. According to the CDFW Vegetation Program, alliances with state ranks of S1-S3, as well as certain additional associations specifically noted as sensitive in the list, are considered to be imperiled, and thus, potentially of special concern. One sensitive plant community occurs within the Project Area: pickleweed mats (*Sarcoconia pacifica* – *Jaumea carnosa* – *Distichlis spicata* Association). This community is designated as G3/S3 and occurs in a narrow band along the lagoon OHWM, covering approximately 0.18 acre within the Project Area.

The California Coastal Act defines Environmentally Sensitive Habitat Areas (ESHAs) as “any area in which plant or animal life or their habitats are either rare or especially valuable because of their nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.” Unique plant habitats, rare and endangered plant and animal habitats, wetlands, coastal streams, rocky points, sea cliffs, intertidal areas, and kelp beds are typically considered ESHA. According to the County General Plan and Local Coastal Plan (County of Santa Cruz 1994), “all lakes, wetlands, estuaries, lagoons, streams, and rivers” are considered sensitive habitat. Therefore, Moran Lagoon and its associated wetlands, as well as Moran Creek, are

designated as ESHAs. Riparian corridors within the Coastal Zone are also considered ESHAs and the riparian vegetation associated with Moran Creek is an ESHA. Additionally, the marine and estuarine habitat that occurs in the southwestern portion of the Project Area, below the HTL of the Pacific Ocean is also considered an ESHA. Areas which provide habitat for rare, endangered, or threatened species are also considered ESHA. The eucalyptus groves within Moran Lake County Park which provide overwintering habitat for the monarch butterfly are therefore also ESHAs.

Federally designated critical habitat for the black abalone (*Haliotis cracherodii*, FE) occurs along many portions of the California coastline from the Mean Higher High Water (MHHW) line to a depth of six meters (NOAA 2022). The southern portion of the Project Area overlaps with black abalone critical habitat. However, this narrow overlap occurs only between the MHHW line and the southern Project Area boundary, which includes only sandy portions of Moran Lake Beach and contains no rocky intertidal or subtidal habitat for the species. Critical habitat for the federally endangered tidewater goby occurs within Corcoran Lagoon, approximately 0.35 mile northwest of Moran Lagoon (USFWS 2021a).

4.3 Jurisdictional Waters and Wetlands

The United States Army Corp of Engineers (USACE) asserts jurisdiction under Section 404 of the Clean Water Act (CWA) over non-wetland (e.g., streams, lakes, oceans) and wetland (e.g., marshes, estuaries) waters of the U.S. that typically exhibit a hydrologic surface connection to traditionally navigable waters. The limits of jurisdiction extend to the OHWM for non-tidal waters or HTL for tidal waters, and to the edge of those wetlands abutting or, in some cases, adjacent to non-wetland waters of the U.S. that exhibit all three criteria defining federal wetlands: hydric soils, hydrophytic vegetation, and wetland hydrology. Navigable waters of the U.S. are also regulated under Section 10 of the Rivers and Harbors Act of 1899 (USACE) and most proposed activities within the limits defined for navigable waters of the U.S. require a Department of the Army permit, especially if the placement of a new structure or work affects the course, location, or condition of the water body. The CDFW has regulatory authority over activities that divert, obstruct, or alter the channel, bed, or bank of any river, stream, or lake under Section 1600 et seq. of the CFGC. Therefore, perennial, intermittent, and ephemeral streams and associated riparian vegetation also fall under the jurisdiction of the CDFW. The Regional Water Quality Control Board (RWQCB) also has jurisdiction over waters of the State under Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. The CCC has a one-parameter definition of wetlands, which states that wetlands must have only one or more of the following three attributes: (1) at least periodically the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and/or (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year. The CCC also regulates activities occurring below the HTL, as does the State Lands Commission.

Moran Lagoon is a coastal lagoon and a Relatively Permanent Water (RPW) with tidal influence from the Pacific Ocean, a Traditional Navigable Water (TNW). Moran Lagoon has intermittent connectivity with the Pacific Ocean during storm and king tide events. Moran Lagoon receives flow from Moran Creek and directly from stormwater and residential runoff from the culverts located around the lagoon and creek. Moran Lagoon is heavily used by the public; trash, pet fecal matter, and pollutants from stormwater runoff impact this feature. In spite of these anthropogenic impacts, this feature supports native fish species including tidewater goby and threespine stickleback. The OHWM of Moran Lagoon is defined by a change of vegetation, drift deposits, and break in bank slope. Substrates within the lagoon consist of sandy silt with occasional boulders. Saline emergent

wetland vegetation was observed within the OHWM of the lagoon consisting primarily of pickleweed, salt grass, and marsh jaumea. Moran Lagoon contains intermittent fringes of coastal wetlands within the OHWM.

Moran Creek is an intermittent stream and a RPW with confluence to Moran Lagoon. Moran Creek receives flow from stormwater and residential runoff from the culverts located around the creek. The OHWM of Moran Creek is defined by a change in vegetation and break in bank slope. Substrates within the creek are similar to Moran Lagoon, consisting of sandy silt with cobble. No vegetation was observed within the OHWM of the creek. Riparian vegetation along the banks of Moran Creek consists primarily of invasive species, including Himalayan blackberry and cape ivy, with several coast live oak and California bay laurel trees growing near the Thirtieth Avenue culvert outlet.

Moran Lagoon and Moran Creek qualify as waters of the U.S. and State and are considered potentially subject to the jurisdiction of the USACE and RWQCB pursuant to Sections 404 and 401, respectively, of the CWA based on their status as RPWs and direct surface connection to a TNW (i.e., the Pacific Ocean). The riparian vegetation associated with Moran Creek is likely subject to the jurisdiction of the RWQCB under the Porter-Cologne Water Quality Control Act. Considering that these features contain defined bed and banks as well as wetland and riparian vegetation, they are also considered potentially subject to the jurisdiction of CDFW pursuant to CFGC Section 1600 et seq. The wetland and riparian vegetation associated with Moran Lagoon and Moran Creek, respectively, and the lake and creek themselves are considered potentially subject to the jurisdiction of CCC (Figure 5).

Marine portions of the Project Area extend from the HTL of the Pacific Ocean to the southwestern most boundary of the Project Area. This area consists of sandy beach habitat within Moran Lake Beach and is potentially subject to USACE and CCC jurisdictions. This area is also potentially under the jurisdiction of the State Lands Commission. Table 4 provides a summary of jurisdictional areas within the Project Area.

Table 3 USACE, CDFW, RWQCB and CCC Jurisdictional Areas within the Project Area

Feature	USACE Waters of the U.S.		CDFW Streambed/RWQCB Waters of the State		CCC Jurisdiction
	Waters of the U.S. (acres/linear feet)	Wetland Waters of the U.S. (acres/linear feet)	Waters of the State (acres/linear feet)	Wetland Waters of the State (acres/linear feet)	Coastal Wetlands (acres/linear feet)
Moran Lagoon and Moran Creek	2.87/2,225	–	4.02/2,225	–	4.02/2,225
Pacific Ocean (Moran Lake Beach)	0.13/37	–	–	–	0.13/37
Total	3.00/2,262	–	4.02/2,225	–	4.15/2,262

Figure 5 Jurisdictional Waters and Wetlands



4.4 Wildlife Movement

Wildlife movement corridors, or habitat linkages, are generally defined as connections between areas of suitable habitat that allow for physical and genetic exchange between otherwise isolated wildlife populations. Such linkages may serve a local purpose, such as providing a linkage between foraging and denning areas, or they may be regional in nature. Some habitat linkages may serve as migration corridors, wherein wildlife periodically move away from an area and then subsequently return. Others may be important as dispersal corridors for young wildlife. A group of habitat linkages in an area can form a wildlife corridor network. The California Essential Habitat Connectivity Project, commissioned by the California Department of Transportation (Caltrans) and CDFW, identifies “Natural Landscape Blocks” which support native biodiversity and the “Essential Connectivity Areas” which link them (Spencer et al. 2010).

Trails and open spaces surrounding the lagoon, as well as the disturbed riparian corridor, could serve as local wildlife movement corridors, particularly for disturbance-tolerant species, such as raccoons and coyotes. The lagoon can provide small-scale movement opportunities for aquatic species, including the federally endangered tidewater goby. No Essential Connectivity Areas or Natural Landscape Blocks are mapped within the Project Area (Spencer et al. 2010).

4.5 Local Policies and Ordinances

The Project is located in the County of Santa Cruz and is subject to all policies and ordinances within the County of Santa Cruz General Plan and the Local Coastal Plan. Biological and water resources are protected by policies outlined in *Chapter 5: Conservation and Open Space* of the General Plan. Relevant policies for the Moran Lake County Park Improvement Project include those outlined under the following General Plan and Local Coastal Plan objectives: *5.1 Biological Diversity*, *5.2 Riparian Corridors and Wetlands*, *5.3 Aquatic and Marine Habitats*, *5.4 Monterey Bay and Coastal Water Quality*, and *5.7 Maintaining Surface Water Quality*. Each of the pertinent policies is outlined in Appendix A. The goals of the Project will directly align with the goals and policies of the General Plan and Local Coastal Plan and the Project will not conflict with any local policies or ordinances.

4.6 Habitat Conservation Plans

The Project Area falls within the Plan Area of the City of Santa Cruz Operations and Maintenance Habitat Conservation Plan (HCP). However, the County is not included as a responsible entity in the HCP and Project activities are not part of any Covered Activity described in the HCP. Therefore, the HCP is not applicable for this Project.

Avoidance and minimization measures developed for the Project will align with the general conservation measures and species-specific measures outlined in the HCP. The Project will not conflict with any of the HCP measures or objectives.

5 Impact Analysis and Avoidance and Minimization Measures

This section discusses the potential impacts and effects to special-status species and sensitive biological resources that may occur from implementation of the Project and provides recommended avoidance and minimization measures (AMMs) that would reduce those impacts where applicable. The analysis and recommendations are based on the CEQA Guidelines Appendix G Initial Study Checklist; therefore, Section 5 is organized according to the threshold criteria therein.

5.1 Special-status Species

The Project would have a significant effect on biological resources if it would:

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

5.1.1 Special-status Plant Species

Based on the level of disturbance within the Project Area and the results of two botanical surveys, no special-status plant species are expected to occur on site. Therefore, no impacts to special-status plant species are anticipated and no additional measures are recommended.

5.1.2 Special-status Wildlife Species

Twenty-one special-status wildlife species have potential to occur within the Project Area. The Monterey hitch (SSC), CRLF (FT), southwestern pond turtle (SSC), northern California legless lizard (SSC), tricolored blackbird (ST), western snowy plover (FT, SSC), black swift (SSC), bank swallow (ST), California least tern (FE, SE, FP), pallid bat (SSC), and Townsend's big-eared bat (SSC) all have a low potential to occur. The white-tailed kite (FP), American peregrine falcon (FD, SD, FP), and osprey (WL) have a moderate potential to occur. The Cooper's hawk (WL), California brown pelican (FD, SD, FP), and yellow warbler (SSC) have a high potential to occur. The monarch butterfly (FC), tidewater goby (FE), American white pelican (SSC), and double-crested cormorant (WL) are present within the Project Area. Nesting birds protected under the MBTA and CFGC also have potential to occur throughout the Project Area during the nesting season (February 1 to September 15).

Potential impacts from Project activities to each of these special-status wildlife species are described below. Recommended measures for avoiding and minimizing potential impacts to less than significant, as necessary, are also provided. Adherence to agency permits and/or agreements that will be required for Project implementation will also ensure that any potential impacts to special-status species are reduced to less than significant.

Monarch Butterfly

Eucalyptus groves within the Project Area provide important overwintering habitat for monarch butterflies and the species is present on site. Should monarchs be present within the Project Area

during construction, direct impacts could include injury or mortality of individuals. Implementation of AMMs BIO-1, BIO-2, BIO-4, BIO-5, and BIO-9 will reduce any potential impacts to less than significant. The Project will result in overall improvements to monarch habitat within Moran Lake County Park, including installation of late-flowering native plant species and planting of new trees within overwintering groves to provide additional habitat and fill in wind gaps. The forthcoming Monarch Management Plan for Moran Lake County Park will include more specific recommendations for maintaining and enhancing monarch habitat on site. These recommendations will also be incorporated into Project plans prior to construction.

Tidewater Goby

The tidewater goby is present within Moran Lagoon and is likely breeding within the lagoon. Potential impacts to the species could include injury or mortality of individuals, habitat disturbance, and/or disruption of breeding or foraging behavior. Should sediment or pollutants be allowed to enter Moran Lagoon as a result of construction activities, water quality changes could also impact tidewater gobies. Implementation of AMMs BIO-1 through BIO-4, BIO-5, BIO-6, and BIO-9 will reduce any potential impacts to less than significant. The Project may require a Biological Opinion and Incidental Take Statement from the USFWS, which will likely include further AMMs. Wetland restoration efforts included in the Project plans will likely result in improved water quality and tidewater goby habitat within Moran Lagoon.

Monterey Hitch

The Monterey hitch has a low potential to occur within Moran Lagoon. Impacts to non-listed species such as the Monterey hitch (SSC) would be considered significant under CEQA if they would threaten the continued existence of the population. Project activities are not expected to threaten the continued existence of the population, nor result in a downward trend leading to the listing of the species. Therefore, no significant impacts are anticipated and no further AMMs are recommended. Implementation of AMMs BIO-1 through BIO-4 and BIO-5 would further reduce the risk of potential impacts to these species.

California Red-legged Frog

The CRLF has a low potential to occur within and around the freshwater inlet to Moran Lagoon, in the northeastern portion of the Project Area. Should any CRLF be present within the Project Area during construction, direct impacts could include injury or mortality of individuals. Other potential impacts could include disruption of foraging, migration, or breeding habitat. Implementation of AMMs BIO-1 through BIO-4, BIO-5, BIO-7, and BIO-9 will reduce any potential impacts to less than significant.

Special-status Reptiles

The southwestern pond turtle and northern California legless lizard both have a low potential to occur within the Project Area. Impacts to non-listed species such as the southwestern pond turtle (SSC) and northern California legless lizard (SSC) would be considered significant under CEQA if they would threaten the continued existence of the population. Project activities are not expected to threaten the continued existence of these populations, nor result in a downward trend leading to the listing of these species. Therefore, no significant impacts are anticipated. Implementation of AMMs BIO-1, BIO-2, and BIO-5 would further reduce the risk of potential impacts to these species.

Special-status Bird Species

The American white pelican is present within the Project Area, but no suitable nesting habitat for the species occurs on site. The double-crested cormorant is present within the Project Area and has a high potential to nest within eucalyptus groves on site. No pelican or cormorant nesting colonies were observed on site during the biological surveys. The Cooper's hawk has a high potential to fly through, forage, and nest within the Project Area. The California brown pelican has a high potential to fly through, forage, or rest within the Project Area, but is not expected to nest on site. The osprey has a moderate potential to fly through, forage, and nest within the Project Area. The white-tailed kite and American peregrine falcon both have a moderate potential to fly through or forage within the Project Area, but neither is expected to nest on site. The tricolored blackbird, black swift, western snowy plover, bank swallow, and California least tern all have a low potential to fly through or forage within the Project Area, but are not expected to nest on site. Should any of these species occur within the Project Area during construction, potential Project impacts could include injury or mortality to individuals. Should these species nest within the vicinity of the Project Area, Project activities could result in altered nesting behavior or nest abandonment. The loss of a nest due to construction activities would be a violation of the MBTA and CFGC Section 3503. Implementation of AMMs BIO-1 through BIO-4, BIO-8, and BIO-9 would reduce potential impacts to special-status bird species to less than significant.

Special-status Bat Species

The pallid bat and Townsend's big-eared bat both have a low potential to occur and roost within the Project Area. Impacts to non-listed species such as the pallid bat (SSC) and Townsend's big-eared bat (SSC) would be considered significant under CEQA if they would threaten the continued existence of the population. Project activities are not expected to threaten the continued existence of these populations, nor result in a downward trend leading to the listing of these species. Therefore, no significant impacts are anticipated. Implementation of AMMs BIO-1 through BIO-4, and BIO-5 would further reduce any potential impacts to special-status bat species to less than significant.

Migratory and Nesting Birds

Migratory birds protected under the MBTA and nesting birds and raptors protected under CFGC Section 3503 have the potential to breed throughout the Project Area during the nesting season (February 1 to September 15). Potential nesting habitat includes eucalyptus and other trees, shrubs, other vegetation, human-made structures, and the ground surface.

Should any birds nest on or near the Project Area, Project activities could directly impact breeding by destroying the nest, or through disruption of normal biological behaviors during construction of the Project resulting in nest failure. Indirect impacts could include disturbance of breeding habitat. The loss of a nest or disturbance of nesting habitat due to construction activities would be a violation of the MBTA and CFGC Section 3503. Implementation of AMMs BIO-1 through BIO-4, BIO-8, and BIO-9 would reduce potential impacts to special-status bird species to less than significant.

5.2 Sensitive Plant Communities, Environmentally Sensitive Habitat Areas, and Critical Habitat

The proposed Project would have a significant effect on biological resources if it would:

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

One sensitive plant community occurs within the Project Area: pickleweed mats (*Salicornia pacifica* – *Jaumea carnosa* - *Distichlis spicata* Association). This community occurs in a narrow band near the lagoon OHWM and covers approximately 0.18 acre within the Project Area. This community is designated as G3/S3 and is listed on the CDFW Sensitive Natural Communities List (CDFW 2021). This plant community exists within the saline emergent wetland habitat surrounding Moran Lagoon and is potentially under the jurisdiction of the USACE, RWQCB, CDFW, and CCC. Impacts to this community could result if any sediment or pollutants were allowed to enter the community as a result of Project activities. Implementation of AMMs BIO-1 through BIO-4 and BIO-9 will reduce these potential impacts to less than significant. Other impacts to this community could include grading along the banks of Moran Lagoon as part of wetland restoration efforts. Any impacts to pickleweed mats will be mitigated for at a minimum ratio of 1:1 for temporary impacts and 2:1 for permanent impacts. The Project includes restoration of the wetland habitat surrounding Moran Lagoon and will likely result in long-term benefits to, and expansion of, the pickleweed mats within the Project Area. The Project will therefore be self-mitigating and a separate Habitat Mitigation and Monitoring Plan will not be required.

ESHAs within the Project Area include Moran Lagoon and its adjacent wetlands, Moran Creek and its associated riparian corridor, marine habitat on the southwest side of East Cliff Drive, and the eucalyptus groves that provide overwintering habitat for monarch butterflies. Potential impacts to these areas could include grading along the banks of the lagoon, temporary water quality impacts, and vegetation trimming. Implementation of AMMs BIO 1 through BIO-4 and BIO-9 will reduce any potential impacts to ESHAs to less than significant during Project construction. The Project is focused on restoration and enhancement of these important habitat areas and will include invasive species removal surrounding Moran Lagoon, installation of native wetland and riparian plant species, maintenance and enhancement of monarch habitat within the existing eucalyptus groves, and stormwater and drainage improvements that will enhance water quality.

The southern portion of the Project Area overlaps with federally designated critical habitat for the black abalone. However, this overlap only occurs between the MHHW line and the southern Project Area boundary, which includes only sandy portions of Moran Lake Beach and contains no suitable habitat for the species. Therefore, no significant impacts are anticipated and no further AMMs are recommended.

5.3 Jurisdictional Waters and Wetlands

The proposed Project would have a significant effect on biological resources if it would:

- c) *Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.*

Moran Lagoon and its surrounding wetlands, as well as Moran Creek and its associated riparian corridor, occur within the Project Area and are potentially under the jurisdiction of the USACE, RWQCB, CDFW, and CCC. A portion of marine habitat below the HTL of the Pacific Ocean also occurs within the Project Area and is potentially subject to USACE and CCC jurisdictions. Temporary impacts to water quality in these jurisdictional areas could occur due to the run-off of sediment or pollutants from construction activities. Implementation of AMMs BIO-1 through BIO-4 and BIO-9 will reduce potential impacts to water quality to less than significant. Other Project impacts to jurisdictional areas could include grading along the banks of Moran Lagoon as part of wetland restoration efforts. Project goals include restoration of wetland habitat and improvement of water quality within Moran Lake County Park. The Project will therefore be self-mitigating and a separate Habitat Mitigation and Monitoring Plan will not be required. Any impacts to jurisdictional features will be mitigated for at a minimum ratio of 1:1 for temporary impacts and 2:1 for permanent impacts.

5.4 Wildlife Movement

The proposed Project would have a significant effect on biological resources if it would:

- d) Interfere substantially with the movement of any resident or migratory fish or wildlife species or with established resident or migratory wildlife corridors or impede the use of wildlife nursery sites.*

There are no Natural Landscape Blocks or Essential Connectivity Areas mapped within the Project Area (Spencer et al. 2010). The Project is not expected to substantially alter existing wildlife movement or interfere with established resident or migratory wildlife corridors. Therefore, impacts to wildlife movement would be less than significant.

5.5 Local Policies and Ordinances

The proposed Project would have a significant effect on biological resources if it would:

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

The County General Plan and Local Coastal Program includes policies related to land use, conservation, and open space, as well as additional protections for ESHAs. Proposed Project activities are not in conflict with any elements of the General Plan or Local Coastal Program. The restoration goals of the Project are directly aligned with the goals and policies of the County General Plan and Local Coastal Program. Therefore, no additional AMMs are recommended.

5.6 Adopted or Approved Plans

The proposed Project would have a significant effect on biological resources if it would:

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

The Project Area falls within the Plan Area of the City of Santa Cruz Operations and Maintenance Habitat Conservation Plan (HCP). However, the County is not included as a responsible entity in the HCP and Project activities are not part of any Covered Activity described in the HCP.

Therefore, the Project will not conflict with any of the HCP measures or objectives and no additional AMMs are recommended.

5.7 Recommended Avoidance and Minimization Measures

BIO-1 Worker Environmental Awareness Program

Prior to initiation of construction activities (including staging and mobilization), all personnel associated with Project construction should attend Worker Environmental Awareness Program (WEAP) training, conducted by a qualified biologist, to aid workers in recognizing special-status species (e.g., tidewater goby, monarch and CRLF), nesting birds, pickleweed mats, and other biological resources that may occur in the Project Area. The specifics of this program will include identification of special-status species with potential to occur, a description of their regulatory status and habitat requirements, general ecological characteristics of any other sensitive resources, and a review of the limits of construction and mitigation measures required to reduce impacts to biological resources within the Project Area. A fact sheet conveying this information will also be prepared for distribution to all contractors, their employers, and other personnel involved with construction. All employees should sign a form provided by the trainer indicating they have attended the WEAP and understand the information presented to them. A WEAP training recorded by a qualified biologist specifically for the Project may be utilized if in-person trainings are restricted due to COVID-19 or if the construction schedule makes it infeasible for a biologist to train each new crew member in person. The crew foreman will be responsible to ensure crew members are aware of project boundaries and adhere to the guidelines and restrictions designed to avoid or minimize effects to CRLF, steelhead, nesting birds, and other sensitive species and biological resources.

BIO-2 Project Delineation, Staging Areas, Materials Storage, and Waste Management

Prior to the start of any Project activities (including any vegetation clearing), sturdy, high-visibility fencing should be installed to protect jurisdictional areas and sensitive resource areas adjacent to and within the Project Area. This fencing shall be placed so that unnecessary impacts to adjacent habitat are avoided. No Project activities (including storage of materials) should occur outside of the "Project Limits". The required fencing shall remain in place during the entire construction period and be maintained as needed by the contractor.

Areas of temporary disturbance shall be minimized to the extent practicable. Staging and laydown areas should be limited to sites that are unvegetated and previously disturbed (e.g., existing paved parking areas). Materials should be stored on impervious surfaces or plastic ground covers to prevent any spills or leakage. Material storage should be at least 50 feet from Moran Lagoon and the Pacific Ocean. Construction materials and spoils should be protected from stormwater runoff using temporary perimeter sediment barriers such as fiber rolls, sand/gravel bags, and straw bale barriers, as appropriate.

All trash should be properly contained and regularly disposed of such that it does not leave the Project site, enter any water body, or attract wildlife. Following Project completion, all trash and construction debris will be removed from the work and laydown areas.

BIO-3 Best Management Practices to Protect Water Quality

No construction activities should occur within wetted portions of any jurisdictional water body to the greatest extent practicable. Grading along the banks of Moran Lagoon may occur below the OHWM, as necessary for wetland restoration efforts, but will be conducted during times when the water level is below the OHWM (e.g., during the dry season and/or at low tide).

All vehicles and equipment should be in good working condition and checked daily for leaks. The contractor shall prevent petroleum products, or any other pollutant, from contaminating the soil or entering any water body. When vehicles or equipment are not in use, mats or drip pans should be placed below vehicles to contain fluid leaks.

Work during times of precipitation should be avoided to the maximum extent possible. The County or their contractor(s) or representative(s) shall utilize Best Management Practices (BMPs), including (but not limited to): berms, burlap-wrapped fiber rolls, jute netting, sand/gravel bags, and straw bale barriers to stabilize work areas and prevent any sediment or pollutants from entering the creek.

To further protect water quality and sensitive habitat areas, no refueling, cleaning, or maintenance of equipment or vehicles shall occur within 50 feet of Moran Lagoon or any other water body. Spill kits must be kept on the project site and readily available at all times. Should a spill occur in the work area, clean-up shall be conducted immediately, the contaminant(s) removed to the greatest extent feasible, and any contaminated materials disposed of properly. The project foreman or other designated liaison shall immediately notify the biological monitor and the County following any project spills. Additionally, the off-site tracking of loose construction and landscape materials shall be prevented and/or cleaned up daily, with street sweeping, vacuuming, and/or rumble plates, as appropriate.

These measures may be superseded or added to by resource agency permits. A Stormwater Pollution Prevention Plan may be prepared for the Project, if required by resource agencies.

BIO-4 Invasive Species Management

Prior to construction, Project plans will clearly identify methodology for removal and disposal of invasive exotic species found within the Project Area, including iceplant. Invasive vegetation removed within the Project Area shall be properly disposed of at an offsite location⁷. All construction materials (including jute netting, fiber rolls, and straw bales) brought into the Project Area should be free from invasive plant material. All revegetation efforts (e.g., hydroseeding, planting container stock or cuttings) surrounding the lagoon and lagoon inlet shall include only native plant species appropriate for the Project site and existing habitat. Eucalyptus trees may be planted in limited areas within existing groves, as necessary, to enhance or maintain monarch overwintering habitat. Invasive aquatic wildlife species, including bullfrog (*Rana catesbeiana*), and signal and red swamp crayfish (*Pacifasticus leniusculus*; *Procambarus clarkii*), should be removed from the Project Area by a qualified biologist using methodologies approved by the USFWS, NMFS, and/or CDFW.

⁷ Eucalyptus trees or limbs removed from onsite groves may be utilized within the Project Area for informal seating, delineation of restoration areas, etc.

BIO-5 General Avoidance and Minimization Measures for Special-status Wildlife Species

A preconstruction survey for special-status wildlife species (including southwestern pond turtle, northern California legless lizard, pallid bat, and Townsend's big-eared bat) shall be conducted within the Project Area by a qualified biologist no more than 48 hours before the onset of work activities. This survey can be conducted concurrently with the preconstruction survey for CRLF. If any special-status wildlife species are found in areas where they are likely to be killed or injured by work activities, then a qualified biologist will be allowed sufficient time to relocate them from the Project Area before work begins. A qualified biologist will also be on site during any vegetation removal or initial ground disturbing activities. Should any special-status species be encountered within the Project Area prior to or during these activities, work shall be halted until the biologist has sufficient time to move any non-listed individuals from the site.

BIO-6 Avoidance and Minimization Measures for the Tidewater Goby

BMPs should be implemented (as described in AMM BIO-3) to prevent any changes to water quality within Moran Lagoon that could impact tidewater gobies.

Any grading or ground disturbance that occurs near the OHWM of Moran Lagoon should be conducted such that soil, sediment, and/or vegetation is pulled back away from the water's edge and is not pushed toward the lagoon or allowed to enter the water. Construction activities should not occur within 50 feet of the lagoon OHWM during rain events when greater than 0.25 inches of precipitation is predicted, or at times when the ocean has breached the lagoon (e.g., during king tides and/or large swell events). Wetland restoration may require some construction activity below the OHWM, but no Project activities should occur within any wetted portions of the lagoon. Therefore, work beneath the OHWM should only occur during times when the surface water level of the lagoon is substantially lower than the OHWM (likely during the dry season and on days when the high tides are not above 5 feet MLLW).

The Project may require a Biological Opinion and Incidental Take Statement from the USFWS, which would likely include further AMMs. The measures detailed above may be superseded or added to by resource agency permits and incidental take authorizations. Wetland restoration efforts are included in Project plans and will likely result in improved water quality and tidewater goby habitat within Moran Lagoon.

BIO-7 Avoidance and Minimization Measures for the California Red-legged Frog

A qualified biologist should survey potential CRLF habitat within the Project Area no more than 48 hours before the onset of work activities. If the biologist finds any life stage of the CRLF and these individuals are likely to be killed or injured by work activities, the biologist will contact the County immediately to discuss next steps (e.g., contacting the USFWS) before work can begin. Project activities will occur between June 1 and October 15, to the maximum extent possible, in order to avoid the CRLF breeding season. In the unlikely event that CRLFs are detected, the Project may require a Biological Opinion and Incidental Take Statement from the USFWS, which would likely include further AMMs. The measures detailed above may be superseded or added to by resource agency permits and incidental take authorizations, as applicable.

BIO-8 Avoidance and Minimization Measures for Special-status Birds and Other Nesting Birds

Project activities will likely occur during the nesting bird season (February 1 to September 15). As such, the following mitigation measures are recommended to reduce impacts to protected species (including the double-crested cormorant, osprey, and Cooper's hawk) and other nesting birds protected by CFGC and the MBTA.

- A preconstruction nesting bird survey shall be conducted by a qualified biologist no more than 14 days prior to initiation of Project activities. The survey shall be conducted within the Project Area and include a 50-foot buffer for passerines and a 500-foot buffer for raptors. The survey shall be conducted by a biologist familiar with the identification of avian species known to occur in the region and should focus on trees, vegetated areas, and other potential nesting within the vicinity of the Project Area. If nests are found, an appropriate avoidance buffer (typically 50 feet for passerine species and 500 feet for raptors) will be determined and demarcated by the biologist with high visibility material located within the Project Area.
- All Project personnel shall be notified as to the existence of the buffer zones and to avoid entering buffer zones during the nesting season. No Project activities shall occur within the buffer until the avian biologist has confirmed that breeding/nesting is complete, and the young have fledged the nest. Encroachment into the buffer shall occur only at the discretion of the qualified biologist.

BIO-9 Avoidance and Minimization Measures for Sensitive Plant Communities and Environmentally Sensitive Habitat Areas

In order to reduce potential impacts to sensitive pickleweeds mats, wetland habitat, riparian habitat, monarch overwintering habitat, and lagoon habitat, the following measures shall be implemented:

- Pickleweed mats within the Project Area will be identified and clearly marked by a qualified biologist prior to the start of construction activities. Impacts to this sensitive plant community will be avoided to the greatest extent feasible during all project activities, including the implementation of wetland restoration surrounding Moran Lagoon.
- Wetlands within 50 feet of any ground disturbance and/or construction-related activities (including staging and access roads) shall be identified and clearly marked by a qualified biologist. Impacts to existing wetland habitat will be limited to the grading, invasive plant removal, and planting activities necessary for implementation of wetland restoration areas. All other impacts from construction equipment and vehicles will be avoided.
- Work within wetlands will have the immediate work area fenced off to prevent equipment and personnel from further impacting portions of the wetland where no work is needed.
- All heavy construction equipment and vehicles shall be restricted to established roadways and access roads to the maximum extent practicable to minimize habitat disturbance. Wetland (i.e., rubber) mats shall be used when heavy equipment must be used outside of established roadways or access roads.
- All construction work within wetland areas will follow the methods and specifications of Project restoration plans and will maintain or improve existing wetland soils, hydrology, and vegetation within work areas.

6 Limitations, Assumptions, and Use Reliance

This Biological Resources Assessment has been performed in accordance with professionally accepted biological investigation practices conducted at this time and in this geographic area. The biological investigation is limited by the scope of work performed. Reconnaissance-level biological surveys for certain taxa were conducted as part of this assessment but were not performed during a particular nesting period, or particular portion of the season when positive identification would be expected if present, and therefore, cannot be considered definitive. The biological surveys are limited also by the environmental conditions present at the time of the surveys. In addition, general biological (or protocol) surveys do not guarantee that the organisms are not present and will not be discovered in the future within the site. In particular, mobile wildlife species could occupy the site on a transient basis or re-establish populations in the future. Our field studies were based on current industry practices, which change over time and may not be applicable in the future. No other guarantees or warranties, expressed or implied, are provided. The findings and opinions conveyed in this report are based on findings derived from the specified historical and literature sources (Section 2.1) and the biological surveys. Standard data sources relied upon during the completion of this report, such as the CNDDDB, may vary with regard to accuracy and completeness. In particular, the CNDDDB is compiled from research and observations reported to CDFW that may or may not have been the result of comprehensive or site-specific field surveys. Although Rincon believes the data sources are reasonably reliable, Rincon cannot and does not guarantee the authenticity or reliability of the data sources it has used. Additionally, pursuant to our contract, the data sources reviewed included only those that are practically reviewable without the need for extraordinary research and analysis.

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Appendix A

Regulatory Setting

Regulatory Setting

The following is a brief summary of the regulatory context under which biological resources are managed at the federal, State, and local levels. A number of federal and State statutes provide a regulatory structure that guides the protection of biological resources. Agencies with the responsibility for protection of biological resources within the Project site include the following:

- U.S. Army Corps of Engineers (wetlands and other waters of the United States)
- U.S. Fish and Wildlife Service (federally listed species and migratory birds)
- National Marine Fisheries Service (marine animals and anadromous fishes)
- Central Coast Regional Water Quality Control Board (waters of the State)
- California Department Fish and Wildlife (riparian areas, streambeds, and lakes; State-listed species; nesting birds, marine resources)
- County of Santa Cruz General Plan
- City of Santa Cruz General Plan

United States Army Corps of Engineers

The United States Army Corps of Engineers (USACE), is responsible for administering several federal programs related to ensuring the quality and navigability of the nation's waters.

Clean Water Act Section 404

Congress enacted the CWA "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Section 404 of the Clean Water Act (CWA) authorizes the Secretary of the Army, acting through the USACE, to issue permits regulating the discharge of dredged or fill materials into the "navigable waters at specified disposal sites."

Section 502 of the CWA further defines "navigable waters" as "waters of the United States, including the territorial seas." "Waters of the United States" are broadly defined at 33 CFR Part 328.3 to include navigable waters, perennial and intermittent streams, lakes, rivers, ponds, as well as wetlands, marshes, and wet meadows. In recent years the USACE and US Environmental Protection Agency (USEPA) have undertaken several efforts to modernize their regulations defining "waters of the United States" (e.g., the 2015 Clean Water Rule and 2020 Navigable Waters Protection Rule), but these efforts have been frustrated by legal challenges which have invalidated the updated regulations. Thus, the agencies' longstanding definition of "waters of the United States," which dates from 1986, remains in effect albeit with supplemental guidance interpreting applicable court decisions as described below.

