APPENDIX E

Biological Technical Report

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BIOLOGICAL TECHNICAL REPORT FOR THE BUENA VISTA LAGOON ENHANCEMENT PROJECT
SAN DIEGO COUNTY, CALIFORNIA

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LIST OF ACRONYMS

BCLA	Biological Core and Linkage Area
BMP	best management practice
BSA	Biological Study Area
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cm	centimeter
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
dB	decibel(s)
EIR	environmental impact report
ERCE	ERC Environmental and Energy Services Co.
FESA	Federal Endangered Species Act
g	grams
I-5	Interstate 5
L_{eq}	equivalent noise level
m	meter
MHCP	Multiple Habitat Conservation Plan
m	millimeter
NCTD	North County Transit District
NMFS	National Marine Fisheries Service
NRCS	Natural Resource Conservation Service
OHWM	ordinary high water mark
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SEL	sound exposure level
SR	State Route
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

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CHAPTER 1.0
INTRODUCTION

The San Diego Association of Governments (SANDAG) proposes to prepare an environmental impact report (EIR) to analyze possible strategies to enhancement Buena Vista Lagoon, herein described as the Buena Vista Lagoon Enhancement Project (Enhancement Project or proposed project). Buena Vista Lagoon is an approximate 220-acre freshwater lagoon that was designated as California's first ecological reserve, signifying the lagoon's importance as a home to a wide range of biological resources. In addition, Buena Vista Lagoon provides recreational opportunities, including fishing and public hiking trails. Over time, the health of the lagoon has declined as a result of natural and anthropogenic factors.

The purpose of this Biological Technical Report (report) is to summarize the biological resources known to occur, or with the potential to occur, in Buena Vista Lagoon and assess potential impacts as a result of project implementation. Buena Vista Lagoon has been a focus of many biological studies, including annual wildlife species surveys, fish and invertebrate surveys, and single survey efforts; a complete list of studies analyzed for this report is provided in Chapter 2. These efforts have been driven by different projects, individuals, and/or agencies, and have been conducted at different levels of detail or within different portions of the lagoon. As a result, a substantial amount of existing information is available to characterize current biological resources in the lagoon. In addition, a number of focused studies have been conducted as part of the preliminary planning process for the Enhancement Project. This report represents a compilation of both existing information and specific focused studies conducted for the proposed project.

1.1 PROJECT LOCATION

Buena Vista Lagoon is located between the Cities of Carlsbad and Oceanside in northern San Diego County (Figure 1). A number of individuals and agencies own portions of the lagoon, including the California Department of Fish and Wildlife (CDFW), whose lands are designated as state conservation area and state wildlife reserve (Figure 2). The lagoon is traversed generally north-to-south by Highway 101, the North County Transit District (NCTD) railroad, and Interstate 5 (I-5). For the purposes of this report, the project area generally includes the entire lagoon.

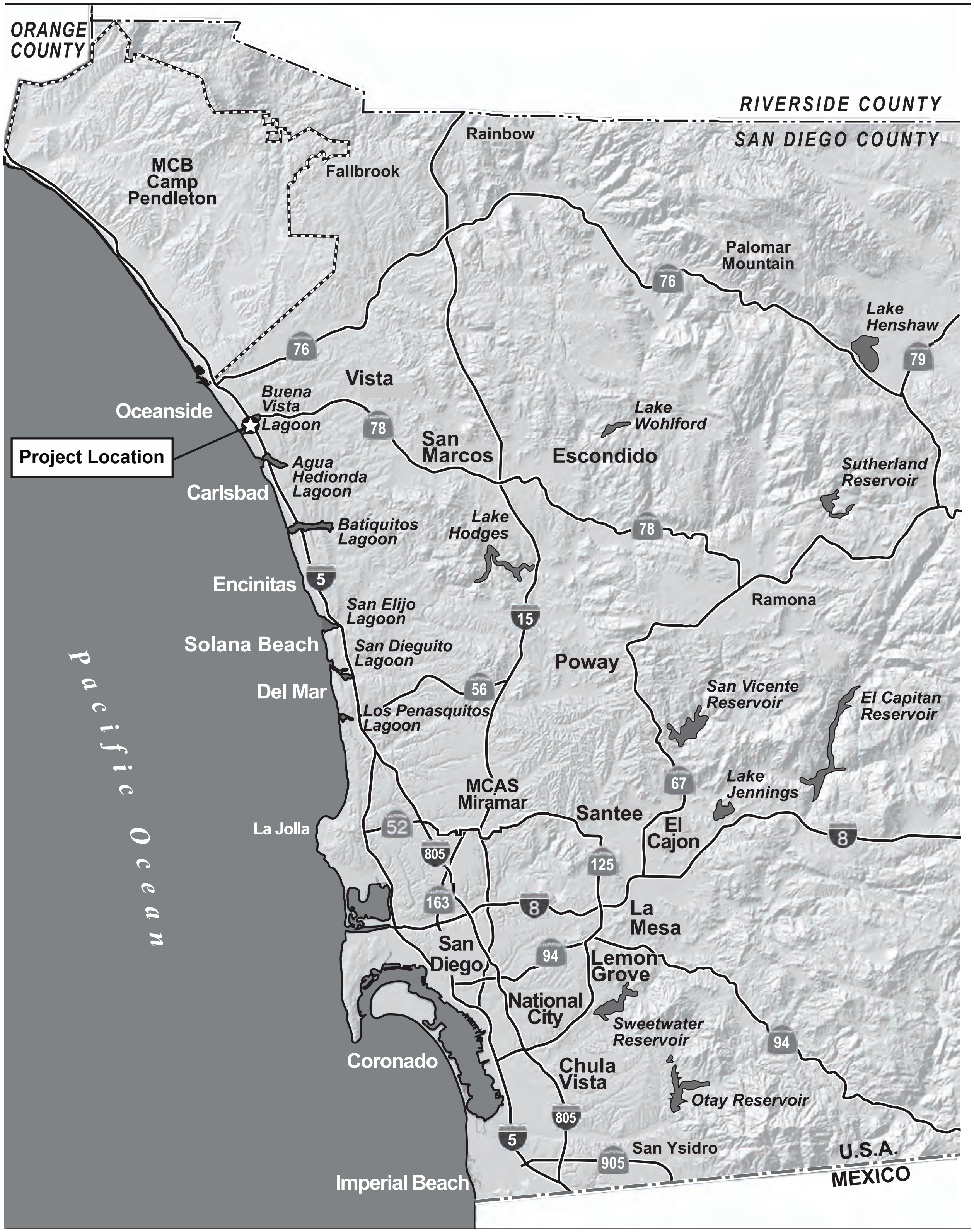

Figure 1
Regional Map

Source: SANDAG 2012; Sangis; Everest; AECOM 2014

Figure 2
Land Ownership and Boundaries within Buena Vista Lagoon

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1.2 PROJECT PURPOSE

The overall purpose of the proposed project is to enhance the biological and hydrological functions of Buena Vista Lagoon to address increased sedimentation and invasive vegetation encroachment, as well as resulting declining coastal biodiversity, degrading water quality, water circulation restriction, and increased vector concerns. Accordingly, the primary objectives of the proposed project include the following:

- Enhance and maintain sensitive habitats and native species, including rare and endangered species, to promote coastal biodiversity within the region.
- Promote a system of native wetland and terrestrial vegetation communities that can be sustained give the opportunities and constraints of the lagoon and anticipated sea level rise.
- Create conditions that curtail the growth and expansion of cattails, bulrushes, and invasive species.
- Protect, improve, and maintain water quality (e.g., reduce eutrophication) to meet water quality standards and address the 303(d) listed water quality impairments.
- Reduce vector concerns (e.g., potential for mosquito-borne disease) by enhancing and improving water circulation.
- Ensure no adverse change to current flood protection occurs, specifically to existing infrastructure and adjacent development.
- Develop a management, maintenance, and long-term monitoring plan with supporting costs for evaluating the proposed alternatives and to assess the success of enhancement efforts and provide a basis for future adaptive management decisions.

1.3 PROJECT DESCRIPTION

A detailed description of the project is provided in the EIR. The project alternatives have been developed from past efforts in response to the need to improve and restore the biologic and hydrologic functions of the lagoon. Each of the alternatives evaluated within this document seeks to enhance existing lagoon functions and services through dredging and grading, as well as control of freshwater and saltwater inputs and outputs. The range of alternatives developed reflect differing water regimes, as well as resulting habitat distribution. As a result of dredging and grading activities proposed under each of the alternatives, material necessitating disposal and/or beneficial reuse would be generated. Material removed from the lagoon could include disposal in the ocean and/or at upland locations or beneficial reuse of the material through placement on the beach or nearshore, dependent upon the suitability of the material (e.g., grain size). Appropriate infrastructure improvements are also included in the proposed project alternatives as necessary to accommodate enhancement actions.

It should be noted that several project components are proposed that would be common to project alternatives. These include a proposed boardwalk (common to each alternative) that would be constructed parallel to the roadway to further increase connectivity between the Cities of Oceanside and Carlsbad and enhance public access to the lagoon, both physically and visually. Another project component is the improvements to Carlsbad Boulevard bridge, which would accommodate increases in hydraulic connectivity between the Coast Highway Basin and the Railroad Basin (for the Saltwater Alternative and Hybrid Alternative). Additional improvements are proposed by other agencies for the lagoon, including replacement of the I-5 bridge over the lagoon and the construction of the I-5/State Route (SR) 78 interchange as part of the North Coast Corridor Project proposed by the California Department of Transportation (Caltrans), and double-tracking the railroad tracks extending through the lagoon as part of the LOSSAN project proposed by SANDAG. These improvements are assumed to be implemented by those agencies regardless of the Enhancement Project alternative selected.

Four project alternatives have been identified for the Enhancement Project:

- No Project – Existing Conditions
- Freshwater Alternative
- Saltwater Alternative
- Hybrid Alternative(Options A and B)

Brief descriptions of the four Enhancement Project alternatives, as well as the No Project Alternative are provided below.

No Project – Existing Conditions

Under the No Project Alternative, the proposed enhancement of the lagoon would not be completed at the project site. The existing weir would remain in place. No removal of sediment or vegetation would occur, and no maintenance regime would be implemented to enhance the biological and hydrological functions of the lagoon.

Freshwater Alternative

Under the Freshwater Alternative (Figure 3), the hydrologic regime of the lagoon would remain a freshwater system influenced primarily by freshwater entering the lagoon from the upstream watershed in the eastern portion of the system and along the boundary of the lagoon. Primary loss of water in the lagoon occurs via evapotranspiration and seepage, and large inflows occur during storm events, when water overtops the weir and beach berm.

Habitats supported under this alternative would remain primarily freshwater marsh and open freshwater habitat, and would be similar to those supported under existing conditions. Enhancement activities would focus on removal of vegetation encroaching into open water areas and decreasing vegetation density. Dredging would be used to minimize the potential for vegetation to expand back into open water areas and to remove nutrient-rich sediments from the lagoon.

Under this alternative, two deep areas, approximately 9 feet deep, would be dredged to function as fishing locations within the lagoon. These new fishing holes would supplement the existing location at the upper end of the lagoon just downstream of Jefferson Street. One fishing hole would be located within the southwest portion of the Coast Highway Basin and would be accessed from Maxton Brown Park or the Boardwalk. The other fishing hole would be located in the northern part of the Railroad Basin off Coast Highway and would be accessed from Carlsbad Boulevard via a trail extending through the currently vacant lot north of the lagoon (acquisition of this vacant lot is anticipated as part of the Enhancement Project).

Saltwater Alternative

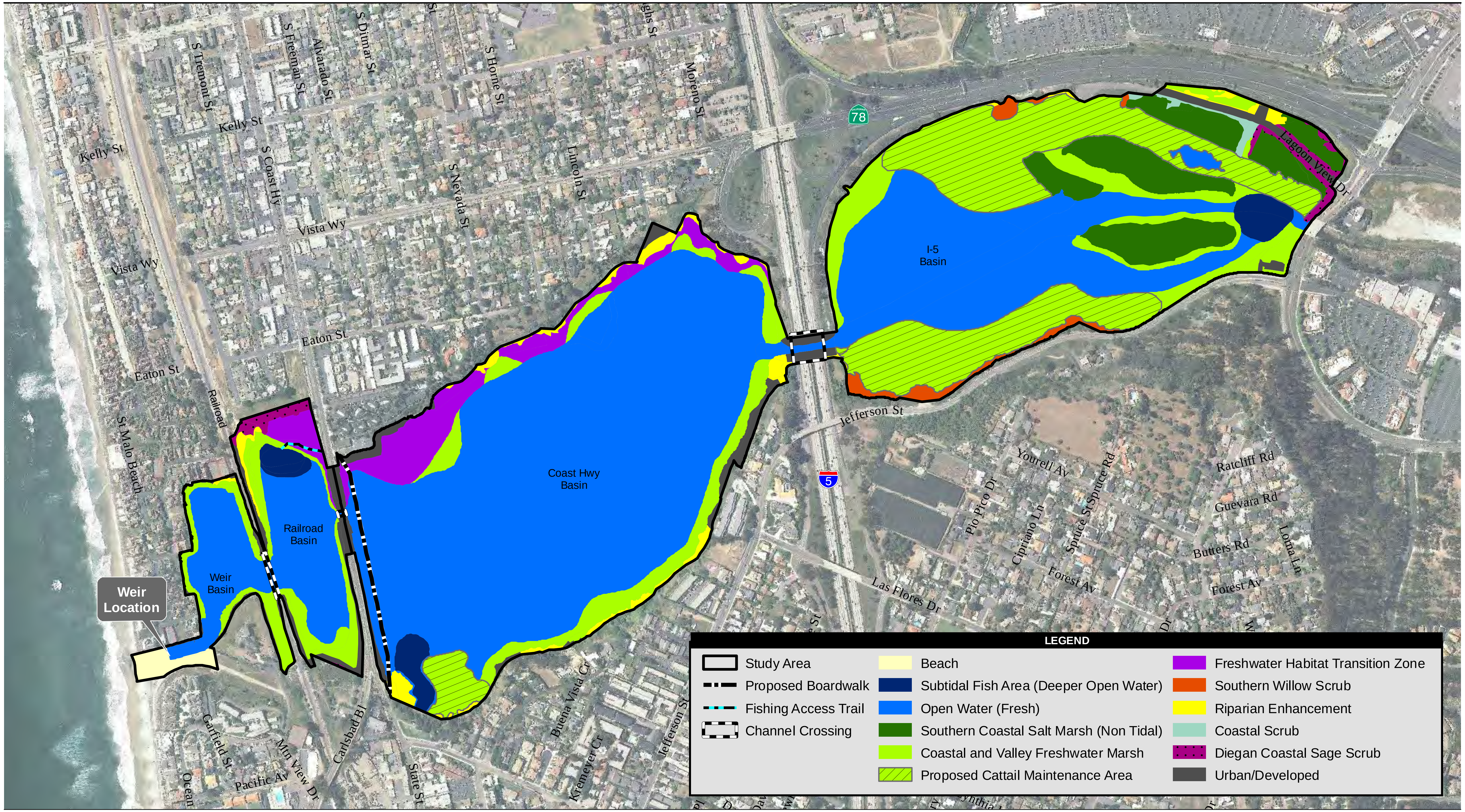
Under the Saltwater Alternative (Figure 4), the hydrologic regime of the lagoon would be changed from the existing freshwater system to a saltwater system influenced primarily by saltwater entering the lagoon from an open tidal inlet during flood tides, as well as freshwater entering the lagoon from upstream and along the boundary of the lagoon. Water exiting the lagoon under the Saltwater Alternative would primarily occur during ebb tides (outgoing tides), with evapotranspiration and seepage providing additional output.

Hybrid Alternative (Options A and B)

Under the Hybrid Alternative (Figure 5 and Figure 6), the hydrologic regime of the lagoon would be changed from the existing freshwater system to a hybrid system influenced by both saltwater and freshwater, with a saltwater system created west of I-5 and a freshwater system maintained east of

I-5. The hydrologic system west of I-5 would be influenced primarily by saltwater entering the system from an open tidal inlet during flood tides, as well as freshwater entering the lagoon just downstream from I-5 and along the boundary of the lagoon. Under the Hybrid Alternative, water would exit the lagoon primarily during ebb tides with evapotranspiration and seepage providing additional output. The hydrologic system east of I-5 would be controlled primarily by freshwater entering the system from upstream and along the boundary of the lagoon, and outputs via evapotranspiration and seepage, or overflow at the weir to be located under I-5.

There are two options under the Hybrid Alternative (Options A and B) differentiated by work within the Weir Basin and the future maintenance requirement. Under Hybrid Alternative, Option A, a channel would be constructed to connect the tidal inlet from the ocean area through the Weir Basin and into the Railroad Basin. Hybrid Alternative, Option B would achieve tidal exchange in the same manner as the Saltwater Alternative with an open tidal inlet connecting the ocean to the Weir Basin. The channel constructed under Hybrid Alternative, Option A would result in a perched water level within the Weir Basin that would have a substantially muted tide range compared to Hybrid Alternative, Option B. In addition, this feature would allow littoral sediment (sand) to bypass the Weir Basin and enter the Railroad Basin where some of the sediment would settle to the bottom. This change in sedimentation associated with the littoral sediment would result in a maintenance regime different than the Saltwater Alternative and the Hybrid Alternative, Option B.



Source: SANDAG 2012; Sangis; Everest; AECOM 2014

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Scale: 1:7,200; 1 inch = 600 feet

Figure 3

Proposed Freshwater Alternative Habitat Distribution

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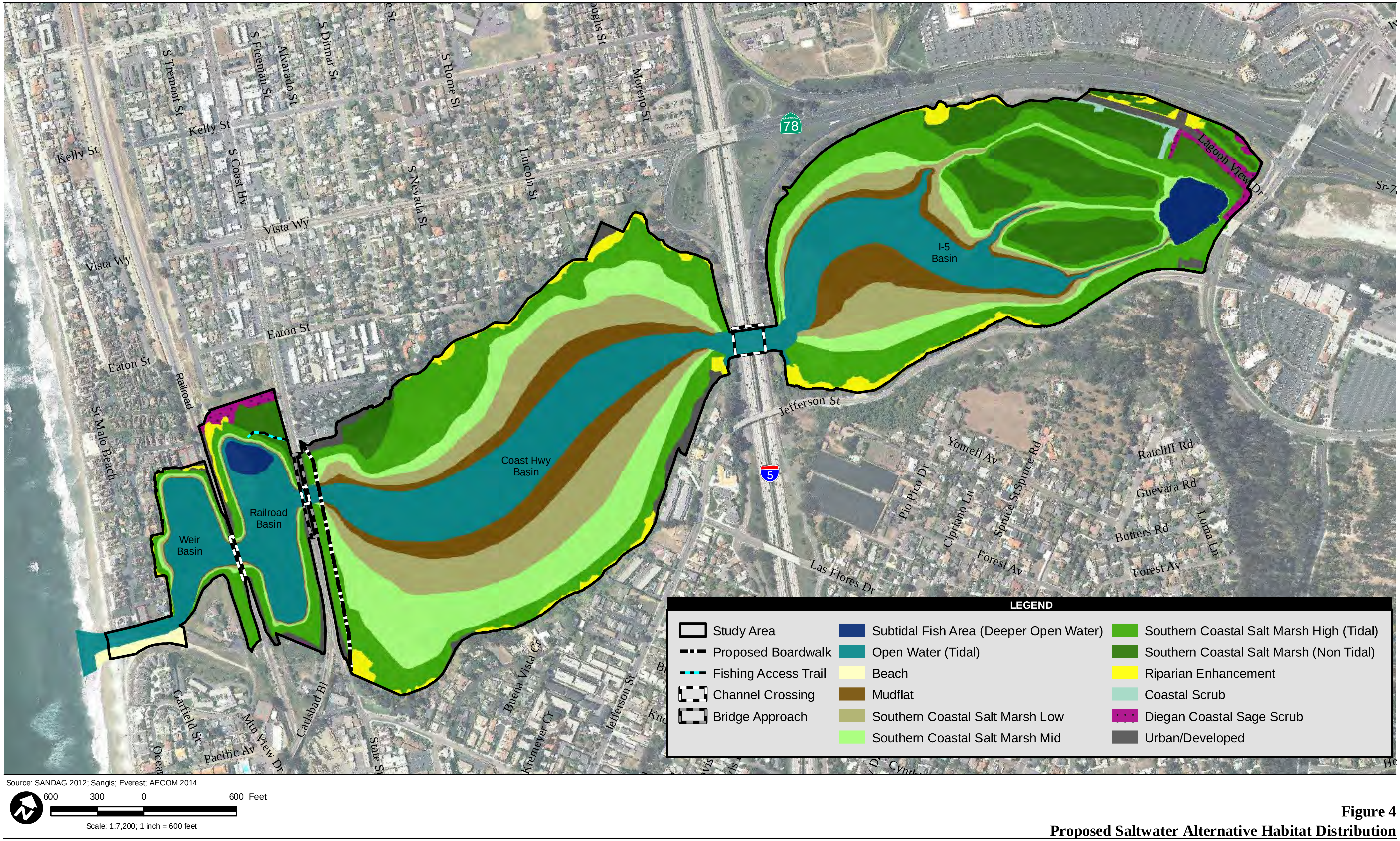

Source: SANDAG 2012; Sangis; Everest; AECOM 2014

Figure 4
Proposed Saltwater Alternative Habitat Distribution

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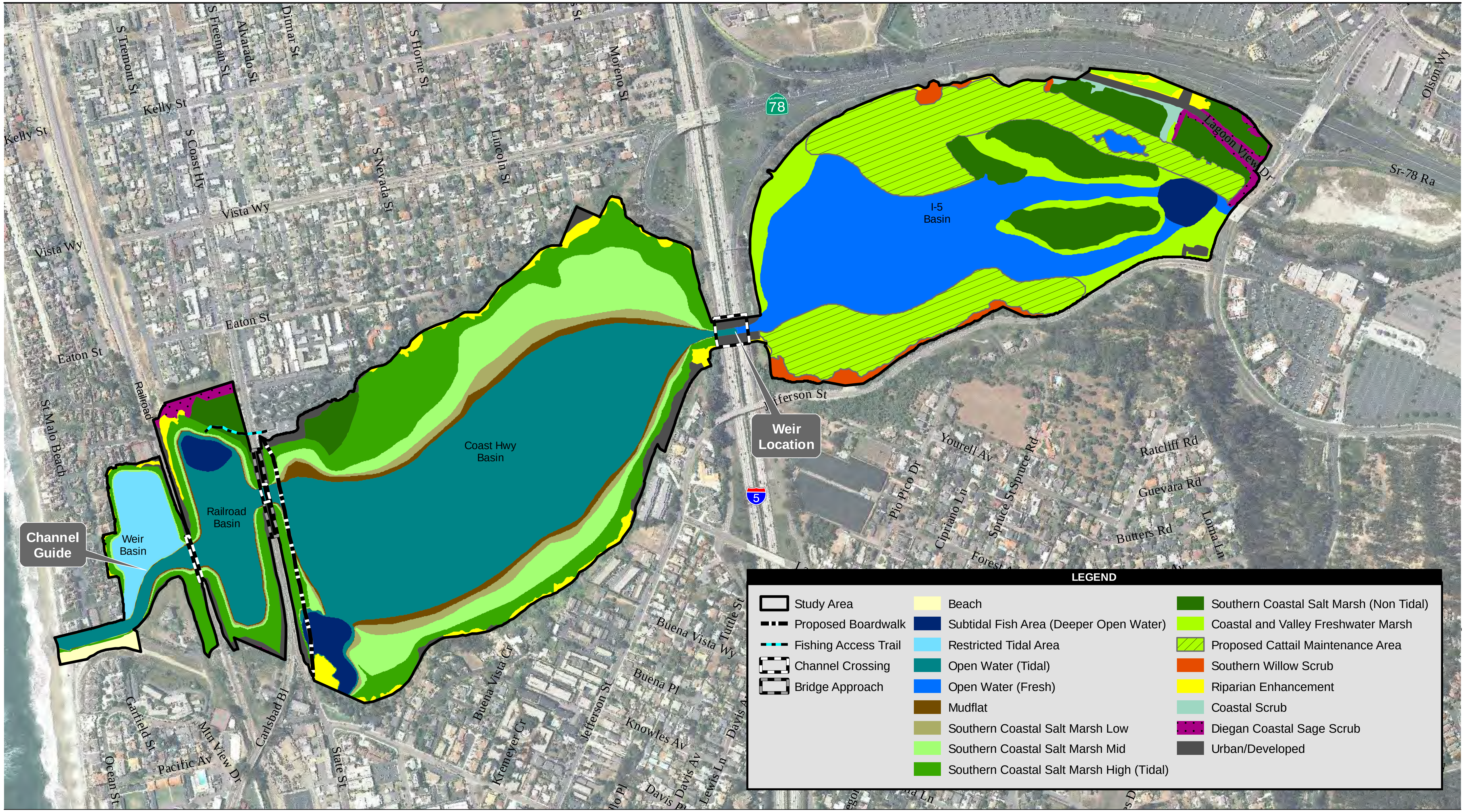

Source: AECOM; Everest 2014; SANDAG 2012

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Scale: 1:7,200; 1 inch = 600 feet

Figure 5

Proposed Hybrid Alternative Option A Habitat Distribution

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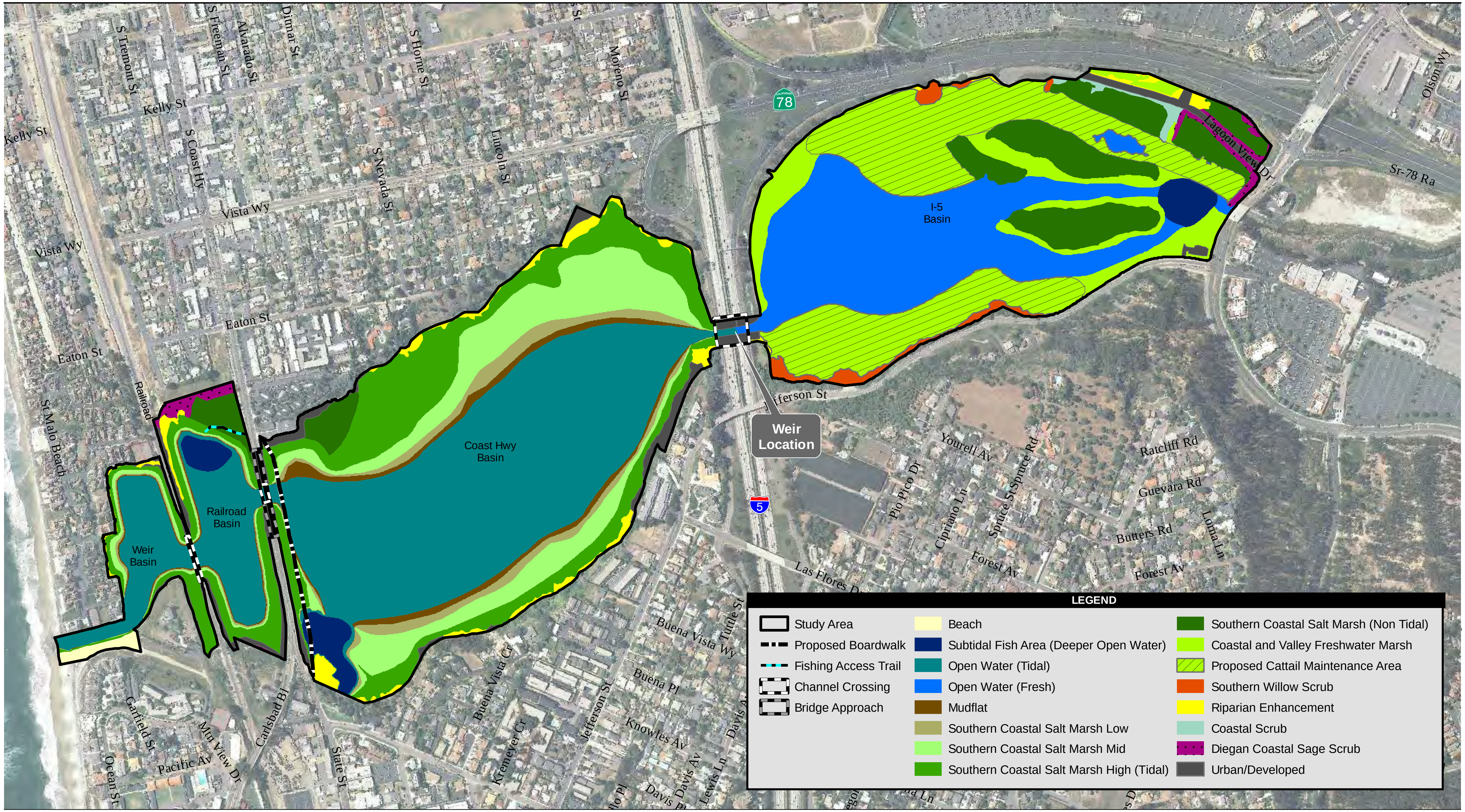

Source: AECOM; Everest 2014; SANDAG 2012

600 300 0 600 Feet

Scale: 1:7,200; 1 inch = 600 feet

Figure 6

Proposed Hybrid Alternative Option B Habitat Distribution

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CHAPTER 2.0
METHODS

2.1 BIOLOGICAL STUDY AREA

The Biological Study Area (BSA) for the Enhancement Project includes the entire lagoon and is mostly surrounded by urban development. The lagoon is bisected by I-5. The western extent of the BSA includes a small portion of beach where it is bordered by the coast. The southern extent of the BSA is bordered by Carlsbad residences west of I-5 and bordered by Jefferson Street east of I-5. The northern boundary is bordered by Oceanside residential development west of I-5 and by SR-78 east of I-5. The eastern boundary of the BSA occurs along Marron Road.

The North County Multi Habitat Conservation Program (MHCP), one of the regional conservation planning documents that covers this portion of northern San Diego County, covers the entire the BSA (SANDAG 2003) (Figure 7). The northern half of the BSA occurs within the City of Oceanside; the Oceanside subarea plan will be the MHCP implementing document of the northern portion, once approved (Foothill Associates 2010). The southern half of the BSA occurs within the City of Carlsbad; the City of Carlsbad Subarea Plan (City of Carlsbad 2004) is the MHCP implementing document for the southern portion. Portions of the BSA are within conservation areas referred to as Hardline Focused Planning Areas within both subarea plans.

2.2 BIOLOGICAL FIELD SURVEYS AND DATA SOURCES

Biological field surveys completed on-site by AECOM include vegetation mapping, rare plant surveys, focused wildlife surveys, and a reconnaissance-level assessment for potential jurisdictional waters. Prior to initiating floral and wildlife surveys, AECOM biologists consulted the CDFW California Natural Diversity Database (CNDDB) (RareFind Version 3.1.0; CDFW 2013), California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2013), and the Natural Resources Conservation Service Web Soil Survey (USDA 2013) to assess the potential for special-status plant species to occur within the BSA.