Waters of the U.S.

In summary, USACE and USEPA regulations define "waters of the United States" as follows:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
 - i. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
 - ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
 - iii. Which are used or could be used for industrial purpose by industries in interstate commerce;
4. All impoundments of waters otherwise defined as waters of the United States;
5. Tributaries of waters identified in paragraphs (a)(1)-(4) of this section;
6. The territorial sea;
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in items 1-6 above.

Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the USEPA.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the United States.

The lateral limits of USACE jurisdiction in non-tidal waters is defined by the "ordinary high-water mark" (OHWM) unless adjacent wetlands are present. The OHWM is a line on the shore or edge of a channel established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed upon the bank, shelving, changes in the character of soil, destruction of vegetation, or the presence of debris (33 CFR 328.3(e)). As such, waters are recognized in the field by the presence of a defined watercourse with appropriate physical and topographic features. If wetlands occur within, or adjacent to, waters of the United States, the lateral limits of USACE jurisdiction extend beyond the OHWM to the outer edge of the wetlands (33 CFR 328.4 (c)). The upstream limit of jurisdiction in the absence of adjacent wetlands is the point beyond which the OHWM is no longer perceptible (33 CFR 328.4; see also 51 FR 41217.)

Wetlands

The USACE defines wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3). The USACE's delineation procedures identify wetlands in the field based on indicators of three wetland parameters: hydrophytic vegetation, hydric soils, and wetland hydrology. The following is a discussion of each of these parameters.

Hydrophytic Vegetation

Hydrophytic vegetation dominates areas where frequency and duration of inundation or soil saturation exerts a controlling influence on the plant species present. Plant species are assigned wetland indicator status according to the probability of their occurring in wetlands. More than fifty percent of the dominant plant species must have a wetland indicator status to meet the hydrophytic vegetation criterion. The USACE published the National Wetland Plant List (USACE 2018), which separates vascular plants into the following four basic categories based on plant species frequency of occurrence in wetlands:

- **Obligate Wetland (OBL).** Almost always occur in wetlands
- **Facultative Wetland (FACW).** Usually occur in wetlands, but occasionally found in non-wetlands
- **Facultative (FAC).** Occur in wetlands or non-wetlands
- **Facultative Upland (FACU).** Usually occur in non-wetlands, but may occur in wetlands
- **Obligate Upland (UPL).** Almost never occur in wetlands

The USACE considers OBL, FACW and FAC species to be indicators of wetlands. An area is considered to have hydrophytic vegetation when greater than 50 percent of the dominant species in each vegetative stratum (tree, shrub, and herb) fall within these categories. Any species not appearing on the United States Fish and Wildlife Service's list is assumed to be an upland species, almost never occurring in wetlands. In addition, an area needs to contain at least 5% vegetative cover to be considered as a vegetated wetland.

Hydric Soils

Hydric soils are saturated or inundated for a sufficient duration during the growing season to develop anaerobic or reducing conditions that favor the growth and regeneration of hydrophytic vegetation. Field indicators of wetland soils include observations of ponding, inundation, saturation, dark (low chroma) soil colors, bright mottles (concentrations of oxidized minerals such as iron), gleying (indicates reducing conditions by a blue-grey color), or accumulation of organic material. Additional supporting information includes documentation of soil as hydric or reference to wet conditions in the local soils survey, both of which must be verified in the field.

Wetland Hydrology

Wetland hydrology is inundation or soil saturation with a frequency and duration long enough to cause the development of hydric soils and plant communities dominated by hydrophytic vegetation. If direct observation of wetland hydrology is not possible (as in seasonal wetlands), or records of wetland hydrology are not available (such as stream gauges), assessment of wetland hydrology is frequently supported by field indicators, such as water marks, drift lines, sediment deposits, or drainage patterns in wetlands.

Applicable Case Law and Agency Guidance

The USACE's regulations defining "waters of the United States" have been subject to legal interpretation, and two influential Supreme Court decisions have narrowed the definition to exclude certain classes of waters that bear an insufficient connection to navigable waters. In *Solid Waste Agency of Northern Cook County v. Army Corps of Engineers* (2001), the United States Supreme Court stated that the USACE's CWA jurisdiction does not extend to ponds that "are not adjacent to

open water.” In reaching its decision, the Court concluded that the “Migratory Bird Rule,” which served as the basis for the USACE’s asserted jurisdiction, was not supported by the CWA. The Migratory Bird Rule extended CWA jurisdiction to intrastate waters “which are or would be used as habitat by birds protected by Migratory Bird Treaties or which are or would be used as habitat by other migratory birds which cross state lines...” The Court was concerned that application of the Migratory Bird Rule resulted in “reading the term ‘navigable waters’ out of the statute. Highlighting the language of the CWA to determine the statute’s jurisdictional reach, the Court stated, “the term ‘navigable’ has at least the import of showing us what Congress had in mind as its authority for enacting the CWA: its traditional jurisdiction over waters that were or had been navigable in fact or which could reasonably be so made.” This decision stands for the proposition that non-navigable isolated, intrastate waters are not waters of the United States and thus are not jurisdictional under the CWA.

In 2006 the United States Supreme Court decided *Rapanos v. United States* and *Carabell v. United States* (collectively “Rapanos”), which were consolidated cases determining the extent of CWA jurisdiction over waters that carry only an infrequent surface flow. The court issued no majority opinion in Rapanos. Instead, the justices authored five separate opinions including the “plurality” opinion, authored by Justice Scalia (joined by three other justices), and a concurring opinion by Justice Kennedy. To guide implementation of the decision, the USACE and USEPA issued a joint guidance memorandum (“Rapanos Guidance Memorandum”) in 2008 stating that “regulatory jurisdiction under the CWA exists over a water body if either the plurality’s or Justice Kennedy’s standard is satisfied.”

According to the plurality opinion in Rapanos, “the waters of the United States include only relatively permanent, standing or flowing bodies of water” and do not include “ordinarily dry channels through which water occasionally or intermittently flows.” In addition, while all wetlands that meet the USACE definition are considered adjacent wetlands, only those adjacent wetlands that have a continuous surface connection because they directly abut the tributary (e.g., they are not separated by uplands, a berm, dike, or similar feature) are considered jurisdictional under the plurality standard.

Under Justice Kennedy’s opinion, “the USACE’s jurisdiction over wetlands depends upon the existence of a significant nexus between the wetlands in question and navigable waters in the traditional sense. Wetlands possess the requisite nexus, and thus come within the statutory phrase ‘navigable waters,’ if the wetlands, either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as ‘navigable.’ When, in contrast, wetlands’ effects on water quality are speculative or insubstantial, they fall outside the zone fairly encompassed by the statutory term ‘navigable waters.’” Justice Kennedy identified “pollutant trapping, flood control, and runoff storage” as some of the critical functions wetlands can perform relative to other waters. He concluded that, given wetlands’ ecological role, “mere adjacency” to a non-navigable tributary was insufficient to establish CWA jurisdiction, and that “a more specific inquiry, based on the significant nexus standard, is therefore necessary.”

Interpreting these decisions, and according to the Rapanos Guidance Memorandum, the USACE and USEPA will assert jurisdiction over the following waters:

- Traditional navigable waters;
- Wetlands adjacent to traditional navigable waters;

- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months); and,
- Wetlands that directly abut such tributaries.

The USACE and USEPA will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a traditional navigable water:

- Non-navigable tributaries that are not relatively permanent;
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent; and,
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.

Where a significant nexus analysis is required, the USACE and USEPA will apply the significant nexus standard as follows:

- A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters; and,
- Significant nexus includes consideration of hydrologic and ecologic factors.

The USACE and USEPA generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow); and,
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

Rivers and Harbors Act Section 10

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the USACE for the construction of any structure in or over any navigable water of the United States. Structures or work outside the limits defined for navigable waters of the United States require a Section 10 permit if the structure or work affects the course, location, or condition of the water body. The law applies to any dredging or disposal of dredged materials, excavation, filling, re-channelization, or any other modification of a navigable water of the United States, and applies to all structures and work. It further includes, without limitation, any wharf, dolphin, weir, boom breakwater, jetty, groin, bank protection (e.g. riprap, revetment, bulkhead), mooring structures such as pilings, aerial or subaqueous power transmission lines, intake or outfall pipes, permanently moored floating vessel, tunnel, artificial canal, boat ramp, aids to navigation, and any other permanent, or semi-permanent obstacle or obstruction. It is important to note that Section 10 applies only to navigable waters, and thus does not apply to work in non-navigable wetlands or tributaries. In some cases, Section 10 authorization is issued by the USACE concurrently with CWA Section 404 authorization, such as when certain Nationwide Permits are used.

Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs) have jurisdiction over “waters of the State,” which are defined as any surface water or groundwater, including saline waters, within the boundaries of the State (California Water Code sec. 13050(e)). These agencies also have responsibilities for administering portions of the CWA.

Clean Water Act Section 401

Section 401 of the CWA requires an applicant requesting a federal license or permit for an activity that may result in any discharge into navigable waters (such as a Section 404 Permit) to provide State certification that the proposed activity will not violate State and federal water quality standards. In California, CWA Section 401 Water Quality Certification (Section 401 Certification) is issued by the RWQCBs and by the SWRCB for multi-region Projects. The process begins when an applicant requests a pre-application meeting with the RWQCB, waits no less than 30 days, and then submits an application to the RWQCB and informs the USACE (or the applicable agency from which a license or permit was requested) that an application has been submitted. The USACE will then determine a “reasonable period of time” for the RWQCB to act on the application; this is typically 60 days for routine Projects and longer for complex Projects but may not exceed one year. Under current regulations, once initiated, the reasonable period of time cannot be stopped or paused. When the period has elapsed, if the RWQCB has not either issued or denied the application for Section 401 Certification, the USACE may determine that Certification has been waived and issue the requested permit. If a Section 401 Certification is issued it may include binding conditions, imposed either through the Certification itself or through the requested federal license or permit.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) is the principal law governing water quality regulation in California. It establishes a comprehensive program to protect water quality and the beneficial uses of water. The Porter-Cologne Act applies to surface waters, wetlands, and ground water and to both point and nonpoint sources of pollution. Pursuant to the Porter-Cologne Act (California Water Code section 13000 et seq.), the policy of the State is as follows:

- The quality of all the waters of the State shall be protected
- All activities and factors affecting the quality of water shall be regulated to attain the highest water quality within reason
- The State must be prepared to exercise its full power and jurisdiction to protect the quality of water in the State from degradation

The Porter-Cologne Act established nine RWQCBs (based on watershed boundaries) and the SWRCB, which are charged with implementing its provisions and which have primary responsibility for protecting water quality in California. The SWRCB provides program guidance and oversight, allocates funds, and reviews RWQCB decisions. In addition, the SWRCB allocates rights to the use of surface water. The RWQCBs have primary responsibility for individual permitting, inspection, and enforcement actions within each of nine hydrologic regions. The SWRCB and RWQCBs have numerous nonpoint source related responsibilities, including monitoring and assessment, planning, financial assistance, and management.

Section 13260 of the Porter-Cologne Act requires any person discharging or proposing to discharge waste that could affect the quality of waters of the State to file a Report of Waste Discharge with the appropriate RWQCB. The RWQCB may then authorize the discharge, subject to conditions, by issuing Waste Discharge Requirements (WDRs). While this requirement was historically applied primarily to outfalls and similar point source discharges, the SWRCB's *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*, effective May 2020, make it clear that the agency will apply the Porter-Cologne Act's requirements to discharges of dredge and fill material as well. The *Procedures* state that they are to be used in issuing CWA Section 401 Certifications and WDRs, and largely mirror the existing review requirements for CWA Section 404 Permits and Section 401 Certifications, incorporating most elements of the USEPA's *Section 404(b)(1) Guidelines*. Following issuance of the *Procedures*, the SWRCB produced a consolidated application form for dredge/fill discharges that can be used to obtain a CWA Section 401 Water Quality Certification, WDRs, or both.

Non-Wetland Waters of the State

The SWRCB and RWQCBs have not established regulations for field determinations of waters of the State except for wetlands currently. In many cases the RWQCBs interpret the limits of waters of the State to be bounded by the OHWM unless isolated conditions or ephemeral waters are present. However, in the absence of statewide guidance each RWQCB may interpret jurisdictional boundaries within their region and the SWRCB has encouraged applicants to confirm jurisdictional limits with their RWQCB before submitting applications. As determined by the RWQCB, waters of the State may include riparian areas or other locations outside the OHWM, leading to a larger jurisdictional area over a given water body compared to the USACE.

Wetland Waters of the State

Procedures for defining wetland waters of the State pursuant to the SWRCB's *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* went into effect May 28, 2020. The SWRCB defines an area as wetland if, under normal circumstances:

- (i) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both;
- (ii) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and
- (iii) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.

The SWRCB's *Implementation Guidance for the Wetland Definition and Procedures for Discharges of Dredge and Fill Material to Waters of the State* (2020), states that waters of the U.S. and waters of the State should be delineated using the standard USACE delineation procedures, taking into consideration that the methods shall be modified only to allow for the fact that a lack of vegetation does not preclude an area from meeting the definition of a wetland.

United States Fish and Wildlife Service

The United States Fish and Wildlife Service (USFWS) implements several laws protecting the Nation's fish and wildlife resources, including the Endangered Species Act (ESA; 16 United States Code [USC] Sections 153 et seq.), the Migratory Bird Treaty Act (MBTA; 16 USC Sections 703-711) and the Bald and Golden Eagle Protection Act (16 USC Section 668).

Endangered Species Act

The USFWS and National Marine Fisheries Service (NMFS) share responsibility for implementing the ESA. Generally, the USFWS implements the FESA for terrestrial and freshwater species, while the NMFS implements the FESA for marine and anadromous species. Projects that would result in “take” of any threatened or endangered animal species, or a threatened or endangered plant species if occurring on federal land, are required to obtain permits from the USFWS or NMFS through either Section 7 (interagency consultation with a federal nexus) or Section 10 (Habitat Conservation Plan) of the ESA, depending on the involvement by the federal government in funding, authorizing, or carrying out the project. The permitting process is used to determine if a project would jeopardize the continued existence of a listed species and what measures would be required to avoid jeopardizing the species. “Take” under federal definition means to harass, harm (which includes habitat modification), pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Proposed or candidate species do not have the full protection of the ESA; however, the USFWS and NMFS advise project applicants that they could be elevated to listed status at any time.

Migratory Bird Treaty Act

The MBTA of 1918 implements four international conservation treaties that the U.S. entered into with Canada in 1916, Mexico in 1936, Japan in 1972, and Russia in 1976. It is intended to ensure the sustainability of populations of all protected migratory bird species. The law has been amended with the signing of each treaty, as well as when any of the treaties were amended, such as with Mexico in 1976 and Canada in 1995. The MBTA prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS.

The list of migratory bird species protected by the law, in regulations at 50 CFR Part 10.13, is primarily based on bird families and species included in the four international treaties. A migratory bird species is included on the list if it meets one or more of the following criteria:

1. It occurs in the United States or U.S. territories as the result of natural biological or ecological processes and is currently, or was previously listed as, a species or part of a family protected by one of the four international treaties or their amendments.
2. Revised taxonomy results in it being newly split from a species that was previously on the list, and the new species occurs in the United States or U.S. territories as the result of natural biological or ecological processes.
3. New evidence exists for its natural occurrence in the United States or U.S. territories resulting from natural distributional changes and the species occurs in a protected family.

In 2004, the Migratory Bird Treaty Reform Act limited the scope of the MBTA by stating the MBTA applies only to migratory bird species that are native to the United States or U.S. territories, and that a native migratory bird species is one that is present as a result of natural biological or ecological processes. The MBTRA requires the USFWS to publish a list of all nonnative, human-introduced bird species to which the MBTA does not apply, and an updated list was published in 2020. The 2020 update identifies species belonging to biological families referred to in treaties the MBTA implements but are not protected because their presence in the United States or U.S. territories is solely the result of intentional or unintentional human-assisted introductions.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the USFWS, from "taking" bald or golden eagles, including their parts (including feathers), nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

"Disturb" means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

California Department of Fish and Wildlife

The California Department of Fish and Wildlife (CDFW) derives its authority from the Fish and Game Code of California and administers several State laws protecting fish and wildlife resources and the habitats upon which they depend.

California Endangered Species Act

The California Endangered Species Act (CESA) (Fish and Game Code Section 2050 et. seq.) prohibits take of state listed threatened or endangered. Take under CESA is defined as "Hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (Fish and Game Code sec. 86). This definition does not prohibit indirect harm by way of habitat modification, except where such harm is the proximate cause of death of a listed species. Where incidental take would occur during construction or other lawful activities, CESA allows the CDFW to issue an Incidental Take Permit upon finding, among other requirements, that impacts to the species have been minimized and fully mitigated. Unlike the federal ESA, CESA's protections extend to candidate species during the period (typically one year) while the California Fish and Game Commission decides whether the species warrants CESA listing.

Native Plant Protection Act

The CDFW also has authority to administer the Native Plant Protection Act (NPPA) (Fish and Game Code Section 1900 et seq.). The NPPA requires the CDFW to establish criteria for determining if a species, subspecies, or variety of native plant is endangered or rare, and prohibits the take of listed plant species. Effective in 2015, CDFW promulgated regulations (14 CCR 786.9) under the authority of the NPPA, establishing that the CESA's permitting procedures would be applied to plants listed

under the NPPA as "Rare." With this change, there is little practical difference for the regulated public between plants listed under CESA and those listed under the NPPA.

Fully Protected Species Laws

The CDFW enforces Sections 3511, 4700, 5050, and 5515 of the Fish and Game Code, which prohibit take of species designated as Fully Protected. The CDFW is not allowed to issue an Incidental Take Permit for Fully Protected species; therefore, impacts to these species must be avoided. The exception is situations where a Natural Community Conservation Plan (NCCP) is in place that authorizes take of the fully protected species.

Avian Protection Laws

California Fish and Game Code sections 3503, 3503.5, and 3513 describe unlawful take, possession, or destruction of native birds, nests, and eggs. Section 3503.5 of the Code protects all birds-of-prey and their eggs and nests against take, possession, or destruction of nests or eggs. Section 3513 makes it a state-level offense to take any bird in violation of the federal Migratory Bird Treaty Act.

Protection of Lakes and Streambeds

California Fish and Game Code section 1602 states that it is unlawful for any person to "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake" without first notifying the California Department of Fish and Wildlife (CDFW) of that activity. Thereafter, if CDFW determines and informs the entity that the activity will not substantially adversely affect any existing fish or wildlife resources, the entity may commence the activity. If, however, CDFW determines that the activity may substantially adversely affect an existing fish or wildlife resource, the entity may be required to obtain from CDFW a Streambed Alteration Agreement (SAA), which will include reasonable measures necessary to protect the affected resource(s), before the entity may conduct the activity described in the notification. Upon receiving a complete Notification of Lake/Streambed Alteration, CDFW has 60 days to present the entity with a Draft SAA. Upon review of the Draft SAA by the applicant, any problematic terms are negotiated with CDFW and a final SAA is executed.

The CDFW has not defined the term "stream" for the purposes of implementing its regulatory program under Section 1602, and the agency has not promulgated regulations directing how jurisdictional streambeds may be identified, or how their limits should be delineated. However, four relevant sources of information offer insight as to the appropriate limits of CDFW jurisdiction as discussed below.

- **The plain language of Section 1602 of CFGC** establishes the following general concepts:
 - References "river," "stream," and "lake"
 - References "natural flow"
 - References "bed," "bank," and "channel"
- **Applicable court decisions**, in particular *Rutherford v. State of California* (188 Cal App. 3d 1276 (1987)), which interpreted Section 1602's use of "stream" to be as defined in common law. The Court indicated that a "stream" is commonly understood to:
 - Have a source and a terminus

- Have banks and a channel
- Convey flow at least periodically, but need not flow continuously and may at times appear outwardly dry
- Represent the depression between the banks worn by the regular and usual flow of the water
- Include the area between the opposing banks measured from the foot of the banks from the top of the water at its ordinary stage, including intervening sand bars
- Include the land that is covered by the water in its ordinary low stage
- Include lands below the OHWM
- **CDFW regulations** defining “stream” for other purposes, including sport fishing (14 CCR 1.72) and streambed alterations associated with cannabis production (14 CCR 722(c)(21)), which indicate that a stream:
 - Flows at least periodically or intermittently
 - Flows through a bed or channel having banks
 - Supports fish or aquatic life
 - Can be dry for a period of time
 - Includes watercourses where surface or subsurface flow supports or has supported riparian vegetation
- **Guidance documents**, including *A Field Guide to Lake and Streambed Alteration Agreements* (CDFG 1994) and *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants* (Brady and Vyverberg 2013), which suggest the following:
 - A stream may flow perennially or episodically
 - A stream is defined by the course in which water currently flows, or has flowed during the historic hydrologic course regime (approximately the last 200 years)
 - Width of a stream course can reasonably be identified by physical or biological indicators
 - A stream may have one or more channels (single thread vs. compound form)
 - Features such as braided channels, low-flow channels, active channels, banks associated with secondary channels, floodplains, islands, and stream-associated vegetation, are interconnected parts of the watercourse
 - Canals, aqueducts, irrigation ditches, and other means of water conveyance can be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife
 - Biologic components of a stream may include aquatic and riparian vegetation, all aquatic animals including fish, amphibians, reptiles, invertebrates, and terrestrial species which derive benefits from the stream system
 - The lateral extent of a stream can be measured in different ways depending on the particular situation and the type of fish or wildlife resource at risk

The tenets listed above, among others, are applied to establish the boundaries of streambeds in various environments. Importance of each factor may be weighted based on site-specific considerations and the applicability of the indicators to the streambed at hand.

The California Coastal Act

The California Coastal Act (Public Resources Code Division 20, 1976) declares that the California coastal zone is a distinct and valuable natural resource of vital and enduring interest to all the people and exists as a delicately balanced ecosystem. As such, development within the coastal zone requires a Coastal Development Permit from either the California Coastal Commission or a local government. Coastal Development Permits are the regulatory mechanism by which proposed developments in the coastal zone are brought into compliance with the policies of Chapter 3 of the Coastal Act. After the Commission certifies a Local Coastal Program, most coastal development permit authority is delegated, and coastal development permit applications are then reviewed and acted on by cities and counties (in this case, the Santa Cruz County Local Coastal Program).

Section 30107.5 of the Coastal Act defines Environmentally Sensitive Habitat Areas (ESHA) as areas in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem, and which could be easily disturbed, degraded, or enhanced by human activities and developments. The Coastal Act states that resource extraction, development, and sales or transfers should be limited or prohibited in ESHA in order to ensure that these areas remain intact (especially Sections 30240, 30233, 30263, and 30609.5). These areas must be protected against habitat disruption, including land use and development that are adjacent to ESHA and may impact such areas. Under the Coastal Act, only uses that are dependent on ESHA resources shall be allowed in ESHA.

The California Coastal Act mandates that local governments prepare a land use plan and schedule of implementing actions to carry out the policies of the Coastal Act. The County of Santa Cruz Local Coastal Program is incorporated into the County's General Plan and represents the County's commitment to implement the Coastal Act through both General Plan policies and identification of detailed land use recommendations.

County of Santa Cruz General Plan and Local Coastal Program

Chapter 5: Conservation and Open Space

Objective 5.1 Biological Diversity

5.1.1 Sensitive Habitat Designation (Local Coastal Program [LCP]) Designate the following areas as sensitive habitats: (a) areas shown on the County General Plan and LCP Resources and Constraints Maps; (b) any undesignated areas which meet the criteria (policy 5.1.2) and which are identified through the biotic review process or other means; and (c) areas of biotic concern as shown on the Resources and Constraints Maps which contain concentrations of rare, endangered, threatened or unique species.

5.1.2 Definition of Sensitive Habitat (LCP) An area is defined as a sensitive habitat if it meets one or more of the following criteria: (a) Areas of special biological significance as identified by the state Water Resources Control Board. (b) Areas which provide habitat for locally unique biotic species/communities, including coastal scrub, maritime chaparral, native rhododendrons and associated Elkgrass, mapped grasslands in the coastal zone and sand parkland; and Special Forests including San Andreas Live Oak Woodlands, Valley Oak, Santa Cruz Cypress, indigenous Ponderosa Pine, indigenous Monterey Pine and ancient forests. (c) Areas adjacent to essential habitats of rare,

endangered or threatened species as defined in (e) and (f) below. (d) Areas which provide habitat for Species of Special Concern as listed by the California Department of Fish and Game in the Special Animals list, Natural Diversity Database. (e) Areas which provide habitat for rare or endangered species which meet the definition of Section 15380 of the California Environmental Quality Act guidelines. (f) Areas which provide habitat for rare, endangered or threatened species as designated by the State Fish and Game Commission, United States Fish and Wildlife Service or California Native Plant Society. (g) Nearshore reefs, rocky intertidal areas, sea caves, islets, offshore rocks, kelp beds, marine mammal hauling grounds, sandy beaches, shorebird roosting, resting and nesting areas, cliff nesting areas and marine. wildlife or educational research reserves. (h) Dune plant habitats. (i) All lakes, wetlands, estuaries, lagoons, streams and rivers. (j) Riparian corridors. (See Appendix B for a list of specific habitats and/or species.)

5.1.3 Environmentally Sensitive Habitats (LCP) Designate the areas described in 5.1.2 (d) through (j) as Environmentally Sensitive Habitats per the California Coastal Act and allow only uses dependent on such resources in these habitats within the Coastal Zone unless other uses are: (a) consistent with sensitive habitat protection policies and serve a specific purpose beneficial to the public; (b) it is determined through environmental review that any adverse impacts on the resource will be completely mitigated and that there is no feasible less-damaging alternative; and (c) legally necessary to allow a reasonable economic use of the land, and there is no feasible less damaging alternative.

5.1.4 Sensitive Habitat Protection Ordinance (LCP) Implement the protection of sensitive habitats by maintaining the existing Sensitive Habitat Protection ordinance. The ordinance identifies sensitive habitats, determines the uses which are allowed in and adjacent to sensitive habitats, and specifies required performance standards for land in or adjacent to these areas. Any amendments to this ordinance shall require a finding that sensitive habitats shall be afforded equal or greater protection by the amended language.

5.1.5 Land Division and Density Requirements in Sensitive Habitats (LCP) Allow land divisions in sensitive habitats only when the density and design of the subdivision are compatible with protection of these resources as determined by environmental assessment and applicable County land use and zoning standards. Apply the following land division and density standards to the habitats listed: (a) Grasslands-Prohibit land division of native and mixed native grassland habitat mapped in the Coastal Zone unless the area to be divided is removed from the mapped grassland habitat area by General Plan-Local Coastal Program amendment. On parcels with existing mapped native and mixed native grasslands and which contain developable land outside those habitats, allow development at the lowest density of the land use designation and require that development be clustered and located outside the habitat areas. Allow one single family dwelling unit per existing parcel of record. Where property owners upgrade grasslands on their parcels outside of mapped areas, through resource management activities, the prevailing General Plan densities shall not be reduced. (b) Special Forests- Prohibit land divisions within designated Special Forests unless the area to be divided is removed from the mapped special forests habitat area by General Plan-Local Coastal Plan amendment. On parcels with existing mapped special forest areas which contain developable land outside that habitat. allow development at the lowest density of the land use designation and require that development be clustered and located outside the habitat areas. Allow one single family dwelling unit per existing parcel of record. Where property owners upgrade special forest areas on their parcels. outside of mapped areas, through resource management activities. the prevailing General Plan densities shall not be reduced.

5.1.6 Development Within Sensitive Habitats (LCP) Sensitive habitats shall be protected against any significant disruption of habitat values; and any proposed development within or adjacent to these areas must maintain or enhance the functional capacity of the habitat. Reduce in scale, redesign, or, if no other alternative exists, deny any project which cannot sufficiently mitigate significant adverse impacts on sensitive habitats unless approval of a project is legally necessary to allow a reasonable use of the land.

5.1.7 Site Design and Use Regulations (LCP) Protect sensitive habitats against any significant disruption or degradation of habitat values in accordance with the Sensitive Habitat Protection ordinance. Utilize the following site design and use regulations on parcels containing these resources, excluding existing agricultural operations: (a) Structures shall be placed as far from the habitat as feasible. (b) Delineate development envelopes to specify location of development in minor land divisions and subdivisions. (c) Require easements, deed restrictions, or equivalent measures to protect that portion of a sensitive habitat on a project parcel which is undisturbed by a proposed development activity or to protect sensitive habitats on adjacent parcels. (d) Prohibit domestic animals where they threaten sensitive habitats. (e) Unlit removal of native vegetation to the minimum amount necessary for structures, landscaping, driveways, septic systems and gardens; (f) Prohibit landscaping with invasive or exotic species and encourage the use of characteristic native species.

5.1.8 Chemicals Within Sensitive Habitats (LCP) Prohibit the use of insecticides, herbicides, or any toxic chemical substance in sensitive habitats, except when an emergency has been declared, when the habitat itself is threatened, when a substantial risk to public health and safety exists, including maintenance for flood control by Public Works, or when such use is authorized pursuant to a permit issued by the Agricultural Commissioner.

5.1.9 Biotic Assessments (LCP) Within the following areas, require a biotic assessment as part of normal project review to determine whether a full biotic report should be prepared by a qualified biologist: (a) Areas of biotic concern, mapped; (b) Sensitive habitats, mapped & unmapped.

5.1.10 Species Protection (LCP) Recognize that habitat protection is only one aspect of maintaining biodiversity and that certain wildlife species, such as migratory birds, may not utilize specific habitats. Require protection of these individual rare, endangered and threatened species and continue to update policies as new information becomes available.

5.1.11 Wildlife Resources Beyond Sensitive Habitats (LCP) For areas which may not meet the definition of sensitive habitat contained in policy 5.1.2, yet contain valuable wildlife resources (such as migration corridors or exceptional species diversity), protect these wildlife habitat values and species using the techniques outlined in policies 5.1.5 and 5.1. 7 and use other mitigation measures identified through the environmental review process.

5.1.12 Habitat Restoration With Development Approval (LCP) Require as a condition of development approval, restoration of any area of the subject property which is an identified degraded sensitive habitat, with the magnitude of restoration to be commensurate with the scope of the project. Such conditions may include erosion control measures, removal of non-native or invasive species, planting with characteristic native species, diversion of polluting run-off, water impoundment, and other appropriate means. The object of habitat restoration activities shall be to enhance the functional capacity and biological productivity of the habitat(s) and whenever feasible, to restore them to a condition which can be sustained by natural occurrences, such as tidal flushing of lagoons.

5.1.13 Habitats Damaged from Code Violations (LCP) In all cases where a sensitive habitat has been damaged as a result of a code violation, require that restoration of damaged areas be undertaken in compliance with all necessary permits and that the size of the restored area be in compliance with Department of Fish and Game requirements. Such restoration shall include monitoring over time to ensure the success of the restoration effort.

5.1.14 Removal of Invasive Plant Species (LCP) Encourage the removal of invasive species and their replacement with characteristic native plants, except where such invasive species provide significant habitat value and where removal of such species would severely degrade the existing habitat. In such cases, develop long-term plans for gradual conversion to native species providing equal or better habitat values.

5.1.15 Priorities for Restoration Funding (LCP) Use the following criteria for establishing funding priorities among restoration projects: (a) Biological significance of the habitat, including productivity, diversity, uniqueness of area, presence of rare, endangered or unique species, or regional importance (e.g., waterfowl resting, etc.). (b) Degree of endangerment from development or other activities, and vulnerability to overuse or misuse.

Objective 5.2 Riparian Corridors and Wetlands

5.2.1 Designation of Riparian Corridors and Wetlands (LCP) Designate and define the following areas as Riparian Corridors: (a) 50' from the top of a distinct channel or physical evidence of high water mark of a perennial stream; (b) 30' from the top of a distinct channel or physical evidence of high water mark of an intermittent stream as designated on the General Plan maps and through field inspection of undesignated intermittent and ephemeral streams; , (c) 100' of the high water mark of a lake, wetland, estuary, lagoon. or natural body of standing water; (d) The landward limit of a riparian woodland plant community; (e) Wooded arroyos within urban areas. Designate and define the following areas as Wetlands: Transitional areas between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water periodically or permanently. Examples of wetlands are saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps. mudflats, and fens. The US Army Corps of Engineers. and other federal agencies utilize a "unified methodology" which defines wetlands as "those areas ~ certain criteria for hydrology, vegetation, and soils."

5.2.2 Riparian Corridor and Wetland Protection Ordinance (LCP) Implement the protection of Riparian Corridors and Wetlands through the Riparian Corridor and Wetland Protection ordinance to ensure no net loss of riparian corridors and riparian wetlands. The ordinance identifies and defines riparian corridors and wetlands, determines the uses which are allowed in and adjacent to these habitats, and specifies required buffer setbacks and performance standards for land in and adjacent to these areas. Any amendments to this ordinance shall require a finding that riparian corridors and wetlands shall be afforded equal or greater protection by the amended language.

5.2.3 Activities Within Riparian Corridors and Wetlands (LCP) Development activities, land alteration and vegetation disturbance within riparian corridors and wetlands and required buffers shall be prohibited unless an exception is granted per the Riparian Corridor and Wetlands Protection ordinance. As a condition of riparian exception, require evidence of approval for development from the US Army Corps of Engineers, California Department of Fish and Game, and other federal or state agencies that may have regulatory authority over activities within riparian corridors and wetlands.

5.2.4 Riparian Corridor Buffer Setback (LCP) Require a buffer setback from riparian corridors in addition to the specified distances found in the definition of riparian corridor. This setback shall be identified in the Riparian Corridor and Wetland Protection ordinance and established based on stream characteristics, vegetation and slope. Allow reductions to the buffer setback only upon approval of a riparian exception. Require a 10-foot separation from the edge of the riparian corridor buffer to any structure.

5.2.5 Setbacks From Wetlands (LCP) Prohibit development within the 100 foot riparian corridor of all wetlands. Allow exceptions to this setback only where consistent with the Riparian Corridor and Wetlands Protection ordinance, and in all cases, maximize distance between proposed structures and wetlands. Require measures to prevent water quality degradation from adjacent land uses, as outlined in the Water Resources section.

5.2.6 Riparian Corridors and Development Density (LCP) Exclude land within riparian corridors in the calculation of development density or net panel size. Grant full density credit for the portion of the property outside the riparian corridor which is within the required buffer setback, excluding areas over 30% slope, up to a maximum of 50% of the total area of the property which is outside the riparian corridor. (See policy 5.11.2.)

5.2.7 Compatible Uses With Riparian Corridors (LCP) Allow compatible uses in and adjacent to riparian corridors that do not impair or degrade the riparian plant and animal systems, or water supply values, such as non-motorized recreation and pedestrian trails, parks, interpretive facilities and fishing facilities. Allow development in these areas only in conjunction with approval of a riparian exception.