For the purposes of this report, species are considered to have special status if they meet at least one of the following criteria:

- Covered under the federal Endangered (FESA) or the California Endangered Species Act (CESA) (CDFW 2013);

- CDFW Species of Special Concern (CDFW 2013);
- CDFW fully protected species (CDFW 2013);
- Listed as sensitive by CNPS (2013);
- Covered under the Carlsbad Subarea Plan (City of Carlsbad 2004); or
- Covered under the Oceanside Subarea Plan (Foothill Associates 2010).

Focused surveys were conducted for the federally listed endangered southwestern willow flycatcher (*Empidonax trailii extimus*), federally listed endangered least Bell's vireo (*Vireo belli pulillus*), and federally listed threatened coastal California gnatcatcher (*Polioptila californica californica*). This report includes existing information on other wildlife species that have been studied extensively through time by a variety of individuals and/or agencies. This existing knowledge, in addition to surveys conducted by AECOM, constitutes the baseline for wildlife species known to occur, or with the potential to occur, within the BSA.

2.2.1 Vegetation Mapping

Vegetation community mapping was conducted within the BSA on April 1, 2013, by biologists Fred Sproul and Lance Woolley of AECOM. Surveyors conducted vegetation mapping within the BSA by walking meandering transects and from selected vantage points that allowed an expansive view of the BSA. Transect spacing and vantage point locations were dynamic, based on habitat complexity and topography, and were close enough to allow complete visual coverage.

Vegetation communities were classified based on the dominant and characteristic plant species, plant physiognomy, and soils in accordance with the *Draft Vegetation Communities of San Diego County* (Oberbauer et al. 2008), based on the *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986). Vegetation community mapping was conducted using digital mapping tools capable of displaying aerial ortho-photographs, topographic relief, and other digitized geographic data at any scale. Upland vegetation communities were mapped to a 1.0-acre minimum mapping unit, while wetland vegetation communities were mapped to a 0.5-acre minimum mapping unit. Rare plants observed were documented during vegetation mapping. A list of plants detected are provided in Appendix A. A list of rare plants detected or with some potential to occur are provided in Appendix B.

Source: SANDAG 2012; Sangis; Everest; AECOM 2014

1,000 500 0 1,000 Feet

Scale: 1 = 12,000; 1 inch = 1,000 feet

Figure 7
Regional Conservation Planning within the BSA

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2.2.2 Assessment of Potential Jurisdictional Waters

A jurisdictional assessment of potential jurisdictional wetlands and waters under the jurisdiction of the U.S. Army Corps of Engineers (USACE), CDFW, the Regional Water Quality Control Board (RWQCB), and the California Coastal Commission (CCC) was performed within the BSA. The jurisdictional assessment consisted of an informal field assessment of the BSA to identify the presence and/or absence of potential jurisdictional waters of the U.S. and state.

Potential jurisdictional waters of the U.S. and state are classified by wetland habitat and other waters of the U.S. (in the form of wetlands or nonwetland waters/ordinary high water mark [OHWM]). Vegetation is classified by habitat type using both the San Diego Regional Holland Code Classification System (Holland 1986) as modified by Oberbauer (Oberbauer et al. 2008) and the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) to describe riparian and wetland (e.g., hydrophytic) vegetation communities occurring within the BSA.

2.2.3 Special-Status Plant Surveys

Rare plant surveys were conducted within the BSA between March 15 and May 5, 2013, by AECOM botanists Fred Sproul and Lance Woolley. A list of potentially occurring sensitive plant species was compiled through searches of the CDFW CNDDB (CDFW 2013) and Jepson Online Interchange (2013). Rare plant surveys followed survey guidelines from Guidelines for Conducting and Reporting Botanical Inventories for Federal Listed, Proposed, and Candidate Plants (USFWS 2000); Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities (CDFG 2009); and CNPS Botanical Survey Guidelines (CNPS 2001).

The portions of the BSA with potential to support rare plants were surveyed by botanists walking meandering transects based on distribution of the resource and topography. The surveys included all accessible locations within the BSA where suitable habitats for sensitive plant species were present. Suitable habitats were determined based on geography, slope aspect, soil substrate, vegetation community, associated plant species, and familiarity with each species based on reference populations and historical surveys conducted in the region.

Survey dates were selected based on the most phenologically appropriate time for each plant species, when reproductive structures (i.e., flowers and fruits) were present and readily identifiable. Three rounds of focused surveys were required to accommodate the distinct phenologies of different rare plant species. If a sensitive plant population was located, the population was assessed and the number of individuals was counted. All sensitive plant locations identified were recorded with a Global Positioning System unit or onto an orthotopographic map and digitized into a geographic information system.

2.2.4 Wildlife Surveys

AECOM conducted general wildlife surveys and focused protocol surveys for the southwestern willow flycatcher, least Bell's vireo, and coastal California gnatcatcher according to the most current U. S. Fish and Wildlife Service (USFWS) protocols (*A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher* (Sogge et al. 2010), *Least Bell's Vireo Survey Guidelines* (USFWS 2001), and Coastal California Gnatcatcher Presence/Absence Survey Guidelines available online (USFWS 1997). Additionally, Buena Vista Lagoon has been studied over the past few decades by various individuals and/or agencies. Wildlife surveys have been conducted for a variety of species. Data collected by these specialists through the year 2014 have been incorporated into the document. This existing knowledge supplements the baseline describing wildlife species known to occur, or with the potential to occur, within the BSA, and represents the most recent data available. Project-specific surveys have been conducted for some resources, and the most current available data for other resources have been used to avoid duplication of survey efforts in Buena Vista Lagoon. Wildlife surveys conducted for this project, as well as surveys known to have been conducted within the past 15 years at Buena Vista Lagoon are listed in Table 2-1. As noted, these surveys were conducted by various individuals and/or agencies, and varying methodology and level of detail is available for each survey. Fish and benthic invertebrate survey results are depicted in *Buena Vista Lagoon Land Management Plan Elements* (Coastal Environments 2000), and additional fish survey results are depicted in *Buena Vista Lagoon Restoration Feasibility Analysis Report* (Everest International Consultants 2004). The results and reports of the remaining surveys found in Table 2-1 are provided in Appendices C through N. Surveys conducted by others within the past 15 years include fish and benthic invertebrate surveys; butterfly surveys; monthly bird counts, and species-specific surveys conducted for western snowy plover (*Charadrius alexandrines nivosus*), California least tern (*Sternula antillarum browni*), light-footed Ridgway's rail (*Rallus longirostris levipes*), and Belding's savannah sparrow (*Passerculus sandwichensis beldingi*).

Table 2-1
Wildlife Surveys Conducted at Buena Vista Lagoon

Survey Information	Data Collection Date	Source
General Wildlife Survey		
During focused surveys for other avian species at Buena Vista Lagoon	2013	AECOM (2013)
Fish and Benthic Invertebrate Surveys		
Buena Vista Lagoon fish surveys	August and September 1999	Buena Vista Lagoon Land Management Plan Elements (Coastal Environments 2000); Buena Vista Lagoon Restoration Feasibility Analysis Report (Everest International Consultants 2004)
Buena Vista Lagoon fish communities update surveys	2003	Merkel and Associates and SAIC 2003 Buena Vista Lagoon Restoration Feasibility Analysis Report (Everest International Consultants 2004)
Benthic invertebrate surveys	July and November 1999	Buena Vista Lagoon Land Management Plan Elements (Coastal Environments 2000); Buena Vista Lagoon Restoration Feasibility Analysis Report (Everest International Consultants 2004)
Butterfly Surveys		
Wandering (salt marsh) skipper presence/absence surveys	August 2012	Geomorphis/Caltrans (2012)
Avian Surveys		
Monthly bird count data Buena Vista Lagoon	2009–2013	Buena Vista Lagoon Audubon Society, and eBird database (eBird 2014)
Southwestern willow flycatcher surveys	2013	AECOM (2013)
Least Bell's vireo surveys	2013	AECOM (2013)
Coastal California gnatcatcher surveys	2013	AECOM (2013)
Western snowy plover summer window survey for snowy plovers on U.S. pacific coast with 2005–2011 results for comparison	2012	USFWS; CDFW; and multiple other agencies and personnel (Audubon 2012)
California least tern breeding survey 1993	1993	Carolee Caffrey (1993)
Light-footed Ridgway's rail management, study, and propagation in California, 2009 and 2010 seasons	2009, 2010	Richard Zembal, Susan Hoffman, John Konecny, Laurie Conrad, Charles Gailband, Michael Mace (2009, 2010)
Light-footed Ridgway's rail status and distribution in California, 2011, 2012, 2013, and 2014 seasons	2011–2014	Richard Zembal, Susan M. Hoffman, and John Konecny (2014)
A survey of Belding's savannah sparrow in California 2010	2010	Richard Zembal and Susan Hoffman (2010); eBird Database (eBird 2014)

General Wildlife Surveys

General wildlife information of species detected or anticipated to occur within or adjacent to the BSA was obtained from the Buena Vista Lagoon Land Management Elements (Coastal Environments 2000). Additional general wildlife observations were made during surveys conducted by AECOM in 2013, and various survey reports from other agencies and personnel.

Fish and Benthic Invertebrate Surveys

Fish and invertebrate surveys have been conducted throughout the BSA as recently as 2003 and 1999, respectively (Everest International Consultants 2004). Data collected during this survey period are summarized for this report.

The 2003 fish survey utilized a combination of an experimental gill net and a small beach seine. The gill net was 125 feet in length and 8 feet deep and consisted of five different mesh sizes ranging from 0.5 inch to 2.5 inches. Gill nets were deployed using a small human-powered inflatable boat and set in areas ranging from 3 to 10 feet deep. A total of eight deployments of the gill net were completed in the lagoon and each gill net soaked for 4 to 12 hours. The small beach seine was 15 feet long and 4 feet deep with a mesh size of 1.2 inches and was deployed five times. The beach seine was used in waters from 0 to 4 feet deep and was typically pulled perpendicular to shore, unless shoreline vegetation necessitated a parallel pull (Everest International Consultants 2004).

Sampling stations were selected to represent each possible habitat type and distance from the lagoon mouth. Beach sampling stations were located in sites that were free of emergent vegetation and that provided a shore onto which the net could be hauled. The gill net at the beach site in the I-5 Basin was set slightly offshore at a depth equivalent to the other stations. Gillnets at the cattail sites were set as close as possible to the vegetation without becoming entangled. The beach seine at the cattail site was pulled parallel to shore toward a beach where the net could be retrieved. Open water sites were chosen for their distance from shore and relative lack of submerged vegetation. Channel sites were generally closer to shore and were located in a finger or between islands (Everest International Consultants 2004).

Surveys were conducted during July and November 1999. Samples were taken in the vicinity of the six fixed water quality stations located along the centerline of each basin; Station 1 in the Weir Basin, Station 2 in the Railroad Basin, Stations 3 and 4 in the Central Basin, and Stations 5 and 6 in the East Basin. Two types of benthic samples were taken during the first survey (July) with a handheld 15-centimeter (cm) corer: Three replicate shallow cores were taken to a depth of about 10 cm and sieved through a 1.0-millimeter (mm) screen to sample for shallow microfauna, and three replicate deep cores to a depth of about 20 cm and sieved through a 5.0-mm screen to sample for deep macrofauna (mainly bivalves and shrimp). During the second survey (November) the deep cores were eliminated from the survey. The reasoning for the deletion of deep core samples was because during the first survey there were few abundances of animals detected below 10 cm. Survey results from 2003 are included in Appendix C.

Butterfly Surveys

A focused butterfly survey for wandering (salt marsh) skipper (*Panoquina errans*) was conducted on August 2, 2012, between 9:45 a.m. and 2:15 p.m. by biologist Michael Klein. Mr. Klein developed a protocol for the skipper requiring that conditions need to be mostly sunny to sunny, 65 degrees Fahrenheit at 3.3 feet above the ground, with wind speed at below 15 miles per hour. Also required is survey of all patches of salt grass (*Distichlis spicata*) (within the BSA out to 50 feet from the salt grass covering no more than 8 acres in 1 hour. Since this was a presence/absence survey, once any life cycle of the skipper, i.e. eggs, larvae, adults or pupa, was observed, surveys would not need to continue for that lagoon.

Two skippers were observed west of I-5, and there were no observations east of I-5. Therefore no further surveys were conducted (Geomorphis 2012). Survey results from 2012 are included in Appendix D.

Avian Surveys

Monthly bird count surveys have been organized by Buena Vista Audubon Society (BVAS), since 1984. The bird count surveys are conducted by a group of volunteers that look for birds along routes walked in various areas of the lagoon. For the purposes of this report, bird count data collected during the period of 2009 through 2013 were reviewed.

Specific surveys conducted for western snowy plover, California least tern, southwestern willow flycatcher, least Bell’s vireo, coastal California gnatcatcher, and Belding’s savannah sparrow are conducted specifically when the timing is optimal for detections per the specific protocols and guidelines. Survey periods focused on the species breeding season when visual and auditory detections are likely to be highest, and when the species is known to migrate to and/or through the BSA.

Specific surveys for light-footed Ridgway's rail have been conducted annually within the BSA for over a decade. These surveys are involved with a state-wide census determining Ridgway's rail status and distribution, and analyzing trends of the species.

Mammal Surveys

In October 2013, AECOM biologists conducted a habitat assessment for Pacific pocket mouse (*Perognathus longimembris pacificus*) within the BSA to determine if there was potential for this species to occur. Potentially suitable Pacific pocket mouse habitat was not identified within the BSA. Although the BSA occurs within the historical range of Pacific pocket mouse, vegetation communities were either too dense, were nonnative in nature, or the soil types were not suitable. Additionally, no Pacific pocket mouse potential burrows were observed, and none of the suitability elements were observed. Therefore, trapping for the species was not recommended.

No additional literature has been recovered of any focused surveys or trapping within the BSA in recent history.

CHAPTER 3.0
EXISTING CONDITIONS

This section describes the existing environmental setting of the BSA, including the regional context of the lagoon, vegetation communities, plant species, wildlife species, rare and sensitive plant and wildlife species either known or potentially occurring in the BSA, jurisdictional waters, and wildlife corridors. The information provided in the following sections is based on results of AECOM surveys conducted in 2013, review of existing studies, and literature research. Detailed information relevant to each section is provided as an appendix, where appropriate.

3.1 TOPOGRAPHY AND SOILS

The approximate 557acre BSA is located within the coastal plain of the Peninsular Ranges Geographic Province and is found on the U.S. Geological Survey San Luis Rey Quadrangle 7.5-minute series topographic map. This Province is characterized by a flat coastal plain with steep sloped hills and a series of elongated mountain ranges trending northwest to southwest and dissected by faults and separated from one another by alluvial valleys. The coastal plain consists of marine and nonmarine terraces dissected by coastal lagoons. The bluffs in the western portion of the BSA rise to about 50 feet above mean sea level (MSL).

Soil series and their respective phases occurring within the BSA were mapped as shown in Figure 8 and listed below in Table 3-1. Soils found within the BSA that are listed on the National List of Hydric Soils (NRCS 2013) are also identified in Table 3-1. Hydric soils are defined as “a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (NRCS 2013).

3.2 VEGETATION COMMUNITIES

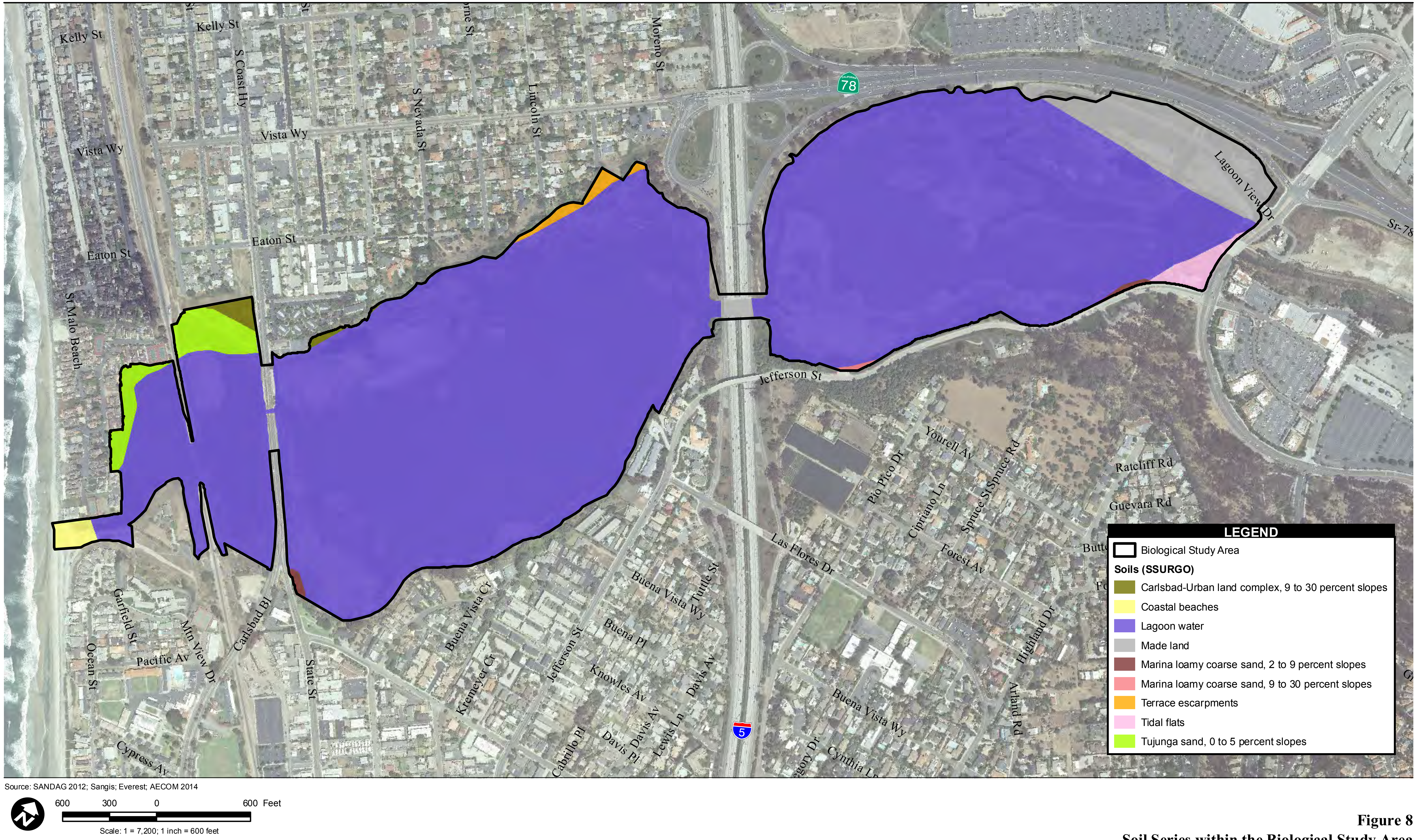
Vegetation communities are assemblages of plant species that generally coexist in the same area and provide habitat for wildlife species. The classification of vegetation communities is based upon the life-form of the dominant species within that community and the associated flora. Descriptions of these vegetation communities and other cover types are provided in the following discussion. Three generalized categories are being used to characterize and discuss the land cover types observed during vegetation community mapping: riparian and other wetlands, uplands, and other cover types. Within these three categories, six riparian and wetland communities, five upland communities, and

Table 3-1
Soils Occurring within the BSA

Soil Series/Land Type	Soil Phase/Soil Land Type/ Soil Map Unit Name	Acreage
Nonhydric Soil/Land Types		
Carlsbad-Urban Land Complex	9 to30 percent slopes, eroded	10.68
Lagoon Water	sol land type	242.95
Las Flores loamy fine sand	15 to 30 percent slopes	21.17
Las Flores loamy fine sand	9 to 15 percent slopes	5.41
Made Land	soil land type	41.59
Marina loamy coarse sand	2 to 9 percent slopes	67.29
Marina loamy coarse sand	9 to 30 percent slopes	18.20
Terrace Escarpments	soil land type	23.15
Hydric Soil/Land Types		
Carlsbad Gravelly Loam	5 to 9 percent slopes	9.68
Coastal Beaches	soil land type	13.10
Tidal Flats	soil land type	20.06
Tujunga Sand	0 to 5 percent Slopes	69.01

two cover types were delineated during the spring 2013 field surveys (Figure 9). The acreages of each vegetation community and cover type within the BSA are provided in Table 3-2.

Vegetation communities and other land cover types classified as “sensitive” within this report were determined by applying the following regulatory context. Guidance for determining sensitive vegetation communities is provided by the resource agencies, including CDFW, and CNPS, as well as supporting documentation such as the CNDDB. These federal, state, and local agencies and related publications are typically in concurrence on the classification of sensitive vegetation communities and other land cover types. For example, vegetation communities or other cover types that are considered potential U.S. and state jurisdictional areas typically result in the vegetation community or nonvegetated area being considered sensitive. For this proposed project, these waters are regulated by Sections 401 and 404 of the Clean Water Act, Sections 1600 et seq. of the California Fish and Game Code, and the Porter-Cologne Water Quality Control Act. Additionally, the occurrence of suitable habitat for special-status plant and animal species also raises the sensitivity of a vegetation community. Biologically, the vegetation communities that provide the highest habitat values within the BSA are the structurally diverse riparian communities and the native upland communities.



Source: SANDAG 2012; Sangis; Everest; AECOM 2014

Figure 8
Soil Series within the Biological Study Area

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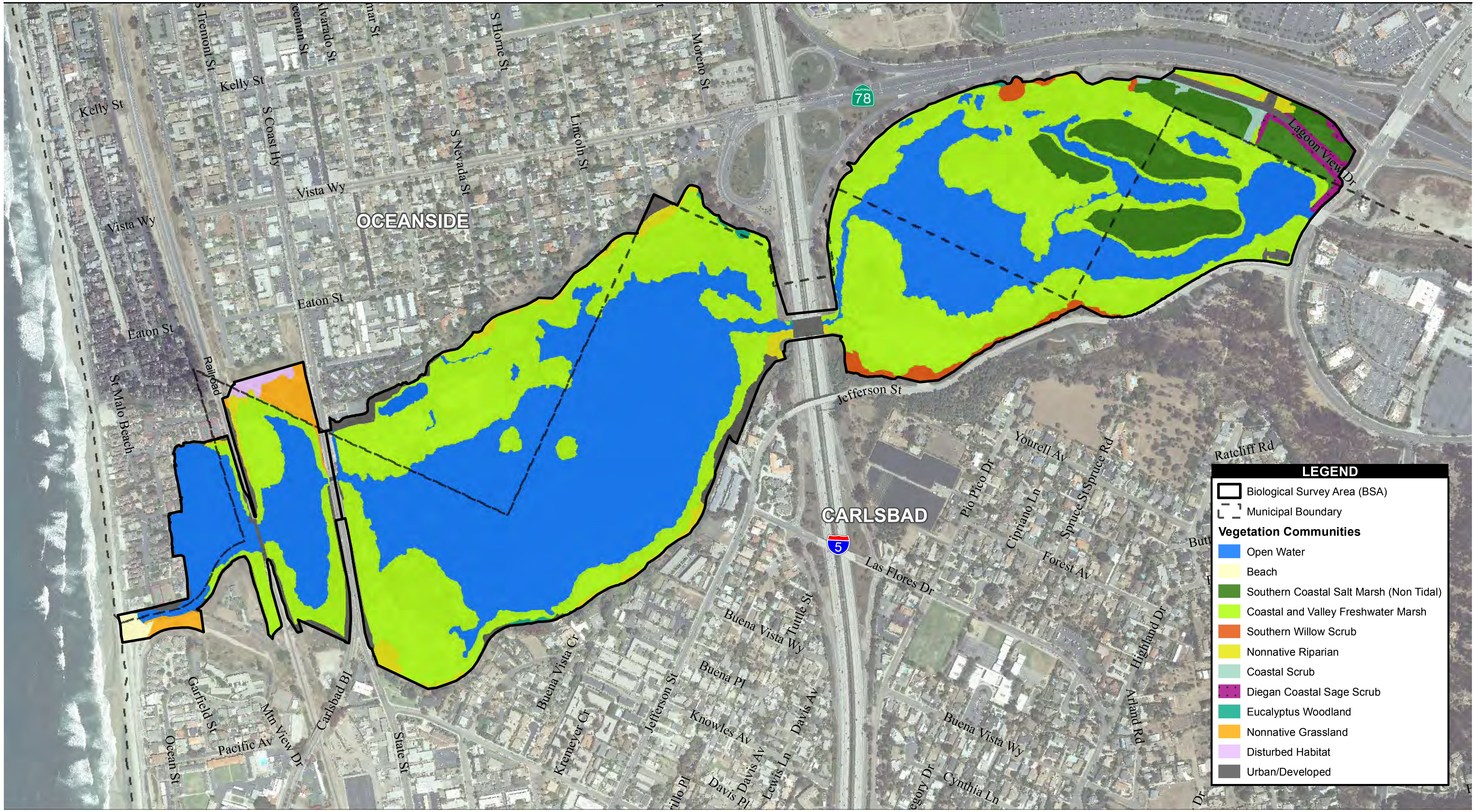

Source: SANDAG 2012; Sangis; Everest; AECOM 2014

600 300 0 600 Feet

Scale: 1 = 7,200; 1 inch = 600 feet

Figure 9
Vegetation Communities within the Biological Survey Area (BSA)

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Table 3-2
Vegetation Communities and Other Cover Types within the BSA (Acres)

Vegetation Communities and Other Cover Types	Project Footprint	500-ft Buffer	BSA
Riparian and Wetlands	**229.00**	**20.39**	**249.40**
Beach	0.00	13.04	13.04
Coastal and Valley Freshwater Marsh	97.28	3.53	100.81
Nonnative Riparian	6.55	3.16	9.71
Open Water	106.68	0.32	107.01
Southern Coastal Salt Marsh Nontidal	14.45	0.34	14.78
Southern Willow Scrub	4.05	0.00	4.05
Uplands	**7.15**	**21.52**	**28.67**
Coastal Scrub	0.58	0.29	0.87
Diegan Coastal Sage Scrub	0.04	3.53	3.57
Diegan Coastal Sage Scrub: *Baccharis*-Dominated	0.68	1.00	1.68
Eucalyptus Woodland	4.00	12.18	16.18
Nonnative Grassland	1.86	4.51	6.36
Other Cover Types	**19.63**	**260.17**	**279.81**
Disturbed Habitat	0.37	8.25	8.62
Urban/Developed	19.26	251.93	271.19
Total	**255.79**	**302.09**	**557.88**

3.2.1 Riparian and Wetland Vegetation Communities

Open water, marsh, and riparian scrub are considered sensitive (Foothill and Associates 2010). All riparian and wetland habitats are considered sensitive due to extensive historic losses of wetlands nationwide and the value of these habitats for sensitive species and wildlife movement. Riparian areas usually harbor greater wildlife diversity and abundance than upland areas and frequently serve as wildlife corridors due to their linear nature and the cover they provide.

Beach

The areas of beach within the BSA consist mainly of sand, but there are small areas of vegetation dominated by hottentot fig (*Carpobrotus edulis*), beach evening-primrose (*Camissoniopsis cheiranthifolia*), and beach bur (*Ambrosia camissonis*).

Coastal and Valley Freshwater Marsh

Freshwater marsh is the dominant vegetation community within the BSA. This community mainly consists of dense stands of southern cattail (*Typha domingensis*) and California bulrush (*Schoenoplectus californicus*). One island on the western side of the lagoon consists of a monotypic stand of California bulrush.

Nonnative Riparian

The nonnative riparian areas within the BSA are adjacent to developed areas and the margins of the lagoon. These areas consist mainly of nonnative trees and shrubs. The most common species include Canary Island date palm (*Phoenix canariensis*), river red gum (*Eucalyptus camaldulensis*), giant reed (*Arundo donax*), tobacco tree (*Nicotiana glauca*), salt cedar (*Tamarix* spp.), and castor bean (*Ricinus communis*).

Southern Coastal Salt Marsh

Southern coastal salt marsh is found in the eastern portion of the BSA. This community has not been tidally influenced since a weir was constructed across the ocean entrance in 1972. This community is largely dominated by Pacific pickleweed (*Salicornia pacifica*), with common associates including salty susan (*Jaumea carnosa*), alkali heath (*Frankenia salina*), alkali weed (*Cressa truxillensis*), salt grass, and southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*).

Southern Willow Scrub

Three small patches of southern willow scrub are found in the eastern portion of the BSA, in slightly higher elevation areas above the coastal and valley freshwater marsh but below the paved roads that surround the lagoon. This community is mainly composed of southern arroyo willow (*Salix lasiolepis*). Other associated species include coyote bush (*Baccharis pilularis*) and nonnative trees, such as Canary island date palm and river red gum.

3.2.2 Upland Vegetation Communities

Many upland vegetation communities are considered sensitive because they provide valuable nesting, breeding, and/or foraging habitat for special-status wildlife species. In addition, some upland vegetation communities such as coastal sage scrub are rapidly in decline due to development. Unlike riparian corridors, which are linear (in association with riverine systems), upland habitats typically form a large matrix and provide a broad variety of species structure and composition. Dense sage scrub vegetation or dense-canopied woodlands provide useful habitat and movement corridors for wildlife. Coastal sage scrub, coastal sage scrub/chaparral, and nonnative grasslands are considered sensitive by the County of San Diego (2009).

Coastal Scrub

The coastal scrub within the BSA is found on the embankment immediately south of Lagoon View Drive in the northeastern portion of the BSA. The coastal scrub community is dominated by Menzies' goldenbush (*Isocoma menziesii*) and coyote bush.

Diegan Coastal Sage Scrub

Diegan coastal sage scrub may be dominated by a variety of different species depending upon site-specific topographic, geographic, and edaphic conditions (Oberbauer et al. 2008) Within the BSA, this community is found in three small patches and is mainly composed of coastal sagebrush (*Artemisia californica*), California encelia (*Encelia californica*), and lemonade berry (*Rhus integrifolia*).

Diegan Coastal Sage Scrub: *Baccharis*-Dominated

The Diegan coastal sage scrub: *Baccharis*-dominated community is found in two small patches immediately east and west of Lagoon View Drive in the northeastern portion of the BSA. This community is dominated by coyote bush and tends to be less diverse than the other scrub communities.

Eucalyptus woodland

Eucalyptus woodland is found scattered throughout the BSA. The eucalyptus woodland within the study area consists of dense stands of nonnative eucalyptus trees, such as blue gum (*Eucalyptus globulus*), river red gum, and iron bark (*Eucalyptus cyderoxylon*). These introduced species produce large amounts of leaf and bark litter, the chemical composition of which may inhibit the establishment and growth of other species, especially natives, in the understory.

Nonnative Grassland

Nonnative grassland generally occurs on fine-textured loam or clay soils that are moist or even waterlogged during the winter rainy season and very dry during the summer and fall. The areas of nonnative grassland within the BSA are composed of nonnative annual grasses, such as red brome (*Bromus madritensis* ssp. *rubens*), ripgut grass (*Bromus diandrus*), wild oat (*Avena barbata*), and wall barley (*Hordeum murinum*). Other common species include common sow thistle (*Sonchus oleraceus*), black mustard (*Brassica nigra*), hottentot fig, Perez's sea lavender (*Limonium perezii*), pride of Madera (*Echium candicans*), radish (*Raphanus sativus*), and cheese weed (*Malva parviflora*). Although this community is mainly composed of nonnative species it may still be important foraging habitat for wildlife species.

3.2.3 Other Cover Types

Disturbed Habitat

Disturbed habitat is any land that has been permanently altered by previous human activity, including grading, repeated clearing, intensive agriculture, vehicular damage, or dirt roads. The disturbed habitat within the study area consists of areas cleared of vegetation or areas of dense nonnative plant species. The disturbed habitat in the eastern portion of the study area consists of bare ground and crown daisy (*Glebionis coronaria*). The disturbed habitat in the southeastern portion of study area consists of European olive (*Olea europea*) and the disturbed habitat in the western portion of the study area consists of hottentot fig.

Urban/Developed Land

The urban/developed land within the study area consists of single-family homes, apartment buildings, shopping centers, and paved roads. These areas also contain ornamental landscaping.

3.3 JURISDICTIONAL WATERS AND WETLANDS

This section summarizes the results of the reconnaissance-level jurisdictional assessment completed. A total of 224.2 acres of potential jurisdictional waters and wetlands occurs within the BSA. Of these acres, 219.7 acres is considered potential waters of the U.S. and state under the jurisdictional purview of USACE, RWQCB, and CDFW. An additional 4.5 acres of nonwetland riparian habitat is considered potential nonwetland riparian habitat subject to the regulatory purview of CDFW.

Total jurisdictional waters of the U.S. and CDFW are listed for each wetland habitat and other waters of the U.S. (in the form of wetlands or nonwetland waters/OHWM) in Table 3-3. Vegetation is classified by habitat type using both the San Diego Regional Holland Code Classification System (Holland 1986) as modified by Oberbauer (Oberbauer et al. 2008) and the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) to describe riparian and wetland (e.g., hydrophytic) vegetation communities occurring within the BSA. A summary of the jurisdictional waters of the U.S. and state, with the corresponding regulatory authority, occurring within the BSA, is provided in Table 3-3.

Table 3-3
Potential Waters of the U.S. and State Occurring within the BSA

Type of Jurisdictional Waters of the U.S. and State	Type of Habitat (Holland et al. 1986, Oberbauer et al. 2008)	Type of Habitat (Cowardin et al. 1979)	Area of Aquatic Resource (acres)
Jurisdictional Waters of the U.S. (USACE, RWQCB, CDFW, and CCC)			
Wetland	Southern Coastal Salt Marsh (52120)	Estuarine; nontidal; Emergent, Persistent, Seasonally Flooded, Mixohaline	14.8
Wetland	Coastal and Valley Freshwater Marsh (52410)	Palustrine; Emergent, Persistent, Permanently Flooded, Fresh	95.9
Wetland	Southern Willow Scrub (63320)	Palustrine; Scrub/Shrub Broad-leaved, Deciduous, Seasonally Flooded, Fresh	2.2
Other Waters	Open Water (64100)	Estuarine; Unconsolidated Bottom, Mud, Fresh	106.8
Subtotal Jurisdictional Waters of the U.S.			219.7
Jurisdictional Waters of the State (exclusively CDFW)			
Nonwetland Riparian	Nonnative Riparian (65000)	Palustrine; Forested Broad-leaved, Deciduous, Seasonally Flooded, Fresh	4.1
Nonwetland Riparian	Eucalyptus Woodland (79100)	Palustrine; Forested Broad-leaved, Evergreen	0.4
Subtotal Jurisdictional Waters of the State (CDFW)			*4.5*
Grand Total Jurisdictional Waters			**224.2**

3.4 FLORA

This section discusses plant species detected within the BSA or with potential to occur within the BSA. Approximately 123 plant species occur within Buena Vista Lagoon; of these 69 are nonnative. A comprehensive list of plant species occurring within Buena Vista Lagoon is included in Appendix A.

Special-status plant species are species that are legally protected under FESA or CESA, or other regulations. Plant species that are not legally protected under the CESA and/or FESA may still be protected by other regulations, or considered by the scientific community to be sufficiently rare to qualify for special-status protections. CNPS List 1A, 1B, and 2 species are fully considered, as they meet the definitions of Section 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (CESA) during the preparation of environmental documents relating to the California Environmental Quality Act (CEQA). Many CNPS List 3 and 4 species do not meet the definitions of Section 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (CESA) but are strongly recommended for consideration under CEQA (CNPS 2001).

Based on searches of the CNDDB and Jepson Online Interchange, 54 sensitive plant species are known from the project vicinity (Appendix B). Of these 54 sensitive plant species, 10 were determined to have some potential to occur in the BSA based on habitat conditions and regional location. One of the 54 sensitive plant species, southwestern spiny rush (*Juncus acutus* ssp. *leopoldi*), was detected within the BSA during the 2013 botanical surveys. Locations of this sensitive plant species within the BSA are mapped in Figure 10.

The 10 sensitive plant species determined to have some potential to occur within the BSA are discussed in more detail below, organized by federally listed, state listed, and nonlisted plant species.

3.4.1 Federally Listed Plant Species

Of the 10 sensitive plant species determined to have potential to occur in the BSA, two are listed as federally endangered; San Diego ambrosia (*Ambrosia pumila*) and coastal dunes milk-vetch (*Astragalus tener* var. *titi*). These two species were not detected within the BSA during surveys and are therefore not discussed further in this document.

3.4.2 State-Listed Plant Species

Of the 10 sensitive plant species determined to have potential to occur in the BSA, one is listed as state endangered: coastal dunes milk-vetch. This species was not detected within the BSA during surveys and is therefore not discussed further in this document.

Source: SANDAG 2012; SANGIS; AECOM 2014

600 300 0 600 Feet

Scale: 1 = 7,200; 1 inch = 600 feet

Figure 10
Special Status Plants

Buena Vista Lagoon Enhancement Project Biological Technical Report

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3.4.3 Nonlisted Special-Status Plant Species

Of the 10 sensitive plant species determined to have potential to occur in the BSA, eight are considered sensitive by the CNPS (Rank 1, 2, 3, or 4). Of these eight nonlisted sensitive plant species, one—southwestern spiny rush—was found to be present within the BSA as shown in Figure 10 and is discussed below.

Southwestern Spiny Rush

Southwestern spiny rush, which is a CNPS List 4.2 species, ranges from southern California south to Baja California, Mexico. Coastal salt marsh, brackish marsh, and alkaline meadows are all suitable habitat for this species (Reiser 2001). Southwestern spiny rush is found in the eastern portion of the BSA in southern coastal salt marsh and coastal and valley freshwater marsh habitats.

3.5 FAUNA

This section discusses wildlife species detected, or with potential to occur, within the BSA. A review of the wildlife studies outlined in Chapter 2 found that at least 296 wildlife species have been detected at Buena Vista Lagoon (Appendix E). This includes 17 aquatic invertebrates, 12 fish species, at least 15 reptile and amphibian species, at least 236 avian species, and 18 mammal species. A discussion of non-special-status wildlife species is provided below, followed by detailed discussions of each special-status species detected during surveys within the BSA.

The numbers depicted above include historical data. With changes of habitat within the BSA the numbers may have fluctuated, with decline for some species.

3.5.1 Non-Special-Status Species

Invertebrates

Insects play an important role within many native habitats. Many insects act as pollinators for specific plants, without which the plants would not be able to persist. Many common pollinators are butterflies and moths.

Aquatic invertebrate species detected during sampling in 1999 include *Daphnia pulex*, *Hyallela azteca*, *Tendipes* sp., *Physa gyrina*, *Trichocorixa reticulate*, *Oligochaeta*, *Helisoma* sp., *Palaemonetes paludosus*, *Planorbidae*, *Rana aurora*, *Corbicula fluminea*, *Odonata*, *Diptera*, *Chironomidae*, *Platyhelmenthis*, *Astacidae*, and *Plumatella repens*.

Fish

The fish found within the BSA consist of at least 12 species according to studies in 1999 (Coastal Environments 2000), and 2003 (Merkel and Associates and SAIC 2003, which is the most recent data available), with only two fish species native, and rest being nonnative species present within the BSA. The fish species detected within the BSA include the native California killifish (*Fundulus parvipinnis*), and striped mullet (*Mugil cephalus*). The remaining nonnative species are black bullhead (*Ameiurus melas*), brown bullhead (*Ameiurus nebulosus*), bluegill (*Lepomis macrochirus*), carp (*Cyprinus carpio*), mosquito fish (*Gambusia affinis*), golden shiner (*Notemigonus crysoleucas*), goldfish (*arassius auratus auratus*), green sunfish (*Lepomis cyanellus*), smallmouth bass (*Micropterus dolomieu*), and largemouth bass (*Micropterus salmoides*). The introduction of nonnative fish species can have negative impacts on native fish species through competition and predation. This may account for the very low numbers of striped mullet and California killifish detected during the 2003 fish assemblage surveys at Buena Vista Lagoon. No special-status fish species were detected within the BSA during those surveys, and it is highly unlikely that special-status fish species have been introduced to the lagoon since that time. Poor water quality, like in Buena Vista Lagoon, is a major contributor to declines and extirpation of listed species when they are present in a system. An assessment of the potential for listed species to occur in the lagoon concluded occupation was highly unlikely due to lack of suitable habitat, water quality, and the lack of presence prior to 2003.

According to local anglers and online fishing forums, Buena Vista Lagoon is popular with recreational fisherman, especially for catching freshwater species such as smallmouth and largemouth bass.

Reptiles and Amphibians

The riparian and upland vegetation communities present within and immediately adjacent to the BSA provide habitat for several reptile and amphibian species. Non-special-status amphibian species detected within the BSA include Pacific treefrog (*Hyla regilla*), bullfrog (*Rana catesbeiana*), pond slider turtle (*Trachemys scripta*), and garden slender salamander (*Batrachoseps major*). Non-special-status reptile species observed within the BSA include western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), western racer (*Coluber* *constrictor*), California kingsnake (*Lampropeltis getula californiae*), gopher snake (*Pituophis catenifer*), and southern pacific rattlesnake (*Crotalus oreganus helleri*).

Birds

The high diversity of bird species at the lagoon is a result of upland, riparian, open water, and coastal interface within or adjacent to the BSA. Bird use is one of the most studied biological elements of Buena Vista Lagoon (Coastal Environments 2000). The BSA has supported over 230 species, many using the BSA as stopover habitat during migration; others migrate to the BSA to breed or winter, and others are year-round residents.

Avian species commonly detected within the BSA during appropriate times of year include mallard (*Anas platyrhynchos*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), northern shoveler (*Anas clypeata*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), great blue heron (*Ardea herodias*), double-crested cormorant (*Phalacrocorax auritus*), pied-billed grebe (*Podilymbus podiceps*), western grebe (*Aechmophorus occidentalis*), American coot (*Fulica americana*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), bushtit (*Psaltriparus minimus*), northern mockingbird (*Mimus polyglottos*), black phoebe (*Sayornis nigricans*), common yellowthroat (*Geothlypis trichas*), yellow-rumped warbler (*Dendroica coronata*), California towhee (*Melozone crissalis*), white-crowned sparrow (*Zonotrichia leucophrys*), song sparrow (*Melospiza melodia*), house finch (*Carpodacus mexicanus*), lesser goldfinch (*Carduelis psaltria*), and house sparrow (*Passer domesticus*). A complete list of avian species detected during BVAS monthly bird counts since 2009 is included in Appendix F.

Mammals

Several species of mammals use upland habitat surrounding the lagoon. Mammal species detected within the BSA include red bat (*Lasiurus borealis*), long-eared myotis (*Myotis evotis evotis*), Virginia opossum *(Didelphis virginiana*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), California ground squirrel (*Spermophilus beecheyi*), pocket gopher (*Thomomys bottae*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), California vole (*Microtus californicus*), dusky-footed woodrat (*Neotoma fuscipes*), southern grasshopper mouse (*Onychomys torridus*), deer mouse (*Peromyscus maniculatus gambelli*), harvest mouse (*Reithrodontomys megalotis longicaudus*), San Diego black-tailed jack rabbit (*Lepus californicus bennettii*), brush rabbit (*Sylvilagus bachmani*), and desert cottontail (*Sylvivlagus audubonii*).

3.5.2 Special-Status Species

Based on a CNDDB search and literature review, 114 special-status wildlife species have potential to occur within the BSA (CDFW 2013; Coastal Environments 2000). Appendix G provides a summary of the special-status species known or potentially occurring with the BSA. Location data that were available for special-status wildlife species detected in the BSA are shown in Figure 11. Because of the biodiversity within the lagoon, special-status species, where suitable breeding habitat has been determined present on-site, were given particular attention within this report. Detailed discussions of special-status wildlife species detected during studies (Section 2.2.5) and considered resident/breeding within the BSA are provided below and summarized in Appendix G. Those special-status species with potential to occur, but that would be considered migrants/nonbreeding season residents (no suitable breeding habitat is present onsite), are only discussed in Appendix G and are not discussed further in this report.

3.5.2.1 Federally Listed Species

Of the 114 special-status species with potential to occur within the BSA, six species are listed as federally threatened or endangered and were detected on-site during previous studies:

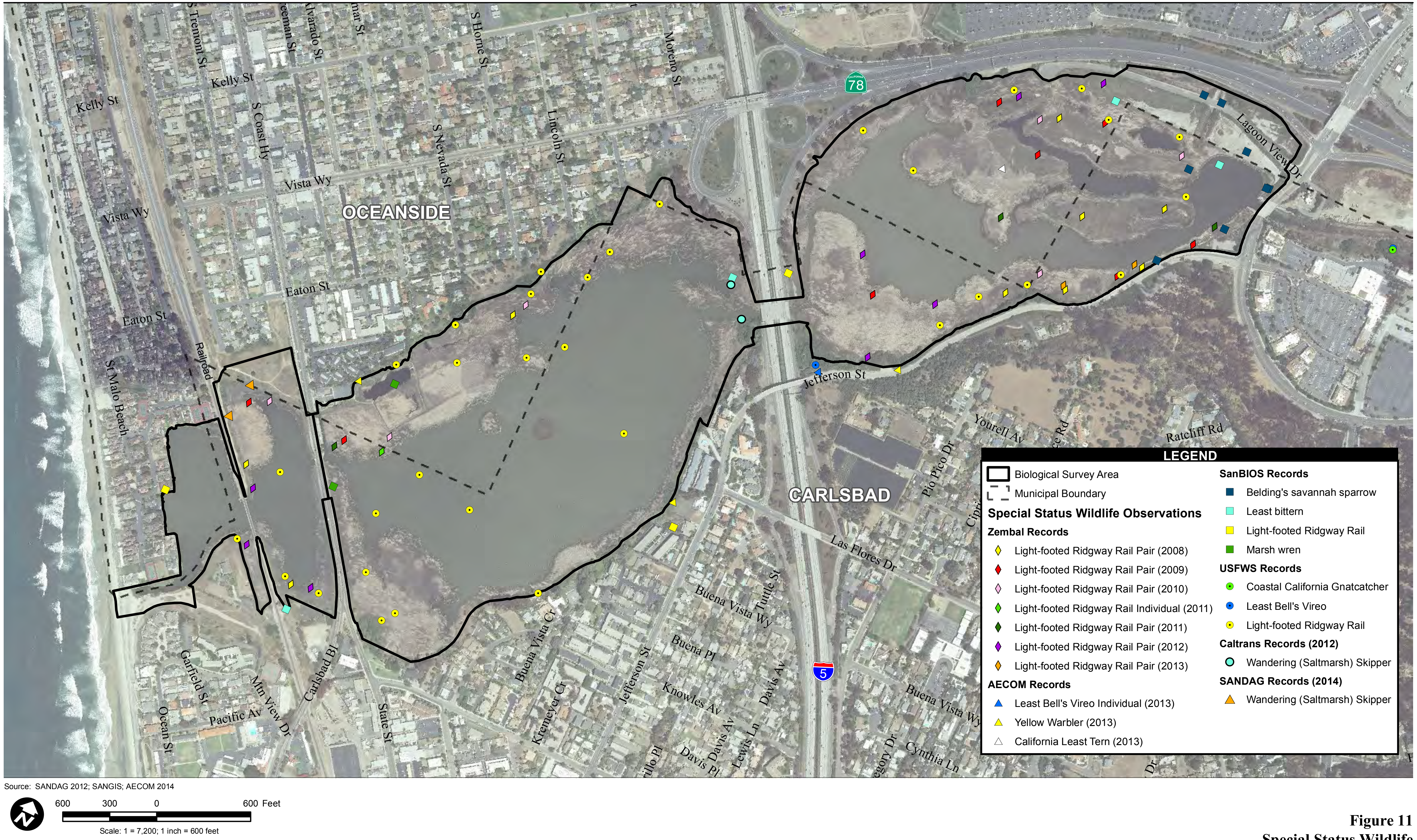
- light-footed Ridgway's rail
- western snowy plover
- California least tern
- southwestern willow flycatcher
- least Bell's vireo
- coastal California gnatcatcher

These species are discussed in further detail below.

Light-Footed Ridgway's Rail

The light-footed Ridgway's rail is federally and state listed as endangered. It was listed as endangered on October 13, 1970 (Federal Register 35 FR 16047). This listing status applies to the entire U.S. population of the species. The state listed the subspecies as endangered on June 27, 1971. USFWS has not designated critical habitat for this species.

The food supply for Ridgway's rail includes insects, spiders, arthropods, small fish, and vegetable matter; these birds are omnivorous and opportunistic (USFWS 1985a). Breeding habitat for this species is restricted to coastal salt marshes in southern California where vegetation is dominated by



Source: SANDAG 2012; SANGIS; AECOM 2014

Figure 11
Special Status Wildlife

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cordgrass (*Spartina foliosa*) and pickleweed (*Salicornia* sp.). It can also be found in brackish and freshwater marshes with cattails and bulrushes. In fresh/brackish water, Ridgway's rails build nests in dense cattail or bulrush. Ridgway's rails forage in higher marsh vegetation and along tidal creeks and at the interface between vegetation and adjacent mudflats. Breeding pairs of the light-footed Ridgway's rail have been found at 22 marshes throughout its range since 1980. As of the 2013 state-wide census, 525 light-footed Ridgway's rails exhibiting breeding behaviors were detected in 22 marshes. This is the highest count on record (Zembal et al. 2013). The light-footed Ridgway's rail ranges in disjunct populations from Santa Barbara County to San Diego County and into Baja California, Mexico. Light-footed Ridgway's rails are uncommon, very localized residents, and number around 100 pairs in San Diego County (Unitt 2004). The largest population in San Diego County is found in the Tijuana National Wildlife Refuge (Unitt 2004).

Suitable habitat within the BSA occurs where cattails and pickleweed are found throughout all basins within the BSA. Within the BSA, the light-footed Ridgway's rail is a year-round resident at Buena Vista Lagoon and can be heard calling at times, although it is rarely seen. Within the past 5 years, the total number of breeding pairs in the lagoon has ranged from a high count of nine, dwindling to only two pairs in 2013, and four pairs in 2014 (Zembal et al. 2013; Zembal et al. 2014). As of 2012, when nine breeding pairs were present, five pairs were found in the I-5 Basin and four pairs were found in the Coast Highway and Railroad Basins. Only one male was found in the Coast Highway Basin near the Interpretive Center. Surveys were conducted in appropriate breeding habitat. Rails were detected mostly by listening for the call of the rail. Tape playback of various Ridgway's rail calls was also used to elicit responses. Locations of light-footed Ridgway's rail observations within the BSA from the past 5 years are depicted in Figure 11. Survey reports from 2009, 2010, and 2013 are found in Appendices H, I, and J, respectively.

Western Snowy Plover

The western snowy plover is listed as federally threatened and a species of special concern by the state. The western snowy plover was listed by USFWS on March 5, 1993 (Federal Register 58 FR 12874). A recovery plan has been adopted for this species (USFWS 2007). Critical habitat was designated on September 29, 2005 (USFWS 2005).

Western snowy plover occurs along the Pacific coast from southern Washington to Baja California. It is a common winter migrant, winter visitor, and a declining and local resident in San Diego County. It nests on undisturbed, flat areas with loose substrate, such as sandy beaches and dried mudflats along the California coast. Western snowy plovers forage primarily on the wet sand at the marine beach-surf interface, where they feed on small crustaceans, marine worms, insects, and amphipods. They have also been observed gleaning insects while in flight (USFWS 2007). Lagoons with some salinity have been shown to provide the best foraging habitat. Nesting occurs between April 1 and September 15. The species is declining because of increased human disturbance, loss of feeding and nesting areas, and increased predation by birds and mammals. Few undisturbed beach areas remain in San Diego County.

Presently, suitable habitat within the BSA occurs mainly at the beach at the west end of the BSA; however, if water levels were to drop and expose mudflats, suitable foraging habitat would be available for this habitat type, which may occur at the fringes of the open water within each basin. Within the BSA, snowy plovers are rarely observed foraging on the beach during the winter season. Historically, plovers were recorded nesting within the BSA; however several historic nesting sites (including Buena Vista Lagoon) have been altered so much by development, erosion, and human-use that breeding habitat no longer exists for snowy plovers (Western Birds 1981). Survey results are included in Appendix K.

California Least Tern

The California least tern is a federally endangered species. The California least tern was listed by USFWS on October 13, 1970 (Federal Register 35 FR 16047). This listing status applies to the entire population of *S. a. browni*. Critical habitat has not been determined by USFWS, although there is an approved recovery plan for the species. The state listed the subspecies as endangered on June 27, 1971.

The species breeds from San Francisco Bay south to Baja California. In San Diego County, it is a fairly common summer resident from early April to the end of September (Unitt 2004). Significant nesting sites in San Diego County include Mission Bay, Aliso Creek, Batiquitos Lagoon, Tijuana River mouth, Chula Vista, North Island Naval Air Station, San Elijo Lagoon, and Lindbergh Field. Wintering areas are thought to be along the Pacific coast of South America. The species historically nested colonially on beaches that are undisturbed, sparsely vegetated, flat areas with loose, sandy substrate. Few beach nesting areas remain and least terns are now found in varied habitats ranging from mudflats to airports. Adults roost primarily on the ground. They typically forage in areas with water less than 60 feet in depth (Atwood and Minsky 1983). This small migratory tern begins nesting in mid-May and is present at nesting colonies from April through August. The species nests in loose colonies in areas relatively free of human or predatory disturbance. Nests are on barren to sparsely vegetated sites near water, usually with a sandy or gravelly substrate.

Much of the least tern’s habitat has been lost because of human development and disturbance, and there are likely to be few opportunities to create or restore habitat to increase the number of nesting sites (USFWS 2006). Subsequent management of nesting sites, including fencing and predator control at nesting colonies, contributed to an increase in the population in California to approximately 7,100 pairs in 2005 (USFWS 2006). In San Diego County, the least tern population has increased from approximately 500 pairs in the 1970s to 2,100 to 2,800 pairs in 1997–2002 and nearly 4,000 pairs in 2003 (Unitt 2004).

Suitable habitat within the BSA occurs mainly at the beach at the west end of the BSA; however, this species regularly forages throughout the open water of all basins within the BSA. In San Diego County, this species has been documented feeding on deepbody and slough anchovies (*Ancho* sp.), shiner surfperch (*Cymatogaster aggregata*), longjaw mudsucker (*Gillichthys mirabilis*), California killfish, jacksmelt (*Atherinopsis californiensis*), and mosquitofish (*Gambusia affinis*) (USFWS 1985a). Within the BSA, the least tern is a common migrant and is observed foraging during the appropriate time of year. Records indicate that this species historically had a breeding population within the BSA; the last records of breeding within the BSA are from 1992. Therefore, it is highly unlikely this species would be found nesting in the BSA. It appears that large roosting flocks of gulls, pelicans, etc., along with the many perches and trees on the periphery of the BSA for raptors to hunt from, discourage breeding attempts in the area. One least tern was incidentally detected foraging within the BSA during 2013 surveys (Figure 11). Survey results from 2003 are included in Appendix L.

Southwestern Willow Flycatcher

The southwestern willow flycatcher, a subspecies of willow flycatcher (*Empidonax trailli*), is a federally endangered species (USFWS 1995). The southwestern willow flycatcher was federally listed as endangered in 1995 and state listed as endangered in 1990. Federally designated critical habitat exists for the subspecies. A recovery plan has been adopted for the southwestern willow flycatcher.

The southwestern willow flycatcher is a summer breeding resident in riparian habitats in southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and northwestern Mexico (USFWS 1995). In San Diego County, only two large, consistent breeding populations are known to remain along the Santa Margarita River and the upper San Luis Rey River. The southwestern willow flycatcher is restricted to dense riparian woodlands of willow, cottonwood, and other deciduous shrubs and trees. In general, the riparian habitat of this species tends to be rare, isolated, small, and/or in linear patches, separated by vast expanses of arid lands. Egg laying by the endangered southwestern willow flycatcher occurs in San Diego County from the end of May through the end of June.

Within the BSA, breeding habitat for this species does not occur. There is a CNDDB record of this species found approximately 1 mile west of the BSA. It is unclear if this record is accurate, or if it was a migrating willow flycatcher of unknown subspecies. Survey results from 2013 are included in Appendix M.

Least Bell's Vireo

The least Bell's vireo was federally listed as endangered in 1986 and state listed as endangered in 1980 (USFWS 1996). Federally designated critical habitat exists for the species. The least Bell's vireo is the westernmost subspecies of the Bell's vireo and breeds entirely within southern California and Baja, California.

Least Bell's vireo breeding season extends from March through September. During the breeding season, the least Bell's vireo is restricted to riparian woodland and riparian scrub. In San Diego County, it occurs mainly in the coastal lowlands, rarely up to 3,000 feet elevation. Territory size ranges from 0.5 to 7.5 acre and there is evidence of high site fidelity among adults (Kus 2002). Early to midsuccessional riparian habitat is typically used for nesting by this vireo because it supports the dense shrub cover required for nest concealment as well as a structurally diverse canopy for foraging (Kus 2002). Food supply for this species consists of insects, including bugs, beetles, grasshoppers, moths, and caterpillars (USFWS 1998).

Within the BSA, this species has been recorded within southern willow scrub habitat in the BSA. Observations of this species within willow scrub were on the south side of the BSA in the I-5 Basin during focused surveys for the species (AECOM 2013). However, this species was detected during a single survey, and presumably was a migrant using the BSA as stop-over habitat (Figure 11). Survey results from 2013 are included in Appendix M.

Coastal California Gnatcatcher

The coastal California gnatcatcher was listed as federally threatened in 1993 and is a state species of special concern. Federally designated critical habitat exists for the species. Coastal California gnatcatcher is declining proportionately with the continued loss of coastal sage scrub habitat in the six southern California counties (San Bernardino, Ventura, Los Angeles, Orange, San Diego, and Riverside) located within the coastal plain.

Habitat preferences in San Diego County consist of Diegan coastal sage scrub dominated by California sagebrush and flat-topped buckwheat, which are the primary plants used by coastal

California gnatcatchers when foraging for insects (ERCE 1990). The species inhabits coastal sage scrub vegetation below 2,500 feet elevation in Riverside County and generally below 1,000 feet elevation along the coastal slope in San Diego County; it generally avoids steep slopes above 25 percent and dense, tall vegetation for nesting.

Within the BSA, the coastal California gnatcatcher has historically been known to occur within the coastal sage scrub located at the east end of the BSA. However, the minimal amount of suitable habitat within the BSA, and very infrequent detections of this species likely indicate dispersing individuals from other nearby breeding locations outside the BSA. From available sources, the last coastal California gnatcatcher detection was from 1997 (eBird 2014). Survey results from 2013 are included in Appendix M.

3.5.2.2 State Listed Species

Of the 115 special-status species with potential to occur within the BSA, five species were listed as state threatened or endangered and were detected during previous studies within the BSA: California least tern, least Bell's vireo, light-footed Ridgway's rail, southwestern willow flycatcher, and Belding's savannah sparrow. The California least tern, least Bell's vireo, light-footed Ridgway's rail, and southwestern willow flycatcher are also federally listed and were discussed above. The Belding's savannah sparrow is discussed in detail below.

Belding's Savannah Sparrow

Belding's savannah sparrow is a state-listed endangered species. Belding's savannah sparrow is a resident from Santa Barbara County to northern Baja California. In San Diego County, populations are known from the Tijuana estuary, San Diego Bay, Mission Bay, San Dieguito Lagoon, Peñasquitos Lagoon, San Elijo Lagoon, Batiquitos Lagoon, Agua Hedionda Lagoon, Santa Margarita River mouth, and Aliso Creek mouth (Unitt 2004). Its preferred habitat is the edge of pickleweed-dominated coastal salt marsh associations. Breeding occurs mostly in dense, moist grasslands, wet meadows, and salicornia wetlands, with or without scattered shrubs or clumps of tall herbs. In winter, the species occupies moist and dry grasslands but prefers dense, short ground cover. It also occurs in low vegetation in croplands and along beaches and shorelines. The preferred food source for this species is brine flies (Zembal and Hoffman 2010). The primary threat to the species is the massive loss of coastal salt marsh habitat that has occurred in recent years.

Suitable habitat within the BSA occurs where pickleweed is found, particularly in the I-5 Basin at the northeastern portion of the BSA. This species may forage at the beach at the west end of the BSA. Within the BSA, the Belding's savannah sparrow is not a common resident within the pickleweed marsh. Surveys have been conducted within the lagoon from 1973 through 2010. Since 1986, the BSA has been surveyed every 5 years as part of a state-wide survey effort for the species. During the 2010 survey, no Belding's savannah sparrow territories were detected. According to Zembal et al., the freshwater marsh and song sparrows (*Melospiza melodia*) have encroached into pickleweed bands enough to preclude Belding's (Zembal et al. 2010b). From available sources, the last Belding's savannah sparrow detection was actually from 2010 (eBird 2014). With conflicting data in 2010, it is possible this species was detected during surveys, but not showing territorial behaviors due to degrading and unsuitable habitat, and was present in extremely low numbers. According to monthly bird counts, savannah sparrows were detected in 2009 and 2011 but were not identified as Belding's savannah sparrow. In 2009, the observation was in May, and in 2011 was in November, both months when other migratory (nonresident) subspecies of savannah sparrow are present within San Diego County. Based on survey data, it is highly unlikely this species would be found nesting in the BSA. Survey results from 2010 are found in Appendix N.

3.5.2.3 Nonlisted Special-Status Species

In addition to the federally and state-listed species discussed above, 23 nonlisted special-status wildlife species were detected during previous surveys. Nonlisted special-status species with potential to occur in the BSA, but not detected during historic surveys, are reviewed in Appendix G and are not addressed further in the text. Nonlisted special-status species detected in the BSA, but where the BSA does not contain suitable breeding habitat, are reviewed in Appendix G and are not addressed further in the text.