5.2.8 Environmental Review for Riparian Corridor and Wetland Protection (LCP) Require environmental review of all proposed development projects affecting riparian corridors or wetlands and preparation of an Environmental Impact Report or Biotic Report for projects which may have a significant effect on the corridors or wetlands.

5.2.9 Management Plans for Wetland Protection (LCP) Require development in or adjacent to wetlands to incorporate the recommendations of a management plan which evaluates: migratory waterfowl use December 1 to April 30; compatibility of agricultural use and biotic and water quality protection; maintenance of biologic productivity and diversity; and the permanent protection of adjoining uplands.

5.2.10 Development in Wetland Drainage Basins (LCP) Require development projects in wetland drainage basins to include drainage facilities or Best Management Practices (BMPs) which will maintain surface runoff patterns and water quality, unless a wetland management plan specifies otherwise, and minimize erosion, sedimentation, and introduction of pollutants.

5.2.11 Breaching of Lagoon, River, Stream or Creek Sandbars (LCP) Do not permit breaching of lagoon sandbars unless the breaching is consistent with an approved management plan for that wetland, river, stream, or creek system.

Objective 5.3 Aquatic and Marine Habitats

5.3.1 Support the Monterey Bay Sanctuary (LCP) Support the mission of the Monterey Bay National Marine Sanctuary to facilitate the long-term management, protection, understanding and awareness of its resources and qualities.

5.3.2 Protecting Shorebird Nesting Sites (LCP) Discourage all activities within 100 feet of shorebird nesting sites during nesting season (March-July). Prohibit dogs from beaches having nesting sites.

5.3.3 Davenport Pier, Rock Cliffs and Outcrops (LCP) Maintain low intensity use, such as nature observation and educational instruction on and adjacent to the Davenport Pier, Rock Cliffs and rock outcrops.

5.3.4 Coastal Dunes and Strand (LCP) Prohibit off-road vehicle use in the coastal dunes and strand, and discourage other uses with the potential to degrade dune habitat. Where trails through dunes are permitted, utilize wooden boardwalks or other techniques to minimize damage to dune habitat

5.3.5 Anadromous Fish Streams Require new water diversions, dams and reservoirs which are constructed on anadromous fish streams to be designed to protect fish populations and to provide adequate flow levels for successful fish production.

5.3.6 Marine Mammal Hauling Grounds (LCP) Prevent access to the bluff top observation points likely to cause disturbance to animals. Discourage access to immediately adjacent beach areas where necessary to minimize disturbance by roping off sensitive areas and posting explanatory signs along fence lines and restricted paths. Fence where necessary to prevent marine mammals from crossing Highway One.

Objective 5.4 Monterey Bay and Coastal Water Quality

5.4.1 Protecting the Monterey Bay National Marine Sanctuary from Adverse Impacts (LCP) Prohibit activities which could adversely impact sensitive habitats of the Monterey Bay National Marine Sanctuary, including the discharge of wastes and hazardous materials. The main sources of concern are wastewater discharge, urban runoff, toxic agricultural drainage water, including that originating outside of Santa Cruz County, and the accidental release of oil or other hazardous material from coastal tanker traffic.

5.4.2 Definition of Wastewater (LCP) Identify “wastewater” as all domestic and municipal sewage and other potentially toxic and/or hazardous materials or effluent resulting from industrial processes or other sources including brine from desalinization plants. Wastewater includes petrochemical compounds, “drilling mud” and associated potentially hazardous substances which may be directly or indirectly discharged into Monterey Bay or other coastal waters of Santa Cruz County as a result of exploratory or other oil drilling. Wastewater shall not include storm water runoff, unless so determined by the California Regional Water Quality Control Board.

5.4.3 Wastewater Discharges Into Coastal Waters (LCP) Require a review of any new and/or increased wastewater discharge into the Monterey Bay or other coastal waters to address the potential marine water quality impacts and determine necessary mitigations.

5.4.4 Disclosure of Chemical and Biological Characteristics of Wastewater (LCP) Require full disclosure of the projected chemical and biological characteristics of all proposed new and/or expansion of wastewater discharges to the Monterey Bay or other coastal waters of Santa Cruz County. Require full disclosure of the projected chemical and biological characteristics of wastewater entering treatment and pretreatment facilities connected with new and/or expansion of wastewater discharges to Monterey Bay or other coastal waters of Santa Cruz County. Particular areas of concern include toxic chemicals, toxic metals, bacteria, virus and other constituents identified as threats to the health and safety of coastal waters.

5.4.5 Levels of Wastewater Treatment (LCP) Require complete information on levels of treatment proposed at the treatment and pretreatment facilities to remove those constituents identified or anticipated in all proposed new and/or expansion of wastewater discharges to the Monterey Bay

and other coastal waters of Santa Cruz County. This information shall also include reliability and efficiency data of the proposed treatment.

5.4.6 Monitoring Wastewater Treatment (LCP) Require a comprehensive monitoring plan for testing of wastewater at treatment and pretreatment facilities for critical constituents or indicators identified or anticipated in all proposed new and/or increased wastewater discharges into the Monterey Bay and other coastal waters.

5.4.7 Location and Methods of Wastewater Discharge (LCP) Require oceanographic studies to determine the most suitable location and methods for wastewater discharge into the Monterey Bay or coastal waters.

5.4.8 Baseline Tests for Wastewater Discharge Sites (LCP) Require tests of ocean waters at proposed wastewater discharge sites and surrounding waters to establish baseline or background levels of toxic chemicals, toxic metals, bacteria and other water quality constituents. These tests must be performed no more than one year prior to submittal of the proposal. Historical data may not be substituted for this requirement.

5.4.9 Toxicity Studies for Proposed Wastewater Discharges (LCP) Require toxicity studies to determine the impacts of the proposed wastewater discharges on marine life, as well as on recreational uses of the coastal waters.

5.4.10 New and/or Increased Wastewater Discharges (LCP) Approve new and/or increased wastewater discharges only if they will not degrade marine habitats; will not create hazardous or dangerous conditions; and will not produce levels of pollutants that exceed any applicable local, state or federal water quality standards.

5.4.11 Land Disposal of Wastewater (LCP) Encourage land disposal of wastewater after adequate treatment to State wastewater reclamation standards to assist in recharging groundwater aquifers and maintaining higher summer stream flows.

5.4.12 Disturbances of Coastal Waters, Wetlands, Estuaries and Lakes (LCP) Prohibit the diking, filling and dredging of open coastal waters, wetlands, estuaries, and lakes. Allow exceptions only for the following purposes and only where there is no other feasible, less environmentally damaging alternative: (a) Incidental public service purposes, including, but not limited to burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines. (b) Restoration purposes, including the protection and enhancement of existing harbors, and where the activity will maintain and enhance the functional capacity of the wetland or estuary as determined through the County environmental review process in conjunction with the California Department of Fish and Game and U.S. Army Corps of Engineers. (c) Nature study, aquaculture, or similar resource-dependent activities.

5.4.13 Redistribution of Dredged Materials (LCP) Require the redistribution of dredged materials into the same littoral cell from which it was taken in an effort to continue beach replenishment as long as the materials are suitable and non-toxic and the deposition of the materials will not adversely affect marine environments or recreational uses. The deposition of such materials must be timed and located so as not to interfere with shoreline processes, longshore current systems, and public beach use.

5.4.14 Water Pollution from Urban Runoff (LCP) Review proposed development projects for their potential to contribute to water pollution via increased storm water runoff. Utilize erosion control measures, on-site detention and other appropriate storm water best management practices to reduce pollution from urban runoff.

Objective 5.7 Maintaining Surface Water Quality

5.7.1 Impacts From New Development On Water Quality (LCP) Prohibit new development adjacent to marshes, streams and bodies of water if such development would cause adverse impacts on water quality which cannot be fully mitigated

5.7.2 Minimum Septic System Setback From Natural Waterways (LCP) Prohibit installation of septic tanks or leach fields within 100 feet of all natural waterways including perennial or intermittent streams, seasonal water channels and natural bodies of standing water. An exception may be made for the repair of existing systems, if the 100-foot setback cannot be maintained, and adequate provisions are made for water quality protection.

5.7.3 Erosion Control For Stream and Lagoon Protection (LCP) For all new and existing development and land disturbances, require the installation and maintenance of sediment basins, and/or other strict erosion control measures, as needed to prevent siltation of streams and coastal lagoons. (Also see Erosion policies in section 6.3.)

5.7.4 Control Surface Runoff (LCP) New development shall minimize the discharge of pollutants into surface water drainage by providing the following improvements or similar methods which provide equal or greater runoff control: (a) include curbs and gutters on arterials, collectors and locals consistent with adopted urban street designs; and (b) oil, grease and silt traps for parking lots, land divisions or commercial and industrial development

5.7.5 Protecting Riparian Corridors and Coastal Lagoons (LCP) Require drainage facilities, including curbs and gutters in urban areas, as needed to protect water quality for all new development within 1000 feet of riparian corridors or coastal lagoons.

5.7.6 Maintaining Saltwater Inflow to Coastal Lagoons (LCP) Prohibit new development, site alteration or road projects adjacent to coastal lagoons unless it can be demonstrated that such projects will not restrict, impound or otherwise interfere with the natural drainage patterns and tidal circulation.

5.7.7 Stormwater Discharge Permit Requirements (LCP) Once the State and Regional Water Quality Control Boards promulgate new stormwater discharge permit requirements for municipal and industrial stormwater systems, obtain appropriate permits for all existing storm drainage systems and proposed drainage facilities and adhere to best management practices.

5.7.8 Animal Keeping Require all stables and other animal keeping operations to be managed to prevent discharge of sediment, nutrients, and contaminants to surface and groundwater.

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Appendix B

Site Photographs



Photograph 1. View of the southern extent of Moran Lagoon and the box culvert beneath East Cliff Drive, facing southwest. November 11, 2021.



Photograph 2. View of Moran Lake County Park and East Cliff Drive, facing northeast. November 11, 2021.



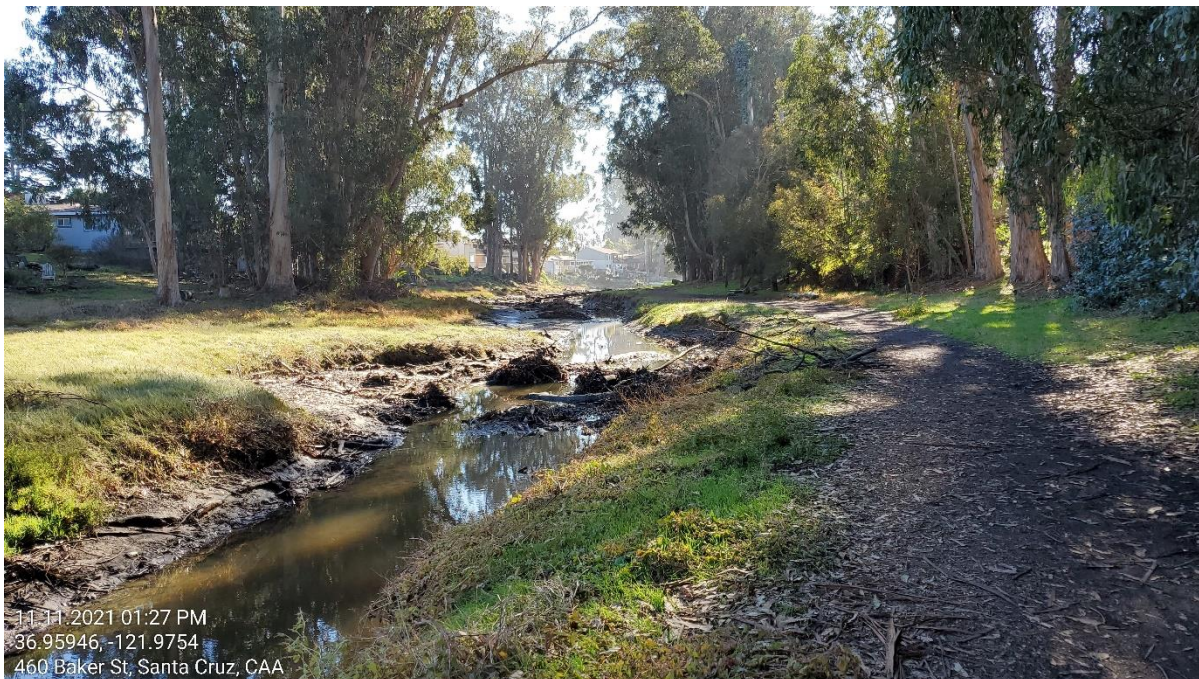
Photograph 3. View of Moran Lagoon and the Pacific Ocean, facing southwest. November 11, 2021.



Photograph 4. View of Rincon biologists utilizing a brailed seine to survey aquatic species within Moran Lagoon on November 11, 2021. Photo taken facing northeast.



Photograph 5. View of the southern extent of Moran Lagoon and surrounding brackish wetland habitat, facing west. The fringe of native pickleweed mats can be seen below the lagoon ordinary high water mark, while invasive iceplant mats can be seen above the pickleweed mats. November 11, 2021.



Photograph 6. View of the northern extent of Moran Lagoon, the existing pedestrian trail, and surrounding eucalyptus groves, facing southeast. November 11, 2021.



Photograph 7. View of Moran Creek and surrounding invasive vegetation, facing northwest. The creek conveys stormwater runoff into the northern portion of Moran Lagoon. November 11, 2021.



Photograph 8. View of the eucalyptus groves surrounding the D.A. Porath Sanitation Facility in the northern portion of the Project Area. November 11, 2021.



Photograph 9. View of pickleweed mats at the edge of Moran Lagoon and ice plant mats growing just upslope of the lagoon. Photo taken facing southeast. November 11, 2021.



Photograph 10. View of Moran Lake Beach and the box culvert beneath East Cliff Drive, facing northeast. November 11, 2021.

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Photograph 11. View of the eucalyptus groves and newly planted trees in the northwestern portion of the Project Area, facing west. November 11, 2021.



Photograph 12. View of the pickleweed mats around the edge of Moran Lagoon. November 11, 2021.



Photograph 13. View of disturbed riparian scrub habitat surrounding Moran Creek, facing east. Moran Creek flows through a culvert beneath Thirtieth Avenue, at the northeastern boundary of Project Area, and then flows into Moran Lagoon. November 11, 2021.



Photograph 14. View of invasive woody vine species and eucalyptus groves growing around the eroded banks of the lagoon inlet in the northeastern portion of the Project Area, facing northeast. November 11, 2021.



Photograph 14. View of the ruderal land cover type surrounding the existing parking area, facing west. April 1, 2022.



Photograph 15. View of the annual grassland vegetation community surrounding the eucalyptus groves near the D.A. Porath Sanitation Facility, facing northwest. April 1, 2022.

Appendix C

Floral and Faunal Compendium

Plant Species Observed within the Project Area on November 11, 2021

Scientific Name	Common Name	Status	Native or Introduced
Herbs			
<i>Achillea millefolium</i>	common yarrow	None	Native
<i>Allium triquetrum</i>	three cornered leek	None	Introduced
<i>Atriplex prostrata</i>	fat-hen	None	Introduced
<i>Bulbine frutescens</i>	stalked bulbine	None	Introduced
<i>Cakile maritima</i>	sea rocket	None	Introduced, Cal-IPC: limited
<i>Carex obnupta</i>	coast carex	None	Native
<i>Carpobrotus edulis</i>	ice plant	None	Introduced, Cal-IPC: High
<i>Chasmanthe bicolor</i>	two-color cobra lily	None	Introduced
<i>Claytonia parviflora</i>	miner's lettuce	None	Native
<i>Conium maculatum</i>	poison hemlock	None	Introduced, Cal-IPC: Moderate
<i>Cotula coronopifolia</i>	brass buttons	None	Introduced, Cal-IPC: Limited
<i>Delairea odorata</i>	cape ivy	None	Introduced, Cal-IPC: High
<i>Echium candicans</i>	pride of Madeira	None	Introduced, Cal-IPC: Limited
<i>Erodium moschatum</i>	musk stork's bill	None	Introduced
<i>Erodium</i> sp.	erodium	None	Introduced
<i>Euphorbia peplus</i>	petty spurge	None	Introduced
<i>Foeniculum vulgare</i>	fennel	None	Introduced, Cal-IPC: Moderate
<i>Frankenia salina</i>	alkali heath	None	Native
<i>Galium aparine</i>	common bedstraw	None	Native
<i>Geranium dissectum</i>	cranesbill	None	Introduced, Cal-IPC: Limited
<i>Hypochaeris radicata</i>	hairy cats ear	None	Introduced, Cal-IPC: Moderate
<i>Jaumea carnosa</i>	marsh jaumea	None	Native
<i>Juncus bufonius</i>	toad rush	None	Native
<i>Juncus patens</i>	spreading rush	None	Native
<i>Juncus</i> sp.	rush	None	Native
<i>Limonium perezii</i>	Perez's sea lavender	None	Introduced
<i>Lysimachia arvensis</i>	scarlet pimpernel	None	Introduced
<i>Malva neglecta</i>	dwarf mallow	None	Introduced
<i>Malva nicaeensis</i>	bull mallow	None	Introduced
<i>Oxalis incarnata</i>	crimson woodsorrel	None	Introduced
<i>Oxalis pes-caprae</i>	bermuda buttercup	None	Introduced, Cal-IPC: Moderate
<i>Pelargonium zonale</i>	geranium	None	Introduced
<i>Plantago coronopus</i>	cut leaf plantain	None	Introduced
<i>Plantago lanceolata</i>	English plantain	None	Introduced, Cal-IPC: Limited
<i>Raphanus raphanistrum</i>	jointed charlock	None	Introduced
<i>Raphanus sativus</i>	wild radish	None	Introduced, Cal-IPC: Limited
<i>Salicornia pacifica</i>	pickleweed	None	Native
<i>Tetragonia tetragonoides</i>	New Zealand spinach	None	Introduced

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Scientific Name	Common Name	Status	Native or Introduced
<i>Topaeolum majus</i>	nasturtium	None	Introduced
<i>Medicago polymorpha</i>	California bur-clover	None	Introduced, Cal-IPC: Limited
<i>Medicago sp.</i>	bur-clover	None	Introduced
<i>Rumex crispus</i>	curly dock	None	Introduced, Cal-IPC: Limited
<i>Sisymbrium officinale</i>	hedge mustard	None	Introduced
<i>Sisyrinchium bellum</i>	blue-eyed grass	None	Native
<i>Sonchus oleraceus</i>	common sowthistle	None	Introduced
<i>Stellaria media</i>	chickweed	None	Introduced
<i>Verbena lasiostachys</i>	western vervain	None	Native
<i>Vicia sativa</i>	spring vetch	None	Introduced
<i>Vinca major</i>	bigleaf periwinkle	None	Introduced, Cal-IPC: Moderate
<i>Zantedeschia aethiopica</i>	calla lily	None	Introduced, Cal-IPC: Limited
Grasses			
<i>Avena barbata</i>	slender wildoats	None	Introduced, Cal-IPC: Moderate
<i>Avena fatua</i>	wild oat	None	Introduced, Cal-IPC: Moderate
<i>Bromus diandrus</i>	ripgut brome	None	Introduced, Cal-IPC: Moderate
<i>Erharta erecta</i>	panic veldt grass	None	Introduced, Cal-IPC: Moderate
<i>Festuca perennis</i>	Italian rye grass	None	Introduced, Cal-IPC: Moderate
<i>Cynodon dactylon</i>	Bermuda grass	None	Introduced, Cal-IPC: Moderate
<i>Hordeum murinum</i>	foxtail barley	None	Introduced, Cal-IPC: Moderate
<i>Pennisetum clandestinum</i>	kikuyu grass	None	Introduced, Cal-IPC: Limited
<i>Poa annua</i>	annual bluegrass	None	Introduced
<i>Distichlis spicata</i>	saltgrass	None	Native
Shrubs and Vines			
<i>Aeonium arboreum</i>	tree aenium	None	Introduced
<i>Aloe arborescens</i>	krantz aloe	None	Introduced
<i>Cotoneaster lacteus</i>	milkflower cotoneaster	None	Introduced, Cal-IPC: Moderate
<i>Crassula ovata</i>	jade plant	None	Introduced
<i>Delairea odorata</i>	cape ivy	None	Introduced, Cal-IPC: High
<i>Euryops pectinatus</i>	golden daisy bush	None	Introduced
<i>Genista monspessulana</i>	French broom	None	Introduced, Cal-IPC: High
<i>Hedera helix</i>	English ivy	None	Introduced, Cal-IPC: High
<i>Pyracantha sp.</i>	firethorn	None	Introduced
<i>Rosmarinus officinalis</i>	rosemary	None	Introduced
<i>Salvia leucantha</i>	Mexican bush sage	None	Introduced
<i>Salvia mellifera</i>	black sage	None	Native
<i>Sequoia sempervirens</i>	coast redwood	None	Native (planted)
<i>Toxicodendron diversilobum</i>	poison oak	None	Native
<i>Rubus armeniacus</i>	Himalayan blackberry	None	Introduced, Cal-IPC: High
<i>Rubus ulmifolius</i>	elmleaf blackberry	None	Introduced, Cal-IPC

Scientific Name	Common Name	Status	Native or Introduced
Trees			
<i>Acacia dealbata</i>	silver wattle	None	Introduced, Cal-IPC: Moderate
<i>Acacia pycnantha</i>	golden wattle	None	Introduced, Cal-IPC: Watch
<i>Eucalyptus globulus</i>	blue gum eucalyptus	None	Introduced, Cal-IPC: Limited
<i>Eucalyptus rudis</i>	flooded gum	None	Introduced
<i>Hesperocyparis macrocarpa</i>	Monterey cypress	None	Native (planted), Cal-IPC: Limited
<i>Leptospermum laevigatum</i>	Australian tea tree	None	Introduced, Cal-IPC: Watch
<i>Lyonothamnus floribundus</i>	Catalina ironwood	None	Native (planted)
<i>Metrosideros excelsa</i>	New Zealand christmas tree	None	Introduced
<i>Pinus eldarica</i>	Eldarica pine	None	Introduced
<i>Quercus agrifolia</i>	coast live oak	None	Native
<i>Syzygium paniculatum</i>	brush cherry	None	Introduced
<i>Umbellularia californica</i>	California bay laurel	None	Native
<i>Washingtonia robusta</i>	Mexican fan palm	None	Introduced, Cal-IPC: Moderate
Cal-IPC=California Invasive Plant Council Rank			

Wildlife Species Observed Within the Project Area on November 11, 2021

Scientific Name	Common Name	Status	Native or Introduced
Birds			
<i>Anas platyrhynchos</i>	mallard	None	Native
<i>Buteo jamaicensis</i>	red-tailed hawk	None	Native
<i>Corvus brachyrhynchos</i>	American crow	None	Native
<i>Egretta thula</i>	snowy egret	None	Native
<i>Junco hyemalis</i>	dark-eyed junco	None	Native
<i>Melanitta perspicillata</i>	surf scoter	None	Native
<i>Mergus serrator</i>	red-breasted merganser	None	Native
<i>Nannopterum auritum</i>	double-crested cormorant	WL (nesting colony)	Native
<i>Pelecanus erythrorhynchos</i>	American white pelican	SSC (nesting colony)	Native
<i>Poecile rufescens</i>	chestnut-backed chickadee	None	Native
<i>Sayornis nigricans</i>	black phoebe	None	Native
<i>Sitta carolinensis</i>	white-breasted nuthatch	None	Native
<i>Zenaida macroura</i>	mourning dove	None	Native
<i>Zonotrichia leucophrys</i>	white-crowned sparrow	None	Native
Mammals			
<i>Thomomys bottae</i>	Botta's pocket gopher	None	Native
Fish			
<i>Eucyclogobius newberryi</i>	tidewater goby	FE	Native
<i>Gasterosteus aculeatus</i>	partially armored threespine stickleback	None	Native
Invertebrates			
<i>Bombus vosnesenskii</i>	yellow-faced bumble bee	None	Native
<i>Danaus plexippus</i> pop. 1	monarch butterfly	FC	Native
<i>Hemigrapsus nudus</i>	purple shore crab	None	Native
<i>Lophopanopeus bellus</i>	black-clawed crab	None	Native
<i>Mytilus californianus</i>	California mussel	None	Native
FE = Federally Endangered WL = CDFW Watchlist Species FC = Federal Candidate SSC = CDFW Species of Special Concern			

Appendix D

Special-status Species Potential to Occur Evaluations

Special-status Plant Species in the Regional Vicinity of the Project Area

Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale
<i>Agrostis blasdalei</i> Blasdale's bent grass	None/None G2/S2 1B.2	Coastal bluff scrub, Coastal dunes, Coastal prairie. Sandy or gravelly soil close to rocks; often in nutrient-poor soil with sparse vegetation. 0-150m. Blooms May-Jul.	Not Expected	Coastal scrub and dune habitats are not present.
<i>Amsinckia lunaris</i> bent-flowered fiddleneck	None/None G3/S3 1B.2	Cismontane woodland, Coastal bluff scrub, Valley and foothill grassland. 3-500m. Blooms Mar-Jun.	Not Expected	Coastal scrub and grassland habitats are not present.
<i>Arctostaphylos andersonii</i> Anderson's manzanita	None/None G2/S2 1B.2	Broadleafed upland forest, Chaparral, North Coast coniferous forest. Edges, Openings 60-760m. Blooms Nov-May.	Not Expected	Natural forest habitats are not present and no manzanita species were observed during the site visit.
<i>Arctostaphylos hookeri</i> ssp. <i>hookeri</i> Hooker's manzanita	None/None G3T2/S2 1B.2	Chaparral, Cismontane woodland, Closed-cone coniferous forest, Coastal scrub. Sandy 60-536m. Blooms Jan-Jun.	Not Expected	Natural chaparral or woodland habitats are not present and no manzanita species were observed during the site visit.
<i>Arctostaphylos pajaroensis</i> Pajaro manzanita	None/None G1/S1 1B.1	Chaparral. Sandy soils. 30-760m. Blooms Dec-Mar.	Not Expected	Natural chaparral habitats are not present and no manzanita species were observed during the site visit.
<i>Arctostaphylos silvicola</i> Bonny Doon manzanita	None/None G1/S1 1B.2	Chaparral, Closed-cone coniferous forest, Lower montane coniferous forest. Only known from Zayante (inland marine) sands in Santa Cruz County. 120-600m. Blooms Jan-Mar.	Not Expected	Natural chaparral, sand hill, or woodland habitats are not present and no manzanita species were observed during the site visit.
<i>Arenaria paludicola</i> marsh sandwort	FE/SE G1/S1 1B.1	Occurs in sandy substrates and openings within freshwater or brackish marshes and swamps. This species blooms between May and August, and typically occurs at elevations ranging from 3-170 meters.	Not Expected	Natural brackish marsh habitat exists around Moran lagoon but is heavily disturbed and generally lacks suitable openings that contain sandy substrate. The species was not observed during the reconnaissance survey or botanical surveys. There are no documented occurrences of the species within five miles of the Project Area (Calflora 2022, CDFW 2022b).
<i>Calyptidium parryi</i> var. <i>hesseae</i> Santa Cruz Mountains pussypaws	None/None G3G4T2/S2 1B.1	Chaparral, Cismontane woodland. Gravelly (sometimes), Openings, Sandy (sometimes) 305-1530m. Blooms May-Aug.	Not Expected	Chaparral and woodland habitats are not present.

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Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale
<i>Campanula californica</i> swamp harebell	None/None G3/S3 1B.2	Bogs and fens, Closed-cone coniferous forest, Coastal prairie, Marshes and swamps, Meadows and seeps, North Coast coniferous forest. Mesic 1-405m. Blooms Jun-Oct.	Not Expected	Freshwater bogs and coniferous forests are not present and the Project Area is outside of the known range of the species (Calflora 2022).
<i>Carex comosa</i> bristly sedge	None/None G5/S2 2B.1	Coastal prairie, Marshes and swamps, Valley and foothill grassland. Lake margins, wet places; site below sea level is on a Delta Island. 0-625m. Blooms May-Sep.	Not Expected	Some marsh habitat occurs on site, but the species was not observed during the botanical surveys. There are no documented occurrences of the species within five miles of the Project Area (Calflora 2022, CDFW 2022b).
<i>Carex saliniformis</i> deceiving sedge	None/None G2/S2 1B.2	Coastal prairie, Coastal scrub, Marshes and swamps, Meadows and seeps. Mesic 3-230m. Blooms Jun (Jul).	Not Expected	Marginal quality coastal salt marsh is present. However, the Project Area is outside of the known geographic range of the species.
<i>Ceanothus ferrisiae</i> Coyote ceanothus	FE/None G1/S1 1B.1	Evergreen shrub. Blooms Mar-May. Chaparral, valley and foothill grassland, coastal scrub. Serpentine sites in the Mt. Hamilton range. 150-460 m.	Not Expected	Natural chaparral habitats are not present and no ceanothus species were observed during the site visit.
<i>Centromadia parryi</i> ssp. <i>congdonii</i> Congdon's tarplant	None/None G3T1T2/S1S2 1B.1	Valley and foothill grassland. Alkaline soils, sometimes described as heavy white clay. 0-230m. Blooms May-Oct(Nov).	Not Expected	Valley and foothill grassland with suitable soil is not present.
<i>Chorizanthe pungens</i> var. <i>hartwegiana</i> Ben Lomond spineflower	FE/None G2T1/S1 1B.1	Lower montane coniferous forest. Zayante coarse sands in maritime ponderosa pine sandhills. 90-610m. Blooms Apr-Jul.	Not Expected	Coniferous forests and Zayante sand hills are not present.
<i>Chorizanthe pungens</i> var. <i>pungens</i> Monterey spineflower	FT/None G2T2/S2 1B.2	Chaparral, Cismontane woodland, Coastal dunes, Coastal scrub, Valley and foothill grassland. Sandy 3-450m. Blooms Apr-Jun(Jul-Aug).	Not Expected	Coastal scrub, dune, and grassland habitats are not present.
<i>Chorizanthe robusta</i> var. <i>hartwegii</i> Scotts Valley spineflower	FE/None G2T1/S1 1B.1	Meadows and seeps, Valley and foothill grassland. In grasslands with mudstone and sandstone outcrops. 230-245m. Blooms Apr-Jul.	Not Expected	Meadows and seeps, and grassland habitats are not present.
<i>Chorizanthe robusta</i> var. <i>robusta</i> robust spineflower	FE/None G2T1/S1 1B.1	Chaparral, Cismontane woodland, Coastal dunes, Coastal scrub. Gravelly (sometimes), Sandy (sometimes) 3-300m. Blooms Apr-Sep.	Not Expected	Coastal scrub, dune, and woodland habitats are not present.

Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale
<i>Collinsia multicolor</i> San Francisco collinsia	None/None G2/S2 1B.2	Annual herb. Blooms March-May. Closed-cone coniferous forest, coastal scrub. On decomposed shale (mudstone) mixed with humus. 30-250m (100-820ft).	Not Expected	Coniferous forests and coastal scrub habitats are not present.
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> seaside bird's-beak	None/SE G5T2/S2 1B.1	Chaparral, Cismontane woodland, Closed-cone coniferous forest, Coastal dunes, Coastal scrub. Disturbed areas (often), Sandy 0-515m. Blooms Apr-Oct.	Not Expected	Chaparral, cismontane woodland, closed-cone coniferous forest, coastal dunes, and coastal scrub habitat with disturbed, sandy, openings are not present.
<i>Dacryophyllum falcifolium</i> tear drop moss	None/None G2/S2 1B.3	North Coast coniferous forest. Limestone substrates and rock outcrops. 50-275m.	Not Expected	Coniferous forests and rocky outcrops are not present.
<i>Eriogonum nudum</i> var. <i>decurrens</i> Ben Lomond buckwheat	None/None G5T1/S1 1B.1	Chaparral, Cismontane woodland, Lower montane coniferous forest. Ponderosa pine sandhills in Santa Cruz County. 50-800m. Blooms Jun-Oct.	Not Expected	Chaparral and coniferous forests are not present.
<i>Erysimum ammophilum</i> sand-loving wallflower	None/None G2/S2 1B.2	Chaparral, Coastal dunes, Coastal scrub. Sandy openings. 0-60m. Blooms Feb-Jun(Jul-Aug).	Not Expected	Chaparral and coastal dunes or scrub habitats are not present.
<i>Erysimum teretifolium</i> Santa Cruz wallflower	FE/SE G1/S1 1B.1	Chaparral, Lower montane coniferous forest. Inland marine sands (Zayante coarse sand). 120-610m. Blooms Mar-Jul.	Not Expected	Chaparral and Coniferous forests are not present and the site is outside this species elevation range.
<i>Fissidens pauperculus</i> minute pocket moss	None/None G3?/S2 1B.2	North Coast coniferous forest. Moss growing on damp soil along the coast. In dry streambeds and on stream banks. 10-1024m.	Not Expected	Coniferous forests and dry streambeds are not present.
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> Monterey gilia	FE/ST G3G4T2/S2 1B.2	Chaparral, Cismontane woodland, Coastal dunes, Coastal scrub. Sandy openings in bare, wind-sheltered areas. Often near dune summit or in the hind dunes; two records from Pleistocene inland dunes. 0-45m. Blooms Apr-Jun.	Not Expected	Chaparral and coastal dunes or scrub habitats are not present.
<i>Hesperocyparis abramsiana</i> var. <i>abramsiana</i> Santa Cruz cypress	FT/SE G1T1/S1 1B.2	Chaparral, Closed-cone coniferous forest, Lower montane coniferous forest. Restricted to the Santa Cruz Mountains, on sandstone and granitic-derived soils; often w/ <i>Pinus attenuata</i> , redwoods. 280-800m.	Not Expected	Chaparral and coniferous forests are not present and the site is outside this species elevation range. Additionally, this species was not observed during the site visit.