Nonlisted special-status wildlife species that were detected during previous studies and are considered resident/breeding within the BSA include wandering (salt marsh) skipper, western spadefoot toad (*Spea hammondii*), ~~south~~western pond turtle (*~~Actinemys~~ Emys marmorata marmorata ~~pallid~~*), San Diego coast horned lizard (*Phrynosoma coronatum* (*blainvillei*), two-striped garter snake (*Thamnophis hammondii*), redhead (*Aythya americana*), least bittern (*Ixobrychus exilis*), white-faced ibis (*Plegadis chihi*), white-tailed kite (*Elanus leucurus*), Cooper's hawk (*Accipiter cooperi*), northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), Allen's hummingbird (*Selasphorus sasin*), Nuttall's woodpecker (*Picoides nuttallii*), western bluebird (*Sialia Mexicana*), Clark's marsh wren (*Cistothorus palustris clarkae*), yellow warbler (*Dendroica petechia brewsteri*), yellow-breasted chat (*Icteria virens*), western red bat

(*Lasiurus blossevillii*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), southern grasshopper mouse (*Onychomys torridus Ramona*), and San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). These species are discussed below.

Invertebrates

Wandering (Salt Marsh) Skipper

The salt marsh skipper is distributed along the coast from near the mouth of the Santa Clara River to San Diego County (Emmel and Emmel 1973). It is restricted to estuarine and tideland habitats where adults are often associated with salt grass. Adults are dull brown in color with a wingspan of about an inch. Emergence appears to occur from July through September but it is uncertain whether there is an earlier brood. Larvae utilize salt grass as a food plant but females reportedly will deposit their eggs on other grass species and the larvae will occasionally feed on other thin bladed grasses such as cordgrass and Bermuda grass (Emmel and Emmel 1973). Native nectar sources include deerweed (*Lotus scoparius*), salty susan, and frankenia (*Frankenia* spp.). Adults have been observed using introduced species such as heliotrope (*Heliotropium curvassavicum*), sea rocket (*Cakile maritima*), sea-fig (*Carpobrotus* sp.), and chrysanthemum (*Chrysanthemum coronarium*) as nectar sources at the Tijuana Estuary.

This species was detected during surveys in August 2012 during surveys of the Caltrans right-of-way. Two individuals were observed west of I-5, and there were no observations east of I-5 (Figure 11). Suitable breeding and foraging habitat is present throughout all basins within the BSA, where widespread coastal and valley freshwater marsh habitat is located, and within the I-5 Basin where southern coastal salt marsh is present. It should be noted that, although this species is typically associated with salt marsh habitat, it was found in areas mapped as coastal and valley freshwater marsh habitat where infrequent, scattered salt marsh species were present including the skipper’s required host plant, salt grass, likely from historical remnant salt marsh habitat prior to influence from the ocean. These areas of salt marsh vegetation were so small and infrequent that they did not meet the minimum mapping unit of 0.5 acre for wetland vegetation. Thus, it is a conservative assumption that salt marsh skipper may inhabit coastal and valley freshwater marsh throughout the BSA.

Reptiles and Amphibians

Western Spadefoot Toad

The western spadefoot is a CDFW species of special concern. It occurs in the Central Valley of California and west of the coastal ranges from Point Conception to northern Baja California It is found from near sea level to 1,363 m, but usually below 910 m (Stebbins 1985). Western spadefoot toads occur in a wide range of habitats including lowlands to foothills, grasslands, open chaparral, coastal sage scrub, pine-oak woodlands.

The western spadefoot toad was historically detected within or in the vicinity of the BSA (Coastal Environments 2000). Given this is a historical record; it is unclear if this species occurred within the BSA, or adjacent habitats of the Buena Vista Creek Ecological Reserve. Suitable habitat may occur where coastal sage scrub is found at the east end of the BSA.

~~Southw~~Western Pond Turtle

The ~~south~~western pond turtle is a state species of special concern. It inhabits slow-moving rivers, streams, and ponds of coastal California from the San Francisco Bay area and the central valley south and into northern Baja California. Its elevational distribution is from sea level to 1,430 m. It most often occurs in smaller pools and permanent or intermittent streams. In intermittent streams, the turtles rely on small pools that persist through the dry season. Emergent marsh vegetation along the water course is needed for cover.

The ~~south~~western pond turtle has been historically detected within the BSA (Coastal Environments 2000). It likely occurs along the water's edge. Given this is a historical record, it is unclear if this species occurred within the BSA, or adjacent habitats of the Buena Vista Creek Ecological Reserve. Suitable habitat occurs in all basins along the shoreline and waters with emergent marsh vegetation throughout the BSA. The most recent siting of the western pond turtle was pre-1988 with no evidence of sitings since that time (CDFW 2015).

San Diego Coast Horned Lizard

This subspecies is a CDFW species of special concern. It is endemic to extreme southwestern California, from Los Angeles County into Baja California. In San Diego County, it is relatively widespread and locally common from the coast to the western edge of the desert. San Diego horned lizards occur from sea level to over 8,000 feet. They are most often found on sandy or friable soil with a variety of habitats from sage scrub and chaparral to coniferous and broadleaf woodlands.

The San Diego coast horned lizard has been historically detected within the BSA (Coastal Environments 2000). Given this is a historical record, it is unclear if this species occurred within the BSA, or adjacent habitats of the Buena Vista Creek Ecological Reserve. Areas of coastal sage scrub and nearby chaparral at the eastern end of the BSA is where the species would likely occur.

Two-Striped Garter Snake

Two-striped garter snake is a CDFW species of special concern. It is locally common in aquatic habitats from coastal central California to northwestern Baja California from sea level to 2,450 m. It is widespread and locally common in creeks throughout western and central San Diego County, but is absent from the desert.

This garter snake occurs in aquatic habitats, preferring rocky streams with protected pools, cattle ponds, marshes, vernal pools, and other shallow bodies of water lacking large aquatic predators.

The two-striped garter snake has historically been detected within the BSA (Coastal Environments 2000). Given this is a historical record, it is unclear if this species occurred within the BSA, or adjacent habitats of the Buena Vista Creek Ecological Reserve. Habitat for this species occurs throughout all basins in the shallow nearshore waters of the BSA.

Birds

Redhead

The redhead is a CDFW species of special concern. The redhead is mainly a winter visitor to San Diego County, but it also breeds in small numbers along the county’s north coast (Unitt 2004). Mission Bay supports hundreds of birds in the winter; however, this species is also found in lagoons and lakes. The nests are usually within dense marshes often over the water. San Diego County represents the southern tip of the species’ breeding range along the Pacific coast of North America (Unitt 2004).

This species has successfully bred within the BSA (Unitt 2004) and can be found throughout the waters and shorelines of the BSA.

Least Bittern

The least bittern is a CDFW species of special concern. Most of the California population winters in Mexico and migrates in the spring and the summer to scattered locations in the western United States, including the Colorado River, Salton Sea, and coastal lowlands of southern California where some populations are resident (Unitt 2004). Least bittern inhabits fresh and brackish water marshes, usually near open water sources, and desert riparian habitats.

The least bittern has been documented breeding within the BSA. The cattails located throughout all basins within the BSA are where this species is most likely to be detected.

White-faced Ibis

The white-faced ibis is a CDFW species of special concern. The white-faced ibis is an uncommon winter migrant and visitor and a rare summer resident of San Diego County. The range of the species extends from Oregon, south to Argentina, and southeast to Louisiana. It frequents freshwater lagoons, rivers, lakes, wet agricultural fields, and occasionally salt marshes.

This species can be found foraging along the water's edge, in shallow water and perched on cattails located throughout all basins within the BSA. This species has historically nested within the BSA.

White-tailed Kite

The white-tailed kite is a fully protected species by CDFW. White-tailed kites are resident in southern Texas and California; at scattered locations in Washington, Oregon, and Florida; and from Mexico to South America. In southern California, kites are widespread except in the Anza-Borrego Desert (Unitt 2004). While this species is commonly observed hunting within savanna, open woodlands, marshes, grasslands, and agricultural fields, they are known to almost exclusively nest in association with watercourses. Nests are typically placed in the crowns of oaks or other densely foliaged trees. In San Diego County, the nesting season lasts from February through fledging in June (Unitt 2004).

The white-tailed kite utilizes the entire BSA and was documented within the BSA during the monthly bird counts. Suitable foraging and breeding habitat occurs throughout all basins within the BSA. Foraging habitats are located in all basins wherever any vegetation occurs. Favored nesting habitats of this species would include any larger trees or woodlands within or adjacent to the BSA.

Cooper's Hawk

The Cooper's hawk is a designated animal on the CDFW Watch List. The species is a breeding resident throughout most of the wooded portion of California. In San Diego County, the Cooper's hawk occurs as a year-long resident and a winter migrant. Cooper's hawks nest primarily in oak woodlands but occasionally in willows or eucalyptus. The species prefers dense stands of live oak, riparian deciduous, or other forest habitat near water. The species usually nests and forages near open water or riparian vegetation. The Cooper's hawk will catch small birds, especially young during nesting season, and small mammals. They will also forage on reptiles and amphibians.

Cooper's hawk is typically found in wooded areas throughout the BSA and was documented during the monthly bird counts. Favored nesting habitats of this species would include any larger trees or woodlands within or adjacent to the BSA.

Northern Harrier

The northern harrier is a CDFW species of special concern. San Diego County lies at the southwest edge of the harrier's breeding range in North America (Johnsgard 1988). Northern harrier is an uncommon to fairly common winter visitor and rare and local summer resident in the coastal lowlands of San Diego County (Unitt 2004). Since the mid-1970s, some documented nesting locations in San Diego County include Marine Corps Base Camp Pendleton and Sweetwater River estuary, and Proctor Valley (Unitt 2004). Harriers breed in marshes and grasslands and forage in grasslands, agricultural fields, wetlands, and open coastal sage scrub.

Home ranges and breeding territories are variable in size and probably reflect differing habitat resources (Johnsgard 1988). This species responds to local prey abundance and can therefore be spatially unpredictable. Reproduction is similarly flexible, with no long-term pair bonds and little site fidelity between years. Males are facultatively polygamous under conditions of abundant food.

Northern harrier is typically found utilizing the marshes, grasslands, and saltpan/open water habitats and is documented during monthly bird counts within the BSA. Suitable nesting and foraging habitat occurs throughout all basins within the BSA. Foraging habitats are located in all basins wherever any vegetation occurs. Although breeding habitat is found within all basins within the

BSA, the proximity of human disturbance would likely exclude all basins east of I-5, and the islands at the northeast portion of the I-5 Basin would be most suitable.

Osprey

The osprey is a designated animal on the CDFW Watch List. Ospreys breed throughout California around large bodies of water but are more common in northern California and along the coast. The species is an uncommon year-round resident and more common winter migrant in San Diego County. Known nesting or wintering areas within the county include North Island Naval Air Station, Lake Murray, Lake Hodges, Sweetwater, Morena, Mission Bay, Mesa College, Marron Valley, Torrey Pines State Reserve, and National City. Nests are generally built near water, often in large trees, snags, and dead-topped trees in open forest habitats for cover. The species requires clear, open waters for foraging. Within San Diego County, it is often found near large bodies of water (Unitt 2004). The osprey is a year-long, diurnal species. It preys mostly on fish but will also take mammals, birds, reptiles, amphibians, and invertebrates. The osprey breeds from March through September. An average clutch size is one to four eggs. Colonial nesting is common. Ospreys will build large stick nests and often reuse them year after year (Unitt 2004). They will build nests on trees, cliffs, or man-made structures. Young can breed when 3 years old. In California, the osprey migrates south along the coast and the western slope of the Sierra Nevada to Central and South America in October. Ospreys arrive on their nesting grounds mid-March to early April. Pesticides have caused reproductive failure in the past (Garber 1972). However reproductive success appears to be increasing since the early 1970s (Airola and Shubert 1981; Unitt 2004).

The osprey is found foraging over the open waters of the BSA and was documented within the BSA during the monthly bird counts. This species will also utilize any habitat within the BSA with an available perch, including the ground. Potentially suitable nesting habitat is present within and adjacent to the BSA where there are large trees.

Allen’s Hummingbird

The Allen’s hummingbird is a federal bird of conservation concern. It breeds only along a slender strip along the coast of California and southern Oregon. This species was first recorded nesting in San Diego County in 2001 (Unitt 2004). This species is now a common nesting species in the county.

This species is detected on monthly bird counts and can be found around any vegetation in all basins throughout the BSA.

Nuttall's Woodpecker

The Nuttall's woodpecker is a federal bird of conservation concern. This species is San Diego County's most widespread woodpecker, a common permanent resident in riparian, oak, and coniferous woodlands. This species occupies almost the entire coastal slope of the county (Unitt 2004).

This species is detected on monthly bird counts. It can be found in all scrub and trees in all basins within the BSA.

Western Bluebird

The western bluebird is a covered species by MHCP/ Natural Community Conservation Plan, and the City of Oceanside subarea plan (Foothill and Associates 2010). This species is a common resident of San Diego County's foothills and meadows, especially where meadows lie among groves of oak or pine (Unitt 2004). The western bluebird is a cavity nester and competes heavily with many other species for holes in trees. Although there is competition for nesting sites for the western bluebird, this species appears to be expanding its range and colonizing urban areas with mature trees and large lawns (Unitt 2004). Insects are the primary food source during the warmer months, and during the winter season it favors berries and is especially attracted to mistletoe.

The breeding distribution of western bluebirds in San Diego County is largely associated with montane coniferous and oak woodlands. Where these habitats occur (mainly the mountains of San Diego County), this species is relatively abundant during the breeding season. Approaching the coast, the western bluebird becomes less abundant and more localized (Unitt 2004). Nesting of this species is primarily in early April through the end of June.

This species is detected on monthly bird surveys and may be detected in a variety of habitats in all basins within the BSA.

Clark's Marsh Wren

The Clark's marsh wren is a CDFW species of special concern. Clark's marsh wren is a year-round resident that inhabits freshwater and brackish marshes mainly along the coast. It is joined by migratory marsh wrens during the winter season. This species is known to have a long breeding season in the county with newly fledged young recorded within the BSA on April 15,

2000. These fledglings likely came from eggs laid in mid-March. Fledglings from a location outside of the BSA were encountered in late July 2000 (Unitt 2004).

This species was detected by AECOM biologists in 2013; it is also detected during monthly bird surveys. Habitat for this species is mainly throughout all the cattails in all basins within the BSA.

Yellow Warbler

The yellow warbler (*brewsteri* subspecies) is a state species of special concern. The yellow warblers nesting in San Diego County and most migrants are *D. p. morcomi* (Unitt 2004). However, per the American Ornithologists' Union, *D. p. brewsteri* is considered not separable from *D. p. morcomi*; therefore, they have been addressed as sensitive herein.

The yellow warbler breeds from northern Alaska and Canada southward to the middle United States and in the western United States southward into Mexico. This warbler winters in Mexico and in Central and South America. Nest building may occur as early as April in San Diego County, with fledglings reaching independence by August (Unitt 2004). This species occurs most commonly in riparian woodlands dominated by willows. The yellow warbler is frequently parasitized by the brown-headed cowbird (*Molothrus ater*).

The yellow warbler was documented within the BSA in 2013 by AECOM biologists (Figure 11) and during monthly bird counts (Appendix G). The yellow warbler is primarily associated with southern willow scrub habitat. This species, however, can also be found foraging in other habitats within the BSA, such as nonnative vegetation during migration and post-breeding dispersal.

Yellow-breasted Chat

The yellow-breasted chat is a state species of special concern. This species breeds across the central and eastern United States and southern Canada from South Dakota to New Hampshire and southward to eastern Texas and northern Florida. It also occurs in scattered regions across the western United States from southern Canada to very northern Mexico. In San Diego County, nest building typically occurs in May and fledging is completed by August (Unitt 2004). In California, chats require dense riparian thickets associated with watercourses, saturated soils, or standing water (lakes or ponds). They typically occur in riparian woodland/scrub with dense undergrowth. In San Diego County, this species occurs in the coastal lowlands and is strongly concentrated in the northwest portion of the county (i.e., Santa Margarita River and San Luis Rey River) (Unitt 2004).

Comparable to other breeding riparian passerines addressed herein, the chat is frequently parasitized by the brown-headed cowbird.

The yellow-breasted chat appears only to occur within the BSA as a migrant and is rarely detected according to BVAS Monthly Bird Counts and eBird database (eBird 2014). Habitat within the BSA that may support the species is southern willow scrub habitat, located at the southwestern portion of the I-5 Basin.

Mammals

Western Red Bat

The western red bat is a CDFW species of special concern. It is locally common in some areas of California, occurring from Shasta County to the Mexican border, west of the Sierra Nevada/Cascade crest and deserts. The winter range includes western lowlands and coastal regions south of San Francisco Bay. There is migration between summer and winter ranges, and migrants may be found outside the normal range. Roosting habitat includes forests and woodlands from sea level up through mixed conifer forests. This species roosts in the foliage of large shrubs and trees, usually sheltering on the underside of overhanging leaves. Foraging has been noted in habitats such as mature orchards, oak woodland, low-elevation conifer forest, along riparian corridors, among nonnative trees in urban and rural residential areas, and also near strong lights that attract flying insects. In addition, this species may forage in habitats and agricultural areas adjacent to streams and rivers that do not provide roosting habitat.

Suitable foraging and roosting habitat exists throughout all basins within the BSA. Large trees scattered within and immediately adjacent to the BSA provide some suitable roosting habitat.

As listed above, the western red bat is a CDFW species of special concern that has the potential to occur within the BSA. While not specifically observed during biological surveys, CDFW staff have observed bats roosting in the I-5 bridge (CDFW 2015).

Northwestern San Diego Pocket Mouse

Northwestern San Diego pocket mouse is a CDFW species of special concern. It occurs on the coastal slope of southern California and northern Baja California. Its range extends as far north as Claremont and San Bernardino and as far east as Banning and Jacumba. It is often associated with open, arid habitats including coastal sage scrub, annual grassland, and desert habitat.

This species was historically detected. Given this is a historical record; it is unclear if this species occurred within the BSA, or adjacent habitats of the Buena Vista Creek Ecological Reserve. The coastal sage scrub located at the east end of the BSA would likely be where it may be encountered.

Southern Grasshopper Mouse

The southern grasshopper mouse is a CDFW species of special concern. It ranges from San Fernando in the north, along the more arid coastal lowlands to northwestern Baja California. It nests in abandoned burrows of other rodents, usually in dry, friable soil with low to moderate shrub cover.

Given this is a historical record; it is unclear if this species occurred within the BSA, or adjacent habitats of the Buena Vista Creek Ecological Reserve. This species may occur within the BSA in the nonnative grasslands at the southwest portion of the Weir Basin, the northeast portion of the Railroad Basin, and the coastal sage scrub at the east end of the I-5 Basin.

San Diego Black-tailed Jack Rabbit

The San Diego black-tailed jackrabbit is a CDFW species of special concern. It is found from the coast to the western slope of the coastal mountains, up to 6,000 feet, in San Diego County. It inhabits open land but requires some shrubs for cover. Typical habitats include early stages of chaparral, open coastal sage scrub, and grasslands near the edges of brush.

This species was historically detected within or adjacent to the BSA. Habitat at the east end of the BSA is where it may be found.

3.6 ESSENTIAL FISH HABITAT/CRITICAL HABITAT

No essential fish habitat or critical habitat for wildlife species occurs within the BSA.

3.7 WILDLIFE MOVEMENT

Connectivity, or the ability of organisms to move through a landscape, is essential in heterogeneous landscapes, especially in increasingly urban settings, for the persistence of healthy and genetically diverse animal communities. Corridors can facilitate connectivity on different temporal and spatial scales. Corridors are linear landscape features that allow for species movement over time between two patches of habitat or patches of vital resources that would otherwise be disconnected (Beier and Noss 1998; Lidicker and Peterson 1999; Beier et al. 2008). Because many wildlife species have species-specific habitat requirements for survival and dispersal, corridors may also be species specific. At a minimum, corridors promote local colonization or recolonization of distinct habitat patches and potentially increase genetic variability within and between populations. Isolation of populations can have harmful impacts on both population genetics and metapopulation dynamics. In addition, increased exposure to an inhospitable urban matrix due to reductions in connectivity can increase general mortality. All of these factors can contribute significantly to local species extinctions. Thus, corridors help species populations, distributed in and among habitat patches, to persist over time.

Local corridors allow resident animals to access critical resources (food, water, and cover) in other areas that might otherwise be isolated. The area is important to local wildlife movement, as it provides open, undeveloped habitats for wildlife use. In general, wildlife species are likely to use habitat in the BSA for movements related to home range activities (foraging for food or water, defending territories, searching for mates, breeding areas, or cover).

Regional corridors link two or more large areas of natural open space. Buena Vista Lagoon has been identified as a Biological Core and Linkage Area (BCLA) under the MHCP, and it is completely surrounded by development. Instead of functioning as a regional corridor Buena Vista Lagoon is a large area of natural open space that is important because it provides habitat for core populations of sensitive wildlife and plant species. Instead, it is a large area of natural open space that is important in that it provides a large area of habitat for core populations of sensitive wildlife and plant species, for local movement. This BCLA functions as a large contiguous area of habitat that supports major and critical species populations such as those species discussed in this document, and is considered an area of high habitat value (SANDAG 2003).

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CHAPTER 4.0
IMPACTS

This section addresses project-related benefits and/or impacts on vegetation communities and special-status plant and wildlife species that would occur during project construction and also with post-habitat restoration.

4.1 DEFINITION OF IMPACTS

Direct and indirect impacts may be either temporary (short-term) or permanent (long-term). These impact categories are defined below.

Short-Term Changes: Any benefits or impacts considered to have reversible impacts on biological resources can be viewed as temporary. Newly planted vegetation will take time to establish and become suitable breeding and foraging habitat. These impacts are therefore considered short-term impacts and would occur to habitats/waters/species but would be reversible over 5 to 10 years, as vegetation becomes established. In addition, short-term impacts may be construction related and may include the generation of fugitive dust during construction and construction-related noise.

Long-Term Changes: For the purposes of this restoration project, long-term changes in the environment are those changes anticipated to occur or be maintained over the long term (i.e., changes that will remain post-implementation and after the conclusion of the 5-year monitoring program).

For the purpose of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the project would result in a significant impact. These thresholds of significance are based on Appendix G of the CEQA Guidelines as well as criteria developed in previous beach sand projects (i.e., Bolsa Chica Lowlands Restoration Project [Chambers Group 2001]). Incorporating significance criteria derived from these projects, in addition to those included in Appendix G, provides additional context for evaluating impacts to the unique biological resources of lagoon ecosystems as a result of restoration/enhancement activities.

A significant impact related to biological resources would occur if implementation of the proposed project would result in the following:

1) Substantial adverse impacts on any riparian, aquatic or wetland habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;

All habitats within the BSA, as well as aquatic habitats that may be located offshore of the sand disposal locations, are considered sensitive based on local, regional, and state guidance, with the exception of eucalyptus woodland, disturbed habitat, and other land cover types such as developed. For the purposes of this Enhancement Project, the term “substantial” is defined as a temporary or permanent change that would cause a loss of more than 50 percent of a sensitive habitat, because greater than 50 percent loss of any sensitive habitat is considered to have the potential to threaten the continued existence of a sensitive species known to occur within Buena Vista Lagoon.

2) Substantial adverse impacts on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

The majority of Buena Vista Lagoon is a potential jurisdictional water/wetland by USACE, CDFW, and RWQCB. For the purpose of this Enhancement Project, a significant impact on a federally protected wetland would include a loss of wetlands (temporary or permanent) in terms of aquatic function and value. Potential water quality impacts (including turbidity, salinity, etc.) associated with wetland function and value are addressed in Section 3.4 (Water Quality) of the EIR and are not addressed herein.

3) Substantial adverse impacts, 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 CDFW or USFWS;

For the purposes of this Enhancement Project, the term “substantial” is defined as a temporary or permanent change that would cause a decline, or prevent the survival and recovery of, a local population of a listed species to below self-sustaining levels within Buena Vista Lagoon. Data are lacking for most species regarding the size of a self-sustaining population for a given area of habitat; however, for the purposes of this analysis, a 50 percent decline in the lagoon breeding population (i.e., movement out of lagoon and not mortality) or a temporary loss of more than 50 percent of the suitable nesting habitat for that population at the lagoon, was considered a threat to the continued existence of the Buena Vista Lagoon population (Chambers Group 2001). In addition, the direct loss of adults, eggs, or young of species listed as endangered or threatened would be a significant impact. For example, an impact would be considered less than significant if the selected BVLEP alternative would ultimately contribute to the long-term increase of the population even though construction would result in a temporary loss of 35 percent of the nesting areas or breeding habitat for species listed as endangered or threatened.

In addition, an increase in noise to a level that would substantially modify breeding or foraging behavior of rare, threatened, or endangered species or species of special concern would be considered significant.

4) Substantial interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impedance in the use of native wildlife nursery sites;

For the purposes of this project, impacts would be considered significant if the project would substantially interfere with wildlife access to foraging habitat, breeding habitat, water sources, or other areas necessary for reproduction, or if the project would introduce roads/trails or other permanent features that would impede wildlife movement through a local or regional wildlife corridor.

5) Conflict with any local policies or ordinances or conservation plans protecting biological resources, such as tree preservation policies or ordinances, Habitat Conservation Plan or Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plans.

For the purposes of this project, an inconsistency with goals or provisions of the MHCP, Carlsbad HCP, and Oceanside Subarea Plan, as well as an inconsistency with the Carlsbad or Oceanside Local Coastal Programs (LCPs) would be considered potentially significant.

4.2 IMPACTS ANALYSIS

The following section discusses each of the three lagoon enhancement alternatives and their potential to affect biological resources within the BSA.

4.2.1 Freshwater Alternative

4.2.1.2 Sensitive Riparian and Natural Vegetation Communities

Temporary and permanent impacts would occur to vegetation communities as a result of implementing the proposed Freshwater Alternative. Short-term changes would result from vegetation removal within areas designated for soil drying and construction staging, as these areas would be restored to preconstruction conditions after project implementation. Temporal loss of habitat within the construction limits would also occur. Long-term permanent impacts would result from project construction and direct impacts from grading, dredging, and sediment excavation. Impacts to vegetation communities are detailed in Table 4-1. Potential impacts are described in further detail below.

Table 4-1
Direct Impacts to Vegetation Communities from Implementation of the Freshwater Alternative (acres)[1]

Vegetation Community	Grading/ Dredging	Soil Drying	Staging Areas	Total Impacts	% in the Project Area
Riparian and Wetlands					
Beach	0.37	0	0.09	0.46	76%
Coastal and valley freshwater marsh	55.44	1.22	0.52	57.18	59%
Nonnative riparian	0.31	0.51	0.05	0.86	21%
Southern willow scrub	0	0.07	0	0.07	3%
Open water	99.76	0	0.05	99.81	93%
Southern coastal salt marsh nontidal	0.37	3.50	1.52	5.39	36%
Uplands					
Coastal scrub	0	0.36	0	0.36	60%
Diegan coastal sage scrub: *Baccharis*-dominated	0	0.41	0.28	0.69	53%
Nonnative grassland	0.16	0	2.08	2.24	93%
Other Cover Types					
Disturbed habitat	0	0	0.42	0.42	59%
Urban/developed	0.32	0.01	0.13	0.46	6%
Total	**156.73**	**6.08**	**5.12**	**167.93**	**71%**

[1] Numbers may not sum exactly due to rounding.

Temporary Direct

Implementation of the Freshwater Alternative would result in direct impacts to 71 percent of the project area. Approximately 157 acres of vegetation would be temporarily displaced during vegetation removal, sediment removal, and grading and dredging activities, as shown in Figure 12. While it is the intent of this alternative to allow existing vegetation to remain in place to the extent feasible (e.g., southern coastal salt marsh tidal habitat would be left in place to the extent possible), acreages presented in Table 4-1 represent a worst-case scenario for vegetation communities that may be impacted. The primary concern for temporal loss of habitat is reduced availability of food and shelter for resident and migratory species that rely on the lagoon. As noted previously, temporary impacts are considered significant if more than 50 percent of sensitive habitat within the lagoon would be lost temporarily. As shown in Table 4-1, construction would result in greater than 50 percent temporal loss of sensitive riparian habitat (coastal and valley freshwater marsh and open water vegetation types). The temporal loss of these habitats may threaten local populations of sensitive resident species, as described further in Section 4.2.1.4 below. Temporary, direct impacts to beach, coastal and valley freshwater marsh, open water, coastal scrub, Diegan coastal sage scrub: *Baccharis*-dominated, and nonnative grassland are therefore considered significant.

Temporary impacts to riparian wetland vegetation communities, such as nonnative riparian, southern coastal salt marsh nontidal, and southern willow scrub are not considered significant because greater than 50 percent of the local habitat would remain available to local residents and migratory species during construction. Additionally, vegetation removal during the breeding season would be avoided. Prior to construction, sensitive “no construction” zones with breeding habitat for federally listed or state-listed species would be identified and fenced or flagged to avoid impacts outside of the identified limits of disturbance. These areas would be monitored throughout construction by a qualified biologist. Temporary direct impacts to nonnative riparian and southern coastal salt marsh nontidal, and southern willow scrub are therefore considered less than significant.

Implementation of the Freshwater Alternative would also result in temporary impacts to vegetation types within soil drying areas and staging areas, primarily located on the outer perimeters of the Weir Basin, Railroad Basin, and I-5 Basin (Figure 12). Vegetation would initially be cut and moved to the staging area specific to each basin. At areas with sufficient room (e.g., Coast Highway Basin and I-5 Basin), these areas would be used for soil drying, and vegetation mass removed from the construction limits would be laid on the ground and/or picked up with slotted/holed picks/scoops to facilitate draining and/or drying of the vegetation and associated root mass. At these soil drying areas and at staging areas, existing vegetation would be crushed and/or removed, and the ground would be compacted. Approximately 6.08 acres would be temporarily impacted at the proposed soil drying locations. Approximately 5.12 acres would be impacted within the proposed staging areas. It should be noted that these areas would be restored to pre-construction conditions, after project implementation.

Temporary Indirect

Construction activities would remain within the limits of disturbance as depicted in Figure 12. Indirect impacts as a result of construction may include construction-generated dust, sedimentation, and runoff into surrounding vegetation communities and open water. However, implementation of best management practices (BMPs), delineation of sensitive "no construction" zones, and construction monitoring) would be incorporated into the project, and short-term indirect impacts would be less than significant.

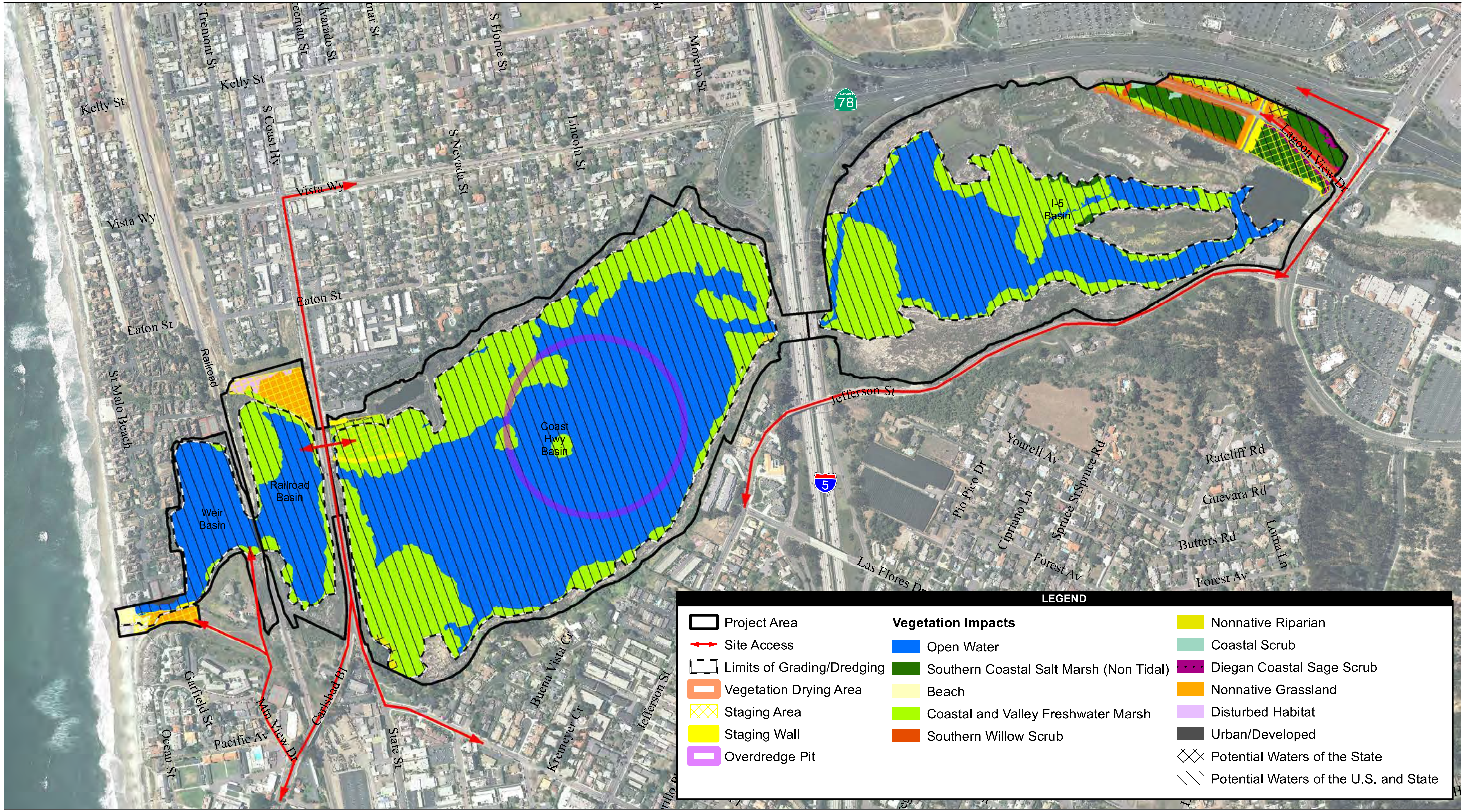
Permanent Direct

Long-term permanent impacts to vegetation communities and open water as a result of implementation of the Freshwater Alternative consists of habitat conversion as a result of vegetation removal, sediment removal, and dredging. Vegetation proposed to replace existing vegetation communities as a result of habitat conversion for each alternative is provided in Table 4-2. Vegetation type-conversion would continue through time as a result of modified elevations and tidal regime.

Generally, the Freshwater Alternative would result in a decrease in coastal and valley freshwater marsh. However, new communities and cover types would be created, including freshwater habitat transition zone, deep open water, a cattail maintenance area, and transitional habitat. Acreages of beach, open water, and southern willow scrub would increase.

The Freshwater Alternative incorporates hydrological modification in the form of replacement of the 50-foot weir at the ocean outlet with a wider, 80-foot weir to improve flood performance. Similar to existing conditions, this weir would continue to retain freshwater in the lagoon by limiting discharges to the ocean only when the lagoon level rises above the weir elevation. Also, removal of sediment under the Carlsbad Boulevard bridge would result in a deeper channel restored to original design dimensions, and removal of cattails currently encroaching into open water habitat would result in increased water circulation.

Overall acreage of habitat available for special-status species would remain unchanged with this alternative, but benefits from improved hydrological function are expected. There would be



Source: Sangis 2014; SANDAG 2012; AECOM 2014; Everest 2014

600 300 0 600 Feet

Scale: 1 = 7,200; 1 inch = 600 feet

Figure 12

Freshwater Alternative Impacts to Vegetation Communities and Habitats

Path: P:\2013\60288954_BVLEP_EIR\06GIS\6.3_Layout\Reports\BTR\Rev_2015\Freshwater_VegImpacts.mxd, 6/29/2015, sorensenj

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Table 4-2
Existing and Proposed Habitat Distribution (acres)[1]

Habitat Type	Existing Condition	Freshwater Alternative	Saltwater Alternative	Hybrid Alternative (Options A&B)
Freshwater habitat transition zone	--	9.2	--	--
Beach	0.6	1.3	0.8	0.8/0.8
Coastal and valley freshwater marsh	96.2	24.7	--	--
Coastal scrub	0.6	0.6	0.5	0.7/0.7
Deep open water	--	4.5	4.0	5.0/5.0
Diegan coastal sage scrub	<0.1	0.6	0.8	2.1/2.1
Diegan coastal sage scrub: *Baccharis*-dominated	1.3	1.6	1.3	--
Disturbed habitat	0.7	--	--	--
Eucalyptus woodland	0.5	--	--	--
Mudflat	--	--	20.0	4.7/4.9
Nonnative grassland	2.4	--	--	--
Nonnative riparian	4.2	--	--	--
Open water	106.8	134.4	51.0	67.1/66.2
Proposed cattail maintenance area[2]	--	32.9	--	--
Riparian enhancement	--	4.5	6.56	4.6/4.6
Southern coastal salt marsh (nontidal)	14.8	14.8	23.2	14.7/14.7
Southern coastal salt marsh high	--	--	55.0	26.5/26.5
Southern coastal salt marsh low	--	--	33.2	6.3/6.5
Southern coastal salt marsh mid	--	--	35.4	20.3/20.6
Southern willow scrub	2.2	2.2	--	--
Transitional[2]	--	<0.1	--	--
Urban/developed	7.5	6.4	6.0	7.2/7.2

[1] Numbers may not sum exactly due to rounding.
[2] Proposed cattail maintenance would function biologically as coastal and valley freshwater marsh.

increased habitat diversity available for special-status species, and increased habitat available for foraging. With avoidance measures to prevent direct construction impacts to nesting species and species using and occupying habitats, and with improved lagoon ecology, increased foraging for species, and no overall loss of lagoon resources, direct impacts to sensitive vegetation communities and open water with implementation of the Freshwater Alternative are considered less than significant.

Permanent Indirect Impacts

With the implementation of avoidance and minimization measures preventing construction-generated dust, sedimentation, and runoff into areas outside of the limits of construction, no permanent indirect impacts are expected. The pedestrian bridge and the proposed Boardwalk directly adjacent Carlsbad Boulevard would be elevated above the habitat. Educational elements and frequent placement of trash receptacles would limit any potential impacts to vegetation from debri/littering. Freshwater vegetation communities directly adjacent to the limits of construction would be contiguous with freshwater habitat within the completed project, and improved water circulation within the lagoon and immediately adjacent to the lagoon would be expected.

4.2.1.2 Jurisdictional Waters and Wetlands

Temporary and permanent impacts would occur to potential jurisdictional waters and wetlands as a result of implementing the Freshwater Alternative. Short-term changes would result from vegetation removal within the construction limits and areas designated for soil drying and construction staging. Long-term permanent impacts would result from project construction and direct impacts from vegetation removal as a result of grading, dredging, and sediment excavation. Impacts to potential jurisdictional waters and wetlands are detailed in Table 4-3. Potential impacts are described in further detail below.

Table 4-3
Direct Project Impacts to Potential Jurisdictional Wetlands and Waters from Implementation of the Freshwater Alternative (acres)

Potential Jurisdictional Wetlands and Waters	Grading/ Dredging	Soil Drying	Staging Areas	Total
Waters of the U.S.				
Wetland	55.81	4.79	2.04	62.64
Other Waters	99.76	0	0.05	99.81
Waters of the State				
Nonwetland Riparian	0.31	0.51	0.05	0.86
Total	**155.58**	**5.30**	**2.13**	**163.32**

[1] Numbers may not sum exactly due to rounding.

Temporary Direct

Implementation of the Freshwater Alternative would also result in temporary or short-term direct impacts to jurisdictional waters and wetlands due to construction activities, which include grading/dredging, soil drying areas, staging areas, and grading/dredging areas. These impacts would include the short-term loss of vegetation, and potential impacts to water quality associated with construction. Of the approximately 224.2 acres of jurisdictional area present in the BSA, approximately 164 acres would be directly impacted by construction (156 acres from grading/dredging, 5.9 acres from soil drying, and 2.1 acres from staging areas). Of this, approximately 1.2 acres is considered nonwetland riparian habitat under the jurisdictional purview of CDFW, consisting of eucalyptus woodland and nonnative riparian along the upper banks of the lagoon, and therefore considered associated riparian habitat of the lagoon. These areas did not support a dominance of hydrophytic vegetation and therefore were determined not to be a three-parameter wetland. These impacts would include the short-term loss of vegetation as described above, and potential impacts to water quality associated with construction.

Several project design features have been incorporated to minimize temporary impacts on water quality within the lagoon. While construction may result in temporary disturbance to wetlands, ultimately water quality is expected to improve with project implementation. Areas within the soil drying and staging areas would be restored to pre-construction conditions. Due to the temporary nature of the direct impacts, overall project objective of restoration of coastal wetlands, and with implementation of project design features and compliance with regulatory requirements for BMPs, short-term impacts to jurisdictional waters and wetlands associated with construction are considered less than significant.

Temporary Indirect Impacts

Short-term indirect impacts to jurisdictional waters would include changes in habitat or water quality that may result from project implementation. Indirect impacts to jurisdictional resources from project construction would include construction-generated dust, sedimentation, and runoff into surrounding waters, resulting in. However, implementation of BMPs, delineation of sensitive “no construction” zones, and construction monitoring would be incorporated into the project, and short-term indirect impacts would be less than significant.

Permanent Direct

Prior to implementation of the Freshwater Alternative, approximately 224.2 acres of the 557-acre BSA was determined to be potential jurisdictional waters of the U.S. and CDFW jurisdictional areas. Following implementation of the Freshwater Alternative, conversion from one wetland type to another would occur due to dredging of channels/basins and improvements to hydrologic function. Implementation of the Freshwater Alternative would only result in habitat type-conversion and would not result in permanent loss of jurisdictional waters and wetlands of the U.S. and state. Additionally, there would be an increase in open water, and habitat value and function are expected to increase relative to pre-enhancement conditions. Therefore, no long-term significant indirect permanent impacts to jurisdictional waters and wetlands are anticipated with implementation of the Freshwater Alternative.

Permanent Indirect Impacts

Long-term indirect impacts to jurisdictional waters adjacent to the construction limits would potentially result in an improved freshwater system, as a result of connectivity with the improved water circulation and decreased vegetation mass within the construction limits. No significant indirect impacts to wetlands are anticipated with restoration implementation.

4.2.1.3 Fish Resources

Temporary Direct Impacts

Implementation of the Freshwater Alternative could result in temporary direct impacts to fish resources, within and adjacent to the construction limits. Impacts from construction activities may include harassment, displacement, reduction in recruitment and population densities, mortality, and water quality impairment. Implementation of BMPs and other measures would minimize the risk of impacts occurring, and reduce impacts below a level of significance.

In-water construction activities may cause harassment, displacement, and mortality of fish. Harassment and displacement can cause physiological stress; affect normal behaviors; reduce tolerance to disease and toxicants; and cause fish to relocate from optimal rearing, feeding, and predator avoidance habitat to less optimal habitat. Construction activities may occur during the spawning time period for many of the resident freshwater fish species causing nest abandonment and failure, direct destruction of nests, and mortality. These impacts can reduce feeding efficiency, condition, survival rates, and recruitment, and increase predation. The overall effect on fish resources from these impacts would be decreased population health and densities (Bash et al. 2001).

Vegetation removal, dredging, and grading would disturb benthic sediments; this would mobilize sediments and increase turbidity, which could temporarily impair water quality in the lagoon. Equipment staging and construction vehicle traffic could contribute to sediment mobilization if such activities cause erosion of soils and these soils enter the waters of the lagoon. Sediment mobilization, increased turbidity, and the resulting impaired water quality could affect fish habitat and physical health.

Turbidity is a measure of the amount of suspended particles or sediments, typically inorganic materials, within a body of water. Turbidity is an optical property of water where suspended and dissolved materials such as silt, clay, finely divided organic and inorganic matter, chemicals, plankton, and other microscopic organisms cause light to be scattered rather than transmitted in straight lines (Bash et al. 2001). Suspended sediments originate from both natural processes and human-related activities. Temporal variation in weather patterns, particularly precipitation and runoff, and land-use projects often result in periodic pulses or chronic levels of suspended sediments in water bodies. Turbidity levels above ambient may affect fish by altering their physiology, behavior, and habitat, all of which may lead to physiological stress, reduced survival rates, and reduced population numbers (Bash et al. 2001).

Fish population levels and survival have been linked to levels of turbidity. Prolonged exposure to high levels of suspended sediment may cause a loss of visual capability in fish, leading to a reduction in feeding efficiency and growth rates, a thickening of the gill epithelia reducing respiratory function, clogging and abrasion of gill filaments, and increased stress levels that can reduce tolerance to disease and toxicants (Waters 1995). High levels of suspended sediments can alter movements and redistribute fish populations through avoidance. Fish do not occupy areas unsuitable for survival unless they have no other option. Many fish are sight feeders, and turbid waters reduce the ability of these fish to locate and feed on prey. Some fish, particularly juveniles, could become disoriented and leave optimal feeding and predator avoidance habitat, ultimately reducing growth rates and survival. Some fish species will not spawn in excessively turbid water (Bell 1991). In addition, construction generated sedimentation may settle on fish nests, potentially causing egg suffocation and nest failure. Therefore, project activities could temporarilly reduce available fish habitat, recruitment, and population densities if construction-related increases in turbidty were to preclude a species from occupying habitat required for specific life stages, or suffocate eggs and cause nest failure.

Cofferdam construction associated with weir replacement could temporarily impact fish within the general vicinity of construction activities. Sheetpiles would be driven into bottom sediments using an impact or vibratory hammer. Pile driving can create underwater sound waves and pressures that can negatively affect fish. Sound is defined as small disturbances in a fluid from ambient conditions through which energy is transferred away from a source by progressive fluctuations of pressure or sound waves (Caltrans 2009). Sound waves are always produced by vibrating objects such as sheetpile being driven by a vibratory or impact hammer. As the vibrating surface moves, it compresses the molecules in the adjacent medium, creating a high-pressure region (Caltrans 2009). As the object vibrates back to its original position, the molecules in contact with the vibrating surface produce a low-pressure region (Caltrans 2009). These areas are known as compressions and rarefactions, respectively (Caltrans 2009). The magnitude of the difference between a paired compression and rarefaction dictates potential impacts to fish. Impacts can include change in behavior, decreased fitness, increased predation risk, physical injury, and mortality (Caltrans 2009). The severity of impacts depends on the intensity and characteristics of the sound, the distance and location of the fish in the water column relative to the sound source, the size and mass of the fish, and the fish’s anatomical characteristics (Caltrans 2009).

An interagency working group, including National Marine Fisheries Service (NMFS), established interim criteria for evaluating underwater noise impacts on fish from impact pile driving. These criteria are defined in the document titled *Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities* (Fisheries Hydroacoustic Working Group 2008). This agreement identifies a peak sound pressure level of 206 decibels (dB) and an accumulated sound exposure level (SEL)[1] of 187 dB as thresholds for injury to fish greater than or equal to 2 grams (g). For fish less than 2 g, the accumulated SEL threshold is reduced to 183 dB. Although no formal agreement has been made on a behavioral threshold, NMFS uses the 150-dB root mean square as the threshold for adverse behavioral impacts (NMFS 2009).

The NMFS criteria used for underwater noise levels were established specifically for impact pile driving and are not intended to be applied to vibratory driving. No formal agreement has been made regarding injury thresholds for vibratory pile driving. However, a staff member from NMFS has suggested that thresholds for vibratory driving should be 20 to 30 dB higher than for impact driving (Stadler 2009). In addition, detailed field studies for the Mad River Bridges Replacement Project concluded no immediate significant physical impacts for fish exposure on cumulative SEL values

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[1] Sound exposure level (SEL) is defined as the constant sound level acting for 1 second, which has the same amount of acoustic energy as the original sound. Expressed another way, the sound exposure level is a measure of the sound energy in a single pile driver strike. Accumulated SEL ($SEL_{accumulated}$) is the cumulative SEL resulting from successive pile strikes. $SEL_{accumulated}$ is based on the number of pile strikes and the SEL per strike; the assumption is made that all pile strikes are of the same SEL.

less than 194 dB from impact pile driving at the project site (Caltrans 2009). In the current regulatory environment, vibratory pile driving is generally viewed as a preferred method and mitigation measure for pile driving and not as a substantial source of concern for injury to fish.

The fish species detected within the BSA include the native California killifish and striped mullet; other fish species known to occur in the lagoon are nonnative. Since no special-status fish species occur in the lagoon, temporary direct impacts resulting from the Freshwater Alternative would not be considered significant

Temporary Indirect Impacts

Potential temporary indirect impacts from implementing the Freshwater Alternative may include runoff from staging and work areas, increased sedimentation, accidental spills of fuels and lubricants, and increased turbidity within and adjacent to the limits of construction. These potential impacts would degrade water quality and, in turn, would impact fish resources in Buena Vista Lagoon. In addition, the potential exists for contaminants such as fuels, lubricants, hydraulic fluids, and other chemicals/compounds used in construction activities to be introduced into the lagoon from direct spill or through surface runoff from staging and work areas. Contaminants may be toxic to fish or may alter oxygen diffusion rates and cause acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival. Acute levels of contaminants also can cause mortality of fish. Implementation of BMPs and other measures in compliance with existing regulations would minimize the risk of these impacts occurring. Potential indirect impacts would be temporary because baseline water quality conditions would return shortly following completion of proposed project activities. The risk of temporary impacts to nonnative and non-special status fish currently in the lagoon would be minimal due to regulatory requirements, and no special-status fish species exist in the lagoon. Temporary indirect impacts resulting from the Freshwater Alternative would not be considered significant.

Permanent Direct Impacts

Implementation of the Freshwater Alternative would have permanent, long-term impacts to the fish resources in Buena Vista Lagoon. Impacts from enhancement activities on habitat availability and quality, as well as on water quality would have long-term beneficial effects on fish, fish populations, and the recreational freshwater fishery. No effects on species assemblages or species diversity would occur.

Sedimentation caused by accelerated eutrophication and poor flushing rates has resulted in shallow water with encroaching stands of emergent vegetation throughout much of the lagoon. Such conditions are characteristic of poor-quality freshwater fish habitat and poor water quality. Systems having accelerated rates of eutrophication typically continue to degrade through time resulting in a reduction of available fish habitat and water quality and a concomitant reduction in fish species diversity and population densities.

Enhancement activities under the Freshwater Alternative would focus on removal of emergent vegetation encroaching into open water habitat and decreasing vegetation densities throughout the lagoon. This enhancement would increase open water habitat by approximately 28 acres and provide additional habitat for adult fish. Dredging these areas would remove nutrient-rich sediments from the lagoon and minimize the potential for emergent vegetation to recolonize and expand back into open water habitat. Removal and thinning of emergent vegetation would reduce sedimentation rates (eutrophication) and increase water circulation resulting in improved water quality. Increased circulation would improve dissolved oxygen levels, which would improve fish habitat suitability.

Two deep water areas would be created, through dredging, under the Freshwater Alternative as an additional enhancement measure and would create approximately 4.5 acres of deep, open water fish habitat. Each area would be approximately 9 feet deep and lined with gravel to provide additional spawning and rearing habitat. The deep water habitat would be created nearshore in protected areas to minimize nest failure from disturbance by wind and waves. The deep water areas would provide a range of water depths, which is important for the seasonal habitat requirements of freshwater fish. Deep water habitat would also provide refugia during harsh environmental or poor water quality conditions.

Buena Vista Lagoon provides recreational freshwater angling opportunities that are popular with local residents with angling efforts primarily directed toward largemouth bass and bluegill. Implementation of enhancement activities associated with the Freshwater Alternative and described above would benefit the recreational fishery by increasing the stability and sustainability of fish populations. Although there would be temporary indirect impacts to nonnative and native fish species within the BSA, none of these are special-status species. Long-term direct impacts would be less than significant.

Permanent Indirect Impacts

Permanent indirect impacts resulting from implementation of the Freshwater Alternative include improved water circulation, reduced rate of eutrophication, and an overall improvement to water quality. Post-project water quality would support a healthy, naturally functioning freshwater environment that would be beneficial to freshwater fish resources. Implementation of the Freshwater Alternative would be less than significant.

4.2.1.4 Special-Status Plant Species

No federally listed or state-listed rare, threatened, or endangered plant species occur within the construction limits of the Freshwater Alternative. One special-status plant species, southwestern spiny rush (CNPS List 4.2), is known to occur in the I-5 Basin, within coastal and valley freshwater marsh habitat. Temporary direct impacts would occur to these plants, as they occur within the soil drying areas (Figure 13). Additional southwestern spiny rush plants are located along Jefferson Street, adjacent to the construction limits. Thus, temporary and direct and indirect impacts to this species may occur.

Temporary direct impacts to southwestern spiny rush in the form of vegetation removal and mortality of individuals within the soil drying areas and staging areas may occur. The regulatory requirement to implement BMPs would minimize indirect impacts to plants located adjacent to the construction limits (e.g., construction-generated dust, runoff, and sedimentation). Therefore, significant temporary direct impacts to special-status plant populations are anticipated with implementation of the Freshwater Alternative.

4.2.1.5 Special-Status Wildlife Species

Federally Listed Wildlife Species

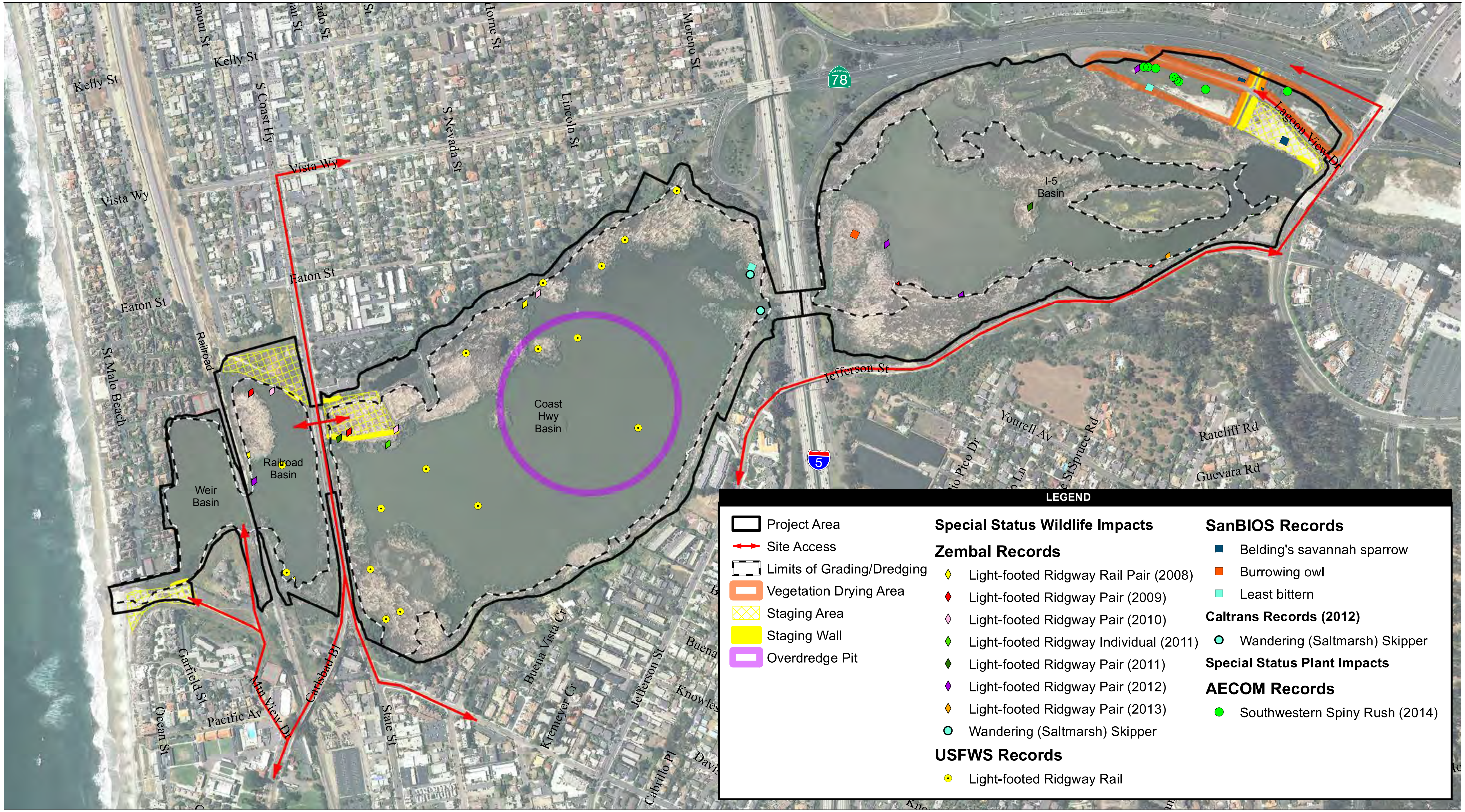
Temporary Direct

Impacts may include the short-term loss of nesting and/or foraging habitat for special-status wildlife species resulting from construction activities and maintenance activities. Of the 114 special-status wildlife species with a potential to occur within the BSA, seven species are federally and/or state listed. These include the light-footed Ridgway’s rail, western snowy plover, California least tern, least Bell’s vireo, southwestern willow flycatcher, Belding’s savannah sparrow, and coastal California gnatcatcher. Impacts to special-status wildlife species habitat are provided in Table 4-4 and are separated into two types of short-term impacts: areas that occur within staging/soil drying areas and areas impacted by grading/dredging. While it is the intent of this alternative to allow much of the existing vegetation to remain in place, acreages

Table 4-4
Direct Project Impacts to Special-Status Wildlife Species Habitat from Implementation of the Freshwater Alternative (acres)[1]

Special-Status Species	**Vegetation Community**	**Existing Habitat**	**Habitat Impacted by Soil Drying/Staging**			**Habitat Impacted by Grading/Dredging**		**Total Direct Impact to Existing Habitat**	
			Soil Drying	**Staging Areas**	**Percent**	**Grading/ Dredging**	**Percent**	**Total**	**Percent**
Light-footed Ridgway's rail	Coastal and valley freshwater marsh	96.2	1.22	0.52	2%	55.44	58%	57.18	59%
	Southern coastal salt marsh nontidal	14.78	3.5	1.52	34%	0.37	3%	5.39	36%
	Light-footed Ridgway's rail total	110.98	4.72	2.04	6%	55.81	50%	62.57	56%
Western snowy plover	Beach	0.6	0	0.05	8%	0.37	62%	0.46	77%
	Western snowy plover total	0.6	0	0.05	8%	0.37	62%	0.46	77%
California least tern	Beach	0.6	0	0.05	8%	0.37	62%	0.46	77%
	Open Water	106.8	3.5	1.52	5%	99.76	93%	99.81	93%
	Southern coastal salt marsh nontidal	14.78	3.5	1.52	34%	0.37	3%	5.39	36%
	California least tern total	122.18	7	3.09	8%	100.5	82%	105.66	86%
Least Bell's vireo and southwestern willow flycatcher	Southern willow scrub	2.2	0.07	0	3%	0	0%	0.07	3%
	Least Bell's vireo and southwestern willow flycatcher total	2.2	0.07	0	3%	0	0%	0.07	3%
Belding's savannah sparrow	Southern coastal salt marsh nontidal	14.78	3.5	1.52	34%	0.37	3%	5.39	36%
	Belding's savannah sparrow total	14.78	3.5	1.52	34%	0.37	3%	5.39	36%
Coastal California gnatcatcher	Coastal scrub	0.6	0.36	0	60%	0	0%	0.36	60%
	Diegan coastal sage scrub: *Baccharis*-dominated	1.3	0.41	0.28	53%	0	0%	0.41	32%
	Coastal California gnatcatcher total	1.9	0.77	0.28	55%	0	0%	0.77	41%

[1] Numbers may not sum exactly due to rounding.



Source: Sangis 2014; SANDAG 2012; AECOM 2014; Everest 2014

600 300 0 600 Feet

Scale: 1 = 7,200; 1 inch = 600 feet

Figure 13

Freshwater Alternative Impacts to Special Status Species

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presented in Table 4-4 represent a worst-case scenario for special-status wildlife species habitat that may be impacted. Temporary and permanent, direct and indirect impacts to special-status wildlife species are discussed further below.

LIGHT-FOOTED RIDGWAY'S RAIL

Light-footed Ridgway's rail is a year-round resident in the lagoon, found in coastal and valley freshwater marsh and southern coastal salt marsh nontidal habitat. The Freshwater Alternative would directly impact 62.57 acres (56 percent) of existing suitable nesting habitat through habitat displacement during direct grading/dredging and staging/soil drying (Table 4-5 and Figure 13). These direct impacts would remove the coastal and valley freshwater marsh and southern coastal salt marsh habitat nontidal that supports this species. Additional direct impacts to this species include mortality of individuals.

The project would designate sensitive "no construction" zones that would be identified and fenced or flagged to avoid impacts outside of the limits of disturbance. Temporary impacts to light-footed Ridgway's Rail with implementation of the Freshwater Alternative are considered significant due to the potential for habitat loss and mortality.

WESTERN SNOWY PLOVER

The western snowy plover suitable habitat is limited to the beach habitat west of the weir; impacts to 0.46 acre (77 percent) of beach habitat for this species would occur during construction. As noted in Chapter 3, western snowy plover does not forage frequently within the BSA and likely no longer breeds there as historic nesting sites within the BSA have been altered by anthropogenic factors. As mudflat habitats suitable for foraging do not occur within the BSA, plover is currently not likely to occur; thus, this species is not likely to be impacted. Therefore, temporary direct impacts to western snowy plover from the Freshwater Alternative would be less than significant.