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Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale
<i>Hoita strobilina</i> Loma Prieta hoita	None/None G2?/S2? 1B.1	Chaparral, Cismontane woodland, Riparian woodland. Serpentine; mesic sites. 30-860m. Blooms May-Jul(Aug-Oct).	Not Expected	Chaparral and woodland habitats on serpentine soils are not present.
<i>Holocarpha macradenia</i> Santa Cruz tarplant	FT/SE G1/S1 1B.1	Coastal prairie, Coastal scrub, Valley and foothill grassland. Light, sandy soil or sandy clay; often with nonnatives. 10-220m. Blooms Jun-Oct.	Not Expected	Coastal scrub or natural grassland habitats are not present, but this species is often found in disturbed grassy areas. There are eight occurrences of the species documented in the CNDDDB within five miles of the Project Area. However, the species was not observed during the botanical surveys.
<i>Horkelia cuneata</i> var. <i>sericea</i> Kellogg's horkelia	None/None G4T1?/S1? 1B.1	Chaparral, Closed-cone coniferous forest, Coastal dunes, Coastal scrub. Old dunes, coastal sandhills; openings. Sandy or gravelly soils. 10-200m. Blooms Apr-Sep.	Not Expected	Chaparral, coniferous forests, and coastal dunes or scrub habitats are not present.
<i>Horkelia marinensis</i> Point Reyes horkelia	None/None G2/S2 1B.2	Coastal dunes, Coastal prairie, Coastal scrub. Sandy flats and dunes near coast; in grassland or scrub plant communities. 5-755m. Blooms May-Sep.	Not Expected	Coastal dunes, prairie, or scrub habitats are not present. There is one occurrence (1990) of the species documented in the CNDDDB within five miles of the Project Area.
<i>Lasthenia californica</i> ssp. <i>macrantha</i> perennial goldfields	None/None G3T2/S2 1B.2	Coastal bluff scrub, Coastal dunes, Coastal scrub. 5-520m. Blooms Jan-Nov.	Not Expected	Coastal dunes or scrub habitats are not present. There is one historic occurrence (1955) of the species documented in the CNDDDB within five miles of the Project Area.
<i>Lessingia micradenia</i> var. <i>glabrata</i> smooth lessingia	None/None G2T2/S2 1B.2	Chaparral, Cismontane woodland, Valley and foothill grassland. Serpentine; often on roadsides. 120-420m. Blooms (Apr-Jun) Jul-Nov.	Not Expected	Chaparral, woodland, and grassland habitats on serpentine soils are not present.
<i>Malacothamnus arcuatus</i> arcuate bush-mallow	None/None G2Q/S2 1B.2	Chaparral, Cismontane woodland. Gravelly alluvium. 15-355m. Blooms Apr-Sep.	Not Expected	Chaparral and woodland habitats are not present.
<i>Microseris paludosa</i> marsh microseris	None/None G2/S2 1B.2	Cismontane woodland, Closed-cone coniferous forest, Coastal scrub, Valley and foothill grassland. 5-355m. Blooms Apr-Jun(Jul).	Not Expected	Woodlands and coniferous forests are not present. There is one historic occurrence (1957) of the species documented in the CNDDDB within five miles of the Project Area.

Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale
<i>Monardella sinuata</i> ssp. <i>nigrescens</i> northern curly-leaved monardella	None/None G3T2/S2 1B.2	Chaparral, Coastal dunes, Coastal scrub, Lower montane coniferous forest. Sandy soils. 0-300m. Blooms (Apr)May-Jul(Aug-Sep).	Not Expected	Chaparral, coastal dunes, coastal scrub, and coniferous forests are not present.
<i>Monolopia gracilens</i> woodland woollythreads	None/None G3/S3 1B.2	Broadleaved upland forest, Chaparral, Cismontane woodland, North Coast coniferous forest, Valley and foothill grassland. Grassy sites, in openings; sandy to rocky soils. Often seen on serpentine after burns, but may have only weak affinity to serpentine. 100-1200m. Blooms (Feb)Mar-Jul.	Not Expected	Forest, chaparral, woodland, and valley and foothill grassland habitats are not present. The project area is also outside of the elevation range for the species. There are two historic occurrences (1908, 1935) of the species documented in the CNDDDB within five miles of the Project Area.
<i>Pedicularis dudleyi</i> Dudley's lousewort	None/SR G2/S2 1B.2	Chaparral, Cismontane woodland, North Coast coniferous forest, Valley and foothill grassland. Deep shady woods of older coast redwood forests; also in maritime chaparral. 60-900m. Blooms Apr-Jun.	Not Expected	Forest, chaparral, woodland, and valley and foothill grassland habitats are not present. There is one historical occurrence (1884) of the species documented in the CNDDDB within five miles of the Project Area.
<i>Penstemon rattanii</i> var. <i>kleei</i> Santa Cruz Mountains beardtongue	None/None G4T2/S2 1B.2	Chaparral, Lower montane coniferous forest, North Coast coniferous forest. Sandy shale slopes; sometimes in the transition between forest and chaparral. 400-1100m. Blooms May-Jun.	Not Expected	Suitable habitat for the species is not present. The project area is also outside of the elevation range of the species.
<i>Pentachaeta bellidiflora</i> white-rayed pentachaeta	FE/SE G1/S1 1B.1	Cismontane woodland, Valley and foothill grassland. Open dry rocky slopes and grassy areas, often on soils derived from serpentine bedrock. 35-620m. Blooms Mar-May.	Not Expected	Cismontane woodlands and valley and foothill grasslands are not present, nor are serpentine soils. There is one historic occurrence (1933) of the species documented in the CNDDDB within five miles of the Project Area.
<i>Piperia candida</i> white-flowered rein orchid	None/None G3/S3 1B.2	Broadleaved upland forest, Lower montane coniferous forest, North Coast coniferous forest. Sometimes on serpentine. Forest duff, mossy banks, rock outcrops, and muskeg. 30-1310m. Blooms (Mar)May-Sep.	Not Expected	Intact forests are not present, nor are mossy banks or rock outcrops.
<i>Piperia yadonii</i> Yadon's rein orchid	FE/None G1/S1 1B.1	Chaparral, Closed-cone coniferous forest, Coastal bluff scrub. On sandstone and sandy soil, but poorly drained and often dry. 10-510m. Blooms (Feb)May-Aug.	Not Expected	Chaparral, coniferous forest, and coastal bluff scrub habitats are not present.

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Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale
<i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i> Choris' popcornflower	None/None G3T1Q/S1 1B.2	Chaparral, Coastal prairie, Coastal scrub. Mesic sites. 3-160m. Blooms Mar-Jun.	Not Expected	Chaparral, coastal prairie, and coastal scrub habitats are not present.
<i>Plagiobothrys diffusus</i> San Francisco popcornflower	None/SE G1Q/S1 1B.1	Coastal prairie, Valley and foothill grassland. Historically from grassy slopes with marine influence. 30-150. Blooms Mar-Jun.	Not Expected	Coastal prairie and valley and foothill grassland habitats are not present, but the site does contain invasive grasses with marine influence. There are four occurrences of the species documented in the CNDDDB within five miles of the Project Area. However, the site is outside of the known elevation range of the species.
<i>Polygonum hickmanii</i> Scotts Valley polygonum	FE/SE G1/S1 1B.1	Valley and foothill grassland. Purisima sandstone or mudstone with a thin soil layer; vernal moist due to runoff. 210-250m. Blooms May-Aug.	Not Expected	Valley and foothill grassland does not occur on site, nor do suitable soils or elevations for the species.
<i>Senecio aphanactis</i> chaparral ragwort	None/None G3/S2 2B.2	Chaparral, Cismontane woodland, Coastal scrub. Drying alkaline flats. 15-800m. Blooms Jan-Apr(May).	Not Expected	Chaparral, cismontane woodland and coastal scrub do not occur on site, nor do drying alkaline flats.
<i>Stebbinsoseris decipiens</i> Santa Cruz microseris	None/None G2/S2 1B.2	Broadleafed upland forest, Chaparral, Closed-cone coniferous forest, Coastal prairie, Coastal scrub, Valley and foothill grassland. Open areas in loose or disturbed soil, usually derived from sandstone, shale or serpentine, on seaward slopes. 10-500m. Blooms Apr-May.	Not Expected	Suitable intact habitat and disturbed soils derived from sandstone, shale, or serpentine are not present. The species was not observed during the botanical surveys.
<i>Trifolium buckwestiorum</i> Santa Cruz clover	None/None G2/S2 1B.1	Broadleafed upland forest, Cismontane woodland, Coastal prairie. Moist grassland. Gravelly margins. 105-610m. Blooms Apr-Oct.	Not Expected	Upland forest, cismontane woodland, and coastal prairie habitats and gravelly soil along habitat margins are not present.
<i>Trifolium hydrophilum</i> saline clover	None/None G2/S2 1B.2	Marshes and swamps, Valley and foothill grassland, Vernal pools. Mesic, alkaline sites. 0-300m. Blooms Apr-Jun.	Not Expected	Wetland habitat surrounding the lagoon and areas around the freshwater lagoon inlet could provide marginally habitat for this species. The species was not observed during the botanical surveys.

Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale
<i>Trifolium polyodon</i> Pacific Grove clover	None/SR G1/S1 1B.1	Closed-cone coniferous forest, Coastal prairie, Meadows and seeps, Valley and foothill grassland. Along small springs and seeps in grassy openings. 5- 425m. Blooms Apr-Jun(Jul).	Not Expected	Coniferous forest, coastal prairie, meadows and seeps, and valley and foothill grassland habitats are not present.

Regional Vicinity refers to within a 7-quad search radius of site.

Status (Federal/State)

FE = Federal Endangered

FT = Federal Threatened

FPE = Federal Proposed Endangered

FPT = Federal Proposed Threatened

FD = Federal Delisted

FC = Federal Candidate

SE = State Endangered

ST = State Threatened

SCE = State Candidate Endangered

SCT = State Candidate Threatened

SR = State Rare

SD = State Delisted

SSC = CDFW Species of Special Concern

FP = CDFW Fully Protected

WL = CDFW Watch List

CRPR (CNPS California Rare Plant Rank)

1A = Presumed extirpated in California, and rare or extinct elsewhere

1B = Rare, Threatened, or Endangered in California and elsewhere

2A = Presumed extirpated in California, but common elsewhere

2B = Rare, Threatened, or Endangered in California, but more common elsewhere

CRPR Threat Code Extension

.1 = Seriously endangered in California (>80% of occurrences threatened/high degree and immediacy of threat)

.2 = Moderately threatened in California (20-80% of occurrences threatened/moderate degree and immediacy of threat)

.3 = Not very endangered in California (<20% of occurrences threatened/low degree and immediacy of threat)

Other Statuses

G1 or S1 Critically Imperiled Globally or Subnationally (state)

G2 or S2 Imperiled Globally or Subnationally (state)

G3 or S3 Vulnerable to extirpation or extinction Globally or Subnationally (state)

G4/5 or S4/5 Apparently secure, common and abundant

GH or SH Possibly Extirpated – missing; known from only historical occurrences but still some hope of rediscovery

Additional notations may be provided as follows

T – Intraspecific Taxon (subspecies, varieties, and other designations below the level of species)

Q – Questionable taxonomy that may reduce conservation priority

? – Inexact numeric rank

Special-status Animal Species in the Regional Vicinity of the Project Area

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
Invertebrates				
<i>Bombus occidentalis</i> western bumble bee	None/SCE G2G3/S1	Once common & widespread, species has declined precipitously from central CA to southern B.C., perhaps from disease. Occurs at elevations of 0 to 2,000 meters. Require suitable nesting sites, overwintering sites for the queens, and nectar and pollen resources throughout the spring, summer, and fall.	Not Expected	Some suitable foraging habitat and food plant genera may occur within open areas of the Project Area during spring. Eight occurrences of the species are documented in the CNDDDB within five miles of the Project Area (CDFW 2022b), but the most recent of these is from 1998 and none are within one mile of Moran Lagoon. The species is now largely confined to high-elevation sites and areas east of the Central Valley (The Oregon Conservation Strategy 2022).
<i>Cicindela ohlone</i> Ohlone tiger beetle	FE/None G1/S1	Remnant native grasslands with California oatgrass and purple needlegrass in Santa Cruz County. Substrate is poorly drained clay or sandy clay soil over bedrock of Santa Cruz mudstone.	Not Expected	Native grasslands on suitable soils are not present. There are four occurrences of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022b). However, the most recent of these occurrences is from 2000 and the closest is over 2 miles from the Project Area.
<i>Danaus plexippus</i> pop. 1 monarch - California overwintering population	FC/None G4T2T3/S2S3	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	Present	Suitable roosting habitat is present and six wintering roosts are known to occur in eucalyptus groves within the Project Area (Santa Cruz County Parks 2010, Xerces Society 2022) There are twenty occurrences of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022b). Individuals were observed on site during the biological surveys.
<i>Euphilotes enoptes smithi</i> Smith's blue butterfly	FE/None G5T1T2/S1	Most commonly associated with coastal dunes and coastal sage scrub plant communities in Monterey and Santa Cruz counties. Hostplant: <i>Eriogonum latifolium</i> and <i>Eriogonum parvifolium</i> are utilized as both larval and adult foodplants.	Not Expected	Natural coastal dune habitat with host plant species is not present.

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Polyphylla barbata</i> Mount Hermon June beetle	FE/None G1/S1	Known only from sand hills in vicinity of Mt. Hermon, Santa Cruz County.	Not Expected	Zayante Sand Hills are not present. Two occurrences of the species (2004) are documented in the CNDDDB approximately five miles northwest of the Project Area (CDFW 2022b).
<i>Trimerotropis infantilis</i> Zayante band-winged grasshopper	FE/None G1/S1	Isolated sandstone deposits in the Santa Cruz Mountains (the Zayante Sand Hills ecosystem). Mostly on sand parkland habitat but also in areas with well-developed ground cover and in sparse chaparral with grass.	Not Expected	Zayante Sand Hills are not present. There is one historic occurrence (1941) of the species documented in the CNDDDB approximately 3.5 miles northeast of the Project Area (CDFW 2022b).
Fish				
<i>Eucyclogobius newberryi</i> northern tidewater goby	FE/None G3/S3	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water and high oxygen levels.	Present	Over six hundred individuals were observed within the lagoon during the aquatic survey in November 2021. The species has also been documented within the lagoon in previous surveys (e.g., Sutter 2018, USFWS 2005). There are eight occurrences of the species documented in the CNDDDB within five miles of the Project Area, one of which is within Moran Lake (CDFW 2022b).
<i>Lavinia exilicauda harengus</i> Monterey hitch	None/None G4T2T4/S3 SSC	Slow moving warm freshwater streams, rivers, and ponds with vegetated banks or other cover (down logs, etc.) for juveniles. Occasionally found in brackish water. Highly heat tolerant.	Low Potential	Suitable habitat for the species is present, particularly near downed trees upstream of the lagoon where salinity is low. The species was not observed during the aquatic survey.
<i>Oncorhynchus kisutch</i> pop. 4 coho salmon - central California coast ESU	FE/SE G5T2T3Q/S2	Federal listing includes populations between Punta Gorda and San Lorenzo River. State listing includes populations south of Punta Gorda. Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water and sufficient dissolved oxygen.	Not Expected	Anadromous fish are not expected to occur within the lagoon due to the lack of suitable upstream habitat and the altered state of the lagoon mouth that limits connectivity to the ocean. There is one historical occurrence of the species documented in the CNDDDB within five miles of the Project Area, within the San Lorenzo River (CDFW 2022b). This occurrence was documented in 1995 and was likely a hatchery fish.

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Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Oncorhynchus mykiss irideus</i> pop. 8 steelhead - central California coast DPS	FT/SC G5T2T3Q/S2S3	DPS includes all naturally spawned populations of steelhead (and their progeny) in streams from the Russian River to Aptos Creek, Santa Cruz County, California (inclusive). Also includes the drainages of San Francisco and San Pablo Bays.	Not Expected	Anadromous fish are not expected to occur within the lagoon due to the lack of suitable upstream habitat and the altered state of the lagoon mouth that limits connectivity to the ocean. Suitable habitat for resident <i>O. mykiss</i> is also absent within the Project Area. There are five occurrences of the species documented in the CNDDB within five miles of the Project Area (CDFW 2022b), none of which is within the Moran Lagoon watershed.
<i>Spirinchus thaleichthys</i> longfin smelt	FC/ST G5/S1	Euryhaline, nektonic and anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15-30 ppt, but can be found in completely freshwater to almost pure seawater.	Not Expected	Anadromous fish are not expected to occur within the lagoon due to the lack of suitable upstream habitat and the altered state of the lagoon mouth that limits connectivity to the ocean.
<i>Thaleichthys pacificus</i> eulachon	FT/None G5/S2	Found in Klamath River, Mad River, Redwood Creek, and in small numbers in Smith River and Humboldt Bay tributaries. Spawn in lower reaches of coastal rivers with moderate water velocities and bottom of pea-sized gravel, sand, and woody debris.	Not expected	Suitable flows and substrates are not present, and the site is outside this species' known range.
Amphibians				
<i>Ambystoma californiense</i> pop. 1 California tiger salamander - central California DPS	FT/ST G2G3/S3 WL	Lives in vacant or mammal-occupied burrows throughout most of the year; in grassland, savanna, or open woodland habitats. Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	Not Expected	Suitable vernal pools or intact upland grassland habitats are not present, and the site is isolated by development.
<i>Ambystoma macrodactylum</i> <i>croceum</i> Santa Cruz long-toed salamander	FE/SE G5T1T2/S1S2 FP	Wet meadows near sea level in a few restricted locales in Santa Cruz and Monterey counties. Aquatic larvae prefer shallow (<12 inches) water, using clumps of vegetation or debris for cover. Adults use mammal burrows.	Not Expected	Suitable wet freshwater meadows are not present, and the site is outside the species' known range and is isolated by development. There is one occurrence of the species documented in the CNDDB approximately five miles northeast of the Project Area (CDFW 2022b).

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Aneides niger</i> Santa Cruz black salamander	None/None G3/S3 SSC	Mixed deciduous and coniferous woodlands and coastal grasslands in San Mateo, Santa Cruz, and Santa Clara counties. Adults found under rocks, talus, and damp woody debris.	Not Expected	Suitable woodland or intact coastal grassland habitats are not present, and the site is isolated by development. There are three occurrences (197X, 1972, 2013) of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022b), all at least three miles north of the Project Area.
<i>Dicamptodon ensatus</i> California giant salamander	None/None G3/S2S3 SSC	Known from wet coastal forests near streams and seeps from Mendocino County south to Monterey County, and east to Napa County. Aquatic larvae found in cold, clear streams, occasionally in lakes and ponds. Adults known from wet forests under rocks and logs near streams and lakes.	Not Expected	Suitable forest and cold stream habitats are not present, and the site is isolated by development. There are two occurrences (1987, 2014) of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022b), both more than three miles north of the Project Area.
<i>Rana boylei</i> foothill yellow-legged frog	None/SE G3/S3 SSC	Partly-shaded, shallow streams and riffles with a rocky substrate in a variety of habitats. Needs at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis.	Not Expected	Suitable freshwater streams are not present, and the site is isolated by development. There is one occurrence (2021) of the species documented in the CNDDDB approximately three miles northeast of the Project Area (CDFW 2022b).
<i>Rana draytonii</i> California red-legged frog	FT/None G2G3/S2S3 SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat.	Low Potential	A very limited amount of disturbed freshwater and riparian habitat is present in the northeastern portion of the Project Area within Moran Creek. There are four occurrences of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022b). However, all of these occurrences are in freshwater ponds near the UC Santa Cruz campus and are at least 4.5 miles west of Moran Lagoon.
Reptiles				
<i>Anniella pulchra</i> Northern California legless lizard	None/None G3/S3 SSC	Sandy or loose loamy soils under sparse vegetation in coastal dunes, chaparral, oak woodlands, desert scrub, sandy washes, or stream terraces. Soil moisture is essential.	Low Potential	Vegetation types preferred by the species do not occur on site and the Project Area is isolated by urban development. However, there is suitable sandy soil and some areas with leaf litter present on site.

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Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Actinemys pallida</i> (<i>Emys marmorata</i>) southwestern pond turtle	None/None G3G4/S3 SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	Low Potential	Suitable habitat is present, though the site is isolated by development. There are five occurrences of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022b), the closest of which was in Schwan Lagoon, approximately one mile west of the Project Area.
Birds				
<i>Accipiter cooperii</i> Cooper's hawk	None/None G5/S4 WL	Woodland, chiefly of open, interrupted or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.	High Potential	Suitable nest trees are present throughout the site and there are numerous nearby sightings on eBird, including begging juveniles and adults (Cornell Lab of Ornithology 2022b). The species has a high potential to forage and nest within the Project Area.
<i>Agelaius tricolor</i> tricolored blackbird	None/ST G1G2/S1S2 SSC	Highly colonial species, most numerous in Central Valley & vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony.	Low Potential (non-nesting)	Suitable foraging habitat for the species occurs around Moran lagoon, though no suitable cattail, agricultural field, or other dense vegetative nesting habitat is present. Two historic occurrences (1973, 1987) of the species are documented in the CNDDDB approximately three miles west of the Project Area (CDFW 2022b). One occurrence of the species is documented within one mile of the lagoon in eBird (Cornell Lab of Ornithology 2022b).
<i>Aquila chrysaetos</i> golden eagle	None/None G5/S3 FP WL	Rolling foothills, mountain areas, sage-juniper flats, and desert. Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.	Not Expected	Suitable nest trees are present, however open space within the Project Area is likely too small to support golden eagle foraging, and the site is surrounded by development.
<i>Asio flammeus</i> short-eared owl	None/None G5/S3 SSC	Found in swamp lands, both fresh and salt; lowland meadows; irrigated alfalfa fields. Tule patches/tall grass needed for nesting/daytime seclusion. Nests on dry ground in depression concealed in vegetation.	Not Expected	Suitable swamp or wet meadow habitats are not present, and the site is surrounded by development.

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Athene cunicularia</i> burrowing owl	None/None G4/S3 SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Not Expected	Suitable dry upland grassland habitat with ground squirrel burrows is not present, and the site is surrounded by development. Several occurrences of the species are documented within five miles of the Project Area in eBird (Cornell Lab of Ornithology 2022b), the closest of which is approximately 1.5 miles west of Moran Lagoon. There is one occurrence (2014) of the species documented in the CNDDB approximately five miles northwest of the Project Area (CDFW 2022b).
<i>Brachyramphus marmoratus</i> marbled murrelet	FT/SE G3/S2	Feeds near-shore; nests inland along coast from Eureka to Oregon border and from Half Moon Bay to Santa Cruz. Nests in old-growth redwood-dominated forests, up to six miles inland, often in Douglas-fir.	Not Expected	Suitable old-growth redwood forests are not present, and the site is surrounded by development.
<i>Charadrius nivosus</i> western snowy plover	FT/None G3T3/S2 SSC	Sandy beaches, salt pond levees and shores of large alkali lakes. Needs sandy, gravelly or friable soils for nesting.	Low Potential (non-nesting)	A limited stretch of sandy beach is present on site, however, it is heavily impacted by recreational use and development, and no longer provides suitable dune habitat for breeding. There are two historic occurrences (1878, 1887) of the species documented in the CNDDB (CDFW 2022b) approximately two and four miles west of the Project Area. There are multiple occurrences documented in eBird within five miles of the Project Area (Cornell Lab of Ornithology 2022b), though none are documented within the Project Area.
<i>Coturnicops noveboracensis</i> yellow rail	None/None G4/S1S2 SSC	Summer resident in eastern Sierra Nevada in Mono County. Freshwater marshlands.	Not Expected	Suitable freshwater marshlands are not present. There is one historic occurrence (1905) of the species documented in the CNDDB approximately 3 miles northwest of the Project Area (CDFW 2022b).

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Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Cypseloides niger</i> black swift	None/None G4/S2 SSC	Coastal belt of Santa Cruz and Monterey counties; central and southern Sierra Nevada; San Bernardino and San Jacinto mountains. Breeds in small colonies on cliffs behind or adjacent to waterfalls in deep canyons and sea-bluffs above the surf; forages widely.	Low Potential (non-nesting)	Suitable cliffs or canyons for nesting are not present, though the species has a low potential to fly over or forage within the Project Area. There are four occurrences of the species documented in the CNDDDB (CDFW 2022b) and several occurrences documented in eBird within five miles of the Project Area (Cornell Lab of Ornithology 2022b).
<i>Elanus leucurus</i> white-tailed kite	None/None G5/S3S4 FP	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	Moderate Potential	The site is heavily impacted by human activity and is surrounded by urban development, which makes it unlikely that the species would nest or roost in trees onsite. However, many occurrences of the species are documented in eBird within one mile of the Project Area (Cornell Lab of Ornithology 2022b) and the species has a moderate potential to fly within the Project Area.
<i>Falco peregrinus anatum</i> American peregrine falcon	FD/SD G4T4/S3S4 FP	Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. Nest consists of a scrape or a depression or ledge in an open site.	Moderate Potential (non-nesting)	Suitable cliffs or other suitable nesting habitats are not present, though foraging habitat and bird prey species are present within Moran Lagoon. Many occurrences of the species are documented within two miles of the Project Area in eBird (Cornell Lab of Ornithology 2022b) and there is a moderate potential for the species to fly over or forage within the Project Area.
<i>Laterallus jamaicensis coturniculus</i> California black rail	None/ST G3G4T1/S1 FP	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	Not Expected	Suitable freshwater marshlands are not present. There is one historic occurrence (1941) of the species documented in the CNDDDB approximately three miles northwest of the Project Area (CDFW 2022b).
<i>Pandion haliaetus</i> osprey	None/None G5/S4 WL	Ocean shore, bays, freshwater lakes, and larger streams. Large nests built in tree-tops within 15 miles of a good fish-producing body of water.	Moderate Potential	Suitable nest trees are present and foraging habitat within the ocean exists nearby. Multiple occurrences of the species are documented in eBird within Moran Lake County Park and the surrounding area (Cornell Lab of Ornithology 2022).

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Pelecanus erythrorhynchos</i> American white pelican	None/None G4/S1S2 SSC (nesting colony)	Colonial nester on large interior lakes with well-sequestered islets.	Present (non-nesting)	The species was observed during the field reconnaissance survey in November 2021. Nesting habitat for the species is not present within the Project Area.
<i>Pelecanus occidentalis californicus</i> California brown pelican	FD/SD G4T3T4/S3 FP	Lives year-round in estuaries and coastal marine habitats along the California coast, and forages, rests, and roosts on islands, offshore rocks, breakwaters and other humanmade structures, rocky intertidal areas, mudflats, and beaches. Generally, nests and breeds at offshore Islands in Southern California. Diet includes mostly small fish that school near the surface of the water.	High Potential (non-nesting)	The species has a high potential to fly over, forage, and/or roost within the Project Area, though nesting habitat is not present. There are multiple occurrences of the species documented in eBird within Moran Lake County Park and the surrounding area (Cornell Lab of Ornithology 2022).
<i>Phalacrocorax auritus</i> double-crested cormorant	None/None G5/S4 WL (nesting colony)	Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state. Nests along coast on sequestered islets, usually on ground with sloping surface, or in tall trees along ocean, lagoon, bay, or lake margins.	Present (non-nesting)	Double-crested cormorants were observed within the Project Area during the site survey and have been frequently documented within Moran Lake County Park and the surrounding area (Cornell Lab of Ornithology 2022b). Suitable nesting habitat is present in eucalyptus groves within the Project Area. However, no nesting colonies were observed during biological surveys.
<i>Rallus obsoletus</i> California Ridgway's rail	FE/SE G3T1/S1 FP	Salt water and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay. Associated with abundant growths of pickleweed, but feeds away from cover on invertebrates from mud-bottomed sloughs.	Not Expected	Some suitable habitat for the species occurs on site, but the Project Area is outside of the species' current known range and there are no documented occurrences within five miles of Moran Lagoon (CDFW 2022b, Cornell Lab of Ornithology 2022b).
<i>Riparia</i> bank swallow	None/ST G5/S2	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	Low Potential (non-nesting)	Suitable banks or cliffs for nesting are not present. Multiple occurrences of the species are documented within five miles of the Project Area in eBird (Cornell Lab of Ornithology 2022b).

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Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Setophaga petechia</i> yellow warbler	None/None G5/S3S4 SSC	Inhabits riparian areas in close proximity to water. Frequently found nesting and foraging in willow shrubs and thickets, and in other riparian plants including cottonwoods, sycamores, ash, and alders.	High Potential	Some marginally suitable nesting habitat for the species occurs within the disturbed riparian scrub in the northeast portion of the Project Area. There are multiple occurrences of the species documented within one mile of the Project Area in eBird (Cornell Lab of Ornithology 2021b).
<i>Sterna antillarum browni</i> California least tern	FE/SE FP G4T2T3Q	Inhabits the coast from San Francisco to Baja California. Nests on open beaches kept free of vegetation by the tide, and also in open, sparsely vegetated and paved areas close to the coast. California least terns winter in Mexico. When feeding, they follow schools of fish and are sometimes seen as far north as southern Oregon.	Low Potential (non- nesting)	Some marginally suitable nesting habitat is present within the Project Area but the species is not known to nest within Moran Lake County Park, and due to the high level of human traffic, it is unlikely that the species would nest on site. Multiple occurrences of the species are documented in eBird within five miles of Moran Lake County Park (Cornell Lab of Ornithology 2022b). The nearest recent observation (2013) was in Corcoran Lagoon, approximately 0.25 mile from Moran Lagoon. There is a low potential for the species to fly through and forage within the Project Area.
Mammals				
<i>Antrozous pallidus</i> pallid bat	None/None G4/S3 SSC	Found in a variety of habitats including deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts in crevices of rock outcrops, caves, mine tunnels, buildings, bridges, and hollows of live and dead trees which must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Low Potential	Potential roosting habitat for the species occurs within eucalyptus trees and within the box culvert beneath the East Cliff Drive. However, it is unlikely that the species would roost on site given the disturbed nature of the area and the high level of human activity. There is one historic occurrence (1988) of the species documented in the CNDDb within five miles of the Project Area (CDFW 2022b).

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Corynorhinus townsendii</i> Townsend's big-eared bat	None/None G4/S2 SSC	Occurs throughout California in a wide variety of habitats. Most common in mesic sites, typically coniferous or deciduous forests. Roosts in the open, hanging from walls and ceilings in caves, lava tubes, bridges, and buildings. This species is extremely sensitive to human disturbance.	Low Potential	Potential roosting habitat for the species occurs within eucalyptus trees and within the box culvert beneath the East Cliff Drive. However, it is unlikely that the species would roost on site given the disturbed nature of the area and the high level of human activity. There are two occurrences (1988, 2014) of the species documented in the CNDDB within five miles of the Project Area (CDFW 2022b).
<i>Neotoma fuscipes annectens</i> San Francisco dusky-footed woodrat	None/None G5T2T3/S2S3 SSC	Typically found in forest habitats with moderate to dense understory. Can occur in chaparral, riparian woodlands, and coniferous forests, particularly redwood. Builds middens out of grasses, leaves, and woody debris. This subspecies is found only in the San Francisco Bay region.	Not Expected	No suitable woodland or forest habitat occurs within the Project Area. The eucalyptus groves have an open understory and are not suitable for woodrats, and the site is also isolated by development.
<i>Sorex ornatus salarius</i> Monterey shrew	None/None G5T1T2/S1S2 SSC	Riparian, wetland and upland areas in the vicinity of the Salinas River delta. Prefers moist microhabitats. feeds on insects and other invertebrates found under logs, rocks and litter.	Not Expected	Wetland habitats are present, however, the site is outside of this species' known range and is isolated by development.

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Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale
<i>Taxidea taxus</i> American badger	None/None G5/S3 SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	Not Expected	Suitable open upland habitats are not present, and the site is isolated by development. There is one occurrence (1996) of the species documented in the CNDDDB within five miles of the Project Area (CDFW 2022b).

Regional Vicinity refers to within a 7-quad search radius of site.

Status (Federal/State)

FE = Federal Endangered
 FT = Federal Threatened
 FPE = Federal Proposed Endangered
 FPT = Federal Proposed Threatened
 FD = Federal Delisted
 FC = Federal Candidate
 SE = State Endangered
 ST = State Threatened
 SCE = State Candidate Endangered
 SCT = State Candidate Threatened
 SR = State Rare
 SD = State Delisted
 SSC = CDFW Species of Special Concern
 FP = CDFW Fully Protected
 WL = CDFW Watch List

CRPR (CNPS California Rare Plant Rank)

1A = Presumed extirpated in California, and rare or extinct elsewhere
 1B = Rare, Threatened, or Endangered in California and elsewhere
 2A = Presumed extirpated in California, but common elsewhere
 2B = Rare, Threatened, or Endangered in California, but more common elsewhere
 3 = Need more information (Review List)
 4 = Limited Distribution (Watch List)

CRPR Threat Code Extension

.1 = Seriously endangered in California (>80% of occurrences threatened/high degree and immediacy of threat)
 .2 = Moderately threatened in California (20-80% of occurrences threatened/moderate degree and immediacy of threat)
 .3 = Not very endangered in California (<20% of occurrences threatened/low degree and immediacy of threat)

Other Statuses

G1 or S1 Critically Imperiled Globally or Subnationally (state)
 G2 or S2 Imperiled Globally or Subnationally (state)
 G3 or S3 Vulnerable to extirpation or extinction Globally or Subnationally (state)
 G4/5 or S4/5 Apparently secure, common and abundant
 GH or SH Possibly Extirpated – missing; known from only historical occurrences but still some hope of rediscovery

Additional notations may be provided as follows

T – Intraspecific Taxon (subspecies, varieties, and other designations below the level of species)
 Q – Questionable taxonomy that may reduce conservation priority

Appendix B

Xerces Society - Western Monarch Count Protocols and Datasheet

Habitat Assessment Survey Instructions

Protocol for the Xerces Society's Western Monarch Count

Thank you for your interest in conducting a western monarch overwintering habitat assessment. The information that you collect is valuable to document site conditions, boundaries, and threats. And, if used regularly, these assessments can be used to document changes in a site over time. The data may also be useful to site managers and conservation groups to help inform overwintering site restoration and management. To get started, gather the supplies you will need.

Equipment List

- Habitat Assessment Survey Instructions
- Habitat Assessment Datasheet (hardcopies, or set up on the Survey123 app)
- Binoculars
- Pen or pencil (if using hardcopy datasheets)
- Clipboard (if using hardcopy datasheets)
- GPS unit or smart phone w/ GPS capability (helpful but not required)
- Compass or smart phone w/ Compass app (helpful but not required)
- Kestrel pocket weather meter or outdoor weather thermometer (helpful but not required)
- GPS unit or smart phone w/ GPS capability (helpful but not required)
- Plant identification field guide or the Seek by iNaturalist app (helpful but not required)
- Camera or phone for taking pictures (helpful but not required)

Instructions

There are two versions of Habitat Assessment datasheets—the Short Form and the Long Form—feel free to use whichever datasheet you have time and equipment for. Once you have chosen a datasheet, please fill out all fields to the best of your ability. If you are unsure for any fields, no information is better than inaccurate information (please leave fields blank if this is the case). The majority of fields listed on the datasheet are self explanatory; however, we've listed a few definitions and instructions for fields that require further explanation under the section titled "Monitoring Definitions" below.

When and How Often to Count

Habitat Assessments can be conducted at any time, but they are most helpful during the overwintering season when clustering monarchs may be observed. Temperature is less important for the Habitat Assessment surveys, so you should always conduct the Monarch Count first. Please aim to fill out a habitat assessment once a year per site.

Submitting Data

Monarch Count and Habitat Assessment data should be submitted as soon as possible through the Survey123 mobile app or online forms available at [WesternMonarchCount.org](https://www.westernmonarchcount.org). Monitoring partners will need to decide who is responsible for submitting their joint datasheet and plan accordingly to avoid submitting multiple reports of the same data. If inconsistencies, missing

data or protocol concerns are noted, a Xerces staff person or regional coordinator will attempt to contact the individual(s) for clarification, using the email provided in their datasheet.