CALIFORNIA LEAST TERN

California least tern is documented as annually foraging at Buena Vista Lagoon but is not known to breed in the lagoon. Impacts to 0.46 acre (77 percent) of beach, 99.8 acres (93 percent) of open water, and 5.39 (36 percent) of southern coastal salt marsh nontidal would occur as a result of grading/dredging and staging/soil drying for the Freshwater Alternative. Approximately 105

Table 4-5
Freshwater Alternative Existing and Post-Implementation Acreage of Suitable Habitat for Special-Status Wildlife Species (acres)[1]

Special-Status Species	Vegetation Community	Existing Habitat	Habitat Acreage Post-Implementation	Net Change in Habitat Acreage Post-Implementation	Percent Change Post-Implementation
Light-footed Ridgway's rail	Freshwater habitat transition zone	0.0	9.2	9.2	N/A
	Coastal and valley freshwater marsh	96.2	24.7	-71.5	-74%
	Proposed cattail maintenance area[2]	0.0	32.9	32.9	N/A
	Transitional[2]	0.0	<0.01	<0.01	<0.01%
	Southern coastal salt marsh nontidal	14.8	14.8	0	N/A
	Total	111.0	81.6	-29.4	-26%
Western snowy plover	Beach	0.6	1.3	0.7	117%
	Total	0.6	1.3	0.7	117%
California least tern	Beach	0.6	1.3	0.7	117%
	Open water	106.8	134.4	27.6	26%
	Total	107.4	135.7	28.3	26%
Least Bell's vireo and southwestern willow flycatcher	Southern willow scrub	2.2	2.2	0.0	N/A
	Total	2.2	2.2	0.0	N/A
Belding's savannah sparrow	Freshwater habitat transition zone	0.0	9.2	9.2	N/A
	Southern coastal salt marsh nontidal	14.8	14.8	0	N/A
	Total	14.8	24.0	9.2	62%
Coastal California gnatcatcher	Coastal scrub	0.6	0.6	0.0	N/A
	Diegan coastal sage scrub	0.0	0.6	0.6	N/A
	Diegan coastal sage scrub: *Baccharis*-dominated	1.3	1.6	0.3	23%
	Total	1.9	2.8	0.9	44%

[1] Numbers may not sum exactly due to rounding.
[2] These habitat types would function biologically as coastal and valley freshwater marsh.

acres (86 percent) total acres of California least tern foraging habitat would be impacted as a result of construction for the Freshwater Alternative. No suitable nesting habitat occurs within the lagoon.

Sediment mobilization, increased turbidity, and the resulting impaired water quality could affect fish, which is the primary food of California least tern. However, foraging species like the least tern are highly mobile and move throughout the lagoon as well as up and down the coast; as such, the temporary loss of their potential foraging habitat is not expected to have a significant impact on these species. In addition, many of these areas post-implementation are expected to return to the same/similar habitat type but with improved conditions as a result of improved hydrology. Therefore, temporary direct impacts to California least tern from the Freshwater Alternative would be less than significant.

LEAST BELL'S VIREO AND SOUTHWESTERN WILLOW FLYCATCHER

One least Bell's vireo was observed during 2013 protocol surveys and another historic observation of vireo occurred outside of the project area. Both detections are within southern willow scrub habitat in the 500-foot buffer of the BSA. Southern willow flycatcher was not detected during 2013 surveys and is not known to occur within the BSA. Neither species has been documented to breed on-site although there is the potential that vireo breeding may occur as suitable southern willow scrub is present. Implementation of the Freshwater Alternative would directly impact 0.07 acre (3 percent) of the southern willow scrub riparian habitat within the lagoon as a result of staging within the soil drying areas (Table 4-5). Both least Bell's vireo and southwestern willow flycatcher are migratory birds. Both species may use the riparian scrub for foraging during summer months, but the short-term impact to 3 percent of the southern willow scrub riparian habitat is not substantial and would not result in a decline in the local population below self-sustaining levels (as a local population does not exist). Therefore, temporary direct impacts to least Bell's vireo and southwestern willow flycatcher from the Freshwater Alternative would be less than significant.

BELDING'S SAVANNAH SPARROW

Belding's savannah sparrow occupies southern coastal salt marsh nontidal habitat. Observations are particularly dense in the eastern portion of the I-5 Basin where pickleweed-dominated marsh habitat is prevalent. As a result of vegetation removal and grading/dredging and staging within the soil drying areas and staging areas, the Freshwater Alternative would temporarily impact 5.39 acres (36 percent) of southern coastal salt marsh nontidal habitat across the four basins (Table 4-5 and Figure 13).

Although Belding’s savannah sparrows maintain territories, they do not often nest in the exact same location. In addition, the size of the territories and their boundaries are variable and change year to year based on environmental conditions, with expansion in dry years and contraction in wet years. It is anticipated that the resident birds would respond to the construction as they do to seasonal variability by shifting and contracting their territory size to accommodate the new acreage available.

Belding’s savannah sparrow is a year-round resident and project construction would result in the temporary loss of less than 50 percent of their nesting habitat (southern coastal salt marsh nontidal). Direct impacts to this species include mortality of individuals. Temporary direct impacts from the Freshwater Alternative on Belding’s savannah sparrow would be significant due to the potential for mortality.

COASTAL CALIFORNIA GNATCATCHER

One coastal California gnatcatcher has been historically observed (last observation in 1997) within the coastal sage scrub located within the 500-foot buffer of the BSA; this species was not detected within 2013 surveys. This species is not known to breed within the BSA. Implementation of the Freshwater Alternative would directly impact 0.36 acre (60 percent) of the coastal scrub habitat and 0.41 acre (32 percent) of Diegan coastal sage scrub: *Baccharis*-dominated at the eastern end of the BSA as a result of staging within the soil drying areas (Table 4-5). This species would likely use the site for foraging during summer months, but the short-term impact to 0.77 acre (41 percent) of suitable scrub habitats on-site less than 50 percent of available habitat and would not result in a decline in the local population below self-sustaining levels (as a local population does not exist). Additionally, habitat within the soil drying areas would be restored to pre-construction conditions after project implementation. Therefore, temporary direct impacts to coastal California gnatcatcher from the Freshwater Alternative would be less than significant.

Temporary Indirect

Indirect short-term/temporary impacts to sensitive species may include increases in exposure to predators as a result of nighttime lighting and construction-generated noise.

During construction, and as habitat becomes reestablished on-site, Belding’s savannah sparrow and light-footed Ridgway’s rail may be exposed to higher predation as they would be more concentrated in the remaining unimpacted habitat, much of which is located along the perimeter of the lagoon. Additionally, nighttime lighting in adjacent habitat would potentially increase predation by increasing visibility of sensitive species to predators. Short-term/temporary indirect impacts to sensitive species resulting from concentrating species in unimpacted habitat and nighttime lighting would be considered significant.

During construction, sensitive birds using the lagoon may be exposed to degraded water quality resulting from dredging and other sediment-disturbing activities. These activities may increase turbidity and the presence of unconsolidated sediments, lowering visibility and making foraging more difficult. In addition, after the equipment ceases work in any given area, the material should reconsolidate within a short amount of time (hours if not days). Additionally, the disturbance of sediment would release sediment-dwelling organisms, potentially increasing foraging efficiency. Short-term/temporary indirect impacts to sensitive species resulting from degraded water quality would be less than significant.

The addition of construction noise to the lagoon environment has the potential to impact sensitive birds throughout the year. An increase in ambient noise levels could disrupt nesting and breeding behaviors that play an important role in the reproduction of wetland species such as the light-footed Ridgway’s rail and Belding’s savannah sparrow, and upland species such as the coastal California gnatcatcher (if present). In addition, elevated noise levels have the potential to affect bird foraging behavior during the nonbreeding season. As the loudest contiguous noise caused by construction, the dredge would be mobile in the lagoon and the potential for noise impact would travel with the machinery. In addition to dredging, other noise-generating equipment may be used during construction. It is unlikely that all of the equipment in the worst-case scenario would be used simultaneously or at the same location; however, this is the maximum equipment anticipated for this type of project and allows for a conservative estimate of impacts.

Construction equipment may vary, but it is assumed that the loudest contiguous noise would be generated by dredging activity and the use of diesel engines. For the purposes of the noise analysis, a dredge was assumed using a hydraulic engine, which equates to 73 A-weighted decibels (dBA) L_{eq} at 50 feet (see Section 3.13 [Noise] of the EIR). Unlike stationary equipment, the dredge would be mobile in the lagoon and the potential for noise impact would travel with the machinery. Dredging activity would occur up to 24 hours a day for the duration of construction. In addition to dredging, other noise-generating equipment may be used during construction. It is unlikely that all of the equipment in the worst-case scenario would be used simultaneously or at the same location; however, this is the maximum equipment anticipated for this type of project and allows for a conservative estimate of impacts.

Species that occupy habitat at the lagoon edge, or outside the impact footprint, would be less affected by noise than those species occurring within the impact footprint. These edge species include California least tern and least Bell's vireo, which currently are known to forage and/or may occur throughout the lagoon and can be found distributed throughout the noise contours where appropriate foraging and nesting habitat occurs. Although the ambient noise levels are high for a natural system and the species have adapted to them, the addition of a dredge and other construction equipment would increase ambient levels. Currently, noise levels for the dredge are estimated at 73 dBA community noise equivalent level (CNEL) at 50 feet and 67 dBA CNEL at 100 feet. Other construction equipment may reach maximum noise levels of 80 dBA at 50 feet for most equipment (see Section 3.12), but this equipment is anticipated to be localized to areas that are likely to support construction (i.e., the staging areas and soil drying areas).

When in proximity to wildlife, the effects of dredge and other construction noise would likely be pronounced and may result in modified foraging or breeding behavior. The greatest impact from noise would occur within the first 200 feet of equipment and would dissipate exponentially with distance. For example, one piece of equipment that generates a maximum noise level of 80 dBA at 50 feet (typically with a usage factor of 40 percent) would attenuate to 60 dBA L_{eq} 240 feet from the source. The noise impact would be more pronounced within the quieter areas of the lagoon as opposed to the louder areas near the roads. The dredge is slow moving and construction would occur in one basin at a time; therefore, birds could always relocate to quieter habitat. However, relocation during the breeding season is not feasible for nesting birds. Avoiding construction during the breeding season was evaluated as part of the development process for this project, which included participation by all resource agencies. It was determined that avoiding the breeding season would almost double the length of construction and might pose a larger impact to resident marsh birds, including the listed light-footed Ridgway's rail and Belding's savannah sparrow that breed in the lagoon. As such, the contiguous construction phased across basins is the project's best attempt to minimize overall noise impacts to sensitive species.

While birds within a substantial portion of the lagoon are already subject to elevated noise levels associated with the various transportation corridors, there is still a potential for construction noise to negatively impact breeding and foraging behavior. The movement of construction activities and the distribution and mobility of the wildlife make minimizing the effects of noise with attenuating devices virtually impossible. As such, noise impacts on sensitive birds are considered significant.

In addition to noise generated by construction equipment, an increase in noise associated with vehicular traffic may also affect sensitive species. Most of the staging areas/soil drying areas and construction traffic routes occur outside of the lagoon environment or on the periphery where ambient noise levels from existing traffic already exist. Although implementation of the proposed project would increase the frequency of vehicular traffic, birds nesting in this area are accustomed to vehicular traffic and, as such, are not expected to be substantially affected by a minor increase in traffic volume and the associated vehicular noise. Noise impacts to birds from vehicular traffic are therefore considered less than significant.

Permanent Direct

Direct permanent impacts to sensitive species include the active conversion of nesting and/or foraging habitat to another habitat type, modified lagoon conditions, and long-term maintenance and operation, including cattail maintenance.

As described above, suitable habitat for sensitive species would be changed and/or converted as a result of the proposed project. The direct permanent changes to suitable habitat for sensitive species are summarized in Table 4-5. This change may include a direct increase or decrease in the total acreage of a specific habitat type post-enhancement. Proposed special-status wildlife species habitat is provided in Table 4-5.

Long-term monitoring and maintenance would be part of the Enhancement Project. This may include, but is not limited to, biological monitoring, nonnative species treatment, cattail maintenance, and other adaptive management strategies. Although each of these actions is intended to help the success of the enhancement effort, there is the potential for impacts to sensitive birds in the lagoon.

LIGHT-FOOTED RIDGWAY’S RAIL

Light-footed Ridgway’s rail nesting and foraging habitat would be modified as a result of the Freshwater Alternative. Post-enhancement, the largest decrease in habitat type is coastal and valley freshwater marsh, which would have a negative percent change of 74 percent (Table 4-6). Also, it should be noted that, post-implementation, although coastal and valley freshwater marsh is being reduced, the amount of southern coastal salt marsh nontidal would not change. Post-implementation of the Freshwater Alternative, habitat types are proposed that would be suitable to support light-footed Ridgway’s rail, including the proposed cattail maintenance area and transitional area, which would function biologically as coastal and valley freshwater marsh (Table 4-6).

Table 4-6
Direct Impacts to Vegetation Communities from Implementation of the Saltwater Alternative (acres)[1]

Vegetation Community	Grading/Dredging	Soil Drying	Staging Areas	Total	% in the Project Footprint
Riparian and Wetlands					
Beach	0.45	0	0.05	0.49	82%
Coastal and valley freshwater marsh	64.42	1.22	0.83	66.48	69%
Nonnative riparian	0.43	0.40	0.05	0.88	21%
Open water	100.79	0	0.04	100.84	94%
Southern willow scrub	0.02	0.07	0	0.09	4%
Southern coastal salt marsh nontidal	1.11	2.57	1.52	5.20	35%
Uplands					
Coastal scrub	0	0.36	0	0.36	60%
Diegan coastal sage scrub: *Baccharis*-dominated	0.08	0.33	0.28	0.69	53%
Eucalyptus woodland	0.03	0	0	0.03	7%
Nonnative grassland	0.39	0	1.85	2.24	93%
Other Cover Types					
Disturbed habitat	0	0	0.42	0.42	42%
Urban/developed	1.35	0.01	0.12	1.49	20%
Total	**169.08**	**4.97**	**5.15**	**179.21**	**75%**

[1] Numbers may not sum exactly due to rounding.

Although habitat acreage is important to consider when assessing project impacts, it is also important to consider the condition of the impacted habitat. The current and potential future southern coastal salt marsh nontidal and coastal and valley freshwater marsh habitat occupied by light-footed Ridgway's rail is denoted under existing conditions by the overall poor conditions of the lagoon resulting from poor tidal flushing and sediment accumulation, and these less than optimal conditions would continue without implementation of the Freshwater Alternative. Altogether, there would be a net loss of nesting habitat acreage for light-footed Ridgway's rail by 29.4 acres, which equates to a loss of 26 percent when compared to existing. As discussed in Chapter 3, light-footed Ridgway's rail observations have generally declined in the last 5 years. This may correlate to the overall impact through time of the weir preventing the natural ocean-lagoon tidal processes.

In addition to affecting habitat acreage, the changes to lagoon hydrology under the Freshwater Alternative would also improve the condition of the remaining foraging and nesting habitat for light-footed Ridgway's rail, within and adjacent to the construction limits. Under current conditions, much of the southern coastal salt marsh nontidal and coastal and valley freshwater marsh in the I-5 Basin is inundated with standing, potentially stagnant, water and this habitat is occupying nutrient-laden sediment that often experiences periods of anoxia. Dredging the sediment load and removing vegetation mass would ultimately improve water circulation in the lagoon. This is expected to enhance the benthic community in all foraging habitats. The improved conditions for nesting and foraging habitat outweigh the loss of habitat acreage. The net loss of nesting habitat is considered an impact; however, the reduction in nesting habitat would not substantially affect the sustainability of the Ridgway's rail population within the lagoon. Ultimately, the project is expected to benefit light-footed Ridgway's rail populations at Buena Vista Lagoon. Therefore, permanent impacts to light-footed Ridgway's rail with implementation of the Freshwater Alternative are considered less than significant.

The project would prepare an adaptive management, maintenance, and monitoring program that would include avoidance measures to minimize impacts to sensitive wildlife on-site, as described in Section 2.9. However, during cattail maintenance, there is potential for year-round mortality of birds in addition to take of nests during the breeding season. As such, long-term maintenance activities would be considered significant.

WESTERN SNOWY PLOVER

As a result of implementation of the proposed project, conversion of habitat would result in a net increase of beach habitat, with an increase from 0.6 acre of beach habitat, to 1.3 acres. This may be a potential benefit to this species, which is rarely observed foraging on the beach within the BSA. As such, no significant or permanent impacts to western snowy plover would result from implementation of the Freshwater Alternative.

CALIFORNIA LEAST TERN

California least tern is documented as annually foraging at Buena Vista Lagoon. Implementation of the Freshwater Alternative would permanently increase suitable nesting habitat for California least tern with a 26 percent change, increasing what is currently 107.4 acres of suitable habitat by 28.3 acres. Also, the result of dredging accumulated sediment load may improve conditions for benthic species and fish species, as the improved circulation would enhance environmental conditions for the prey communities that this bird feeds on. The Freshwater Alternative would directly benefit species like California least tern that regularly use the lagoon for foraging, by increasing foraging habitat in both quantity and quality. As such, no significant permanent impacts to California least tern would result with project implementation of the Freshwater Alternative.

LEAST BELL'S VIREO AND SOUTHWESTERN WILLOW FLYCATCHER

As a result of implementation of the proposed project, there would be no conversion of habitat from the Freshwater Alternative. Additionally, historic and/or recent locations of these species occur outside of the construction limits and neither of these migratory bird species is known to breed on-site. As such, no significant permanent impacts to least Bell's vireo and southwestern willow flycatcher would result with implementation of the Freshwater Alternative.

BELDING'S SAVANNAH SPARROW

As depicted in Table 4-5, southern coastal salt marsh nontidal would not be converted to another habitat type as a result of the Freshwater Alternative (these areas would be left in place). Additionally, freshwater habitat transition zone, a new habitat type suitable to support Belding's savannah sparrow, would be created (9.2 acres), from existing coastal and valley freshwater marsh vegetation (Figure 3). This would result in a percent change increase of 62 percent.

In addition, the changes to lagoon hydrology would increase the condition of the remaining foraging and nesting habitat suitable for Belding's savannah sparrow. Under current conditions, the frequency and duration of soil saturation in marsh habitat are highly variable and often affected by late season rains and ponding. This results in large fluctuations in the Belding's savannah sparrow population and nesting success each year, as they can only nest on dry soil. Improved hydrology would improve overall circulation and flow, which would facilitate the drying of high-marsh habitat used for ground nesting. In addition, creating freshwater habitat transition zone habitat would also improve overall habitat structure and diversity. The improved conditions post-implementation of the Freshwater Alternative would ultimately benefit the Belding's savannah sparrow population at Buena Vista Lagoon and permanent impacts are considered less than significant.

COASTAL CALIFORNIA GNATCATCHER

Post-implementation of the Freshwater Alternative, there would be an increase of 0.3 acre of acreage of Diegan coastal sage scrub: *Baccharis*-dominated habitat, and a new habitat, Diegan coastal sage scrub (0.6 acre), suitable to support coastal California gnatcatcher. This would increase habitat suitable to support coastal California gnatcatcher by a 44 percent change. As such, no significant permanent impacts to coastal California gnatcatcher would result with project implementation.

Permanent Indirect

Indirect long-term/permanent impacts include the increased potential for invasive species, and changes to water quality, as well as impacts associated with cattail maintenance. As the Freshwater Alternative would result in habitat within the construction limits that would be similar to habitat immediately adjacent, transition to another habitat type is not anticipated.

It is possible that areas immediately adjacent to the construction limits may be more prone to invasion by nonnative species. Nonnative invasive species have the potential to exclude native plant recruits and ultimately shape the vegetation community to something less than suitable for wildlife, including the Belding's savannah sparrow and light-footed Ridgway's rail. As part of the Post-Implementation habitat monitoring and maintenance program for this project, the occurrence of these invasive species would be closely monitored. Future maintenance would regularly treat invasive species to limit the possibility of invasion. Indirect impacts to sensitive species resulting from invasive species are not considered significant.

Construction of the boardwalk would encourage additional recreation at the lagoon. The boardwalk would be constructed directly adjacent to Carlsbad Boulevard and therefore no substantial increase in noise is anticipated to result from recreational use. In addition, the boardwalk would be built above the habitat, limiting potential for predation or harassment of sensitive species by domestic pets. Lastly, as noted above, educational elements along with frequent placement of trash recepticles would minimize potential impacts associated with debris/littering. Indirect impacts to sensitive species resulting from bridge construction are not considered significant.

Cattail maintenance would occur during daylight hours and outside of the breeding season. Indirect impacts associated with long-term cattail maintenance due to nighttime lighting and noise would not occur. Long-term/permanent indirect impacts to sensitive species resulting from nighttime lighting and noise would be considered less than significant.

Nonfederally Listed Wildlife Species

Twenty-two nonfederally listed special-status wildlife species were detected within the BSA as summarized in Appendix G. Impacts to the 22 nonlisted resident wildlife species may include the direct loss of individuals as well as the short-term loss of habitat from grading/dredging and staging within the soil drying/staging areas. A few species may use habitats within the impact footprint, such as the wandering skipper, which is associated with salt marshes and is found in every lagoon in San Diego (Greer 2014). The project includes standard construction practices to minimize impacts to sensitive species, such as the presence of the Resident Engineer or designee to ensure that sensitive areas would be avoided. In addition, project impacts would be phased across the lagoon so that, at any given time, continued foraging and breeding habitat would be available to nonlisted wildlife species. Impacts to nonfederally listed wildlife species are not expected to result in the decline of any species below self-sustaining levels. However, potential impacts that may occur include mortality of individuals within the project footprint during the breeding season, and increased predation (as a result of nighttime lighting) and construction noise impacts to nonfederally listed special-status bird species within and adjacent to the project footprint.

Long-term direct and indirect impacts to nonfederally listed special status species may also occur as a result of cattail maintenance activities. Maintenance would be scheduled outside the breeding season and during daytime hours, and the potential for mortality, noise impacts, and increased predation would be minimized. Long-term direct and indirect impacts would be less than significant.

4.2.1.6 Wildlife Corridors/Connectivity

The Freshwater Alternative would result in temporary and short-term impacts to wildlife movement throughout the lagoon during grading and dredging activities. However, construction would be phased and would occur within discrete locations at discrete timeframes within the lagoon basins, thereby allowing for wildlife movement within adjacent habitat within the BSA at any given time during construction.

No long-term impacts are anticipated. The project area would still function as a large area of natural open space that would allow for wildlife movement similar to existing conditions. Therefore, no significant temporary or permanent impacts to wildlife movement/connectivity are anticipated with implementation of the Freshwater Alternative.

4.2.1.7 Local Ordinances/Policies/Adopted Plans

The project would be required to be consistent with Regional Conservation Plans. The North County MHCP covers the entire BSA, which includes the City of Oceanside HCP Subarea and

Carlsbad HCP Subarea. Portions of the BSA are within conservation areas referred to as Hardline Focused Planning Areas within both subarea plans. The MHCP allows for restoration of preserve areas. Specifically, the MHCP acknowledge the intent for restoration of Buena Vista Lagoon (see Section 6.3.5 of the MHCP). All restoration, maintenance, and monitoring plans prepared for the Freshwater Alternative would be prepared in accordance with the goals of the MHCP, draft Oceanside Subarea Plan, and final Carlsbad subarea plan, and in consultation with the wildlife agencies. The proposed project is also consistent with the goals and policies of the Carlsbad and Oceanside LCPs. The Oceanside LCP includes the following goals for Buena Vista Lagoon: "to protect and enhance the ecological and aesthetic values of the lagoon, including water quality, biological productivity and species diversity, and to provide opportunities for public access, recreation and educational use consistent with natural and aesthetic resource protection." Although the Carlsbad LCP does not establish specific goals for the lagoon, it prioritizes the protection of the lagoon as an environmentally sensitive habitat area.. Therefore, no significant impact would result with implementation of the Freshwater Alternative.

4.2.1.8. Long-term Benefits of the Freshwater Alternative

Some relatively modest benefits to biological resources would occur under the Freshwater Alternative. Although overall acreage suitable for threatened and endangered species nesting would decrease from existing conditions with the removal of vegetation (from 101.5 to 65.2 acres), the quality of remaining freshwater marsh would increase. Existing vegetation is dense and continues to encroach into open water areas of the lagoon. The Freshwater Alternative would retain some freshwater marsh but would include maintenance of areas that exceed approximately 150 feet wide. Maintenance would include the creation of channels into dense stands of marsh vegetation, which would enhance habitat quality for nesting birds such as Ridgway's rail. These channels would provide open water foraging opportunities as well as increase localized water quality and circulation through the freshwater marsh areas. In addition, this alternative would halt the conversion of the lagoon to a more monotypic freshwater marsh through removal of cattails and the reduction of accumulated sediment to a depth that would minimize continued vegetation encroachment into the lagoon basins. Removal and management of freshwater marsh vegetation would increase open water habitat for freshwater fish, as would the creation of deep open water areas. These deeper open water areas would experience longer residence times than existing conditions, but could still provide additional habitat for fish, depending on water quality conditions.

4.2.2 Saltwater Alternative

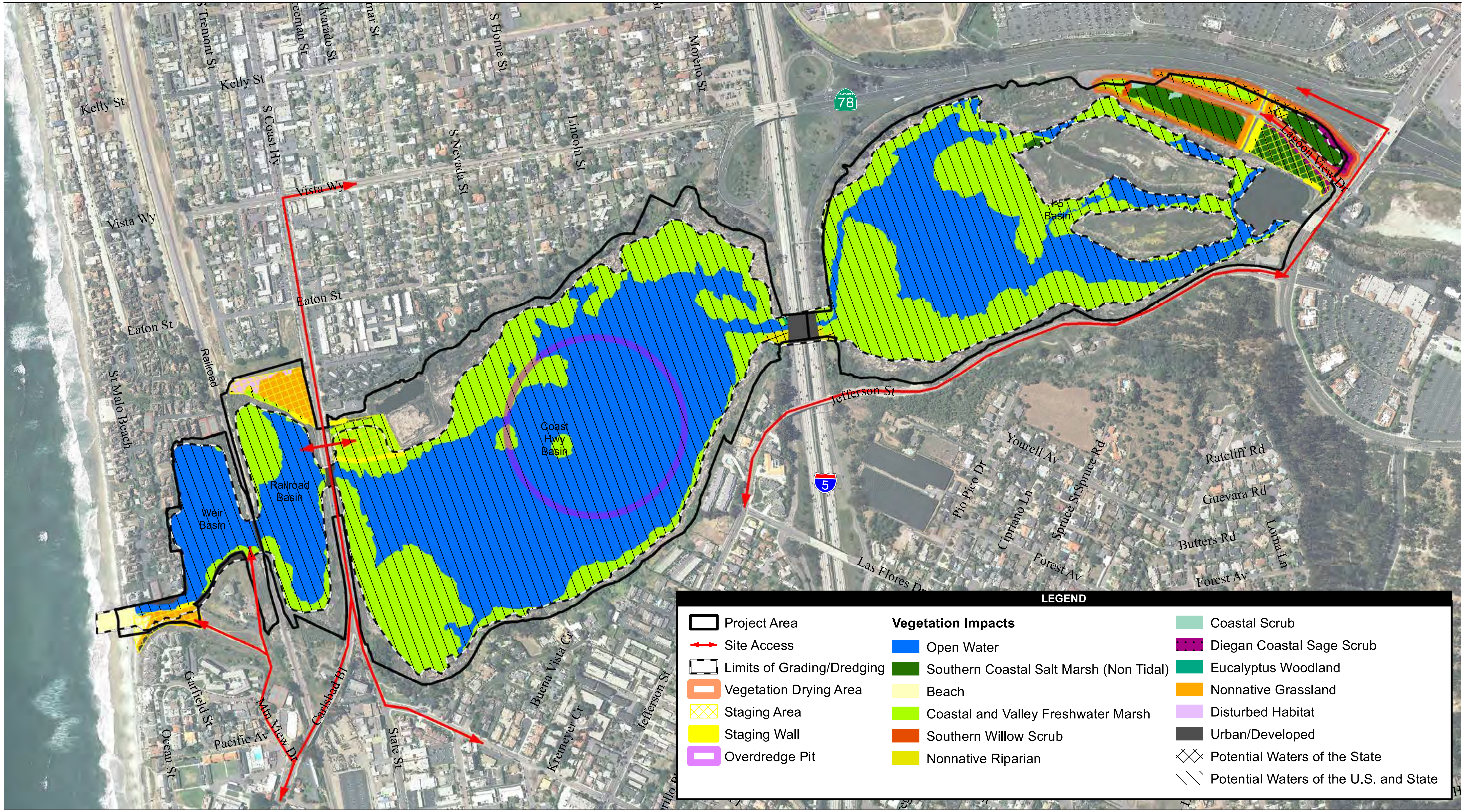
4.2.2.1 Sensitive Riparian and Natural Vegetation Communities

Temporary and permanent impacts would occur to vegetation communities as a result of implementing the proposed Saltwater Alternative. Short-term changes would result from vegetation removal within areas designated for soil drying and construction staging. Long-term permanent impacts would result from project construction and direct impacts from vegetation removal as a result of opening the lagoon to tidal flushing from the ocean, grading, dredging, and sediment excavation. Impacts to vegetation communities are detailed in Table 4-6. Potential impacts are described in further detail below.

Temporary Direct

Implementation of the Saltwater Alternative would result in impacts to 75 percent of the project footprint. Approximately 179.21 acres of vegetation may be temporarily displaced during vegetation removal, sediment removal, and grading and dredging activities, as shown in Figure 14. The primary concern for temporal loss of habitat is reduced availability of food and shelter for resident and migratory species that rely on the lagoon. As noted previously, temporary impacts are considered significant if more than 50 percent of sensitive habitat within the lagoon would be lost temporarily. As shown in Table 4-6, construction would result in greater than 50 percent temporal loss of sensitive riparian habitat (coastal and valley freshwater marsh, open water vegetation types) and sensitive upland habitat (coastal scrub and Diegan coastal sage scrub: *Baccharis*-dominated). The temporal loss of these habitats may threaten local populations of sensitive resident species, as described further in Section 4.2.2.4 below. Temporary, direct impacts to beach, coastal and valley freshwater marsh, open water, coastal scrub, Diegan coastal sage scrub: *Baccharis*-dominated, and nonnative grassland are therefore considered significant.

Temporary impacts to riparian wetland vegetation communities such as nonnative riparian, southern coastal salt marsh nontidal, and southern willow scrub are not considered significant because greater than 50 percent of the local habitat would remain available to local residents and migratory species during construction. Prior to construction, sensitive “no construction” zones would be identified and fenced or flagged to avoid impacts outside of the identified limits of disturbance. These areas would be monitored throughout construction by a qualified biologist. Temporary direct impacts to nonnative riparian and southern coastal salt marsh nontidal, and southern willow scrub would be less than significant.