Monitoring Definitions

General Site Information

- **Site ID:** This is the unique 4-digit number assigned to the site from the Xerces Society's Western Monarch Overwintering Sites Database. You can find a Site ID using the interactive map on the project website, WesternMonarchCount.org.
- **Property Owner:** This is the legal owner of the property that the overwintering site is located on. This may be a public agency such as the U.S. National Forest Service or California Department of Parks and Recreation (State Parks), private landowners such as home owners or business owners or non-profit organizations. List multiple owners if applicable. If the property owner is a private landowner, please provide the individual, family, or company's name and contact information, if known.
- **Current Land Use:** This is the primary human use of a specific land area. Some examples include city, regional, county, state or national parks; state or national forests; residential; commercial; industrial; agricultural; golf courses; or other land uses. List multiple land uses if applicable.
- **Site Location/Directions:** Please be as specific as possible, make the directions so that anyone with the directions could find the site, particularly if you are documenting a new site. Be sure to include relevant information such as town names, highway or street names, river or stream names, and distances, if applicable.

Site Access Categories

- **Open Access:** Unrestricted direct access to the site/cluster trees (e.g., public parks or open spaces that remain open all/most hours, public walkways, roadways, or parking lots)
- **Limited Access:** Complete or partial access to the site/cluster trees *with* limitations or restrictions (e.g., fees, limited operating hours, requires site access coordination or special permissions, environmental obstacles, etc.)
- **No Access:** No direct access at this time; however, the site may or may not be visible from a nearby location, such as a public road (e.g., private property, restricted access area, environmental barriers, etc.)

Weather Data

If you have access to a Kestrel pocket weather meter (or similar device), please use this to collect the microclimate data. Be sure to note the metric used (e.g., mph vs. m/s, C vs. F). If you do not have access to this device, please skip the relative humidity data field and use an outdoor weather thermometer to record the temperature data. If you do not have access to any weather device, leave this section blank.

Habitat Information

Answer habitat information questions based off of the core cluster areas where monarchs typically congregate at the site. Clustering is defined as three or more adjacent monarchs with

closed wings. If you do not know where monarchs cluster at the site and do not see any clustering while you are doing this survey, indicate that on the form. You can contact Xerces (wmtc@xerces.org) to get a copy of the site report and any spatial information we have about where monarchs typically cluster so you can refine your search area in advance.

Community Structure

Record a visual estimate of the percentage each forest structure layer (i.e. tree, shrub, herbaceous layer) occupies. Note: The total for all layers combined can be greater than 100%.

- **Tree cover** is measured by imaging that the tree cover is viewed from above in two dimensions as if it were pressed flat against the ground. Densely growing trees would be 80-100% cover, whereas very sparsely growing trees would be 20% or less cover.
- **Shrub cover** includes woody species that do not reach tree height.
- **Herbaceous cover** comprises forbs (most non-woody flowers), grasses, or other plants that are not woody.
- **Leaf litter** cover is the percentage of dead material such as leaves, branches, and tree bark that covers the ground.
- **Bare soil** cover includes all exposed soil not covered by plants or dead material. Consider each layer on its own.

Photopoints

If you are able, please take several photographs of the site. Try to capture images of the monarch cluster trees with notable landmarks visible, any threats or disturbances observed at the site, and any key resources (e.g., wind buffers, nectar/water sources, etc.) that monarchs are using. Record a description of each photopoint and note the GPS coordinates and what each photo is showing. Send in your photos when you submit your datasheet, whether that is via the Survey123 app, online forms, or over email.

Overall Site Sketch/ Location Data

Providing a hand-drawn map, aerial map, Google Maps image, ArcGIS shapefile, or Google Earth kmz file with the site boundaries, cluster locations, and/or other important features clearly marked is very helpful. Draw as much information as you can, including monarch cluster trees, trees within the grove in which monarchs are not roosting, buildings, trails, streams/rivers, adjacent roads or highways, signs, areas with nectar plants, and open areas. Please provide GPS coordinates of the cluster locations and any threats or disturbances observed at the site. If known, note the accuracy of the GPS unit and the datum (i.e. NAD27, NAD83, WGS84) that the data is collected in. Many smartphone compass apps will show coordinates, so please double check on this before monitoring your site. If you do not have access to GPS, leave this section blank on the hardcopy datasheet, and add in location information when you submit data via the online forms.

Thank you for participating in the Western Monarch Count!

Please refer to the resources available at WesternMonarchCount.org for more information.

Habitat Assessment (Long Form) Datasheet

Xerces Society's Western Monarch Count

Date _____ Site ID # _____ Site Name _____

Observers (first & last names) _____

Survey Start Time _____ ☐AM / ☐PM End Time _____ ☐AM / ☐PM

County _____ Property Owner _____

Site Access (defined in protocol document): ☐ Open Access / ☐ Limited Access / ☐ No Access

Site Access Notes (e.g., What coordination is required to gain access to the site? What are the limitations or barriers?)

Directions to Site (e.g., Best parking? Navigating/walking to cluster trees?) _____

Please provide GPS coordinates of the grove's boundaries. If the grove is an odd-shaped polygon or many cluster trees, please draw a map on the back of this sheet, or make a shapefile/kmz using Google Earth or GIS products.

GPS Point of Grove's Northern corner: _____ N _____ W Accuracy (ft): _____

GPS Point of Grove's Eastern corner: _____ N _____ W Accuracy (ft): _____

GPS Point of Grove's Western corner: _____ N _____ W Accuracy (ft): _____

GPS Point of Grove's Southern corner: _____ N _____ W Accuracy (ft): _____

GPS Point of Cluster tree #1: _____ N _____ W Accuracy (ft): _____

GPS Point of Cluster tree #2: _____ N _____ W Accuracy (ft): _____

Datum of GPS Unit: ☐ NAD27 ☐ NAD83 ☐ WGS84 ☐ Smartphone ☐ Unknown

Weather and Microclimate

Cloud/fog cover: _____ %

Precipitation: ☐ none ☐ drizzle ☐ rain ☐ downpour

Microclimate INSIDE the grove, near the cluster trees

Temperature: _____ ☐ °F ☐ °C

Relative Humidity: _____

Average wind speed _____ (☐ mph / ☐ bft) Maximum wind speed _____ (☐ mph / ☐ bft)

Wind Direction (direction wind is coming FROM), circle what applies: N, NE, NW, S, SE, SW, W, E

Wind OUTSIDE the grove, away from the cluster trees

Temperature: _____ ☐ °F ☐ °C

Relative Humidity: _____

Average wind speed _____ (☐ mph / ☐ bft) Maximum wind speed _____ (☐ mph / ☐ bft)

Wind Direction (direction wind is coming FROM), circle what applies: N, NE, NW, S, SE, SW, W, E

Monarchs Observed? ☐ Yes / ☐ No

If so, is there an associated count data sheet? ☐ Yes / ☐ No

If not, roughly how many monarchs were observed? _____

Habitat Assessment (Long Form) Datasheet

Xerces Society's Western Monarch Count

Habitat Information

1. Is there a wind buffer between the cluster trees and the edge of the grove?

☐ Yes / ☐ No / ☐ No current cluster trees.

If so, in what directions (circle all that apply)? N, NE, NW, S, SE, SW, W, E

2. Describe the grove's tree arrangement (e.g., u-shape, linear along a drainage, dense grove with scattered openings, etc.) _____

3. Do the cluster trees get direct sunlight? ☐ Yes / ☐ No / ☐ No current cluster trees.

If so, during what times of day (circle those that apply)? ☐ Morning / ☐ Midday / ☐ Afternoon / ☐ Other

4. Are there dead/diseased/hazard trees in the grove? ☐ Yes / ☐ No

If so, please describe their location, # of affected trees, and species _____

5. Is there fresh water (including dew) available nearby? ☐ Yes / ☐ No

If so, what is/are the source(s)? ☐ Dew / ☐ Stream / ☐ Pond / ☐ Lake / ☐ Other _____

How far away is it from the cluster trees? _____ ☐ feet / ☐ meters ☐ yards

6. Are nectar plants currently blooming nearby? ☐ Yes / ☐ No

Record what species are present (check all that apply). If possible, rate the relative amount of blooms available to monarchs per species: A= abundant; M= moderate; S= scarce)

Native Species:	Native Species (cont.):	Non-native Species (cont.):
☐ Narrow leaf milkweed (<i>Asclepias fascicularis</i>) ☐ Mule fat/seep willow (<i>Baccharis glutinosa</i>) ☐ Coyote brush (<i>Baccharis pilularis</i>) ☐ Arroyo willow (<i>Salix lasiolepis</i>) ☐ Other willow (<i>Salix</i> sp.) ☐ Monkeyflower (<i>Mimulus</i> sp.) ☐ Morning glory (<i>Calystegia</i> sp.) ☐ Miner's lettuce (<i>Montia perfoliata</i>) ☐ Dune groundsel/ragwort (<i>Senecio blochmaniae</i>) ☐ Mock heather (<i>Ericameria ericoides</i>) ☐ Crisp dune mint (<i>Monardella crisper</i>) ☐ California blackberry (<i>Rubus ursinus</i>) ☐ Manzanita (<i>Arctostaphylos</i> sp.) ☐ Blue blossom (<i>Ceanothus thyrsiflorus</i>) ☐ Western goldenrod (<i>Euthamia occidentalis</i>) ☐ Bluedicks (<i>Dichelostemma capitatum</i>)	☐ Red alder (<i>Alnus rubra</i>) ☐ Aster (<i>Aster</i> sp.) ☐ Seaside fleabane (<i>Erigeron glaucus</i>) Other: _____ _____ _____ <u>Non-native Species:</u> ☐ Tropical milkweed (<i>Asclepias curassavica</i>) ☐ Blue gum (<i>Eucalyptus globulus</i>) ☐ Red gum (<i>Eucalyptus camaldulensis</i>) ☐ Black mustard (<i>Brassica nigra</i>) ☐ Unknown or other mustard (<i>Brassica</i> sp.) ☐ Common dandelion (<i>Taraxacum officinale</i>) ☐ Ox-eye daisy (<i>Chrysanthemum leucanthemum</i>) ☐ Periwinkle (<i>Vinca major</i>) ☐ Butterfly bush (<i>Buddleia</i> sp.)	☐ English ivy (<i>Hedera helix</i>) ☐ German ivy (<i>Senecio mikanioides</i>) ☐ Passionflower vine (<i>Passiflora</i> sp.) ☐ Bull thistle (<i>Cirsium vulgare</i>) ☐ Wild radish (<i>Raphanus sativus</i>) ☐ English daisy (<i>Bellis perennis</i>) ☐ White nightshade (<i>Solanum nodiflorum</i>) ☐ Ice plant (<i>Mesembryanthemum</i> sp.) ☐ Field bindweed (<i>Convolvulus arvensis</i>) ☐ Chrysanthemum (<i>Chrysanthemum</i> sp.) ☐ Klamath weed/tansy mustard (<i>Senecio</i> sp.) ☐ Lily-of-the-Nile (<i>Agapanthus africanus</i>) ☐ Sweet fennel (<i>Foeniculum vulgare</i>) ☐ Bottlebrush (<i>Callistemon</i> sp.) ☐ Lantana (<i>Lantana</i> sp.) ☐ Lemon (<i>Citrus limon</i>) ☐ Pride of madeira (<i>Echium fastuosum</i>) Other: _____ _____ _____

7. How close is the closest nectar source from the monarch cluster trees? _____ ☐ feet / ☐ meters ☐ yards

Habitat Assessment (Long Form) Datasheet

Xerces Society's Western Monarch Count

8. Did you observe monarchs feeding on nectar? ☐ Yes / ☐ No

If yes, which species? _____

9. Record the tree species that monarchs are clustering on (check all that apply).

☐ Blue gum (<i>Eucalyptus globulus</i>) ☐ Red river gum (<i>Eucalyptus camaldulensis</i>) ☐ Unknown or other Eucalyptus species (<i>Eucalyptus spp.</i>) ☐ Monterey pine (<i>Pinus radiata</i>) ☐ Unknown or other pine (<i>Pinus spp.</i>) ☐ Monterey cypress (<i>Cupressus macrocarpa</i>)	☐ Coastal redwood (<i>Sequoia sempervirens</i>) ☐ Coast live oak (<i>Quercus agrifolia</i>) ☐ Western sycamore (<i>Platanus racemosa</i>) ☐ Willow (<i>Salix spp.</i>) ☐ Acacias (<i>Acacia spp.</i>) Other: _____
---	--

10. Record other tree species present at the site that monarchs are not clustering on (check all that apply).

☐ Blue gum (<i>Eucalyptus globulus</i>) ☐ Red river gum (<i>Eucalyptus camaldulensis</i>) ☐ Unknown or other Eucalyptus species (<i>Eucalyptus spp.</i>) ☐ Monterey pine (<i>Pinus radiata</i>) ☐ Unknown or other pine (<i>Pinus spp.</i>) ☐ Monterey cypress (<i>Cupressus macrocarpa</i>)	☐ Coastal redwood (<i>Sequoia sempervirens</i>) ☐ Coast live oak (<i>Quercus agrifolia</i>) ☐ Western sycamore (<i>Platanus racemosa</i>) ☐ Willow (<i>Salix spp.</i>) ☐ Acacias (<i>Acacia spp.</i>) Other: _____
---	--

11. Estimate the community structure composition (total can be >100% for all layers combined).

Tree cover ____% Shrub cover ____% Herbaceous cover ____% Leaf litter ____% Bare soil ____%

12. Record any threats or disturbances you observe at the site (check all that apply).

☐ Storm damage ☐ Cut trees ☐ Trimmed trees ☐ Possibly too dense of trees (i.e. too much shade) ☐ Trees diseased from pitch canker ☐ Trees diseased from Eucalyptus leaf beetle ☐ Trees diseased from Eucalyptus lerp psyllid ☐ Trees diseased from Eucalyptus longhorn borer ☐ Trees diseased from unknown source ☐ Dead/dying trees from non- disease source ☐ Old/aging trees ☐ Utility maintenance ☐ High human visitation load ☐ Erosion ☐ Campsite	☐ Cattle/burro/other livestock grazing ☐ Pesticide use at site (observed) ☐ Pesticide use at site (likely) ☐ Fire damage ☐ Construction ☐ Buildings ☐ Pavement ☐ Parking lot ☐ Mowing/plowing of nectar plants ☐ Railroad tracks ☐ Extensive trails ☐ Road (within the site) Other: _____ _____
--	--

13. Describe the disturbances/threats in greater detail, if possible. For example, if you observed dead/dying trees, how many did you observe and are they cluster trees? If the site is affected by erosion, what is the cause of the erosion? _____

Habitat Assessment (Long Form) Datasheet

Xerces Society's Western Monarch Count

14. Record any threats or disturbances you observe OUTSIDE but nearby the site (check all that apply).

☐ Roads/Highways ☐ High vehicle traffic area ☐ Housing Developments ☐ Shopping Malls/Restaurants ☐ Pavement	☐ Parking lot ☐ Pesticide/herbicide use in landscape (observed) ☐ Pesticide/herbicide use in landscape (likely) ☐ Construction Other: _____
--	---

15. Record possible FUTURE threats that seem likely to affect this site (check all that apply).

☐ High possibility that overwintering trees will be cut ☐ Site might become too dense/shady in the future ☐ Site might not offer enough wind protection in the future ☐ Proposed housing development ☐ Proposed expansion of facilities or buildings within the site	Other: _____ _____
---	-----------------------

16. Is there a staff and/or docent presence at the site? ☐ Yes / ☐ No

If so, from what agencies/groups (list all that apply)? _____

Photopoints

Camerapoint Description: _____

Photopoint #1 Description: _____

Photopoint #2 Description: _____

Notes:

Overall Site Sketch

Provide a sketch here or on the back of the datasheet; utilize aerial maps, ArcGIS, Google Earth, Google Maps, or other programs to provide a more detailed map of the site and its major features, including cluster locations, if possible.

Monarch Count Datasheet

Xerces Society's Western Monarch Count

Date _____ Site ID # _____ Site Name _____

Observers (first & last names) _____

Site Access (defined in protocol document): ☐ Open Access / ☐ Limited Access / ☐ No Access

Access Notes (e.g., ownership, directions, etc.) _____

Count Start Time _____ End Time _____ Cloud/Fog Cover _____ %

Temp (°F or °C) _____ Precipitation: ☐ none / ☐ drizzle / ☐ rain / ☐ downpour

Wind _____ (☐ mph / ☐bft) Wind Direction (direction wind is coming FROM) _____

[illegible]

Additional rows for monarch cluster data, if needed. Don't forget to add these to your grand total!

[illegible]

Thank You for Participating in the Western Monarch Count!

Please submit your data through the [online forms](https://www.westernmonarchcount.org) found at [WesternMonarchCount.org](https://www.westernmonarchcount.org)

Appendix C

U.S. Fish and Wildlife Service Coastal Program Workplan for the Moran Lake Monarch
Butterfly Management Update 2021



**U.S. Fish and Wildlife Service
Coastal Program for Central California Coast**



**COASTAL PROGRAM WORK PLAN
Moran Lake Monarch Butterfly Management Plan Update 2021**

The conservation project described below is agreed to by the Service, and Santa Cruz County Parks Department.

Description of Project and Objectives: The Santa Cruz County Parks Department will work in partnership with the Service, to update the Monarch Butterfly Habitat Management Plan for the Moran Lake County Park. This project will not be the subject of habitat restoration activities, but it is anticipated that the result of this plan will lead to implementation of habitat improvement activities at the Moran Lake site.

➤ **Project Location:**

Moran Lake County Park is located within the city limits of Santa Cruz, California and is owned by the County of Santa Cruz. Moran Lake park is a multi-use public park situated immediately inland of the Pacific Ocean. The park is also surrounded by residential neighborhoods on three sides. Specifically, the park is located at 22775 E Cliff Dr, Santa Cruz, CA 95062.

➤ **Baseline Assessment:**

Monarch butterflies are suffering steep population declines throughout their North American range and especially so with the western population. West coast wintering surveys have shown an almost 100% decline in monarch returns within the last five years. In 2020 the USFWS determined that the monarch butterfly was warranted for listing under the Endangered Species Act (ESA) but that listing precluded by higher priority actions.

Wintering population surveys at the Moran Lake monarch overwintering grove located near Santa Cruz, California is no acceptance. Listed as one of the top-ten highest priority sites by the Xerces Society in 2016, this site had almost no monarch overwinter during the 2020-2021 winter. The County of Santa Cruz owns and manages monarch habitat at Moran Lake County Park and they propose to plan and implement habitat improvements over the next decade. In 2010 the County of Santa Cruz Parks Department developed a “Monarch Butterfly Habitat Management Plan” that needs updating with the most recent monarch population use and habitat information. This proposal will provide an updated Monarch Butterfly Habitat Management Plan for Moran Lake County Park. Other sub-tasks include an updated site assessment and specific management recommendations.

Statement of Problem:

- **Problem Statement 1:** The Santa Cruz County Parks Department (County Parks) lacks a comprehensive, updated, and certified management plan for the monarch butterfly overwintering habitat at Moran Lake County Park.
- **Problem Statement 2** - The lack of a plan inhibits County Parks from implementing appropriate tree management, including replacements, to enhance monarch overwintering habitat as hazardous tree pruning and removal is completed incrementally at the overwintering site.

- **Problem Statement 3** - The lack of a plan also inhibits County Parks from pursuing other park and habitat enhancements such as invasive species removal, increased understory nectar plantings, and additional tree plantings.
- **Problem Statement 4** - County Parks is not able to create an updated management plan without a site assessment and recommendations from a qualified entomologist.

Restoration Hypothesis:

- **Hypothesis 1:** The number of overwintering monarchs present at Moran Lake will increase if County Parks completes habitat enhancements including but not limited to planting additional windscreen trees, establishing additional winter nectar sources, and managing recreational activities to protect overwintering monarchs.

Specific Project Goals and Objectives:

- **Goal 1** - Enhance monarch butterfly habitat at Moran Lake Park.
 - **Objective 1** - By 2023, create an updated site assessment and set of management recommendations, based on monitoring of the overwintering monarch site, to be referenced and considered in a future Monarch Butterfly Habitat Management Plan.
 - **Objective 2** - By 2023, with stakeholder and community input, prepare an updated Monarch Butterfly Habitat Management Plan for Moran Lake County Park, and prepare environmental review document in accordance with the California Environmental Quality Act, bring to the County Board of Supervisors for review and adoption, allowing subsequent objectives to be completed.
 - **Task 1:** Contract a qualified entomologist, specializing in migratory monarchs, to monitor the site and complete an updated site assessment, and to provide a set of recommendations for monarch habitat management at Moran Lake County Park

Specific Landowner Objectives:

- **Objective 1** - By 2023, establish annual monarch monitoring program in accordance with updated Monarch Butterfly Habitat Management Plan.
- **Objective 2** - By 2023, establish tree and understory monarch habitat monitoring program in accordance with the updated Monarch Butterfly Habitat Management Plan.
- **Objective 3** - By 2030, complete other park improvements to be consistent with updated Monarch Butterfly Habitat Management Plan including park trail construction, drainage improvements, interpretive improvements and other public access and ADA improvements.

Additional Unforeseen Habitat Improvements:

In addition to the above the project activities, the partners agree that should any additional or other priority habitat improvements be identified by the Service on this or other lands owned by the landowner(s), such improvements will be incorporated as part of the project with prior written approval of all signatories to the Coastal Program Agreement and/or Work Plan through a Modification. Additional USFWS funding may be obligated to this project through a modification.

Who will manage the project?

- Will Fourt of the County of Santa Cruz Parks Department will be the primary project manager. Shawn Milar and Samantha Marcum of the USFWS staff will provide specific on-the-ground management recommendations and technical expertise.

Habitat Accomplishments Anticipated: Not applicable. This project will produce a habitat management plan. Future habitat restoration activities will likely be informed by this proposed plan but are not anticipated with FY2021 obligated funding. Future funding assistance may be considered for habitat restoration activities.

<u>Accomplishment</u>	<u>Explain</u>	<u>Location Shown in Figure?</u>
1) Monarch Butterfly Habitat Management Plan	Update to 2010 Moran Lake Monarch Butterfly Management Plan by 2023	Figure 1,2

Additional Reporting Details: In addition to the information presented in the Notice of Award Letter, Santa Cruz County Parks Department will provide the following for your Annual and Final Reports on the project.

➤ **Annual Reports:**

- a. Annual performance reports should at minimum include:
 - i. Activities Completed (what, when, where)
 1. What activities completed since the last reporting period
 2. When? include X Date to X Date.
 3. Where? Ex. - X occurred in the pasture c.
 - ii. Photos Before and After (whatever appropriate).
 - iii. Statements explaining any problems or delays in implementing project tasks.
 - iv. Lessons learned: (if appropriate)
 - v. Other Reporting: If submitting reports to other federal, state, and local agencies and the above annual report content met then submitting these reports is acceptable.
- b. Submit annual reports via email to USFWS Project Officer (see below for contact information).

➤ **Final Report:**

- c. Includes all of above information/headings with a synthesis of all project activities completed.
- d. The final report must be submitted to the USFWS Project Officer before you submit the final invoice for payment on the project. Please note that prior to submitting final report

we require Service review of the draft final report at least 15 days before finalizing to allow for the incorporation of our feedback and comments before going final.

All reports must be submitted to:

USFWS Project Officer

Name: Shawn Milar, Coastal Program Biologist

Address: 1352 Lighthouse Avenue

City/State/Zip: Pacific Grove, CA 93950

Phone: 83-648-0623

Email: shawn_milar@fws.gov

Provide all photos electronically (including those presented in body of reports). By providing these photos, you grant the Service permission to use such photos (submitted by you or your organization) in Service educational publications and/or in the Service Web Page and for other educational non-commercial uses. We will ensure you or your organization receives appropriate credit for such photos.

Special Conditions and Provisions:

A. Joint Obligations: The USFWS and the County of Santa Cruz Parks Department work cooperatively in further developing the monarch butterfly habitat management plan as proposed by this agreement. Further, each shall;

1. Communicate on a regular basis (at least quarterly) to assess project progress, accomplishments, needs, and shortfalls.
2. Jointly prepare a project summary report for the project as outlined in the reporting requirements section.

B. The Service will:

1. Work cooperatively with the County of Santa Cruz County Parks Department to provide project guidance for activities conducted pursuant to this Agreement where appropriate;
2. Ensure that the project complies with the following Federal laws and regulations:
 - a. Section 106 of the National Historic Preservation Act
 - b. National Environmental Policy Act
 - c. Endangered Species Act
3. Assume no liability for damage or injury other than that caused by its own negligence, on the above project site. The Service does not assume jurisdiction over the premises by this Agreement. The landowners participating under this Work Plan retain all rights to control trespass and retains all responsibility for taxes, assessments, and damage claims;
4. Ensure County of Santa Cruz County Parks Department receives appropriate credits for all photos provided to the Service.

C. Santa Cruz County Parks Department will:

1. Serve as administrator of contracts, services, materials acquisitions, and disbursement of the Service's cost-share for activities relating to project completion.
2. Work cooperatively with the Service to carry out this agreement to participate in fish and wildlife conservation activities.
3. Maintain proper books, records, and accounts of all specific project expenditures for the project. (The Service must have the right to review the appropriate documentation to verify project expenditures upon a 30-day notice in writing from the Service.)
4. Work directly with interested parties and project stakeholders to complete the objectives outlined in this agreement;
5. Grant the Service permission to use photos submitted by Santa Cruz County Parks Department in the Service's educational publications and/or in the Service's Web Page and for other educational non-commercial uses;
6. Ensure that the funds provided by and activities conducted pursuant to this Work Plan are not to replace, supplement or otherwise contribute to any mitigation or compensation that may be required of the landowner, or other parties as a result of development or other activities that impact habitat on the project site;
7. Provide substantive written progress reports to the Service, as specified in the Reporting Requirements section of the Notice of Award letter and Additional Reporting section of this Work Plan.

Budget Table

Item (main headings should match 424a budget form's object class categories)	Cost	Coastal Program (USFWS)**
Contractual	\$20,000	**
TASK 1. Funding for Santa Cruz County Parks Department to contract a qualified entomologist, specializing in migratory monarchs, to monitor the site and complete an updated site assessment, and to provide a set of recommendations for monarch habitat management at Moran Lake County Park		\$20,000
Total Project Costs	\$20,000	\$20,000
% Cost-shares	100%	100%

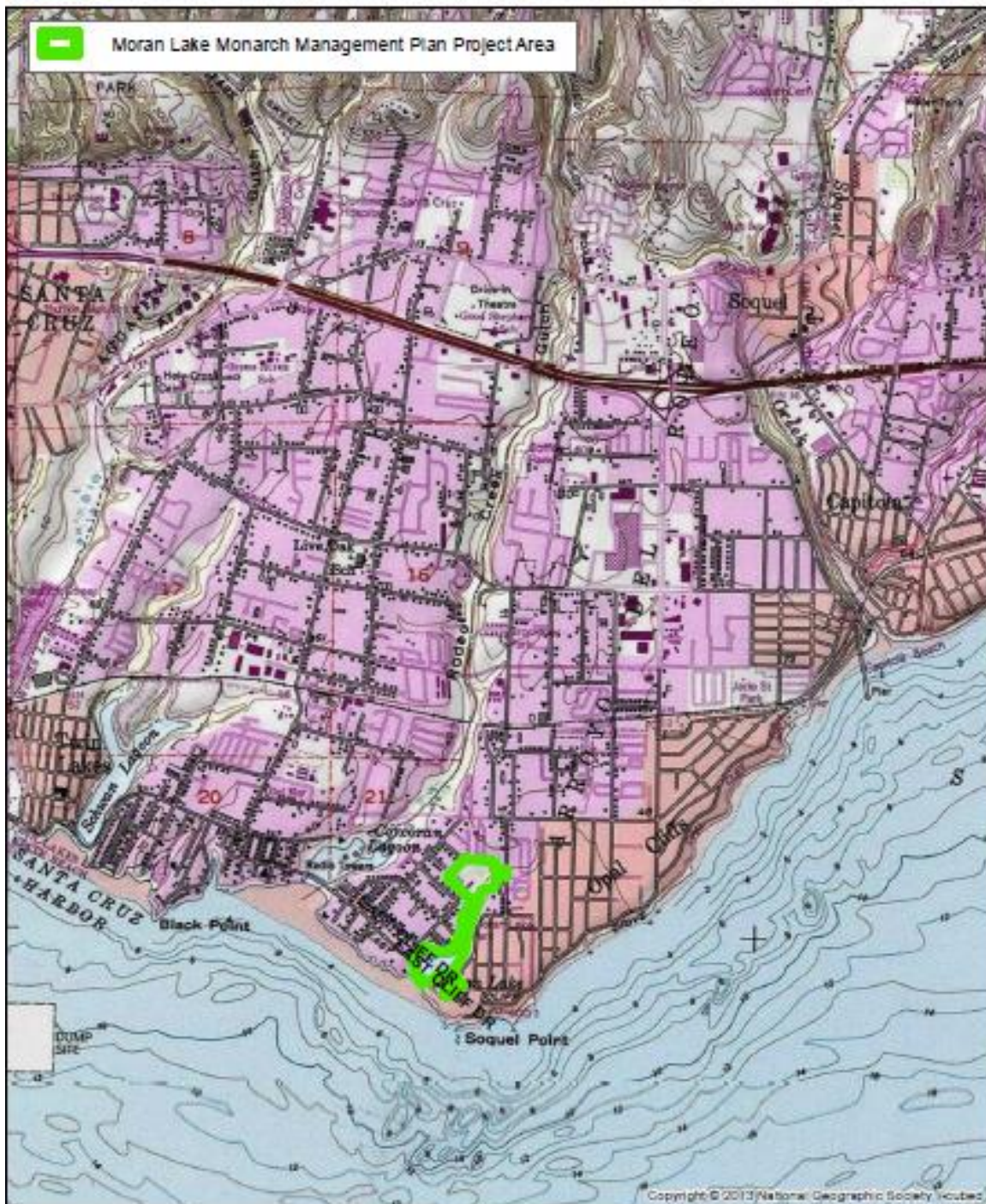
** Coastal Program totals needs to match Object Class Categories on SF 424A Budget form

CONTRIBUTIONS (DETAIL OF FUNDING BY SOURCE)

	Cash	In-kind	Total
Breakdown of Cost-shares			
Coastal Program (USFWS)	\$20,000	\$0	\$20,000
Total Cash and In-kind Contributions	\$20,000	\$0	\$20,000

Budget Narrative:

Task 1. USFWS will provide \$20,000 in funding to the Santa Cruz County Parks Department specifically for contracting a qualified entomologist who specializes in migratory monarchs who will monitor the site, complete an updated site assessment, and to provide a set of recommendations for monarch habitat management at Moran Lake County Park.



**Exhibit 1:
Project Area**





Figure 2, Moran Lake County Park boundary and surrounding infrastructure.

This Work Plan is compliance with Regional and National Program Policies.

Regional/State Program Coordination

Appendix D

Past Studies and Reports Completed for Moran Lake Monarch Butterfly Management Area

Past Monarch Butterfly Habitat Management Reports - Moran Lake

1982	<i>Revegetation monitoring</i>
03/02/1987	<i>Environmental Baseline Study.</i> Gery Stern, Paul Courter, Sally Sample.
03/2005	<i>Technical Report: Moran Lake Water Quality Study & Conceptual Restoration Plan.</i> John Gilchrist & associates, Fall Creek Engineering, Inc.
08/09/2010	<i>Moran Lake monarch Butterfly Habitat Management Plan.</i> Joni L. Janecki & Associates, John Gilchrist & Associates, Fall Creek Engineering, Barrie Coate consulting Arborist, Entomological Consulting Services Ltd, Erica Fielder Studio.
06/14/2017	<i>Assessment of potential impacts on monarch butterfly wintering habitat at the D.A. Porath Sanitation Facility that may result from proposed vegetation management in the western grove area.</i> John Dayton
07/17/2017	<i>Tree Survey and Maintenance Matrix.</i> Nigel Belton.
07/28/2017	<i>Tree Survey and Location Map, Lode Street Facility.</i> Nigel Belton.
08/12/2017	<i>Revision to tree management report and tree survey & maintenance matrix concerning the blue gum eucalyptus trees on scco sanitation facility property.</i> Nigel Belton
09/01/2017	<i>A biotic Assessment of the Potential Impacts on Monarch Butterflies Wintering at Moran Lake that may result from six proposed tree trimmings and removal projects at Moran lake county park and the D.A. Porath Sanitation Facility in Santa Cruz County.</i> John Dayton
10/10/2018	<i>Recommendations for the planting of replacement trees and preservation of habitat on the county sanitation facility site at 2750 lode street.</i> Nigel Belton.
04/18/2020	<i>Tree Maintenance Matrix.</i> Nigel Belton
05/04/2021	<i>Letter to SC Parks RE 40 Moran Way.</i> John Dayton
07/02/2021	<i>Moran Lake Monarch Butterfly Habitat Management Plan Update</i>
04/2023	<i>Maintenance Activities of the Eucalyptus grove at DA Porath Facility</i>

Ray

REVEGETATION OF THE SHORELINE AREAS OF MORAN LAKE, SANTA CRUZ, CALIFORNIA

Marine Research Center (MRC) has been involved in the planning for the Moran Lake Enhancement Project since early 1980. MRC staff made observations of the area and subsequent recommendations on the revegetation aspects of the project. The overall goal was to establish an intertidal salt marsh with a wide variety of habitats and food for shorebirds, waterfowl, and wildlife.

Initial planting recommendations were for the development of three contiguous planting zones. The first zone would be the submerged and partially submerged portion of the lake; the second, the shoreline or intertidal zone; and the third, the upper transition zone. Plant establishment elevations of these zones would be determined by the tidal levels fluctuating within the lake.

The water levels, and thus the planting zones, were to be assured by the construction of a large culvert between the lake and the ocean allowing for the re-establishment of tidal influence. Dredging to enlarge the tidal prism within the lake in combination with the culvert could not overcome the littoral buildup of sand on the ocean side of the culvert. This buildup of beach sand blocks the flow of water in and out of the lake, eliminating tidal fluctuations.

With fluctuation of water in and out of the lake impeded, the characteristics of the lake for salt marsh development became very different from those anticipated. The water lake changed to a periodic stagnant situation in which accumulating runoff and detritus are concentrated by evaporation, thereby accelerating eutrophication. In addition, saltwater intrusion by very high tides introduces salts to the lake which are also concentrated through evaporation.

The salinity of the lake varies greatly. On March 18, 1982 salinity of the lake was measured at 1.1 parts per thousand (ppt), but by May 28, 1982, it was 26 ppt. This difference was probably due to the cessation of freshwater runoff from the winter rains which diluted the salinity and the intermittent saltwater intrusion and evaporation.

The lack of intertidal action on the lake has two effects which impede revegetation of the shoreline: (1) it does not permit flushing of the lake to prevent the buildup of nutrients and salinity, and (2) without the tidal flood and ebb on the plants located within the intertidal zone, the establishment of a typical salt marsh would be difficult.