Source: Sangis 2014; SANDAG 2012; AECOM 2014; Everest 2014

600 300 0 600 Feet

Scale: 1 = 7,200; 1 inch = 600 feet

Figure 14

Saltwater Alternative Impacts to Vegetation Communities and Habitats

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Implementation of the Saltwater Alternative would also result in temporary impacts to vegetation types within soil drying areas and staging areas, primarily located on the outer perimeters of the Weir Basin, Railroad Basin, and I-5 Basin (Figure 12). Vegetation would initially be cut and moved to the staging area specific to each basin. At areas with sufficient room (e.g., Coast Highway Basin and I-5 Basin), these areas would be used for soil drying, and vegetation mass removed from the construction limits would be laid on the ground and/or picked up with slotted/holed picks/scoops to facilitate draining and/or drying of the vegetation and associated root mass. At these soil drying areas and at staging areas, existing vegetation would be crushed and/or removed, and the ground would be compacted. Approximately 4.97 acres would be temporarily impacted at the proposed soil drying locations. Approximately 5.15 acres would be impacted within the proposed staging areas. It should be noted that these areas would be restored to preconstruction conditions, after project implementation.

Temporary Indirect

Short-term indirect impacts associated with the Freshwater Alternative would be similar to the Saltwater Alternative. Implementation of BMPs, delineation of sensitive "no construction" zones, and construction monitoring would be incorporated into the project, and short-term indirect impacts would be less than significan**t**.

Permanent Direct

Long-term permanent impacts to vegetation communities as a result of implementation of the Saltwater Alternative consist of habitat conversion as a result of vegetation removal, sediment removal, and dredging. Vegetation proposed to replace existing vegetation communities as a result of habitat conversion for each alternative is provided in Table 4-2. Vegetation type-conversion would continue through time as a result of exposure to tidal flushing and influx of saltwater from the open channel.

Generally, the Saltwater Alternative would result in complete habitat conversion into saltwater-associated vegetation communities from coastal and valley freshwater marsh, influenced primarily by saltwater entering the lagoon from an open tidal inlet during flood tides, as well as freshwater entering the lagoon from upstream and along the boundary of the lagoon. Water exiting the lagoon under the Saltwater Alternative would primarily occur during ebb tides (outgoing tides), with evapotranspiration and seepage providing additional output.

The Saltwater Alternative would feature a subtidal, open water channel running from the ocean (tidal inlet) to approximately halfway through the I-5 Basin. On either side of the channel, the ground would be graded to provide intertidal mudflat and a mix of coastal salt marsh habitats (low, mid, and high salt marsh) within each of the four basins.

As will be discussed further in the Section 4.2.25 below, overall acreage of habitat available for special-status species would increase with this alternative, and benefits from improved hydrological function would be expected. There would be increased habitat available for special-status species not currently using the lagoon. With improved lagoon ecology, increased foraging for species, and no overall loss of lagoon resources, direct impacts to sensitive vegetation communities with implementation of the Saltwater Alternative are considered less than significant.

Permanent Indirect Impacts

As a result of implementation of the Saltwater Alternative, saltwater would inundate freshwater marsh habitat adjacent to the limits of construction. As a result, these areas would be naturally transitioned to salt marsh habitat types as catttails would die from saltwater exposure. Dead biomass would be removed and monitored to confirm the need for active supplemental planting. Approximately 97.28 acres of coastal valley and freshwater marsh habitat occurs within the project footprint; of this amount, approximately 66.48 acres would be directly impacted within the limits of construction. Thus, approximately 30.80 acres of coastal and valley freshwater marsh habitat may be converted to salt marsh habitat over time. Although coastal and valley freshwater habitat would be impacted, it would be replaced by a natural community type that would continue to provide habitat for special-status species. Thus, permanent indirect impacts as a result of the Saltwater Alternative are considered less than significant.

4.2.2.2 Jurisdictional Waters and Wetlands

Temporary and permanent impacts would occur to potential jurisdictional waters and wetlands as a result of implementing the Saltwater Alternative. Short-term changes would result from vegetation removal within the construction limits and areas designated for soil drying and construction staging. Long-term permanent impacts would result from project construction and direct impacts from vegetation removal as a result of tidal influence, grading, dredging, and sediment excavation. Impacts to potential jurisdictional waters and wetlands are detailed in Table 4-7. Potential impacts are described in further detail below.

Table 4-7
Direct Project Impacts to Potential Jurisdictional Wetlands and Waters from Implementation of the Saltwater Alternative (acres)[1]

Potential Jurisdictional Wetlands and Waters	Grading/ Dredging	Soil Drying	Staging Areas	Total
Waters of the U.S.				
Wetland	65.55	3.87	2.35	71.77
Other Waters	100.79	0	0.04	100.84
Waters of the State				
Nonwetland riparian	0.47	0.40	0.05	0.92
Total	**166.81**	**4.27**	**2.44**	**173.52**

[1] Numbers may not sum exactly due to rounding.

Of the approximately 224.2 acres of jurisdictional waters and wetlands, approximately 173.52 acres would be directly impacted by construction as a result of direct habitat removal (166.81 acres from grading/dredging, 4.27 acres from soil drying areas, and 2.44 acres from staging areas). Of this, approximately 0.92 acre is considered nonwetland riparian under the jurisdictional purview of CDFW, consisting of eucalyptus woodland and nonnative riparian along the upper banks of the lagoon, and therefore considered associated riparian habitat of the lagoon. These areas do not support a dominance of hydrophytic vegetation and therefore were determined not to be a three-parameter wetland. These impacts would include the short-term loss of vegetation as described above, and potential impacts to water quality associated with construction. As described in Section 3.4 Water Quality and Aquatic Sediment Quality, several project design features have been incorporated to minimize temporary impacts on water quality within the lagoon.

Due to the temporary nature of the direct impacts, overall project objective of improved wetland function and value, and with implementation of project design features and compliance with requirements for BMPs, the short-term direct impacts resulting from the implementation of Saltwater Alternative are considered less than significant

Temporary Indirect Impacts

Short-term indirect impacts to jurisdictional waters would include changes in habitat or water quality that may result from project implementation. Indirect impacts to vegetation would include construction-generated dust, sedimentation, and runoff into surrounding waters. However, implementation of BMPs, delineation of sensitive “no construction” zones, and construction monitoring would be incorporated into the project, and short-term indirect impacts would be less than significant.

Permanent Direct

Prior to implementation of the Saltwater Alternative, approximately 224.2 acres of the 557-acre BSA was determined to be potential jurisdictional waters and wetlands of the U.S. and state. Following implementation of the Saltwater Alternative, conversion from one wetland type to another would occur due to dredging of channels/basins and improvements to hydrologic function. Implementation of the Saltwater Alternative would only result in habitat type-conversion and would not result in permanent loss of jurisdictional waters and wetlands of the U.S. and state. Therefore, no long-term significant indirect permanent impacts to jurisdictional waters and wetlands are anticipated with implementation of the Saltwater Alternative.

The amounts of jurisdictional waters and wetlands are expected to be similar to existing conditions following implementation of the Saltwater Alternative. In addition, the Saltwater Alternative would create higher diversity of wetland communities by slowly transitioning from open water to high southern coastal salt marsh (tidal) throughout the lagoon thereby enhancing wetland conditions of jurisdictional waters and wetlands within the lagoon.

Permanent Indirect Impacts

Long-term indirect impacts to jurisdictional waters adjacent to the construction limits would potentially result in an improved saltwater system, as a result of natural tidal flushing and increased circulation within the lagoon. No significant permanent indirect impacts to wetlands are anticipated with enhancement.

4.2.2.3 Fish Resources

Temporary Direct and Indirect Impacts

Implementation of the Saltwater Alternative would extirpate nonnative freshwater fish species and encourage native saltwater fish species to enter and utilize Buena Vista Lagoon during various life history stages. The impact would be permanent and it would apply to the entire lagoon. Implementation of this alternative would have no impact on the two native species currently present in the lagoon, California killifish and striped mullet, because both species are euryhalic and capable of thriving in a variety of marine environments. The net effect to the native fish resources of the lagoon would be positive for native fish from implementation of the Saltwater Alternative. Short-term indirect impacts associated with the Freshwater Alternative would be similar to the Saltwater Alternative. Implementation of BMPs, delineation of sensitive "no construction" zones, and construction monitoring would be incorporated into the project, and short-term indirect impacts would be less than significant.

Permanent Direct Impacts

Implementation of the Saltwater Alternative would have permanent, long-term impacts on the fish resources in Buena Vista Lagoon. Implementation of the Saltwater Alternative would extirpate nonnative freshwater fish species while promoting native saltwater fish species to enter and utilize Buena Vista Lagoon during various life history stages. The impact would be permanent and would apply to the entire lagoon, but is not significant as these are impacts to nonnative fish. Impacts from enhancement activities to habitat availability and quality, and water quality would have long-term impacts on native fish, fish populations, the recreational fishery, species assemblage, and species diversity. Under the Saltwater Alternative, Buena Vista Lagoon would be converted from a freshwater system to a saltwater system by engineering an inlet that would allow saltwater inundation throughout the lagoon. There would be impacts and beneficial effects on fish resources in Buena Vista Lagoon under the Saltwater Alternative including, but not limited to, creation and enhancement of habitat and enhanced water quality conditions for native marine species. Implementation of this alternative would have no impact on the two native species currently present in the lagoon, California killifish and striped mullet, because both species are euryhalic and capable of thriving in a variety of marine environments.

Anticipated salinity levels associated with the Saltwater Alternative would exceed the upper tolerance range of freshwater fish species currently present in the lagoon, which would affect species assemblages. Freshwater fish species would be extirpated from the lagoon and replaced by saltwater guilds. Conversion to a saltwater system would encourage saltwater fish species to enter and utilize the lagoon during various life history stages. The lagoon could provide fertile rearing habitat, and possibly spawning habitat, for a variety of saltwater fish species including members of the Atherinidae (silversides), Engraulidae (anchovies), Gobiidae (gobies), Embiotocidae (surfperch), and Clupeidae (herring, sardine) families. Fish species diversity is likely to increase in the lagoon following establishment of a saltwater environment, including associated habitat, and based on results from the Batiquitos Lagoon Restoration Project (Merkel and Associates 2009). Species assemblages, population structure, and species diversity are likely to change through time as a result of temporal changes to saltwater habitat complexity and composition (e.g., development of kelp and eelgrass beds) and primary production.

Enhancement activities affecting habitat quality and quantity under the Saltwater Alternative are similar to those described above under the permanent direct impacts section for the Freshwater

Alternative: vegetation removal, dredging, and creation of deep water habitat. The difference between the two alternatives is the amount and types of habitat that would be created. Much of the lagoon would be dredged and graded to create tidal mudflats and allow salt marsh communities to develop through natural processes. Approximately 20 acres of mudflat and 124 acres of salt marsh, both habitat types tidally influenced, would be created. Open water habitat would be reduced by approximately 56 acres. Creation of mudflats and salt marsh would have long-term, beneficial effects on saltwater fish species that may utilize the lagoon following implementaton of the Saltwater Alternative. Loss of open water habitat would not impact saltwater fish species because a naturally functioning, healthy saltwater ecosystem would be created providing high-quality, suitable habitat and suitable hydrologic conditions. Creation of deep water habitat, approximately 4 acres, would have the same long-term, beneficial effects on saltwater fish resources as described above under the permanent direct impacts section for the Freshwater Alternative.

Establishment of marine submergent vegetation is likely to occur at some point in time following saltwater inundation. Submergent vegetation such as kelp and eelgrass provide spawning and nursery habitat for a variety of saltwater fish species and improve water quality. In addition, establishment of submergent vegetation may attract fish species other than those listed above. The overall effect to marine fish resources from establishment of submergent vegetation would be an increase in available habitat types, improved water quality, and increased species diversity.

Hydrologic regimes under the Saltwater Alternative would maintain high water quality conditions throughout the lagoon that would be suitable for saltwater fish species. Engineering designs for the tidal inlet and graded elevations would allow tidal exchange, improve circulation, provide saltwater inundation, and maintain a frequency of flushing throughout to ensure high water quality. The anticipated magnitude of the tidal prism and the modeled water residence times through a range of conditions suggest frequent mixing would preclude stratification between saltwater and freshwater, a situation that could create an anoxic zone in the hypolimnion unsuitable for fish resources. Regular tidal exchange, frequent flushing, and good circulation would maintain a healthy, functional marine environment beneficial to saltwater fish species.

Freshwater recreational angling opportunities would be eliminated under the Saltwater Alternative. However, conversion to a saltwater system may encourage saltwater fish species popular among recreational anglers to enter and utilize the lagoon. These species could include spotted sand bass (*Paralabrax maculatofasciatus*, family Serranidae), barred sand bass (*Paralabrax nebulifer*, family Serranidae), kelp bass (*Paralabrax clathratus*, family Serranidae), and California halibut (*Paralichthys californicus*, family Paralichthyidae). It is uncertain if saltwater fish species targeted by recreational anglers would utilize the lagoon in sufficient numbers and size classes to provide viable recreational angling opportunities.

While the transition to saltwater under this alternative would cause a change in the fish species that may be supported within the lagoon, the change has the potential to significantly benefit native saltwater fish species. Implementation of this alternative would have no impact on the two native species currently present in the lagoon, California killifish and striped mullet, because both species are euryhalic and capable of thriving in a variety of marine environments. Implementation of this alternative would extirpate the nonnative fish species currently present in the lagoon; however, none of these species are listed. Implementation would result in a positive net effect on native fish resources. No sensitive freshwater species are known to occcur in the lagoon. Therefore, implementation of the Saltwater Alternative would not result in significant permanent direct impacts.

Permanent Indirect Impacts

Permanent indirect impacts resulting from implementation of the Saltwater Alternative include increased flushing and circulation, reduced rate of eutrophication, and an overall improvement to water quality. Post-project water quality would support a healthy, naturally functioning saltwater environment that would be beneficial to saltwater fish resouces. Thus, permanent indirect impacts as a result of the Saltwater Alternative would not be considered significant.

4.2.2.4 Special-Status Plant Species

No federally listed or state-listed rare, threatened, or endangered plant species occur within the construction limits of the Saltwater Alternative. One special-status plant species, southwestern spiny rush (CNPS List 4.2), is known to occur in the I-5 Basin, within coastal and valley freshwater marsh habitat. Temporary direct impacts would occur to these plants, as they occur within the soil drying areas (Figure 15). The large population of southwestern spiny rush is expected to persist within the lagoon, as the majority of the salt marsh (mid and high) habitats would remain intact. Therefore, no significant impacts to sensitive plant populations are anticipated with implementation of the Saltwater Alternative.

Temporary direct impacts to southwestern spiny rush in the form of vegetation removal and mortality of individuals within the soil drying areas and staging areas may occur. The regulatory requirement to implement BMPs would minimize indirect impacts to plants located adjacent to the construction limits (e.g., construction-generated dust, runoff, and sedimentation). Therefore, no significant temporary direct impacts to special-status plant populations are anticipated with implementation of the Saltwater Alternative.

4.2.2.5 Special-Status Wildlife Species

Federally Listed Wildlife Species

Temporary Direct

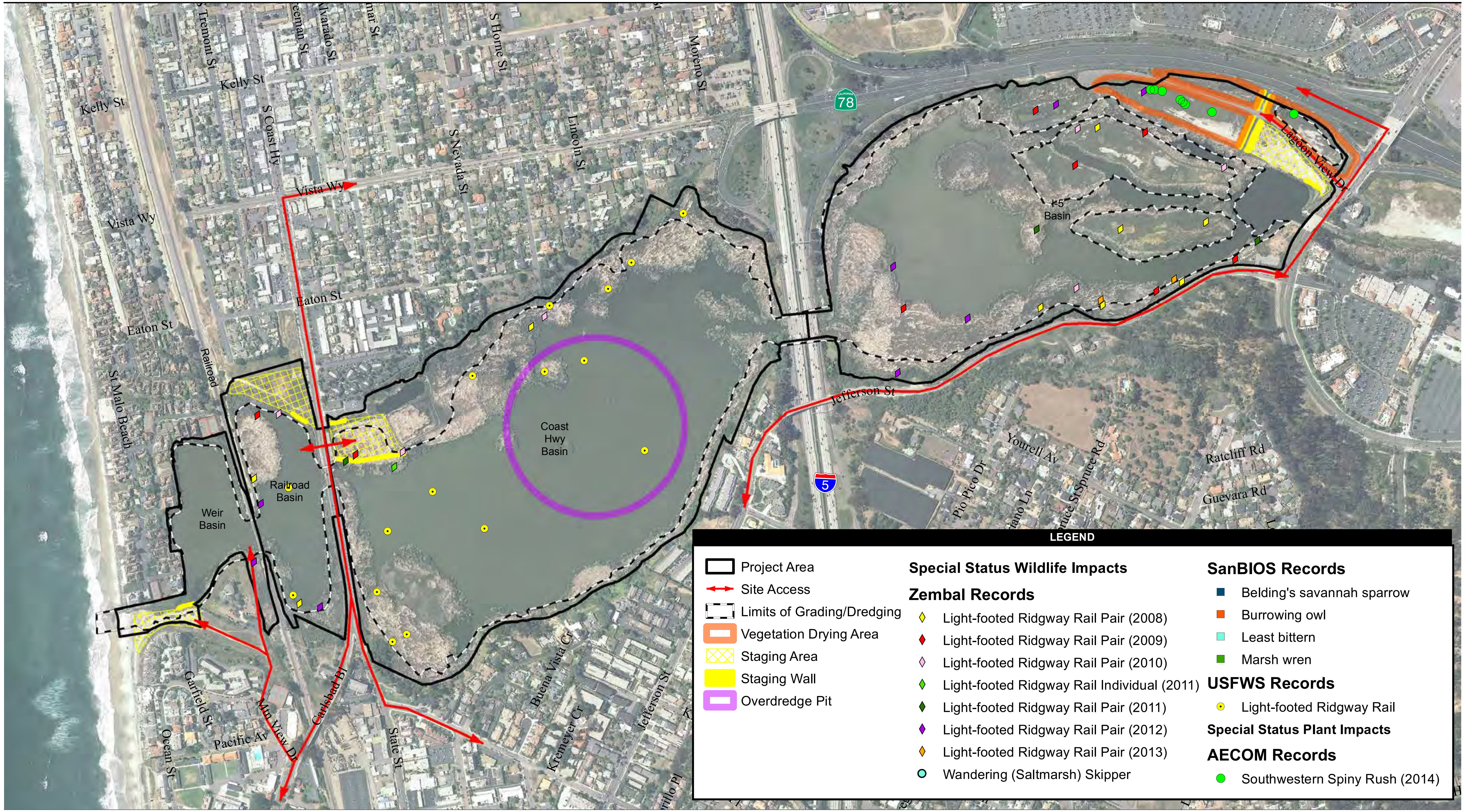
Temporary direct impacts may include the short-term loss of nesting and/or foraging habitat for special-status wildlife species resulting from construction and maintenance activities. Of the 114 special-status wildlife species with the potential to occur within the BSA, seven species are federally and/or state listed. These include the light-footed Ridgway's rail, western snowy plover, California least tern, least Bell's vireo, southwestern willow flycatcher, Belding's savannah sparrow, and coastal California gnatcatcher. Impacts to special-status wildlife species habitat are provided in Table 4-8 and are separated into two types of short-term impacts: areas that occur within staging/soil drying areas and areas impacted by grading/dredging.

LIGHT-FOOTED RIDGWAY'S RAIL

Light-footed Ridgway's rail is a year-round resident in the lagoon, found in coastal and valley freshwater marsh and southern coastal salt marsh nontidal habitat. The Saltwater Alternative would directly impact 71.7 acres (65 percent) of existing suitable nesting habitat through direct grading/dredging and staging/soil drying (Table 4-8 and Figure 15). Impacts are associated with habitat removal for areas that occur within the grading/dredging and staging footprint, or habitat displacement within the vegetation drying areas. Additional impacts to this species include mortality of individuals, increased predations as a result of nighttime lighting within the construction footprint, and noise impacts during the breeding season. As impacts to greater than 50 percent of the suitable habitat with would occur with implementation of the Saltwater Alternative, temporary direct impacts to light-footed Ridgway's rail are considered significant.

WESTERN SNOWY PLOVER

The western snowy plover suitable habitat is limited to the beach habitat west of the weir; impacts to 0.46 acre (77 percent) of beach habitat for this species would occur during construction. As noted in Chapter 3, western snowy plover does not forage frequently within the BSA and likely no longer breeds there as historic nesting sites within the BSA have been altered by anthropogenic factors. As



Source: SanGIS 2009; Landiscorp 2010; Everest 2014

600 300 0 600 Feet

Scale: 1 = 7,200; 1 inch = 600 feet

Figure 15
Saltwater Alternative Impacts to Special Status Species

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Table 4-8
Direct Project Impacts to Special-Status Wildlife Species Habitat from Implementation of the Saltwater Alternative (acres)[1]

Special-Status Species	Vegetation Community	Existing Habitat	Habitat Impacted by Soil Drying/Staging			Habitat Impacted by Grading/Dredging		Total Direct Impact to Existing Habitat	
			Soil Drying	Staging Areas	Percent	Grading/ Dredging	Percent	Total	Percent
Light-footed Ridgway's rail	Coastal and valley freshwater marsh	96.2	1.22	0.83	2%	64.42	67%	66.48	69%
	Southern coastal salt marsh nontidal	14.78	2.57	1.52	28%	1.11	8%	5.2	35%
	Light-footed Ridgway's rail total	110.98	3.79	2.35	6%	65.53	59%	71.68	65%
Western snowy plover	Beach	0.6	0	0.05	8%	0.45	75%	0.49	82%
	Western snowy plover total	0.6	0	0.05	8%	0.45	75%	0.49	82%
California least tern	Beach	0.6	0	0.05	8%	0.37	62%	0.46	77%
	Open Water	106.8	0	0.04	0%	100.79	94%	100.84	94%
	California least tern total	107.4	0	0.09	0%	101.16	94%	101.3	94%
Least Bell's vireo and southwestern willow flycatcher	Southern willow scrub	2.2	0.07	0	3%	0.02	1%	0.09	4%
	Least Bell's vireo and southwestern willow flycatcher total	2.2	0.07	0	3%	0.02	1%	0.09	4%

Special-Status Species	Vegetation Community	Existing Habitat	Habitat Impacted by Soil Drying/Staging			Habitat Impacted by Grading/Dredging		Total Direct Impact to Existing Habitat	
			Soil Drying	Staging Areas	Percent	Grading/ Dredging	Percent	Total	Percent
Belding's savannah sparrow	Southern coastal salt marsh nontidal	14.78	2.57	1.52	28%	1.11	8%	5.2	35%
	Belding's savannah sparrow total	14.78	2.57	1.52	28%	1.11	8%	5.2	35%
Coastal California gnatcatcher	Coastal scrub	0.6	0.36	0	60%	0	0%	0.36	60%
	Diegan coastal sage scrub: *Baccharis*-dominated	1.3	0.33	0.28	47%	0.08	6%	0.69	53%
	Coastal California gnatcatcher total	1.9	0.69	0.28	51%	0	0%	1.05	55%

[1] Numbers may not sum exactly due to rounding.

mudflat habitats suitable for foraging do not occur within the BSA, plover is currently not likely to occur; thus, this species is not likely to be impacted. Therefore, temporary direct impacts to western snowy plover from the Saltwater Alternative would be less than significant.

CALIFORNIA LEAST TERN

California least tern is documented as annually foraging at Buena Vista Lagoon but is not known to breed in the lagoon. Impacts to 0.46 acre (77 percent) of beach and 100.84 acres (94 percent) of open water would occur as a result of grading/dredging and staging/soil drying for the Saltwater Alternative (Table 4-8). Approximately 101.3 acres (94 percent) of California least tern foraging habitat would be impacted as a result of construction of the Saltwater Alternative. No suitable nesting habitat occurs within the lagoon.

Sediment mobilization, increased turbidity, and the resulting impaired water quality could affect fish, which is the primary food of California least tern. However, foraging species like the least tern are highly mobile and move throughout the lagoon as well as up and down the coast; as such, the temporary loss of their potential foraging habitat is not expected to have a significant impact on these species. In addition, many of these areas post-implementation are expected to return to the same/similar habitat type but with improved conditions as a result of improved hydrology. Therefore, temporary direct impacts to California least tern from the Saltwater Alternative would be less than significant.

LEAST BELL'S VIREO AND SOUTHWESTERN WILLOW FLYCATCHER

One least Bell's vireo was observed during 2013 protocol surveys; another historic location of vireo occurs outside of the project area. Both observations are within southern willow scrub habitat in the 500-foot buffer of the BSA. Southern willow flycatcher was not detected during 2013 surveys and is not known to occur within the BSA. Neither species has been documented to breed on-site although there is the potential that vireo breeding may occur, as suitable southern willow scrub is present. Implementation of the Saltwater Alternative would directly impact 0.09 acre (4 percent) of the southern willow scrub riparian habitat within the lagoon as a result of staging within the soil drying areas and grading/dredging (Table 4-8). Temporary direct impacts are expected to be the same as the Freshwater Alternative. Therefore, temporary direct impacts to least Bell's vireo and southwestern willow flycatcher from the Saltwater Alternative would be less than significant.

BELDING’S SAVANNAH SPARROW

Belding’s savannah sparrow occupies southern coastal salt marsh nontidal habitat. Observations are particularly dense in the eastern portion of the I-5 Basin where pickleweed-dominated marsh habitat is prevalent. As a result of vegetation removal and grading/dredging and staging within the soil drying areas and staging areas, the Saltwater Alternative would temporarily impact 5.2 acres (35 percent) of southern coastal salt marsh nontidal habitat across the four basins (Table 4-8 and Figure 15).

Temporary direct impacts to Belding’s savannah sparrow are expected to be the same as the Freshwater Alternative. The Saltwater Alternative would have a significant temporary direct impact on Belding’s savannah sparrow.

COASTAL CALIFORNIA GNATCATCHER

Implementation of the Saltwater Alternative would directly impact 0.36 acre (60 percent) of coastal scrub habitat and 0.69 acre (6 percent) of Diegan coastal sage scrub: *Baccharis*-dominated at the eastern end of the BSA as a result of staging within the soil drying areas (Table 4-8). As vegetation would be removed outside of the breeding season and both species would likely use the site for foraging during summer months, the short-term impact to 1.05 acres (55 percent) of suitable scrub habitats on-site is greater than 50 percent. However, this would not be substantial and would not result in a decline in the local population below self-sustaining levels (as a local population does not exist). Additionally, habitat within the soil drying areas would be restored to pre-construction conditions after project implementation. Therefore, temporary direct impacts to coastal California gnatcatcher from the Saltwater Alternative would be less than significant.

Temporary Indirect

Indirect short-term/temporary impacts to sensitive species may include increases in exposure to predators as a result of nighttime lighting. These impacts are identical to those described for the Freshwater Alternative. Temporary indirect impacts to sensitive species from predation would be less than significant.

Indirect noise impacts associated with the Saltwater Alternative would be similar to those described for the Freshwater Alternative. The construction (grading/dredging) footprint for the Saltwater Alternative is similar to the Freshwater Alternative. The overall construction approach is similar for both alternatives. Similar to the Freshwater Alternative, short-term noise impacts on sensitive birds from construction would result in a significant impact.

As with the Freshwater Alternative, noise from increased vehicular traffic associated with implementation of the Saltwater Alternative may also occur and would be similar. Noise impacts to birds from vehicular traffic are therefore considered less than significant.

Permanent Direct

Direct permanent impacts to sensitive species include the active conversion of nesting and/or foraging habitat to another habitat type, modified lagoon conditions, and long-term maintenance and operation. As described above, suitable habitat for sensitive species would be changed and/or converted as a result of the proposed project. The direct permanent changes to suitable habitat for sensitive species are summarized in Table 4-9. This change may include a direct increase or decrease in the total acreage of a specific habitat type post-enhancement. Proposed special-status wildlife species habitat is provided in Table 4-9.

Table 4-9
Saltwater Alternative Existing and Post-Implementation Acreage of Suitable Habitat for Special-Status Wildlife Species (acres)[1]

Special-Status Species	Vegetation Community	Existing Habitat	Habitat Acreage Post-Implementation	Net Change in Habitat Acreage Post-Implementation	Percent Change Post-Implementation
Light-footed Ridgway's rail	Coastal and valley freshwater marsh	96.2	0	-96.2	-100%
	Mudflat	0.0	20	20.0	0%
	Transitional	0.0	0	<0.01	<0.01%
	Southern coastal salt marsh nontidal	14.8	23.2	8.4	57%
	Southern coastal salt marsh high	0.0	55	55.0	0%
	Southern coastal salt marsh low	0.0	33.2	33.2	0%
	Southern coastal salt marsh mid	0.0	35.4	35.4	0%
	Total	111.0	166.8	55.8	50%
Western snowy plover	Beach	0.6	0.8	0.2	33%
	Mudflat	0.0	20	20.0	0%
	Total	0.6	20.8	20.2	3367%

Special-Status Species	**Vegetation Community**	**Existing Habitat**	**Habitat Acreage Post-Implementation**	**Net Change in Habitat Acreage Post-Implementation**	**Percent Change Post-Implementation**
California least tern	Beach	0.6	0.8	0.2	33%
	Open water	106.8	51	-55.8	0%
	Deep open water	0.0	4	4.0	0%
	Mudflat	0.0	20	20.0	0%
	Total	107.4	75.8	-31.6	-29%
Least Bell's vireo and southwestern willow flycatcher	Southern willow scrub	2.2	0	-2.2	-100%
	Total	2.2	0.0	-2.2	-100%
Belding's savannah sparrow	Mudflat	0.0	20	20.0	0%
	Southern coastal salt marsh nontidal	14.8	23.2	8.4	57%
	Southern coastal salt marsh high	0.0	55	55.0	0%
	Southern coastal salt marsh low	0.0	33.2	33.2	0%
	Southern coastal salt marsh mid	0.0	35.4	35.4	0%
	Total	14.8	166.8	152.0	1029%
Coastal California gnatcatcher	Coastal scrub	0.6	0.5	-0.1	-17%
	Diegan coastal sage scrub	0.0	0.8	0.8	0%
	Diegan coastal sage scrub: *Baccharis*-dominated	1.3	1.3	0.0	0%
	Total	1.9	2.6	0.7	34%

[1] Numbers may not sum exactly due to rounding.

Long-term monitoring and maintenance would be part of the Enhancement Project. This may include, but is not limited to, biological monitoring, nonnative species treatment, and other adaptive management strategies. Although each of these actions is intended to help the success of the enhancement effort, there is the potential for impacts to sensitive birds in the lagoon.