Test Planting

Initial test plantings of typical coastal salt marsh plant species were undertaken on October 12-13, 1981. These plantings were in all three planting zones in grid and transect patterns. Results from these plantings would provide an indication of the growth and percent survival of various species at a variety of elevations and water levels. The test plantings totaled 855 plants and included Spartina foliosa (200), Scirpus robustus (200), Scirpus acutus (5), Typha latifolia (100), Grindelia stricta (50), Juamea carnosa (50), Frankenia pacifica (50), Salicornia pacifica (50), Limonium californicum (50), Distichlis spicata (50), and Atriplex patula (50).

At the time of the test plantings, it was understood that intertidal action was not occurring in the lake, so plantings of intertidal species were placed within ± 2 feet of the water level of the lake. This placement should resemble the mean tidal growth level of the plants. It must be understood that salt marsh plants of the intertidal zone are not obligate halophytes (i.e., they do not require saltwater to exist, but rather they are salt-tolerant; however, they do prefer to grow in the intertidal zone where they are submerged and exposed periodically by the water. The placement of test plantings was to determine if they could become established at some level ranging from exposed to partially submerged and grow without intertidal action.

Initial observations on the growth of the test plants indicated that those located on the bank and slope directly in front of the parking lot were undergoing the most severe transplant shock. Observations by Les Galyen and his maintenance staff revealed that these plants died about 6 to 7 weeks after planting. This observation could be death in fact, or it could be the appearance of death due to the dry look of the plants resulting from the transplant shock coupled with the onset of winter dormancy. Later information indicated that high concentrations of Boron and other heavy metals were in the the parking lot slope area which could account for the appearance of the plants.

In any event, the majority of the test plantings were washed away by the high flood waters of the January, 1982 rains. Only a few Salicornia plants survived in the lower zones. In the upper areas there were a few surviving Distichlis and Grindelia plants.

Final planting materials selection would have been based upon the initial test results with best surviving plants and zones being heavily planted.

Final Plantings

Final plantings at Moran Lake were conducted during three planting periods in May, 1982. The total number of plants installed during these periods, excluding those remaining from the test plantings, was 5,040. Plant species selected for the final plantings included Spartina foliosa (1000), Scirpus robustus (1000), Typha latifolia (700), Grindelia stricta (165), Cotula coronopifolia (500), Frankenia grandifolia (50), Salicornia pacifica (200), Distichlis spicata (1200), and Atriplex patula (125). In addition to the plants above, 10-20 pounds of Spartina foliosa, Frankenia grandifolia, Limonium californicum, Distichlis spicata, and Isomeris maritima seeds were sown, during each of the three planting periods.

Spartina foliosa, Scirpus robustus, and Typha latifolia sprigs and tumps were planted at elevational zones of ± 1 foot of the existing water level in each of the three planting periods. In the second planting period, the water level had dropped about two feet below the level of the previous plantings. The plants installed during the second planting were placed at the new water's edge. In the third planting period, the water level had risen several feet and was completely inundating the plants of the second period. The final plantings were placed at the higher water level. If the water fluctuates between the levels found during the three planting periods there should be some intermediate zone where the plants will survive and grow. A total of 520 sprigs of these plants were stored at the waterline of the lake for later planting by park staff as the final water level establishes itself (see Table 1 for plants).

The upper transition zones were planted during each of the three periods with combination grids of the remaining plants. Vegetation in these areas should do well and would be helped in its initial establishment if watered by park maintenance staff.

Table 2 lists the species and numbers of each planted in each of ten zones around the lake. The map (Figure 1) shows the corresponding zones. The totals of all species planted and the numbers of each zone are noted on Table 2.

Conclusion

The lack of intertidal action is a critical factor in the success of plant establishment. It is hoped that a zone around the existing water level will support the lower salt marsh zone plants. If the water level should rise for a prolonged period to inundate the plantings, they may not survive.

Information regarding high levels of boron and other heavy metals was obtained only after the final plantings were done. The soil chemistry may contribute to the difficulty of the establishment of the plants in areas where there are high concentrations.

Observations during all three final planting periods showed that shortly after planting the water's edge, the resident duck population moved into those areas to rest, preen and feed. Their behavior seems to indicate an easy acceptance of this new vegetation in preference to the grass slopes they were using.

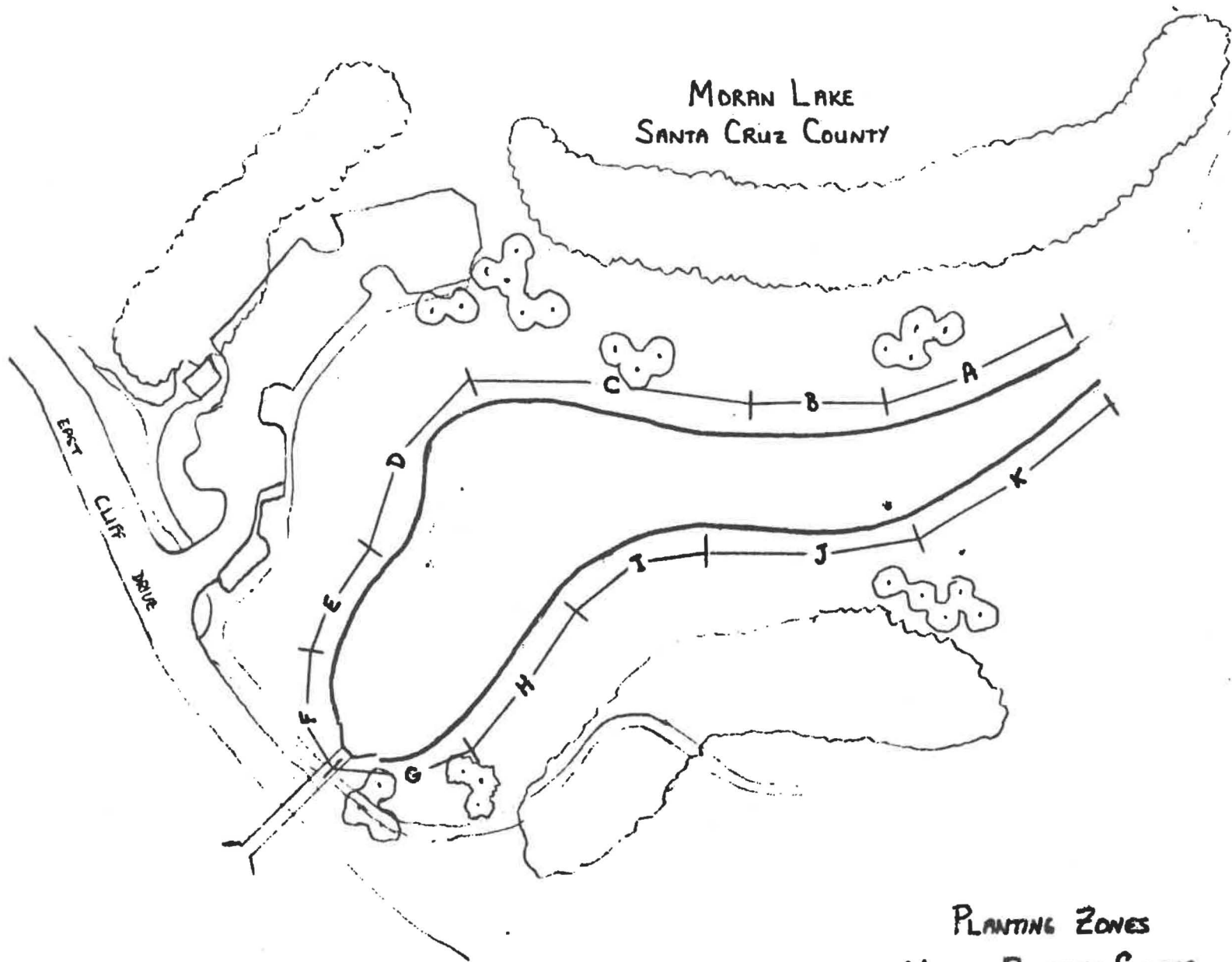
If any way could be found to open the culvert to constant intertidal action it would assure the establishment of a salt marsh and maintain water quality. But with the present situation, water level, nutrient content, and salinity will be subject to great variation throughout the year and will affect the lake shoreline and biota.

Table 1.

MORAN LAKE - PLANT COUNT

<i>Spartina foliosa</i>	200	1000	(200)	Yes	1200
<i>Scirpus robustus</i>	200	1000	(120)	-	1200
<i>Typha latifolia</i>	100	700	(200)	-	800
<i>Grindelia stricta</i>	50	165	-	-	215
<i>Salicornia pacifica</i>	50	200	-	-	250
<i>Cotula coronopifolia</i>	-	500	-	-	500
<i>Distichlis spicata</i>	50	1200	-	Yes	1250
<i>Atriplex patula</i>	50	125	-	-	175
<i>Jaumea carnosa</i>	50	100	-	-	150
<i>Frankenia pacifica</i>	50	50	-	Yes	100
<i>Limonium californicum</i>	50	-	-	Yes	50
<i>Scirpus acutus</i>	5	-	-	-	5
<i>Isomeris maritima</i>	-	-	-	Yes	-
	855	5040	(520)	-	5895

MORAN LAKE
SANTA CRUZ COUNTY



PLANTING ZONES
MARINE RESEARCH CENTER

FINAL PLANTING - NUMBER OF PLANTS EACH AREA

[illegible]

MAR 02 1987

MAR 02 1987

220.305

Report on
Environmental Baseline Study
for the
MORAN LAKE ENHANCEMENT PLAN
Santa Cruz, California

prepared for the
State of California-Coastal Conservancy
Spring 1980

by:

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INTRODUCTION

Moran Lake is a 13 acre coastal wetlands area located in the city of Santa Cruz about 1/4 mile west of Soquel Point. As with many California coastal lagoons, increasingly rapid urban development surrounding Moran Lake and within its 620 acre watershed has severely degraded this once healthy and productive estuary.

During the spring of 1980, the first phase of the Moran Lake Enhancement Plan was implemented by one of the sponsoring agencies, The State Coastal Conservancy. Baseline data on the existing conditions at Moran Lake and the surrounding wetlands was collected and compiled during April, May and June 1980. The investigations at Moran Lake were concerned with the sediment and water quality in relation to biological abundance and diversity prior to site improvements. Biological inventories included vegetation, birds, aquatic invertebrates (benthic and planktonic), fish and mammals. Measurements of the aquatic productivity were collected. Information on the chemical nature of Moran Lake was compiled from new and published data. The results from this baseline study can be used for comparison with post-restoration monitoring at Moran Lake.

DESCRIPTION OF THE MORAN LAKE WETLANDS

General

At one time a series of five coastal lagoons occurred in the Live Oak area of Santa Cruz: Wood's Lagoon, Corcoran's Lagoon, Moran Lake, Schwan Lake and Bonita Lagoon. All of these areas have suffered from the rapid urbanization of Santa Cruz within the last two decades; but of these five, the lagoon ecosystem of Moran Lake has been the most severely disrupted by human activities.

The 13 acre wetlands region of Moran Lake is about 1/4 mile to the west of Soquel (Pleasure) Point. To the west about 1/4 mile is Corcoran's Lagoon. Corcoran's appears to be the only lagoon of the five functioning in a natural state.

History

Little is known about the history of Moran Lake, but past conditions of the lagoon may be interpreted from aerial photos dating back to the 1930's. It is apparent from these photos that no considerable change had occurred at Moran Lake until the 1960's. The article appearing in the Santa Cruz Sentinel on May 8, 1963 pretty well sums up the human-made alterations occurring at Moran during this time. The article was titled 'Preparing to make Lagoon into Lake!.

Moran Lake was one of the many coastal areas that suffered from the Santa Cruz Harbor Project of 1961. Material being dredged from Wood's Lagoon for the construction of the harbor was deposited as fill in Moran Lake. From 1961 to 1963 about 3 acres of the lagoon area at Moran Lake was filled, reducing the total water area to the present 5 acres. To accommodate water drainage from the

'new lake' amidst the human-made alterations at the lagoon, a 7 foot diameter pipe was placed between the ocean and Moran Lake. This culvert however, was placed about 5 feet above the mean high tide level and is more often than not blocked with sand. These human modifications of the lagoon's entrance to the sea have greatly restricted the normal tidal influence upon Moran Lake and subsequently lead to the degradation of this lagoon environment.

Tidal Flushing

A lagoon or estuary by definition is a shallow, semi-enclosed area with a free connection to the open sea. Presumably, before the filling of Moran Lake in the early 60's, the lagoon was subjected to periodic tidal flushing. The mouth of the lagoon in the past permitted ocean water to flow freely to and from the area in response to the daily tidal cycle.

Presently no tidal flushing occurs at Moran Lake. The culvert has completely restricted the water circulation of the lagoon. Waves and tides deposit sand in the culvert blocking off any water exchange between the ocean and Moran Lake about 95% of the time. The impounded waters in Moran Lake are then subject to stagnation and high rates of evaporation.

During the study period a very irregular circulation of the Lake's waters was observed. Heavy rains on April 22 and May 9 raised the water level of the Lake sufficiently high enough to push the sand blockage out of the culvert. On each of these occasions, the lake waters completely drained from the basin exposing the black muddy bottom. (Figure 2) The following high tide filled the lake with ocean water and again blocked the

culvert by sedimentation. An unusually high tide of +6.3' on May 13 washed some new ocean water into the Lake and carried sand into the Lake itself, forming some shallow sand bars near the culvert opening.

The uncommon and irregular flushing activity of Moran Lake has not permitted the lagoon to function in a natural state. The impoundment of the Lake's waters by the sand blocked culvert has created a different type of ecosystem; one that does not have nearly the natural capacity for dealing with waste treatment.

Watershed

The 620 acre watershed of Moran Lake includes both the cities of Santa Cruz and Capitola. Soquel Drive borders the watershed to the north; Twenty-sixth and Thirtieth Avenues on the west and Forty-fifth Avenue on the east. The watershed area includes both suburban and commercial run-off. A 1976 Santa Cruz County Watershed Dept. report identified the watershed of Moran Lake as containing in order of magnitude; single-family residences, commercial-industrial development, grassland (vacant lots) and mobile home parks.

The impervious surfaces of these urban areas in the watershed permit the run-off to collect a number of non-point pollutants such as lead, oil and grease. An intermittent stream which carries mostly storm run-off from this watershed is the only significant source of fresh water for Moran Lake. In 1975 a stormwater detention pond was built on the corner of 38th and Brommer Streets to cope with flood hazards within the watershed. Although it was designed to control storm run-off, no provisions were made for the control of urban pollutants.

The impounded waters of Moran Lake now serve as a catch basin for the sediment and pollutants of the urban run-off. In addition

to the deposition of these materials in Moran Lake, until June 1975, a sewage treatment plant near the Lake periodically dumped raw sewage directly into the waters. This overflow of sewage during periods of peak wet weather flows, greatly increased the amount of organic wastes into the waters of a lagoon already suffering from a diminished capacity for waste treatment.

Topography

The submerged portion of Moran Lake is fairly uniform except in the area immediately adjacent to the culvert opening. At times a small channel leading directly to the culvert may be 3 to 4 feet under water. However, the deposition of sand by the unusually high tides of May 12 and 13 created very shallow sand bars and the average depth in this same area was only 8 or 10 inches under water.

The average lake depth for most of Moran Lake is less than 2 feet. The bottom sediment is composed of a fine black silty-clay material with about 20 to 30% beach sands. This lake sediment, heavy with organic debris, is 1 to 2 feet deep over most of the Lake basin.

The terrain around Moran Lake is dominated by landfilled areas, thick with grasses and weedy plants. The fill is composed of a variety of materials from coarse to fine sand, clay, silt, and small pieces of crushed granitic rocks. This light-colored fill material is a relatively poor sandy soil, but has become darkened in some areas by decaying organic matter. Most of the area surrounding Moran Lake is less than 10 feet in elevation. This surrounding acreage drops sharply about 4 or 5 feet directly into the Lake. (See baseline map)

Visitor Use

In March 1975 3 acres including Moran Lake and some of the surrounding wetlands was purchased for the use as a nature park. The Land and Water Conservation Fund matched funds with the County of Santa Cruz for the purchase and were joined by the State Coastal Conservancy for the restoration of this coastal lagoon.

Visitor use at Moran Lake is presently light to moderate for an area of its size. The trails around the Lake are mostly used by neighborhood residents for access to the beach or to walk their pets. Bicycle riders and joggers frequently use the bike path and other trails in the region. On one occasion I observed two girls riding horseback along the trails near the Lake. Although most visitors use the area for the sole purpose of going to the beach or to walk their dogs, some lake shore residents come down to the lake just to relax and enjoy the quiet serenity offered by the area.

Water Quality

Previous research that has dealt with the effects of urban runoff on coastal lagoons is minimal. For this reason it is useful to consider Moran Lake in relation to its neighboring lagoons, Schwan and Corcoran, which share Moran's geographic location, urban development pattern and history of monitoring.

The three lagoons can be seen to exist along a gradient of freshwater-to-saltwater, Schwan at the former extreme and Corcoran at the latter. Moran fluctuates between extremes, occasionally becoming more saline than ocean water. Each lake's outlet design determines where the lake falls along this gradient. The salinities of each lake can be monitored in the County Watershed's data on conductivity, total dissolved solids and alkalinities for Nov. '79-Feb. '80 (Table 1) as well as previous data.

The three lakes have varying capacities for converting urban runoff to biomass and/or washing it into the ocean. These capacities relate to both size and ocean influx regularity.

Table 2 shows that for the sampling days with the highest previous two-week rainfall period, Jan. 4 and Feb. 26, the nitrate levels of each lake show an increase, with Moran reaching the highest levels. This overall nutrient increase can be attributed to storm runoff, but the excessive nitrate levels found in Moran Lake are due to its diminished capacity for handling nutrient loads.

TABLE 1

	DATE	ELECTRICAL CONDUCTIVITY	TOTAL DIS-SOLVED SOLIDS	ALKALINITY ¹	NITRATE
Moran Lake	11-1-79	off scale ³	23,876	201.2	.038
	11-19-79	off scale	6,155	179.4	.109
	11-29-79	off scale	14,942	198.1	.102
	12-13-79	off scale	24,527	266.4	.003
	1-4-80	10-20 thousand mmhos/cm	815	58.0	.2.210
	2-26-80	10-20 thousand mmhos/cm	1,430	116.0	5.990
Corcoran Lagoon	11-1-79	off scale	21,585	198.7	.022
	11-19-79	off scale	19,158	202.4	.000
	11-29-79	off scale	16,492	198.8	.008
	12-13-79	off scale	19,437	229.4	.003
	1-4-80	off scale	36,525	112.4	.097
	2-26-80	off scale	26,408	N/A	.144
Schwan Lake	11-1-79	970 mmhos/cm	468	113.1	.013
	11-19-79	604 mmhos/cm	434	115.3	.007
	11-19-79	510 mmhos/cm	416	123.3	.011
	12-13-79	500 mmhos/cm	408	114.6	.006
	1-4-80	220 mmhos/cm	181	64.6	.379
	2-26-80	132 mmhos/cm	184	51.1	.602
1 - In mg/l CaCO ₃ 2 - In mg/l NO ₃ -N 3 - Greater than 20 thousand mmhos/cm					

TABLE 2 - Two-week Rain-fall Prior To Sampling¹

11-1-79	3.56
11-19-79	1.13
11-29-79	1.50
12-13-79	0.00
1-4-80	5.53
2-26-80	7.80

1 - Source: John Harlamoff, Soquel

The storm loads were not mixed with ocean water at Moran Lake as they were at Corcoran. Electrical conductivity, total dissolved solids and alkalinities (Table 1) show that Moran acted as a catch-basin for the freshwater runoff, while Corcoran remained open to the sea. Corcoran's lower nitrate levels on the same days are a result of this more reliable ocean flushing and, also, its greater size.

Schwan Lake's lower nitrate levels appear to relate only to its greater size, with no ocean dilution factor involved. Schwan's size alone cannot be expected to prevent indefinitely the eutrophication process and the next generation of Santa Cruzites may have to confront this.

The average levels of fecal coliform in Moran Lake are also higher than in Corcoran's. This appears to be another symptom of restricted exchange between the Lake and the ocean. High coliform counts in Schwan may be related to the greater longevity of bacteria in freshwater.

The levels of nutrients and fecal coliform in Moran Lake seem to indicate that eutrophication is occurring there. The thick mats of Cladophora and the rise in dissolved oxygen levels during the photoperiod (Figure 1) both attest to the availability of these nutrients. (Tables 3,4,5)

The impoundment of Moran Lake's waters, especially during the summer when the pipe is almost always plugged with sand, has lead to stagnation, evaporation and the subsequent concentration of nutrients (nitrate and phosphate), pollutants (heavy metals, sediment, oil, grease) and salts. Stagnant (non-mixing) conditions are evidenced by high turbidity levels as well as the black cloud of fine organic and inorganic matter that lingers

TABLE 3

Moran Lake Date	11-1-79	11-19-79	11-29-79	12-13-79	1-4-80
Cadmium	1tdl ¹	1tdl	1tdl	1tdl	1tdl
Fecal Coliform	2,700	13,600	600	40	1600
Chromium	.07	.02	.05	.09	1tdl ²
Lead	.5	.5	.5	.5	.5
Manganese	.55	.43	.44	.56	.06
Calcium	299.2	95.7	171.6	299.2	28.6
Dissolved-O- Phosphate	.294	.517	.629	.116	.198
Sulfate	1675	na ³	na	na	na
Chloride	12,923	na	na	na	na
Turbidity (NTU)	10	34	21	16	39
Dissolved Oxygen	10.5	7.0	11.9	9.2	8.2
pH	8.5	8.5	7.7	8.1	7.9
Temp.	13.7	11.5	12.7	10.2	12.3
Iron	.48	.25	.47	.48	.58
Potassium	313.1	89.3	158.1	291.2	17.7
Sodium	5700	2000	3400	66040	194
Magnesium	844.3	212.5	411.3	902.0	29.0
1 - Less than detectable limit; .005 for cadmium 2 - Less than detectable limit; .05 for chromium 3 - Not available					

in the water when the bottom sediment is disturbed. The hydrogen sulfide odor that accompanies the black cloud indicates the presence of anaerobic sulfur bacteria.

TABLE 4

Corcoran Lagoon					
Date	11-1-79	11-19-79	11-29-79	12-13-79	1-4-80
Cadmium	1tdl ¹	1tdl	1tdl	1tdl	1tdl
Fecal Coliform	20	112	370	59	640
Chromium	.07	.07	.07	.07	.09
Lead	1tdl ²	1tdl	1tdl	1tdl	.5
Manganese	.35	.25	.36	.33	.43
Calcium	235.4	213.4	211.2	226.6	361.5
Dissolved-C Phosphate	.183	.048	.065	.254	.043
Sulfate	1575	na ³	na	na	na
Chloride	11722	na	na	na	na
Turbidity (NTU)	13	26	16	3.6	2.8
Dissolved Oxygen	10.7	17.7	11.9	11.1	9.9
pH	8.7	9.4	8.9	8.3	8.0
Temp.	13.4	14.0	12.7	10.2	12.4
Iron	.45	.33	.33	.48	.72
Potassium	271.7	234.3	224.2	231.3	415.1
Sodium	5300	4950	4100	5653	9905
Magnesium	730.7	588.1	492.5	460.0	784.8
1 - Less than detectable limit; .005 for cadmium 2 - Less than detectable limit; .5 for lead 3 - Not available					

TABLE 5

Schwan Lake					
Date	11-1-79	11-19-79	11-29-79	12-13-79	1-4-80
Cadmium	1tdl ¹	1tdl	1tdl	1tdl	1tdl
Fecal Coliform	900	2300	1000	430	300
Chromium	1tdl ²	1tdl	1tdl	1tdl	1tdl
Lead	1tdl	1tdl	1tdl	1tdl	1tdl
Manganese	.13	.23	.23	.18	.17
Calcium	32.1	30.4	33.0	30.8	19.8
Dissolved-O- Phosphate	.350	.229	.103	.055	.113
Sulfate	30	na ³	na	na	na
Chloride	134.6	na	na	na	na
Turbidity (NTU)	24	20	22	16	37
Dissolved Oxygen	10	7.0	10.1	8.3	6.6
pH	8.7	7.8	8.0	7.8	7.1
Temp.	15.6	12.8	12.0	10.2	11.8
Iron	.38	.23	.23	.26	.73
Potassium	10.17	8.95	9.54	9.80	6.10
Sodium	85.0	75.8	85.0	111.1	40.4
Magnesium	17.3	16.9	17.3	21.2	10.3
1 - Less than detectable limit; .005 for cadmium 2 - Less than detectable limit; .05 for chromium 3 - Not available					

Sediment

Sediment samples were taken on Feb. 5, 1980 and analyzed for lead, chromium and cadmium, which had been found in high concentrations in a previous County Watershed report. Also found in that report were: a high oil and grease content, high nutrient levels and a high fecal coliform count.

The new data (Table 6) shows a decrease in Moran Lake's lead, chromium and cadmium levels. The drop in lead concentration, a 90% decrease from the previous report, may be a reflection of the greater use of unleaded gasoline, or a result of community clean-ups of Moran Lake, which removed many possible sources of metal contamination. Corcoran's sediment concentrations of metals may be on the low side because of a sampling site far from the source (nearer the ocean outlet). It is no surprise that Schwan, with no ocean exchange, has the highest levels of each metal. South County sloughs have shown consistently high heavy metal levels (10 times Moran Lake's chromium and cadmium levels) but the cause of this is not known.

TABLE 6.

Sediment Sampled	Lead Concentration	Chromium Concentration	Cadmium Concentration
Moran Lake	22.84 ¹	5.30	.140
Corcoran Lagoon	3.12	4.89	.059
Schwan Lake	24.78	7.31	.366
Moran Lake (1976)	50	9.5	.46
1 - Concentrations in ppm			

Aquatic Primary Productivity

Aquatic primary productivity at Moran Lake was measured on May 21 using both the light-dark bottle technique and the interval measurement technique. Map 4 shows the sampling locations for both studies; Figure 1 shows the dissolved oxygen curve for a typical photoperiod at Moran Lake; and Table 7 lists the gross photosynthetic activity and the amount of carbon fixed in one photoperiod. A photograph of the 2-liter bottles and water-sampling kit used is included at the end of this report.

Although the assumptions, variables and sampling non-homogeneity block any attempts for an absolute value of carbon fixation, the numbers derived can be compared with future measurements to gauge changes in the lake's community metabolism.

The range of values seen in the interval measurements may also serve as an approximate range of error for County Watershed data concerning dissolved oxygen.

TABLE 7

Site	Resp. Act. ¹	Net Photosyn- thetic Activity ¹	Gross Photosyn- thetic Activity ¹	Mg. C fixed m ³ /8 hour photoperiod
1	1.3	2.3	3.6	675
2	.8	1.3	2.1	394
3	1.1	1.1	2.2	413
1 - Given in change in dissolved oxtgen content 2 - Noon until dusk; overcast				

FIGURE 1

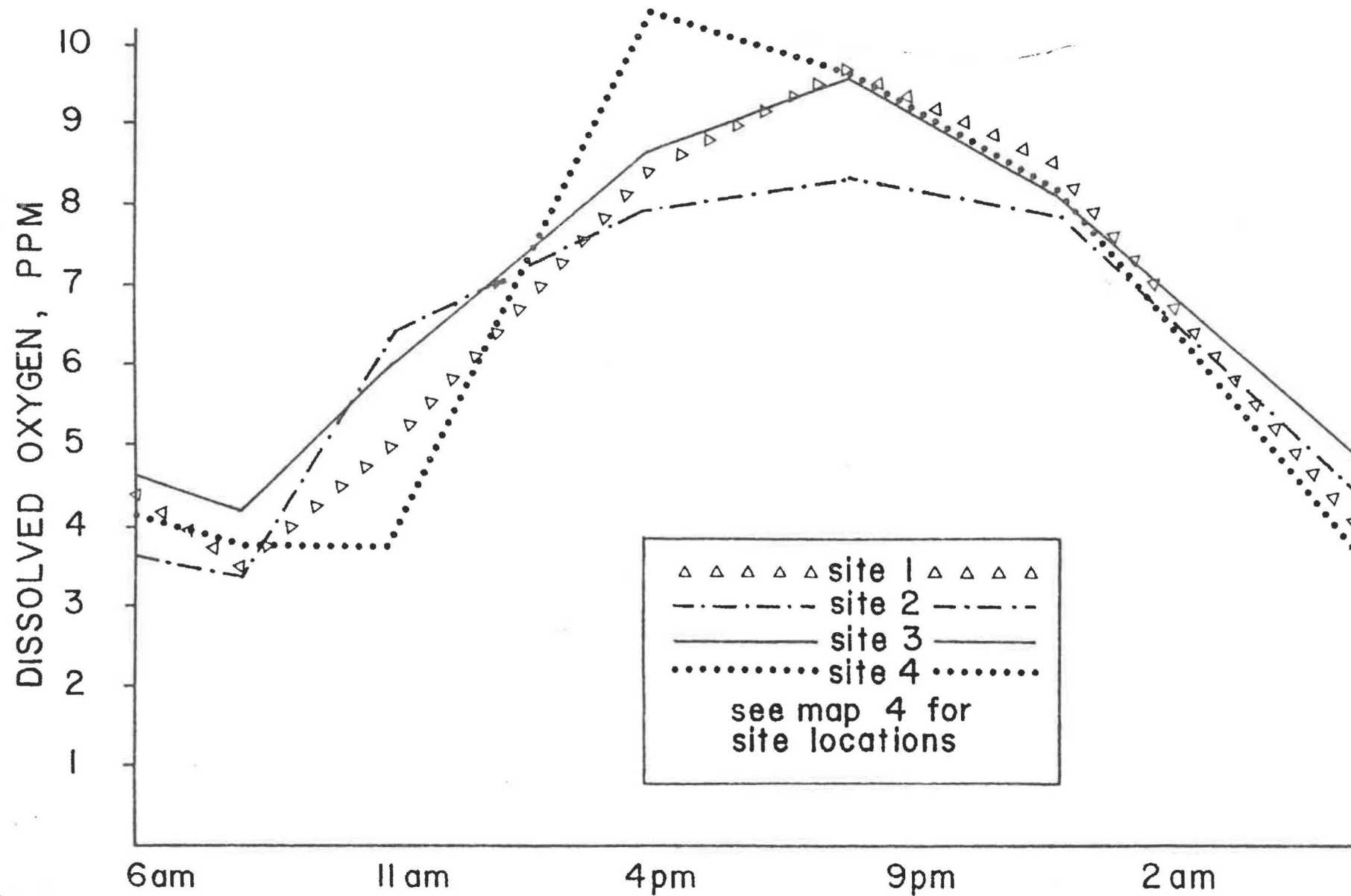
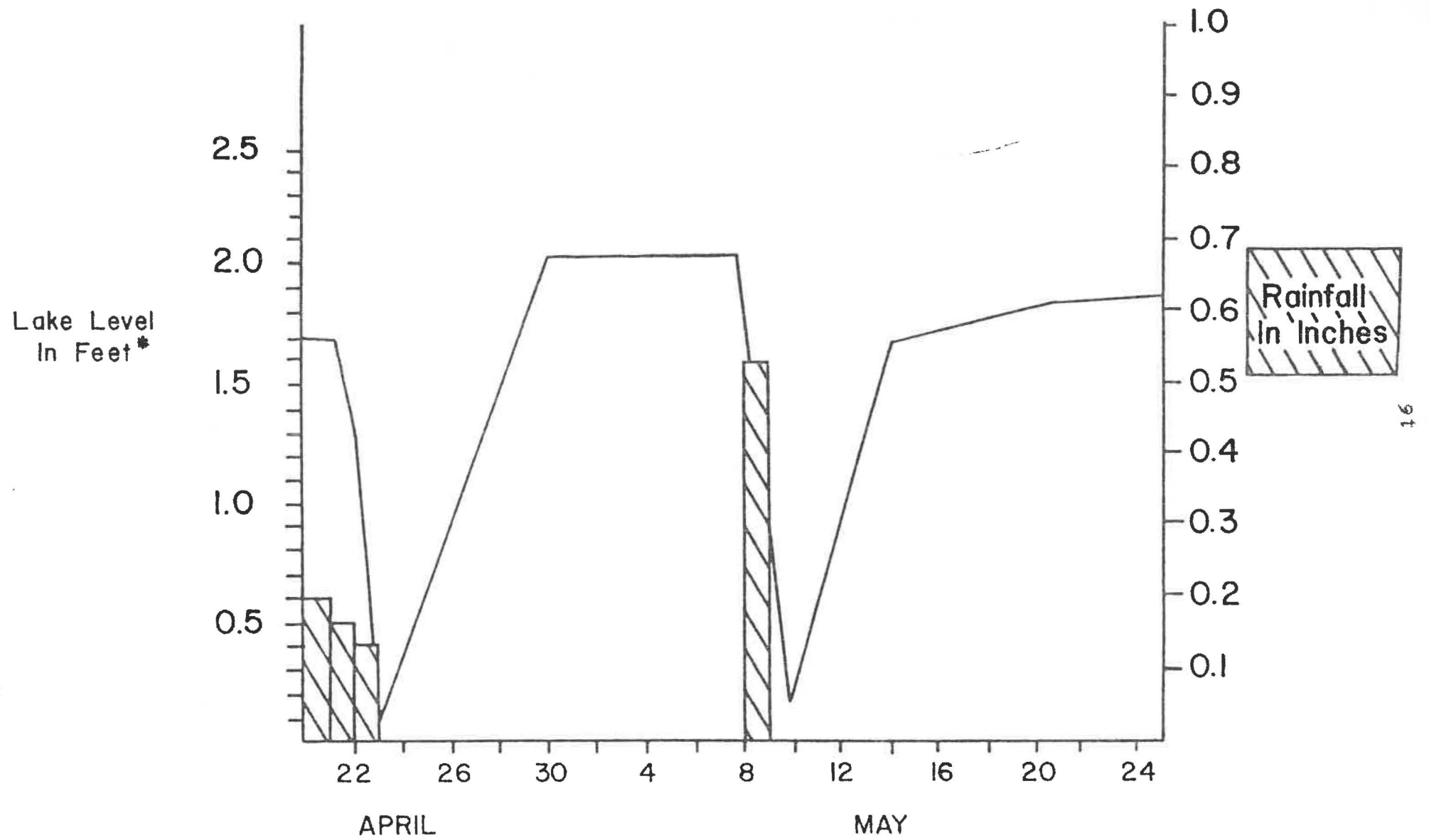


FIGURE 2



* water levels for comparison only

THE BIOLOGICAL ENVIRONMENT

As required for the development of the Moran Lake Enhancement Plan, a biological inventory was made of the area's habitats and wildlife. To our knowledge, no previous work has been conducted on the organisms inhabiting the Moran Lake wetlands region.

As a result of this field work, it has been determined that presently Moran Lake supports an extremely impoverished fauna of estuarine organisms. The condition of the entrance channel to Moran Lake has drastically affected the water quality and in turn, the quality of the lagoon's wildlife habitats.

This problem is particularly evident when Moran Lake is compared with nearby Corcoran's Lagoon, 1/4 mile to the west. The regular tidal flushing of Corcoran's Lagoon permits the area to support an abundant and diverse population of estuarine animals and plants. The interactions of the varying freshwater and saltwater flows create a complex and productive biological environment. The elimination of the regular marine and fresh water interactions by human alterations at Moran Lake have resulted in a low productivity and poor diversity of organisms.

The highly intermittent flow of fresh and sea water into Moran Lake can not support a stable aquatic faunal population that largely depends upon continuous tidal flushing. The stagnant enclosed waters of Moran Lake place severe stress upon all but the most tolerant organisms. Extreme conditions commonly occur at Moran Lake presently. The impounded sea water of the Lake has become as warm as 78°F and the high rates of evaporation can bring the salinity of the lake waters above that of the ocean. (Recorded May 1971) Many species are capable of enduring the harsh conditions for a short period, but often the conditions will deteriorate for long periods at Moran Lake (especially in the summer months), and most

organisms will ultimately die, if they can not escape.

Our studies on the existing biological environment at the Moran Lake wetlands region identified 45 species of land plants, 18 species of birds, 5 species of mammals (not including domestic pets) and 17 species of aquatic invertebrates.

FAUNA AND FLORA OF MORAN
LAKE WETLANDS REGION

Birds

A total of 18 upland and water bird species were observed at Moran Lake during the spring study period. Additional species may frequent the region during other seasons. The bird survey was conducted by weekly morning and evening watches. Each watch was made from one of two observation stations for a duration of one hour. Watches were conducted as close to dawn and dusk as weather and available light would allow. A total of 14 watches were made throughout the study period.

The bird usage of Moran Lake and the surrounding wetlands is extremely light for a coastal lagoon of central California. Moran Lake, presumably, does not offer the preferred habitat and food type desired by the common shore and marsh birds of central California. Only 4 species of aquatic birds were reported at Moran Lake, and it is doubtful that any of these species regularly feed at the lagoon. Increased bird usage of Moran Lake would probably occur if the mudflats and shallow water habitats became more productive. Insects, crustaceans, fish and molluscs are the primary food types sought by shore birds, but the current low productivity at Moran Lake does not support a stable population of these organisms. A slight increase in the number of shore birds and normal feeding behavior by these birds was observed on only two occasions (April 25 and May 12); as it was on these days the lake waters were completely flushed by tidal action.

A resident population of mallard ducks (Anas platyrhynchos) consists of about 15 adults. During the course of this study,

one female mallard successfully raised 13 of an original 19 ducklings. Whether these ducklings will also become part of Moran Lake's resident duck population is not yet clear. These mallards were rarely seen feeding on the aquatic insects and animals, seeds and plants usually consumed by this species (with the exception of the two occasions previously mentioned). Instead, the ducks are fed by the neighborhood residents living around Moran Lake. One elderly woman in particular feeds the ducks bread crumbs twice daily and the ducks gather for these feedings religiously. Data on the distribution of the mallard ducks has been compiled on map overlay #2.

A bird bath in the yard of this same woman is frequented by robins (Turdus migratorius) who bathe there and consume the left-over bread crumbs. A family of 3 starlings (Sturnus vulgaris) were commonly seen in a partially hollow eucalyptus tree on the north shore of the Lake. These birds were observed building a nest in the tree on one occasion and ~~the~~ numerous other sightings of these starlings indicate that they are also Moran Lake residents.

Mourning doves (Zenaidura macroura) often frequent the grassland all around the Lake. These birds were observed on every trip to the area; as they are probably the most abundant species in the region. Western gulls (Larus occidentalis) were observed above the area many times, but never at the Lake itself. Both the killdeer (Charadrius vociferus) and sanderlings (Crocethica alba) infrequently occur on the shores of Moran Lake. Three species of swallows-rough winged swallow (Stelgidopteryx ruficollis), barn swallow (Hirundo rustica), and cliff swallow (Petrochelidon pyrrhonta) were occasionally seen feeding on airborne insects over the Lake.

The eucalyptus trees surrounding the wetlands area are frequented by a number of bird species. The vertical habitat of the tall trees currently receive the most heavy bird use of the region. Two species of sparrows, song sparrows (Melospiza melodia) and white-crowned sparrows (Zonotrichia leucophrys) were often observed. Also very common in these trees are two species of blackbirds, the red-winged blackbird (Agelaius phoeniceus) and brewer's blackbird (Euphagus cyanocephalus).

The following birds were reported from one or two sightings during the spring study period at Moran Lake:

Sparrow hawk-Falco sparverius
Anna's hummingbird-Calypte anna
Scrub jay-Arhelocoma coerulescens
Pygmy nuthatch-Sitta pygmaea

On May 1 and May 15 bird watches were conducted at Corcoran's Lagoon for comparison of the two neighboring areas. Shore birds at Corcoran's were far more abundant and diverse than at Moran Lake. Snowy egrets, American coots, willets and kingfishers are just a few of the birds commonly occurring at Corcoran's Lagoon, but not at Moran Lake; thus indicating the presence of a much healthier estuarine environment at Corcoran's Lagoon than at Moran Lake. The lack of a diverse bird fauna is the most obvious indication of the degraded nature of Moran Lake's ecosystem.

Mammals

Information on mammal abundance and diversity at Moran Lake was obtained by live trapping, animal traces and actual sightings. A total of 5 mammal species, not including dogs and cats, were found at the Moran Lake wetlands area.

Live traps used for the capture of small animals as mice and shrews were steel, rectangular steel boxes called "Sherman"

traps (10 inches long, 3 inches wide and 3 inches high). Each trap was baited with rolled oats and peanut butter. Small pieces of cotton ~~were~~ also placed inside to provide some comfort to the captured animal. The trap is open at one end; when the animal walks in, he trips a release which closes the door.

All traps were set in the grassland areas surrounding Moran Lake for a total of 3 nights of trapping. (Map #2) Traps set on May 22 and 28 were placed in a grid of 20; at one meter intervals, 5 were placed in each compass direction. On these same nights, another transect of 10 traps were set on the north shore; along a 10 meter line, traps were placed at one meter intervals. On May 26 a large grid of 48 traps were placed in the grassland along the south lake shore. Traps were set just before dusk and checked early the next morning.

The only capture occurred on the first night of trapping, May 22-23. A western harvest mouse (Reithrodontomys megalotis) was found in trap 5 south of the grid. (See map #2)

Other mammals that occur in the Moran Lake wetlands include squirrels, opossums and gophers. On April 23rd, a fox squirrel (Sciurus niger) was sighted in the eucalyptus trees along the north shore. During conversations with local residents of the Moran Lake area, it appears that the gray squirrel (Sciurus griseus) and the opossum (Didelphis marsupialis) are not uncommon to the Lake area, although neither of these animals were actually sighted during the study period. Numerous collapsed burrows and holes have indicated the presence of pocket gophers around Moran Lake. The Botta pocket gopher (Thomomys bottae) commonly occurs in coastal California. Although an animal was never actually seen, on two occasions, I observed plants being pulled into the ground, presumably

by a gopher. The presence of gophers in the area of Moran Lake was confirmed by Lake side residents, who commonly find plants eaten in their gardens and burrows contributing to erosion on some hill-sides. Domestic dogs and cats frequently roam the Moran Lake region often without their owners.

Fish

On May 21 numerous fish drags were made in the vicinity of the lower bay area in Moran Lake. A minnow seine net 15' X 4' was pulled through the water to collect any fish that might have been in the Lake. No fish were found to be present in any of the drags. It seems reasonable to assume that at times the influx of ocean water may carry some fish into Moran Lake; however the present environment of Moran Lake does not favor a resident fish population. (Map #2)

Invertebrates

At least 17 species of aquatic invertebrates were found in the waters and sediment of Moran Lake. The existing invertebrate fauna is not extremely diverse or characteristic of a healthy coastal lagoon. The invertebrates identified from Moran Lake appear to only those animals tolerant of stressful conditions.

Planktonic organisms carried in to Moran Lake by the influx of ocean water can not survive long in the warm, stagnant conditions typically present at the Lake today. Levels of dissolved oxygen, nutrients, temperature, salinity and larval abundance are strongly influenced by tidal flushing, and these parameters are very important to the composition of the invertebrate fauna. Human modification of the lagoon's tidal entrance has drastically reduced the relative abundance and diversity of invertebrates at Moran Lake. Inverte-

brates are also an extremely important link in the aquatic food web. Small invertebrates feed larger invertebrates which in turn are consumed by birds and fish. The lack of a stable and diverse invertebrate population in Moran Lake has resulted in a low diversity and productivity of the lagoon's entire aquatic ecosystem. The survey of Moran Lake's invertebrate fauna included both plankton sampling and benthic sampling.

A. Plankton

Planktonic organisms were sampled at Moran Lake on May 7 and June 5. On both days a tow net was dragged across a number of areas in the Lake. (Map #1) The plankton tow net consisted of a 70 micron mesh bag on a metal frame fasten to a towline. A collecting chamber was fasten to the end of the net. While wading in the Lake, nets were dragged through the water. Then organisms were carefully rinsed down from the net into the collection chamber.

On May 7 two plankton drags were conducted in the manner described above. Samples were examined at U.C. Santa Cruz in the plankton lab of Mary Silver. Mary Silver and her graduates students aided in the identification of the organisms. A far greater number of organisms were collected in the samples than originally expected. The samples of May 7 contained the following:

Calanoid copepods-These copepods were by far the most abundant organism in the samples. An estimated 25 or 30% of the animals contained egg cases.

Oligochaetes-These small white annelid worms were common.

Capitellid polychaetes-These small worms are also annelids but usually occur on the bottom. (They may have been stirred up from the bottom during the tow)

Nematodes—~~These~~ minute white-colored worms were not plentiful, but were present in low numbers.

The following zooplankton were seen as only one or two individuals in the samples of May 7: Unidentified polychaete worm about 5 mm in length, a green flatworm, hydrachnid or water mite, 2 species of unidentified crustaceans and a rotifer.

Four species of phytoplankton occurred in these samples: Stauroneis spp. (Diatom), Navicula spp. (Diatom), Oscillatoria spp. (Blue-green algae) and Spirulina spp. (Blue-green algae).

On June 5 another series of plankton drags were conducted in Moran Lake. The three tows on this day were taken to Moss Landing Marine Lab for examine and identification. The samples of these plankton tows contained fewer organisms than on May 7. The organisms identified were all present in the samples of May 7, except for one water bug: Graptocorixa. Graptocorixa spp. commonly known as waterboat men, were extremely abundant in Moran Lake on this day. Graptocorixa is typically a freshwater invertebrate and probably was in the waters of the Lake due to the moderate rainfall on June 4.

Graptocorixa was the only freshwater planktonic organism occurring in the samples. The origin of the other plankton species was certainly from the influx of ocean tides. The surviving plankton in Moran Lake are not only tolerant of the warm, static water conditions, but also a very low oxygen level.

B. Benthos

The benthic organisms of Moran Lake's sediment were sampled on May 27. Dr. John Oliver of the Moss Landing Marine Lab aided in the examination and identification of the benthos in the samples.

The three sites in Moran Lake chosen to be sampled varied slightly in substrate composition and in location. (Map #3) At each of these sites, a total of six samples were collected; three large and three small. Dr. Oliver provided 3 lb. coffee cans for taking the large samples and small plastic cylinders for the smaller samples. A sample was collected by pushing the topless and bottomless can or cylinder into the water-mud interface on the Lake's bottom. The can or cylinder was then capped at both ends to save this material. The bottom sediment collected was then washed through a 1/2 mm screen and the material retained was preserved in 10% formaline. Bengal rose stain was used to color any organisms present in the samples.

Upon the examination of the samples on June 5, the following organisms were identified:

Oligochaetes-These very small white annelid worms were by far the most abundant benthic organisms in Moran Lake. This worm was also present in the plankton samples. Two or three species of oligochaetes may be present. All three sites contained some of these oligochaetes, but they were most abundant at site 1.

Emerita analoga-Juvenile forms of this sand crab were abundant at site 2. The crustaceans only occur at this site because of the sand bars near the culvert opening.

Capitellid polychaete-These annelid worms are larger than the oligochaetes. These worms were only found in the mud of site 1, but were common here.

At site 3 a few other benthos were present in the samples, but in very low numbers. These included: Harpactiloid copepods, a bristle worm, an unidentified insect larva and egg cases.

Vegetation

The Moran Lake area includes the flora of both salt water lagoons and disturbed coastal areas. The Blue gum eucalyptus (Eucalyptus Globulus) surrounding the lake region have in the past outlined the extent of the highest water level for Moran Lake during periods of storm runoff and high tides. The plants now growing in the grassy areas between the trees and the present lake are covering land fill. Most of these grassland plants are well-adapted to withstand the relative salinity of the soil and the cool coastal climate.

Along the southern shore of Moran Lake, about a dozen bunches of bulrush (Sciurus americanus) are growing in the largest area of land fill. This common rush thrives best when the roots are continually damp; indicating that this grassy area adjacent to the lake is a wet-lands region. A small bunch of rushes can also be found in the lake near the north shore of the lower bay area.

Pickleweed (Salicornia subterminalis), which is rarely found outside of a saltmarsh, is found bordering the lake shore in about 5 sites. Salt grass (Distichlis spicata), atriplex (Atriplex patula hastata), and brass buttons (Cotula coronopifolia), all well-adapted to a salt marsh environment, are found bordering Moran Lake in association with the pickleweed.

The grasses hare barley (Hordeum leporinum), ryegrass (Lolium multiflorum), wild oat (Avena fatua), fescue (Festuca californica), sedge (Carex obnupta), and quaking grass (Briza minor) make up the largest portion of the grassland community. Two types of plantains (Plantago lanceolata and P. major) and two crucifers

wild mustard (Brassica campestris) and wild radish (Raphanus sativus) grow profusely within the grassland areas around the lake. The sea rocket (Cakile maritima), also of the Crucifer family, was found growing along the muddy shore in the water around the lake and one specimen was found in the grassland.

The Pea family is well represented around Moran Lake. These legumes appear to do well in disturbed areas such as where the grassland covers land fill around the lake. The Beach pea (Lathyrus maritimus) is very abundant in the grasses all around the lake. Deerweed (Lotus scoparius) covers much of the ground surface in the grassland of the north lake shore. A tangled viney mass of wild vetch (Vicia americana) is growing on top of ice plant just to the east of the culvert on the lake shore. Two species of lupines were found around Moran Lake. A single bush lupine (Lupinus arboreus) is growing almost directly on top of the culvert at the lake opening. Some smaller bush lupine can be found under the eucalyptus trees of the north lake shore. One specimen of sky lupine (Lupinus nanus) was found in between the deerweed on the north shore.

In the well-trampled areas around the lake grasslands, beach burr (Medicago polymorpha) and filaree (Erodium cicutarium) appear to be thriving. Some scarlet pimpernel (Anagallis arvensis) and pearlwort (Sagina procumbens) is found in association with the beach burr. Ice plant is well-adapted to growing in this area of poor soil and salinity. Both Mesembryanthemum chilense and M. adule occur in dense patch in a number of locations along the lake shore and over the culvert to East Cliff Drive.

The dried-out stalks of the pincushion flower (Haplopappus venetus) occur in about 10 sites around the lake not far from

the lake shore. About 5 low-growing coyote bushes (Baccharis pilularis) are scattered around the southern grassland area of Moran lake. The coast hedge-nettle (Stachys chamissonis) reaches 1 or 2 feet above the grasses in a number of places around the lake. The flowers of the California poppy (Eschscholzia californica), the seaside dandelion (Ageroseris apargioides) and the oyster-root (Trigonogon porrifolius) stand out among the grasses around the lake. The less conspicuous red flowers of the sheep sorrel (Rumex acetosella) are common among the grassland. Another sorrel (Oxalis suksdorfii) can be found in the slightly shaded areas of the grassland community. In the wet places of the upper northern lake shore, the tiny purple flowers of Loosestrife (Lythrum hyssopifolia) can be found. A few mallow plants (Malva nicaeensis) were growing in the grassy areas of the southern shore. The marsh plants sweet fennel (Foeniculum vulgare) and water hemlock (Cicuta douglasii) were each represented by one plant also in the southern shore grassland.

Two small Monterey pine trees (Pinus radiata) were found growing near the bike path near the southern end of the area. A few other Monterey pines are growing amongst the eucalyptus trees bordering the Moran Lake region. The garden geraniums under the eucalyptus trees appear to have spilled over from the backyards of nearby homes. The iris plants growing along East Cliff Drive appear to have originated from a similar source. (The plant communities around the Lake have been mapped on overlay #1)

Addendum to the Vegetation
of Moran Lake

Due to the seasonality of herbaceous plants in the grassland surrounding Moran Lake, it is difficult to account for all plant species in the short time period of this study. A few flowering plants were discovered near the end of the study period, necessitating this addendum. To compile a truly complete species account, observations must be made over an entire growing season.

Convolvulus occidentalis-Beach morning glory

Rhus diversiloba-Poison oak

Scirpus koilolepis-Rush

Jaumia carnosu-Jaumia

The small salt marsh plant, Jaumia carnosu, was found in a few small areas along the muddy shore of Moran Lake. The few native Jaumia plants now growing at Moran Lake are probably just a remnant from the time when this area was a healthy lagoon. The smaller rush plants on the southern lake shore were originally thought to be of the same species as those in the lake; however it now appears that these rushes are a smaller species of bulrush, Scirpus koilolepis. The large white flowers of the beach morning glory, Convolvulus occidentalis can be found in a few areas in the grassland of the north shore. Rhus diversiloba, poison oak, is growing in a dense viney mat under the eucalyptus trees along the upper north shore of Moran Lake.

Aquatic Plants

The green algae, Cladophora spp. appears to be the only plant actually growing in Moran Lake. This moss-like filamentous algae of both marine and fresh water environments, can be found growing on rocks and wood throughout Moran Lake. The following algae species were found as drift in Moran Lake: Macrocystis pyrifera, Egretta, Monilegia, Coilodrome californica and a sea grass, Phyllospadix.

Vegetation Analysis
Line Intercept Transects

On May 8, four line intercept vegetation transects were conducted in the Moran Lake wetlands. This transect method for vegetation analysis gives a great deal of information about the composition of a stand of vegetation. Data from these transect measurements can be used to determine plant population distribution, species diversity, density, frequency and coverage in a particular region.

Two transects, #1 and #2 were both 10 meters in length. These transects began at the lake shore and continued into the grassland community (Map #1). Along each transect line, the number of individuals and length of intercept was measured for each plant species. The two grassland transects, #3 and #4, were both 5 meters in length. #3 was located on the south shore of the Lake and #4 was on the north shore. (Map #1). Data was collected as in transects #1 and 2, except a bunch of grass was counted as one individual.

Transect sites were representative of the region's vegetation. Although, this data may be somewhat misleading in that it is strongly related to the size of an individual plant. However, this information does give a good indication as to the structure and composition of the terrestrial plant community. A summary of the data obtained in these transects is recorded in tables # 8,9,10 and 11.

Date May 8 Observers _____Habitat and stratum Lake Shore into GrasslandLocality North Shore Moran LakeTotal transect length (L) 10 metersTotal number of transect intervals 10 (one meter each)

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i)*	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i)*	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
Salicornia subterminalis	2	0.2	0.014	1	0.1	0.025	60 cm	6.0	0.099	0.138
Lolium multiflorum	16	1.6	0.110	5	0.5	0.128	51 cm	5.1	0.085	0.323
Carex obnupta	6	0.6	0.042	1	0.1	0.025	10 cm	1.0	0.016	0.083
Avena fatua	60	6.0	0.417	10	1.0	0.256	135 cm	13.5	0.224	0.897
Brassica campestris	10	1.0	0.069	4	0.4	0.102	35 cm	3.5	0.058	0.229
Mesembryanthemum Spp.	3	0.3	0.021	2	0.2	0.051	38 cm	3.8	0.063	0.135
Hordeum leporinum	6	0.6	0.042	1	0.1	0.025	3 cm	0.3	0.005	0.072
Festuca californica	4	0.4	0.028	3	0.3	0.076	5 cm	0.5	0.008	0.112
Medicago polymorpha	18	1.8	0.125	6	0.6	0.153	125 cm	12.5	0.207	0.485
Lotus scoparius	19	1.9	0.132	6	0.6	0.153	140 cm	14.0	0.232	0.517
Totals	$\Sigma n = 144$	$\Sigma ID = 14.4$	$\Sigma RD = 1.0$		$\Sigma f = 3.9$	$\Sigma Rf = 1.0$	$\Sigma l = 602$	$\Sigma IC = 60.2$	$\Sigma RC = 1.0$	

Date May 8 Observers _____

Habitat and stratum Lake Shore into Grassland

Locality South Shore, Moran Lake

Total transect length (L) 10 meters

Total number of transect intervals 10 (one meter each)

Species (i)	Number of individuals (n)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _i)	Relative frequency (Rf _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Cotula coronopifolia</i>	6	0.6	0.037	2	0.2	0.048	48 cm	4.8	0.066	0.151
<i>Carex obnupta</i>	22	2.2	0.136	5	0.5	0.121	56 cm	5.6	0.077	0.334
<i>Atriplex patula</i> <i>basata</i>	2	0.2	0.012	2	0.2	0.049	29 cm	2.9	0.039	0.100
<i>Avena fatua</i>	52	5.2	0.321	8	0.8	0.195	44 cm	4.4	0.060	0.576
<i>Medicago polymorpha</i>	9	0.9	0.055	3	0.3	0.073	55 cm	5.5	0.075	0.203
<i>Erodium cicutarium</i>	17	1.7	0.105	6	0.6	0.140	82 cm	8.2	0.112	0.363
<i>Mesembryanthemum</i> spp.	47	4.7	0.290	9	0.9	0.219	390 cm	39.0	0.534	1.043
<i>Lathyrus maritimus</i>	6	0.6	0.037	5	0.5	0.121	19 cm	1.9	0.026	0.184
<i>Plantago major</i>	1	0.1	0.006	1	0.1	0.024	7 cm	0.7	0.009	0.039
Totals	$\Sigma n = 162$	$\Sigma ID = 16.2$	$\Sigma RD = 1.0$		$\Sigma f = 4.1$	$\Sigma Rf = 1.0$	$\Sigma l = 730$	$\Sigma IC = 73.0$	$\Sigma RC = 1.0$	

Summary of Data from Line-Intercept Plant Sampling

Date May 8 Observers _____Habitat and stratum Grassland Southern ShoreLocality Moran Lake Southern AreaTotal transect length (L) 10 metersTotal number of transect intervals 10 (one meter each)

Species (i)	Number of individuals (n _i)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j _i)*	Frequency (f _i)	Relative frequency (RF _i)	Intercept length (l _i)*	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
<i>Erodium cicutarium</i>	9	1.8	0.122	3	0.6	0.15	28 cm	5.6	0.081	0.353
<i>Carex obnupta</i>	29	5.8	0.393	5	1.0	0.25	56 cm	11.2	0.162	0.804
<i>Rumex acetosella</i>	15	3.0	0.203	4	0.8	0.20	47 cm	9.4	0.136	0.539
<i>Plantago major</i>	4	0.8	0.054	2	0.4	0.10	14 cm	2.8	0.040	0.194
<i>Lathyrus maritimus</i>	1	0.2	0.014	1	0.2	0.05	3 cm	0.6	0.009	0.073
<i>Juncus effusus</i>	3	0.6	0.041	2	0.4	0.10	87 cm	17.4	0.251	0.392
<i>Avena fatua</i>	12	2.4	0.162	2	0.4	0.10	105 cm	21.0	0.303	0.565
<i>Brassica campestris</i>	1	0.2	0.014	1	0.2	0.05	6 cm	1.2	0.017	0.081
Totals	$\Sigma n = 74$	$\Sigma ID = 14.8$	$\Sigma RD = 1.0$		$\Sigma f = 4.0$	$\Sigma RF = 1.0$	$\Sigma l = 346$	$\Sigma IC = 69.2$	$\Sigma RC = 1.0$	

Summary of Data from Line-Intercept Plant Sampling

Date May 8 Observers _____

Habitat and stratum Grassland

Locality Northern Shore Moran Lake

Total transect length (L) 10 meters

Total number of transect intervals 10 (one meter each)

Species (i)	Number of individuals (n)	Linear density index (ID _i)	Relative density (RD _i)	Present in how many transect intervals? (j) [*]	Frequency (f _i)	Relative frequency (RF _i)	Intercept length (l _i) [*]	Linear coverage index (IC _i)	Relative coverage (RC _i)	Importance value (IV _i)
Plantago major	2	0.4	0.023	2	0.4	0.091	11 cm	2.2	0.064	0.178
Avena fatua	19	3.8	0.215	4	0.8	0.182	18 cm	3.6	0.104	0.501
Brassica campestris	1	0.2	0.011	1	0.2	0.045	10 cm	2.0	0.058	0.114
Lolium multiflorum	42	8.4	0.477	5	1.0	1.136	65 cm	13.0	0.376	1.989
Malva nicaeensis	1	0.2	0.011	1	0.2	0.045	15 cm	3.0	0.087	0.143
Anagallis arvensis	1	0.2	0.011	1	0.2	0.045	3 cm	0.6	0.017	0.023
Hordeum leporinum	11	2.2	0.125	3	0.6	0.136	17 cm	3.4	0.098	0.359
Medicago polymorpha	5	1.0	0.057	4	0.8	0.182	29 cm	5.8	0.168	0.407
Festuca californica	6	1.2	0.068	1	0.2	0.045	5 cm	1.0	0.029	0.142
Totals	$\Sigma n = 88$	$\Sigma ID = 17.6$	$\Sigma RD = 1.0$		$\Sigma f = 14.4$	$\Sigma RF = 1.0$	$\Sigma l = 173$	$\Sigma IC = 34.6$	$\Sigma RC = 1.0$	

PLANTS OF MORAN LAKE
Species Listed by Communities

TREES

Eucalyptus Globulus
Pinus radiata

Blue gum eucalyptus
Monterey pine

ICE PLANT

Mesembryanthemum chilense
M.edule

Sea fig
Hottentot fig

PICKLEWEED

Salicornia subterminalis
Atriplex patula hasata

Pickleweed
Atriplex

GRASSLAND

Scirpus americanus
Lolium multiflorum
Avena fatua
Festuca californica
Distichlis spicata
Hordeum leporinum
Carex obnupta
Briza minor

Bulrush
Rye grass
Wild oat
California fescue
Salt grass
Hare barley
Sedge
Quaking grass

Cakile maritima
Brassica campestris
Raphanus sativus
Erodium cicutarium
Medicago polymorpha
Lupinus arboreus
L. nanus
Lathyrus maritimus
Vicia americana
Lythrum hyssorifolia
Sagina procumbens
Oxalis suksdorfii
Rumex acetosella
Foeniculum vulgare
Tragopogon porrifolius
Anagallis arvensis
Plantago lanceolata
P. major
Eschscholzia californica
Baccharis pilularis
Cotula coronopifolia
Ageroseris apargioides
Haplopappus venetus
Cicuta douglasii
Malva nicaeensis
Stachys chamissonis
Lotus scoparius
Rhus diversiloba

Sea rocket
Wild mustard
Wild radish
Filaree
Beach burr
Bush lupine
Sky lupine
Beach pea
Wild vetch
Loosestrife
Pearlwort
Wood sorrel
Sheep sorrel
Fennel
Oyster-root
Scarlet pimpernel
English plantain
Common plantain
California poppy
Coyote bush
Brass buttons
Seaside dandelion
Pincushion flower
Water hemlock
Mallow
Coast hedge-nettle
Deerweed
Poison Oak

BIRDS OF MORAN LAKE

<u>Anas platyrhynchos</u>	Mallard duck
<u>Turdus migratorius</u>	Robin
<u>Sturnus vulgaris</u>	Starling
<u>Zenaidura macroura</u>	Mourning dove
<u>Larus occidentalis</u>	Western gull
<u>Charadrius vociferus</u>	Killdeer
<u>Crocethica alba</u>	Sanderling
<u>Stelgidopteryx ruficollis</u>	Rough-winged swallow
<u>Hirundo rustica</u>	Barn swallow
<u>Petrochelidon pyrrhonta</u>	Cliff swallow
<u>Melospiza melodia</u>	Song sparrow
<u>Zonotrichia leucophrys</u>	White-crowned sparrow
<u>Agelaius phoeniceus</u>	Red-winged blackbird
<u>Euphagus cyanocephalus</u>	Brewer's blackbird
<u>Falco sparverius</u>	Sparrow hawk
<u>Calypte anna</u>	Anna's hummingbird
<u>Aphelocoma coerulescens</u>	Scrub jay
<u>Sitta pygmaea</u>	Pygmy nuthatch

MAMMALS OF MORAN LAKE

<u>Reithrodontomys megalotis</u>	Western harvest mouse
<u>Sciurus niger</u>	Fox squirrel
<u>S. griseus</u>	Gray squirrel
<u>Didelphis marsupialis</u>	Opossum
<u>Thomomys bottae</u>	Botta pocket gopher
<u>Canis canis</u>	Dog
<u>Felis domesticus</u>	Cat

INVERTEBRATES OF MORAN LAKE

Calanoid copepods (Planktonic)
Harpactiloid copepods (Benthic)
Oligochaete worms-2 or 3 species
Capitellid polychaete worms
Nematode worms
Emerita analoga (Juvenile)

Map #1

Plankton Sampling Sites

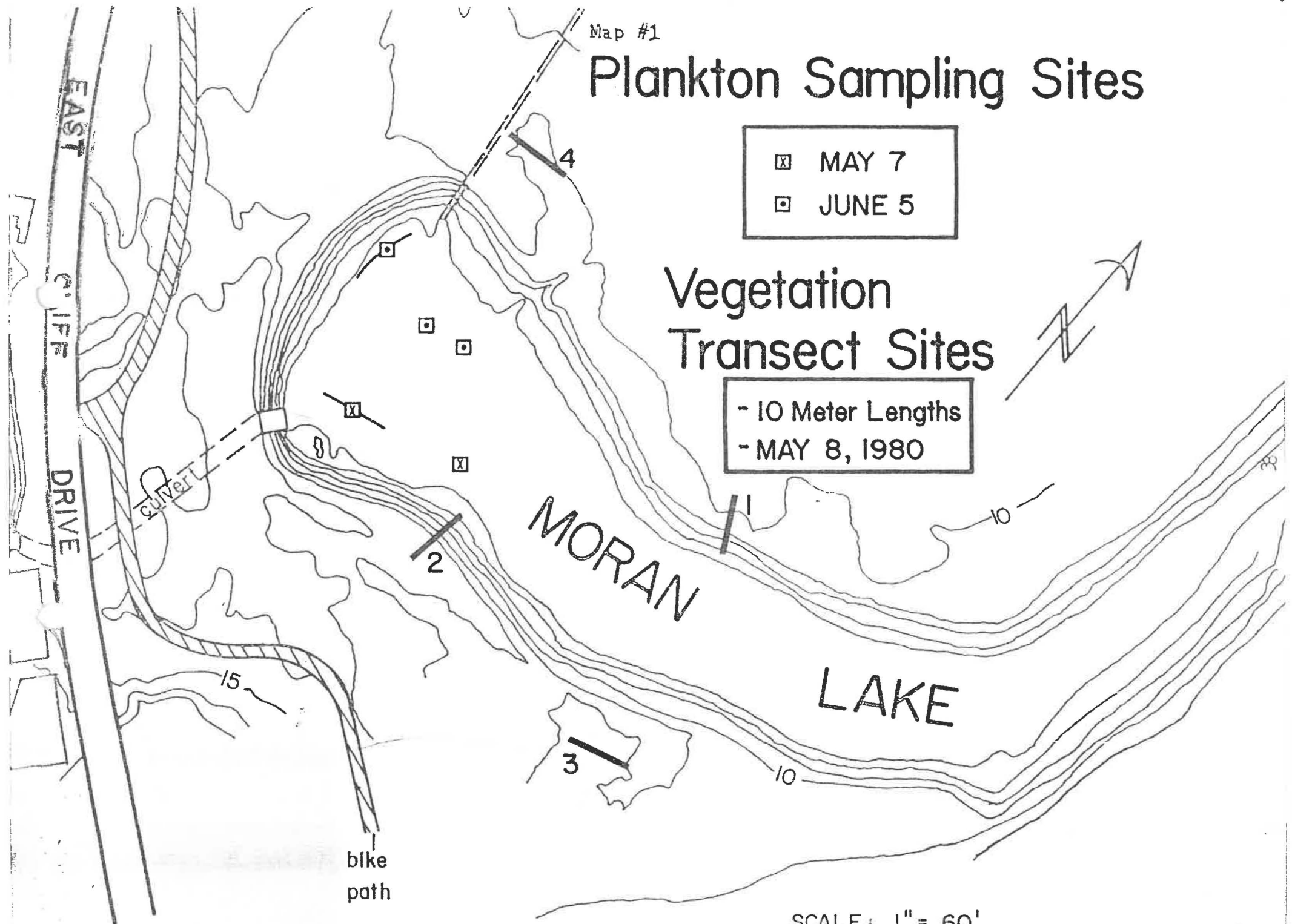
☒ MAY 7

☐ JUNE 5

Vegetation Transect Sites

- 10 Meter Lengths

- MAY 8, 1980



SCALE: 1" = 60'

Map #2

Mammal Trapping Sites

△ MAY 22-23

x MAY 26-27

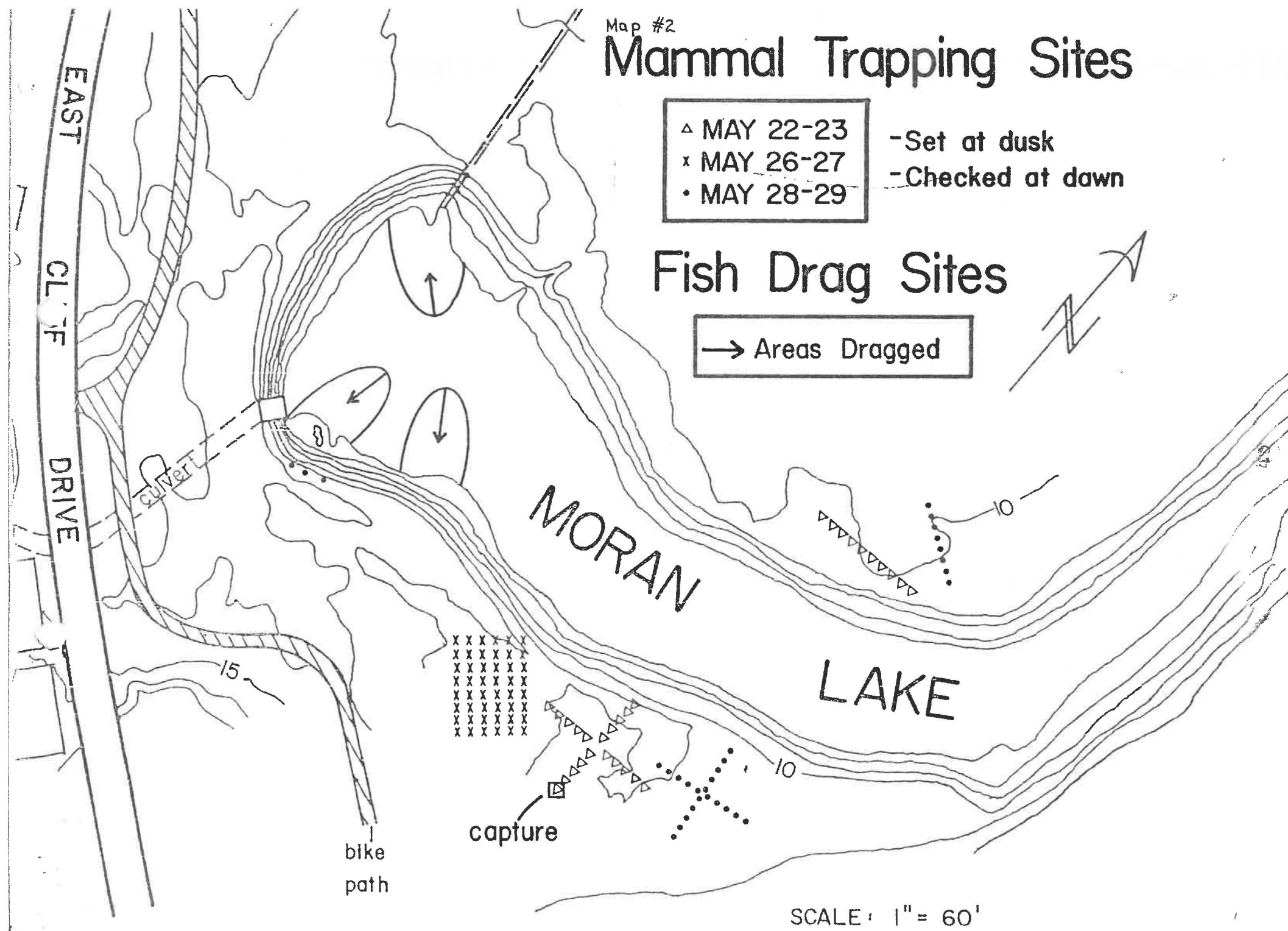
• MAY 28-29

-Set at dusk

-Checked at dawn

Fish Drag Sites

→ Areas Dragged

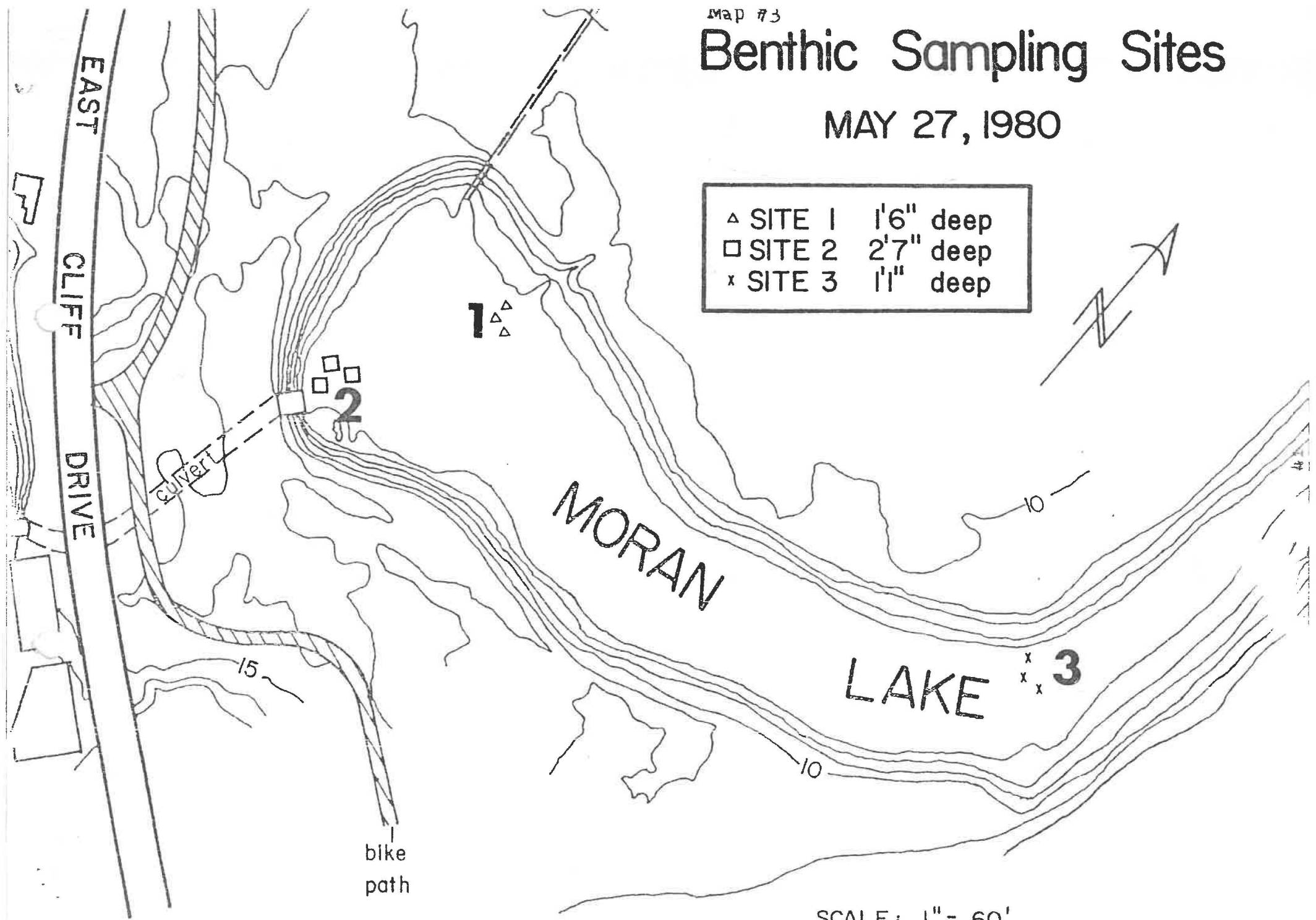


SCALE: 1" = 60'

Benthic Sampling Sites

MAY 27, 1980

△	SITE 1	1'6" deep
□	SITE 2	2'7" deep
x	SITE 3	1'1" deep

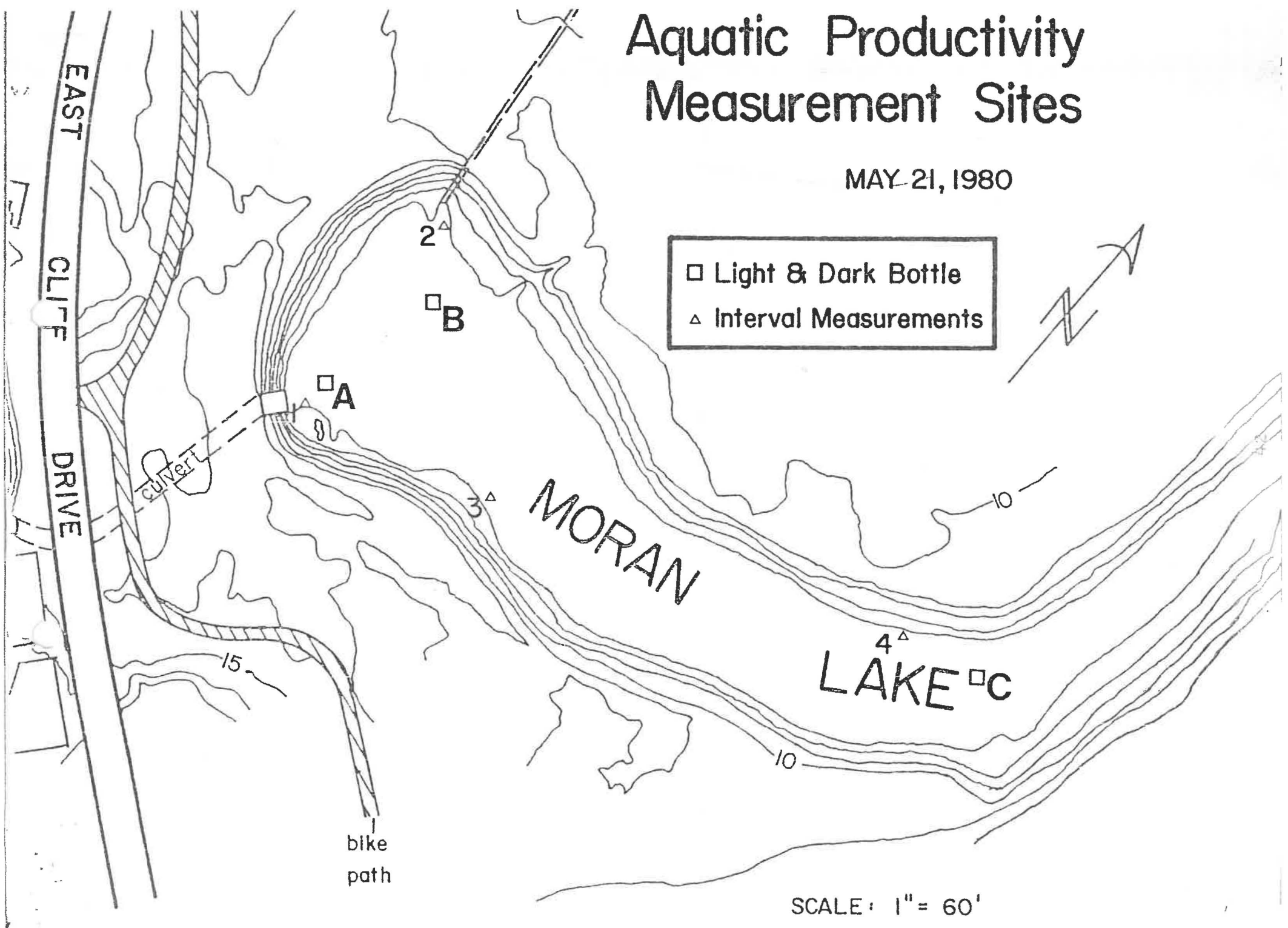


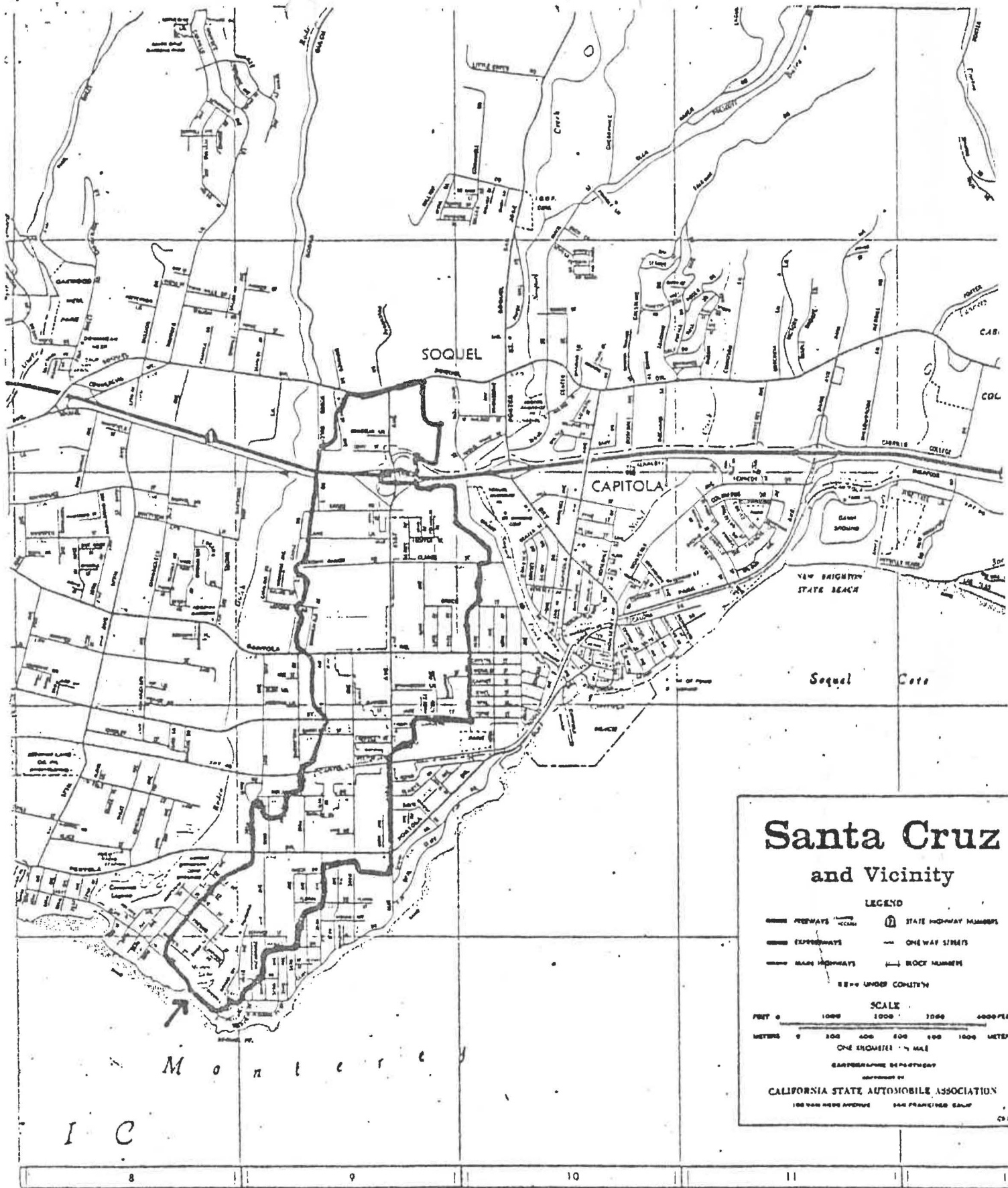
SCALE: 1" = 60'

Aquatic Productivity Measurement Sites

MAY 21, 1980

□ Light & Dark Bottle
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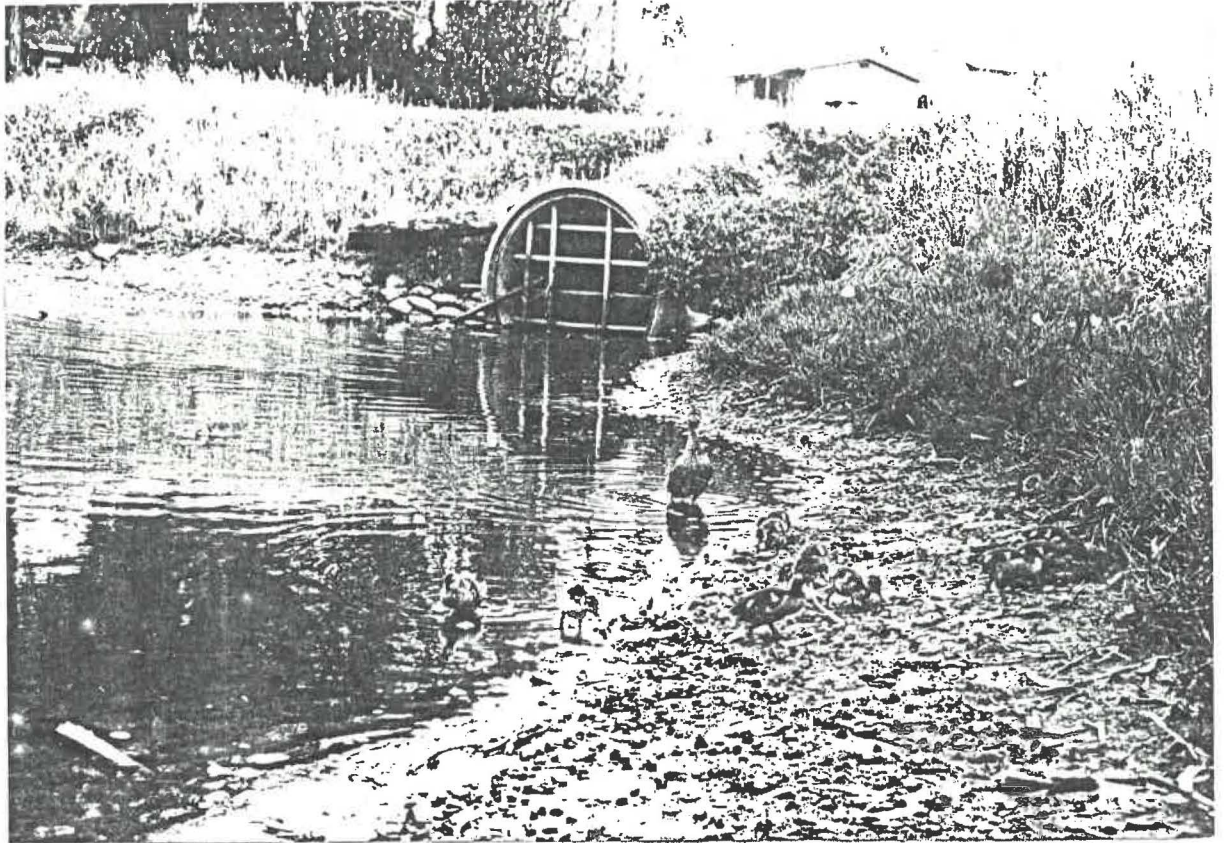
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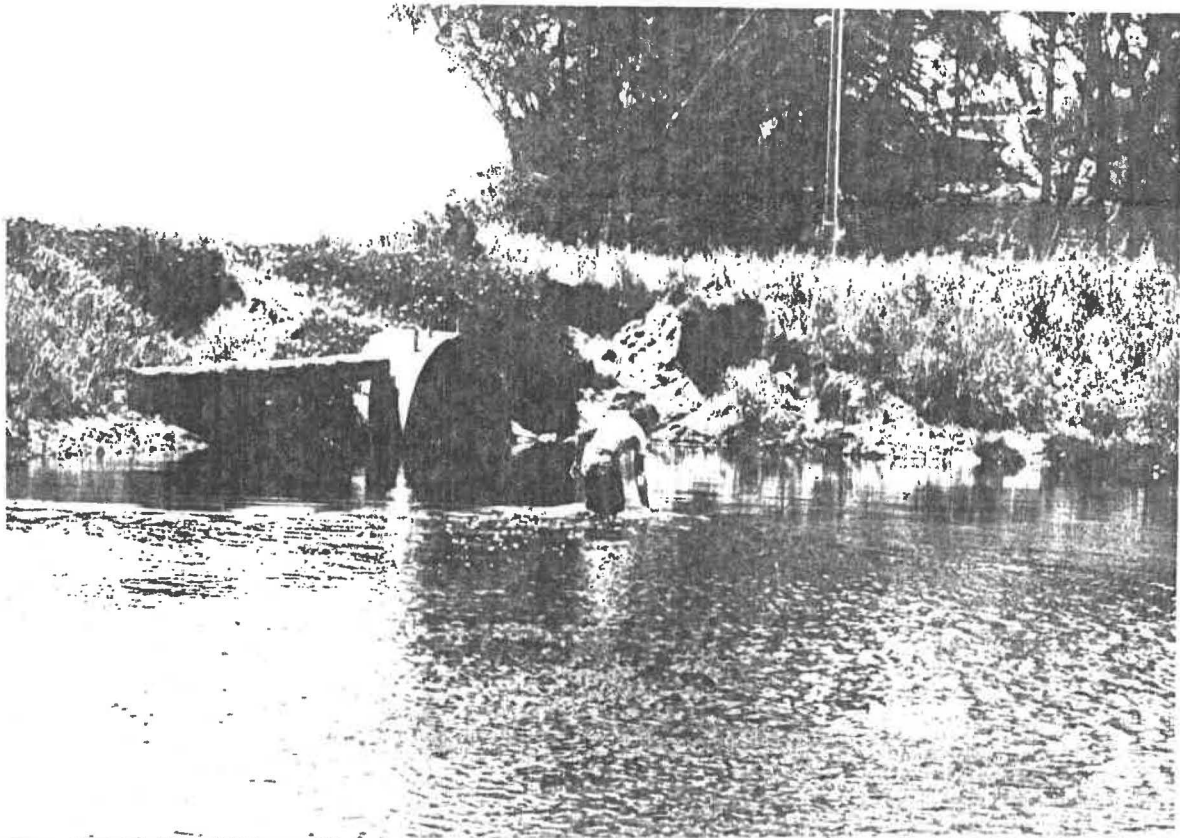
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CULVERT (BEACH)

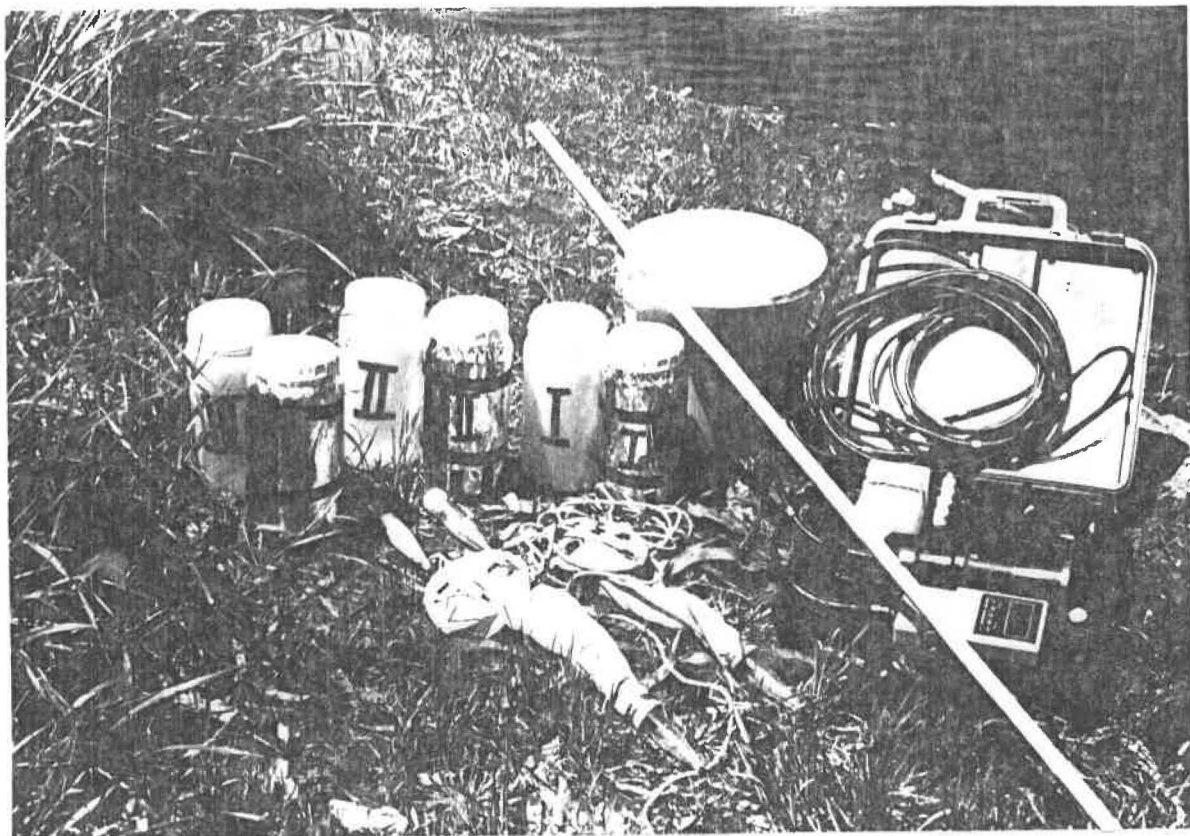
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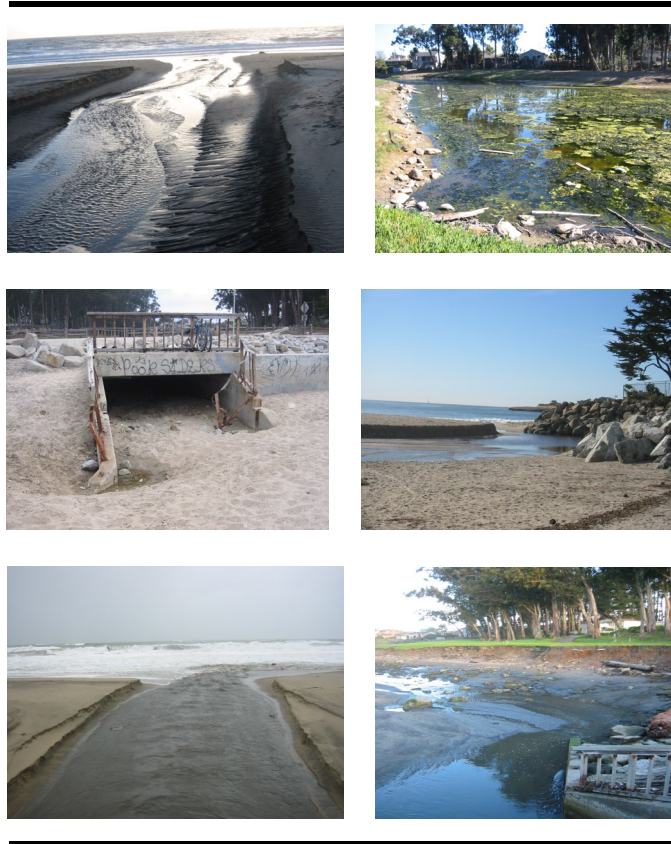
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EQUIPMENT



Technical Report

**MORAN LAKE WATER QUALITY STUDY
&
CONCEPTUAL RESTORATION PLAN**



Prepared For:

Santa Cruz County Redevelopment Agency

701 Ocean Street, 5th Floor
Santa Cruz, CA 95060

Prepared By:

John Gilchrist & Associates
&
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1. EXECUTIVE SUMMARY & INTRODUCTION

1.1 EXECUTIVE SUMMARY

Moran Lake is a coastal lagoon located in the Live Oak Area of Santa Cruz County that seasonally connects to Monterey Bay. The Moran Lake watershed has been modified as a result of development and land use changes in the area. Increased impervious surfacing has decreased infiltration capacity and increased the volume of water entering Moran Lake and its principal tributary, Moran Creek. Roads, parking lots, commercial and residential land uses have contributed to impaired water quality within the watershed and in Moran Lake. Water and sediment sampling and testing conducted in this and previous studies have documented problems concerning water quality and low biologic productivity in Moran Lake. However, the Lake and its surrounding uplands also support two sensitive species, the tidewater goby and monarch butterfly. Presence of these species must be considered in any lake restoration planning. Vegetation in wetland and upland areas around the lagoon consist primarily of non-native trees, shrubs and herbaceous species. Blue gum eucalyptus is the dominant tree species, and is an important resource for the over-wintering monarch butterfly population. Wildlife surveyed during previous studies included relatively common shore birds, water birds and upland bird and mammal species. Numbers of water-associated wildlife species are lower than nearby lagoons such as Corcoran due to reduced aquatic productivity in Moran Lake.

Moran Lake, like other coastal lagoons, is a body of brackish or saline water impounded by a barrier beach, with a seasonal inlet/ outlet. The size and shape of the lagoon, inlet configuration, watershed drainage and other environmental factors influence the chemistry, water circulation and ecology of a lagoon under natural conditions. Moran lagoon has been altered by artificial fill, reducing its size from nine to five acres in the early 1960's, and by constriction of the inlet with a culvert at East Cliff Drive. The 7-foot diameter culvert was replaced by a larger box culvert in 1981. Although culvert replacement increased water exchange, these changes have confined the lagoon to a relatively fixed configuration, with some limitation on ocean – lagoon water interchange. The box culvert may be slightly undersized to handle the full tidal prism and streamflows entering and exiting the lagoon. However, due to presence of a barrier beach and the current reduced lagoon configuration, replacing the culvert with a bridge or arch culvert may not produce significant changes to winter or summer lagoon conditions. In summer months hyperhaline conditions (high salinity), and algal blooms indicative of a eutrophic water body are prevalent in Moran Lake. During the 2004 study period, streamflow into the Lake was small compared to winter months. Lake bank erosion is a problem during higher winter runoff periods.

Because Moran Lake water quality concerns were the focus of this study, baseline water quality monitoring was undertaken at four locations between June and October 2003. In addition, lagoon sediments samples were collected and analyzed at several water sampling locations in November 2003. Fecal coliform contamination continues to be a problem in the lagoon with likely sources that include leaking sewers, domestic animals

and wildlife. Nutrients, including total phosphorus, nitrate and ammonia were reasonably low during summer months, but were elevated after the “first flush” rainfall event in late October. Sources include urban pollutants such as waste products and fertilizers. Dissolved oxygen levels were low and then relatively high in morning and afternoon sampling which is typical of a eutrophic lake with urban pollutants and large algal blooms. Presence of high concentrations of sodium and chloride in late summer was expected due to hyperhaline conditions in the lake. The concentration of trace metals varied significantly both spatially and seasonally, with highest levels taken from the Moran Creek station and during the “first flush” rain event. Copper and zinc were present at potentially toxic levels. Sediment samples detected the presence of several polyaromatic hydrocarbons (PAHs), commonly known as oils and grease. Principal sources of PAHs are roads, parking lots and vehicle service areas. Several of the PAH compounds detected are carcinogenic and other compounds are potentially detrimental to aquatic life. Sediment testing for organochlorine pesticides and PCB’s detected only the pesticide chlordane above threshold levels. This persistent pesticide may also adversely affect aquatic life. Water and sediment sampling yielded results that were generally similar to previous water quality testing for Moran Lake, but some contaminant levels were less than those found in other urban watersheds in the San Francisco Bay area.

Restoration opportunities exist in the Moran Lake watershed to improve water quality and habitat conditions in the lagoon. Many opportunities exist in the immediate vicinity of the lagoon, while other projects and actions can be taken in the upper watershed area. Restoration options include a broad spectrum of activities, including physical restoration projects, storm water management and treatment, recommendations for environmental education, site planning and design standards with the objective of reducing impervious cover in the watershed. Specific Moran Lagoon restoration options include modifying the lagoon inlet-outlet with a bridge or arched culvert to improve ocean-lagoon water exchange, although as noted, the presence of a barrier beach and the current reduced lagoon configuration may limit water quality improvement. The lagoon could also be dredged and expanded, artificially aerated, and/ or artificially breached, although there are constraints to each of these options. Upper watershed streamflow could be augmented with treated wastewater from a small treatment plant at Lode Street, however there are environmental and public perception issues associated with this alternative. There is an opportunity to create a ‘treatment wetland’ on public lands in the upper lagoon that could improve lagoon water quality and wildlife habitat. Other restoration options at Moran Lake include bank replacement and revegetation of the eroded east slope, removal of exotic plant species and revegetation with natives, and interpretative signing on park trails to inform the public about Moran Lake resources.

Restoration in the upper watershed can also improve Moran Lake water quality. Modification of the 38th Avenue Flood Detention Basin to accommodate a treatment wetland would reduce nutrients, bacteria and heavy metals contained in upper Moran Creek watershed urban runoff. The treatment wetland design would need to insure equivalent flood management currently provided by this facility. There are also opportunities to restore portions of Moran Creek to a functional riparian corridor. A restored flood terrace and native riparian vegetation can reduce upstream pollutant

loadings. Storm water management and treatment practices are also available to reduce pollutants from the urban watershed. Source control and treatment best management practices (BMP) are discussed in Chapter 6 and Appendix A. These include innovative site design practices for new development, storm water treatment devices including drainage inlet filters, bioretention swales and constructed wetlands, and implementation of performance standards for storm water management. Finally, public awareness of maintaining good water quality in Moran Creek and Lake can be developed with informational brochures and volunteer watershed stewardship organizations. Prioritization and cost estimates for these restoration measures are set forth in Chapter 6 of this report.

1.2 INTRODUCTION

1.2.1. Background

Moran Lake, one of several coastal lagoons in unincorporated Live Oak, is located near East Cliff Drive in the Pleasure Point area. Previous studies and water quality monitoring have documented problems concerning water quality and low biologic productivity in the Moran Lake lagoon. These same studies have proposed drainage and water quality improvements in the lagoon and upper watershed.

Spoils from Yacht Harbor dredging were used to fill Moran Lake in the early 1960's reducing the size of the lagoon by over 3 acres. In 1981 a box culvert replaced a smaller culvert allowing increased tidal exchange and flushing of lagoon waters. At the same time, a paved parking lot and restrooms were constructed on part of the Harbor fill sediments and the Lake and adjacent uplands began to be managed by the Santa Cruz County Parks, Open Space and Cultural Services Department. Urbanization in the watershed upstream of the lagoon has increased significantly over the last 35 years, causing drainage and water quality problems for the upstream watercourse, Moran Creek, and for Moran Lake.

1.2.2. Public Concerns and Issues

Since 2001 a group of Live Oak neighbors expressed concerns regarding Moran Lake to Santa Cruz County Public Works, Planning and Redevelopment Departments, County Parks Commission and the Board of Supervisors. Specific concerns included the restriction of tidal flow caused by the box culvert, recent rip-rap installation at the culvert, decrease in lake water quality caused by impervious surfaces and polluted runoff from the watershed, and problems associated with lagoon fill from 1960's harbor dredging. The neighborhood group has asked the County to consider replacing the culvert with a bridge in order to restore tidal exchange and flushing of the lagoon. The group has also expressed concerns regarding expansion of the rip-rap at the outlet and continued deterioration of lagoon water quality from urban land uses in the watershed.

1.2.3. Scope of Project & Project Objectives

Previous studies that described Moran Lake as an impaired water body are over 25 years old. Because changes in the watershed and lagoon itself have occurred over the last 25 years, it is not clear whether water quality problems continue as previously observed in Moran Lake, and if so, the severity or magnitude of the problems.

To address these concerns and to update historical information, the Santa Cruz County Redevelopment Agency (RDA) agreed to undertake a baseline study to assess current conditions. The RDA retained John Gilchrist and Associates to conduct this baseline study. The objectives of the project are as follows:

- Obtain water quality data over a 5-6 month period that will provide information on current lagoon conditions
- Develop a better understanding of lagoon hydrology by reviewing watershed inflows, tidal exchange and lagoon configuration in order to assess potential for water quality improvement options and other lagoon/ watershed management opportunities.
- Review existing biologic information, including data on species of concern, to better understand the interactions between lagoon hydrology, water quality and biology, and recommend possible lagoon enhancement options.
- Provide recommendations on future focused studies or design work needed to implement restoration and enhancement options.

This report presents the results of the baseline study. The document is divided into the following technical sections:

Section 2 - Setting. This section provides an overview of the Moran Lake and watershed setting, including a description of the natural history (geology, hydrology, and biology), historic and present watershed boundaries, jurisdictional boundaries, and land use changes over several decades.

Section 3 - Lagoon and Watershed Hydrology. This section provides a detailed description of the historical and current drainage and morphology of the lagoon. It also provides a description of the hydrologic conditions in the upper watershed areas. Emphasis is placed on the effects that modifications to the lagoon and the watershed have had on the function and conditions of the lagoon and watershed hydrologic processes.

Section 4 – Water Quality. This section provides a review of historical and recent water quality studies of Moran Lake, and presents the results of water quality and sediment testing undertaken as part of this study.

Section 5 – Restoration Options. This section provides conceptual restoration opportunities in the Moran Lake watershed to improve water quality and habitat