LIGHT-FOOTED RIDGWAY'S RAIL

Light-footed Ridgway's rail nesting and foraging habitat would be increased as a result of the Saltwater Alternative. Post-enhancement, habitats would increase by an approximate 50 percent change, with the doubling for southern coastal salt marsh tidal habitat and the creation of five new habitat types considered suitable for light-footed Ridgway's rail, including mudflats, and low/mid/high southern coastal salt marsh habitat (Table 4-9).

The existing southern coastal salt marsh nontidal and coastal and valley freshwater marsh habitat occupied by light-footed Ridgway's rail is limited under existing conditions by the overall poor conditions of the lagoon resulting from poor tidal flushing and sediment accumulation, and these less than optimal conditions would continue without implementation of the Saltwater Alternative. As discussed in Chapter 3, light-footed Ridgway's rail observations have generally declined in the last 5 years (Zembal et al. 2013). This may correlate to the overall effect through time of the weir preventing the natural ocean-lagoon tidal processes. It is possible that, through opening of the channel and allowing for tidal influx, changes to lagoon hydrology under the Saltwater Alternative would also improve the condition of the foraging and nesting habitat for light-footed Ridgway's rail by providing habitat stratification, within and adjacent to the construction limits. It would be expected that the Ridgway's rail population would increase as the result of increased availability of optimal habitat. Ultimately, the project is expected to benefit light-footed Ridgway's rail populations at Buena Vista Lagoon. Therefore, permanent impacts to light-footed Ridgway's rail with implementation of the Saltwater Alternative are considered less than significant.

Long-term monitoring and maintenance would be part of the Enhancement Project. This may include, but is not limited to, biological monitoring, nonnative species treatment, and other adaptive management strategies. Although each of these actions is intended to enhance the success of the restoration effort, there is the potential for impacts to sensitive birds in the lagoon. To minimize impacts, the project would prepare an adaptive management, maintenance, and monitoring program that would include avoidance measures to minimize impacts to sensitive wildlife on-site. As such, long-term monitoring and maintenance activities are not expected to have a substantial effect on any sensitive species, and permanent impacts from the Saltwater Alternative are considered less than significant.

WESTERN SNOWY PLOVER

Western snowy plover nesting and foraging habitat would be increased as a result of the Saltwater Alternative. Post-enhancement, habitats would increase by an approximate 3367 percent change, with an increase of 0.6 acre to 0.8 acre of beach habitat (suitable for nesting and foraging), and creation of 20 acres of new mudflat habitat, suitable for foraging (Table 4-9). This species is currently not known to nest within the lagoon but is known to forage; thus this increase in foraging habitat may be a potential benefit to this species. As such, no significant or permanent impacts to western snowy plover would result from implementation of the Saltwater Alternative.

CALIFORNIA LEAST TERN

California least tern is documented annually as foraging at Buena Vista Lagoon. Implementation of the Saltwater Alternative would permanently decrease suitable foraging habitat for California least tern with a 29 percent change, decreasing what is currently 107.4 acres of suitable habitat by 31.6 acres. Also, the result of open tidal influx, creation of mudflats, and dredging accumulated sediment load may improve conditions for benthic species and fish species, as the improved circulation and mudflat habitat type would enhance environmental conditions for the prey communities that this bird feeds on. The Saltwater Alternative would directly benefit species like tern that regularly use the lagoon for foraging, by adding diversity of foraging habitat in quality. As such, no significant permanent impacts to California least tern would result with project implementation of the Saltwater Alternative.

LEAST BELL'S VIREO AND SOUTHWESTERN WILLOW FLYCATCHER

Suitable habitat for least Bell's vireo and southwestern willow flycatcher would not be present within the Saltwater Alternative, post-implementation (Table 4-9). However, historic and/or recent locations of these species occur outside of the construction limits and neither of these migratory bird species is known to breed on-site. As such, no significant permanent impacts to least Bell's vireo and southwestern willow flycatcher would result with project implementation of the Freshwater Alternative.

BELDING'S SAVANNAH SPARROW

Belding's savannah sparrow nesting and foraging habitat would be increased as a result of the Saltwater Alternative. Post-enhancement, habitats would increase by an approximate 1029 percent change, with the doubling for southern coastal salt marsh tidal habitat and the creation of five new habitat types considered suitable for Belding's savannah sparrow, including mudflats, and low/mid/high southern coastal salt marsh habitat (Table 4-9).

In addition, the changes to lagoon hydrology would improve the condition of the remaining foraging and nesting habitat suitable for Belding's savannah sparrow. Under current conditions, the frequency and duration of soil saturation in marsh habitat are highly variable and often affected by late season rains and ponding. This results in large fluctuations in the Belding's savannah sparrow population and nesting success each year, as they can only nest on dry soil. It is possible that, through opening of the channel and allowing for tidal influx, changes to lagoon hydrology under the Saltwater Alternative would also improve the condition of the foraging and nesting habitat for Belding's savannah sparrow by providing habitat stratification, within and adjacent to the construction limits. Improved hydrology would overall improve circulation and flow, which would facilitate the drying of high-marsh habitat used for ground nesting. The improved conditions post-implementation of the Saltwater Alternative would ultimately benefit the Belding's savannah sparrow population at Buena Vista Lagoon and permanent impacts are considered less than significant.

COASTAL CALIFORNIA GNATCATCHER

Post-implementation of the Saltwater Alternative, there would be an increase of 0.7 acre of suitable habitat, including a new habitat, Diegan coastal sage scrub (0.8 acre), suitable to support coastal California gnatcatcher. This would increase habitat suitable to support coastal California gnatcatcher by a 34 percent change. As such, no significant permanent impacts to coastal California gnatcatcher would result with project implementation.

Permanent Indirect

Indirect long-term/permanent impacts include the passive transition of nesting and/or foraging habitat to another habitat type, increased potential for invasive species, and changes to water quality.

Coastal and valley freshwater marsh habitat outside of the construction limits for the Saltwater Alternative may passively transition (change) over a long period of time. Although the change in habitat is unpredictable in the transitional area, the connection to tidal hydrology and the improved circulation is expected to ultimately enhance the condition of the existing habitat within each of the four basins as saltwater marsh habitat is the preferred habitat for light-footed Ridgway's rail and Belding's savannah sparrow. Indirect impacts to sensitive species resulting from changes to the new transitional area are less than significant.

It is possible that reduced periods of saturation and increased salinity may make transitional areas more prone to invasion by nonnative species. As part of the Post-Implementation habitat monitoring and maintenance program for this project, the occurrence of these invasive species would be closely monitored and maintenance would regularly conduct treatments to limit the possibility of invasion. Indirect impacts to sensitive species resulting from invasive species are not considered substantial.

As described for the Freshwater Alternative, indirect changes to lagoon condition are expected as a result of the Saltwater Alternative and the corresponding improvement to tidal hydrology (i.e., circulation, turnover, etc.). The indirect improvement to water quality would benefit sensitive species.

With implementation of project design features and the net benefits of the Enhancement Project, indirect permanent impacts to sensitive species from passive transition of nesting and/or foraging habitat and invasive species are considered less than significant for the Saltwater Alternative.

Nonfederally Listed Wildlife Species

Impacts to nonlisted special-status wildlife species associated with the implementation of the Saltwater Alternative would be the same as the Freshwater Alternative as the extent of grading/dredging is similar. Short-term direct and indirect impacts to migratory and nonresident wildlife species would occur due to mortality, increased risk of predation, and noise. Short-term direct and indirect impacts would be significant.

4.2.2.6 Wildlife Corridors/Connectivity

The Saltwater Alternative would have similar temporary and short-term impacts to wildlife corridors and connectivity as discussed for the Freshwater Alternative. The lagoon is not considered a regional wildlife corridor, but no long-term impacts are anticipated. The lagoon would still function as a large area of natural open space corridor that would allow for wildlife movement and connectivity similar to existing conditions. Therefore, no significant short-term or long-term impacts to wildlife movements or connectivity are anticipated with implementation of the Saltwater Alternative.

4.2.2.7 Local Ordinances/Policies/Adopted Plans

Similar to the Freshwater Alternative, all restoration, maintenance, and monitoring plans prepared for the Saltwater Alternative would be prepared in accordance with the goals of these regional conservation plans, and in consultation with the wildlife agencies. As described under the Freshwater Alternative, the project is consistent with the goals and objectives of the MHCP, draft Oceanside Subarea Plan, final Carlsbad subarea plan, Carlsbad Habitat Management Plan, and the LCPs of both cities. Therefore, no significant impact would result with implementation of the Saltwater Alternative.

4.2.2.8 Long-Term Benefits of the Saltwater Alternative

The Saltwater Alternative would result in substantial benefits to biological resources, including providing high-quality nesting habitat to threatened and endangered species (increasing area from 101.5 to 163 acres compared to existing conditions). This alternative would halt the conversion of the lagoon to a more monotypic freshwater marsh habitat with decreased circulation and open water that is currently occurring due to sedimentation and vegetation encroachment. The Saltwater Alternative would remove the highest amount of cattail and bulrush encroachment currently impeding water circulation and restricting fish habitat, and would transition remaining freshwater marsh areas to salt marsh over time. Increased circulation and flushing would result in a healthier benthic community and more foraging opportunities for birds. The foraging opportunities would be increased in quantity, quality, and diversity resulting in a long-term and persisting benefit for avian populations, including some special-status species. Transitioning the lagoon to a saltwater system would benefit native saltwater fish species that would have access to the lagoon system through the open inlet. Fish would also benefit from the creation of deep water habitat areas through improved spawning and rearing habitat, resulting in long-term beneficial effects on the stability and sustainability of fish populations.

4.2.3 Hybrid Alternative (Options A and B)

4.2.3.1 Sensitive Riparian and Natural Vegetation Communities

Temporary and permanent impacts would occur to vegetation communities as a result of implementing the proposed Hybrid Alternative (Options A and B). Short-term changes would result from vegetation removal within areas designated for soil drying and construction staging. Long-term permanent impacts would result from project construction and direct impacts from vegetation removal as a result of opening the lagoon to tidal flushing from the ocean, grading, dredging, and sediment excavation. Impacts to vegetation communities are detailed in Table 4-10. Potential impacts are described in further detail below.

Temporary Direct

Implementation of the Hybrid Alternative (Options A and B) would result in impacts to 71 percent of the project footprint. Approximately 168.48 acres of vegetation may be temporarily displaced during vegetation removal, sediment removal, and grading and dredging activities, as shown in Figure 16. The primary concern for temporal loss of habitat is reduced availability of

Table 4-10
Direct Impacts to Vegetation Communities from Implementation of the Hybrid Alternative (Options A and B) (acres)[1]

Vegetation Community	Grading/ Dredging	Soil Drying	Staging Areas	Total Impacts	% in the Project Footprint
Riparian and Wetlands					
Beach	0.45	0	0.05	0.50	83%
Coastal and valley freshwater marsh	55.15	1.22	0.63	57.00	59%
Nonnative riparian	0.08	0.51	0.05	0.63	15%
Open water	100.07	0	0.05	100.12	94%
Southern coastal salt marsh nontidal	0.37	3.50	1.52	5.39	36%
Uplands					
Coastal scrub	0	0.36	0	0.36	60%
Diegan coastal sage scrub: *Baccharis*-dominated	0	0.41	0.28	0.69	53%
Eucalyptus Woodland	0.01	0	0	0.01	2%
Nonnative grassland	0.41	0	1.84	2.25	94%
Southern willow scrub	0	0.07	0	0.07	3%
Other Cover Types					
Disturbed habitat	0	0	0.42	0.42	59%
Urban/developed	0.91	0.01	0.12	1.05	14%
Total	**157.44**	**6.08**	**4.96**	**168.48**	**71%**

[1] Numbers may not sum exactly due to rounding.

food and shelter for resident and migratory species that rely on the lagoon. As noted previously, temporary impacts are considered significant if more than 50 percent of sensitive habitat within the lagoon would be lost temporarily. As shown in Table 4-10, construction would result in greater than 50 percent temporal loss of sensitive riparian habitat (coastal and valley freshwater marsh, open water vegetation types) and sensitive upland habitat (coastal scrub and Diegan coastal sage scrub: *Baccharis*-dominated). The temporal loss of these habitats may threaten local populations of sensitive resident species, as described further in Section 4.2.3.4 below. Temporary, direct impacts to beach, coastal and valley freshwater marsh, open water, coastal scrub, Diegan coastal sage scrub: *Baccharis*-dominated, and nonnative grassland are therefore considered significant.

Temporary impacts to riparian wetland vegetation communities such as nonnative riparian, southern coastal salt marsh nontidal, and southern willow scrub are not considered significant because greater than 50 percent of the local habitat would remain available to local residents and migratory species during construction. Prior to construction, sensitive "no construction" zones would be identified and fenced or flagged to avoid impacts outside of the identified limits of disturbance. These areas would be monitored throughout construction by a qualified biologist. Temporary direct impacts to nonnative riparian and southern coastal salt marsh nontidal, and southern willow scrub are therefore considered less than significant.

Implementation of the Hybrid Alternative (Options A and B) would also result in temporary impacts to vegetation types within soil drying areas and staging areas, primarily located on the outer perimeters of the Weir Basin, Railroad Basin, and I-5 Basin (Figure 16). Vegetation would initially be cut and moved to the staging area specific to each basin. Areas with sufficient room (e.g., Coast Highway Basin and I-5 Basin) would be used as soil drying areas, and vegetation mass removed from the construction limits would be laid on the ground and/or picked up with slotted/holed picks/scoops to facilitate draining and/or drying of the vegetation and associated root mass. At these soil drying areas and at staging areas, existing vegetation would be crushed and/or removed, and the ground would be compacted. Approximately 6.08 acres would be temporarily impacted at the proposed soil drying locations. Approximately 4.96 acres would be impacted within the proposed staging areas. It should be noted that these areas would be restored to pre-construction conditions, after project implementation.

Temporary Indirect

Temporary indirect impacts associated with the Hybrid Alternative (Options A and B) would be similar to the Freshwater and Saltwater Alternatives. Short-term indirect impacts to vegetation communities would result with project implementation. No significant indirect impacts to vegetation communities would result with project implementation.

Permanent Direct

Long-term permanent impacts to vegetation communities as a result of implementation of the Hybrid Alternative (Options A and B) consists of habitat conversion as a result of vegetation removal, sediment removal, and dredging. Vegetation proposed to replace existing vegetation communities as a result of habitat conversion for each alternative is provided in Table 4-2. Vegetation type-conversion would continue through time as a result of exposure to tidal flushing and influx of saltwater from the open channel west of I-5.

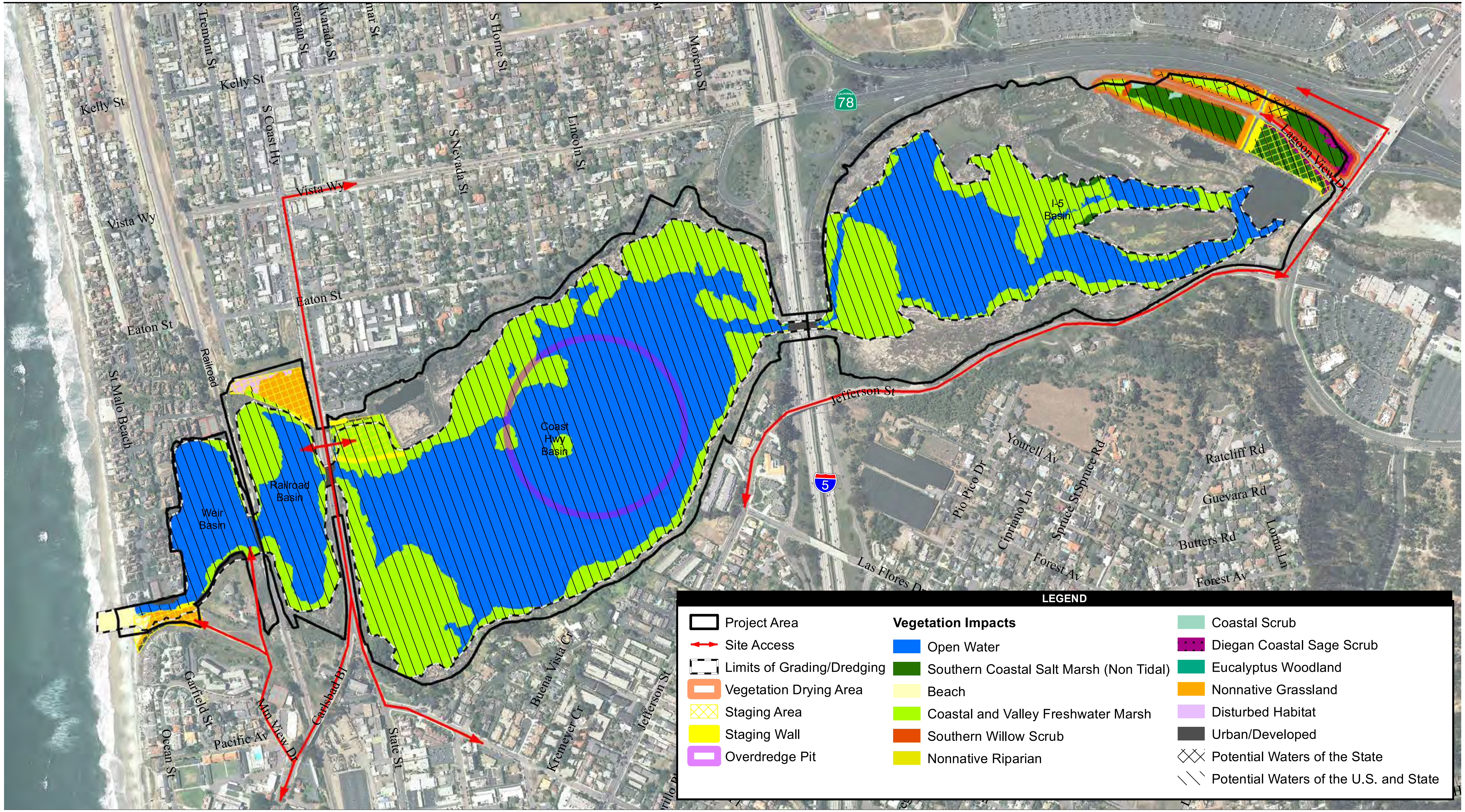
Generally, the Hybrid Alternative (Options A and B) would result in complete habitat conversion into saltwater-associated vegetation communities from coastal and valley freshwater marsh west of I-5, influenced primarily by saltwater entering the lagoon from an open tidal inlet during flood tides. Water exiting the lagoon under the Hybrid Alternative (Options A and B) west of I-5 would primarily occur during ebb tides (outgoing tides), with evapotranspiration and seepage providing additional output. East of I-5, the lagoon would remain a coastal and valley freshwater marsh system, with dredging/grading and sediment removal proposed to improve water circulation and sediment accumulation.

The Hybrid Alternative (Options A and B) would feature a subtidal, open water channel running from the ocean (tidal inlet) up to I-5. On either side of the channel west of I-5, the ground would be graded to provide intertidal mudflat and a mix of coastal salt marsh habitats (low, mid, and high salt marsh) within the three basins west of I-5. East of I-5, the coastal and valley freshwater marsh system would be similar to current conditions.

As discussed further below, overall acreage of habitat available for special-status species would increase with this alternative, and benefits from improved hydrological function are expected. There would be increased habitat available for special-status species not currently using the lagoon. With improved lagoon ecology, increased foraging for species, and no overall loss of lagoon resources, direct impacts to sensitive vegetation communities with implementation of the Hybrid Alternative (Options A and B) are considered less than significant.

Permanent Indirect Impacts

As a result of implementation of the Hybrid Alternative (Options A and B), saltwater would inundate freshwater marsh habitat adjacent to the limits of construction west of I-5. As a result, these areas would be naturally transitioned to salt marsh habitat types as catttails would die from saltwater exposure. Dead biomass would be removed and monitored to confirm the need for active supplemental planting. Thus, coastal and valley freshwater marsh habitat immediately adjacent to the construction limits would be converted to salt marsh habitat types, which are suitable to support special-status species. Although coastal and valley freshwater habitat would be impacted, it would be replaced by a natural community type that would continue to provide habitat for special-status species. Also, east of I-5, habitat conversion outside of the limits of construction would not occur and vegetation would remain a freshwater system. Thus, permanent indirect impacts as a result of the Hybrid Alternative (Options A and B) are considered less than significant.



Source: Sangis 2014; SANDAG 2012; AECOM 2014; Everest 2014

600 300 0 600 Feet

Scale: 1 = 7,200; 1 inch = 600 feet

Figure 16

Hybrid Alternative Options A&B Impacts to Vegetation Communities and Habitats

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4.2.3.2 Jurisdictional Waters and Wetlands

Temporary and permanent impacts would occur to potential jurisdictional waters and wetlands as a result of implementing the Hybrid Alternative (Options A and B). Temporary changes would result from vegetation removal within the construction limits and areas designated for soil drying and construction staging. Permanent impacts would result from project construction and direct impacts from vegetation removal as a result of tidal influence, grading, dredging, and sediment excavation. Impacts to potential jurisdictional waters and wetlands are detailed in Table 4-11. Potential impacts are described in further detail below.

Table 4-11
Direct Project Impacts to Potential Jurisdictional Wetlands and Waters from Implementation of the Hybrid Alternative (Options A and B) (acres)[1]

Potential Jurisdictional Wetlands and Waters	Grading/ Dredging	Soil Drying	Staging Areas	Total
Waters of the U.S.				
Wetland	55.52	4.79	2.15	62.46
Other Waters	100.07	0	0.05	100.12
Waters of the State				
Nonwetland riparian	0.09	0.51	0.05	0.64
Total	**155.67**	**5.30**	**2.25**	**163.23**

[1] Numbers may not sum exactly due to rounding.

The short-term temporary and long-term permanent impacts resulting from the implementation of the Hybrid Alternative (Options A and B) would be similar to those discussed for the Freshwater Alternative and Saltwater Alternative. Of the approximately 224.2 acres of potential jurisdictional waters and wetlands, approximately 163.23 acres would be directly impacted by construction (155.76 acres from grading/dredging, 5.30 acres from soil drying areas, and 2.25 acres from staging areas). Of this, approximately 0.64 acre is considered state-only waters under the jurisdictional purview of CDFW.

The amounts of jurisdictional waters and wetlands are expected to be similar to existing conditions following implementation of the Hybrid Alternative (Options A and B). In addition, the Hybrid Alternative (Options A and B) would create higher diversity of wetland communities within the downstream portion of the lagoon (downstream of I-5) by slowly transitioning from open water to high southern coastal salt marsh (tidal) while extending open water areas within the upstream portion, thereby enhancing wetland conditions of jurisdictional waters and wetlands within the lagoon. The short-term and long-term (direct and indirect) impacts resulting from the implementation of the Hybrid Alternative (Options A and B) would be similar to those discussed for the Freshwater Alterative and Saltwater Alternative and are considered less than significant.

Temporary Indirect Impacts

Temporary indirect impacts to jurisdictional waters for the Hybrid Alternative (Options A and B) would be the same as the Freshwater and Saltwater Alternatives and are considered less than significant.

Permanent Direct

Prior to implementation of the Hybrid Alternative (Options A and B), approximately 224.2 acres of the 557-acre BSA was determined to be potential jurisdictional waters and wetlands of the U.S. and state. Following implementation of the Hybrid Alternative (Options A and B), conversion from one wetland type to another would occur due to dredging of channels/basins and improvements to hydrologic function. Implementation of the Hybrid Alternative (Options A and B) would only result in habitat type-conversion and would not result in permanent loss of jurisdictional waters and wetlands of the U.S. and state. Therefore, no long-term significant indirect permanent impacts to jurisdictional waters and wetlands are anticipated with implementation of the Hybrid Alternative (Options A and B).

Permanent Indirect Impacts

Long-term indirect impacts to jurisdictional waters adjacent to the construction limits would potentially result in an improved saltwater system, as a result of natural tidal flushing and increased circulation within the lagoon. No significant permanent indirect impacts to wetlands are anticipated with enhancement.

4.2.3.3 Fish Resources

Temporary Direct and Indirect Impacts

Temporary direct and indirect impacts to fish resources would be similar to the Freshwater and Saltwater Alternatives for the respective basins. Temporary direct and indirect impacts to fish resources as a result of the Hybrid Alternative (Options A and B) would not be considered significant.

Permanent Direct Impacts

Implementation of the Hybrid Alternative (Options A and B) would have permanent, long-term impacts on the fish resources in Buena Vista Lagoon. Under the Hybrid Alternative (Options A and B), a saltwater system would be created west of I-5 and the freshwater system east of I-5 would be maintained. Impacts from enhancement activities on habitat availability and quality, and water quality would have long-term impacts on fish, fish populations, the recreational fishery, species assemblage, and species diversity. There would be impacts and beneficial effects on fish resources in Buena Vista Lagoon under the Hybrid Alternative (Options A and B).

The differences between Options A and B are not significant enough to have different effects to fish resources; both options would have similar effects. Therefore, this discussion of the impacts associated with implementation of the Hybrid Alternative applies to both options.

Anticipated salinity levels associated with the Hybrid Alternative (Options A and B) would exceed the upper tolerance range of freshwater fish species in the three basins west of I-5 (i.e., Coast Highway Basin, Railroad Basin, and Weir Basin) and affect species assemblages. Freshwater fish species would be extirpated from these basins and replaced by saltwater guilds. Conversion to a saltwater system would encourage saltwater fish species to enter and utilize these basins during various life history stages. The saltwater environment could provide fertile rearing habitat, and possibly spawning habitat, for a variety of saltwater fish species, including members of the Atherinidae (silversides), Engraulidae (anchovies), Gobiidae (gobies), Embiotocidae (surfperch), and Clupeidae (herring, sardine) families. Fish species diversity is likely to increase in the lagoon following establishment of a saltwater environment, including associated habitat, and based on results from the Batiquitos Lagoon Restoration Project (Merkel and Associates 2009). Species assemblages, population structure, and species diversity are likely to change through time as a result of temporal changes to saltwater habitat complexity and composition (e.g., development of kelp and eelgrass beds) and primary production. Freshwater fish species assemblages in the I-5 Basin east of I-5 would not be affected by implementation of the Hybrid Alternative (Options A and B).

Enhancement activities affecting habitat quality and quantity under the Hybrid Alternative (Options A and B) are similar to those described above under the permanent direct impacts section for the Freshwater Alternative and the Saltwater Alternative: vegetation removal, dredging, and creation of deep water habitat. The differences among alternatives are the amount and type of habitat that would be created. Large areas in the basins west of I-5 would be dredged and graded to create tidal mudflats and allow salt marsh communities to develop through natural processes. Approximately 5 acres of mudflat and 68 acres of salt marsh, both habitat types tidally influenced, would be created. Open water habitat throughout the lagoon would be reduced by approximately 40 acres. Creation of mudflats and salt marsh would have long-term, beneficial effects on saltwater fish species that may utilize the lagoon following implementaton of the Hybrid Alternative (Options A and B). Loss of open water habitat would not impact saltwater or freshwater fish species because a naturally functioning, healthy ecosystem would be created providing high-quality, suitable habitat and suitable hydrologic conditions. Creation of deep water habitat in the lagoon, approximately 5 acres, would have the same long-term, beneficial effects on fish resources as described above under the permanent direct impacts section for the other alternatives. Effects on habitat quality and quantity under the Hybrid Alternative (Options A and B) in the I-5 Basin would be similar to those described under the Freshwater Alternative. Habitat quantity and quality would increase and there would be a long-term, beneficial effect on freshwater fish resources.

Establishment of marine submergent vegetation is likely to occur at some point in time following saltwater inundation of the three basins west of I-5. Submergent vegetation such as kelp and eelgrass provide spawning and nursery habitat for a variety of saltwater fish species and improve water quality. In addition, establishment of submergent vegetation may attract fish species other than those listed above. The overall effect to marine fish resources from establishment of submergent vegetation would be an increase in available habitat types, improved water quality, and increased species diversity.

Hydrologic regimes under the Hybrid Alternative (Options A and B) would maintain high water quality conditions throughout the lagoon that would be suitable for saltwater and freshwater fish species. A discussion of effects is provided above in the Freshwater Alternative and Saltwater Alternative sections.

Freshwater recreational angling opportunities would be eliminated from the three basins west of I-5 under the Hybrid Alternative (Options A and B). However, conversion to a saltwater system may encourage saltwater fish species popular among recreational anglers to enter and utilize the lagoon. These species could include spotted sand bass, barred sand bass, kelp bass, and California halibut. It is uncertain if saltwater fish species targeted by recreational anglers would utilize the lagoon in sufficient numbers and size classes to provide viable recreational angling opportunities. Effects on the freshwater recreational fishery in the I-5 Basin under the Hybrid Alternative (Options A and B) would be similar to those described under the Freshwater Alternative. Freshwater habitat quantity and quality would increase in this basin and there would be long-term beneficial effects to the freshwater recreational fishery.

While the transition to saltwater under this alternative would cause a change in the fish species that may be supported within three basins, the change has the potential to significantly benefit saltwater fish species. Although there would be impacts to native and nonnative fish resources currently in the lagoon, no special-status saltwater fish species are known to occur in the lagoon. Therefore, impacts to special status fish species from implementation of the Hybrid Alternative would be less than significant.

Permanent Indirect Impacts

Permanent indirect impacts to fish resources would be similar to the Freshwater and Saltwater Alternatives for the respective basins. Long-term impacts resulting from implementation of the Hybrid Alternative (Options A and B) would be beneficial to fish resources. Therefore, permanent indirect impacts as a result of the Hybrid Alternative (Options A and B) would be considered less than significant.

4.2.3.4 Special-Status Plant Species

No federally listed or state-listed rare, threatened, or endangered plant species occur within the construction limits of the Hybrid Alternative (Options A and B). One special-status plant species, southwestern spiny rush (CNPS List 4.2), is known to occur in the I-5 Basin, within coastal and valley freshwater marsh habitat. Temporary direct impacts would occur to these plants, as they occur within the soil drying areas (Figure 17). The regulatory requirement to implement BMPs would minimize indirect impacts to plants located adjacent to the construction limits (e.g., construction-generated dust, runoff, and sedimentation). Significant o temporary direct impacts to special-status plant populations are anticipated with implementation of the Hybrid Alternative (Options A and B).

4.2.3.5 Special-Status Wildlife Species

Federally Listed Wildlife Species

Impacts may include the short-term loss of nesting and/or foraging habitat for special-status wildlife species resulting from enhancement activities. Of the 30 special-status wildlife species with the potential to occur within the BSA, seven species are federally and/or state listed. These include the light-footed Ridgway’s rail, western snowy plover, California least tern, least Bell’s vireo, southwestern willow flycatcher, Belding’s savannah sparrow, and coastal California gnatcatcher. Impacts to special-status wildlife species habitat are provided in Table 4-12 and are separated into two types of short-term impacts: areas that occur within staging/soil drying areas and areas impacted by grading/dredging.

Temporary

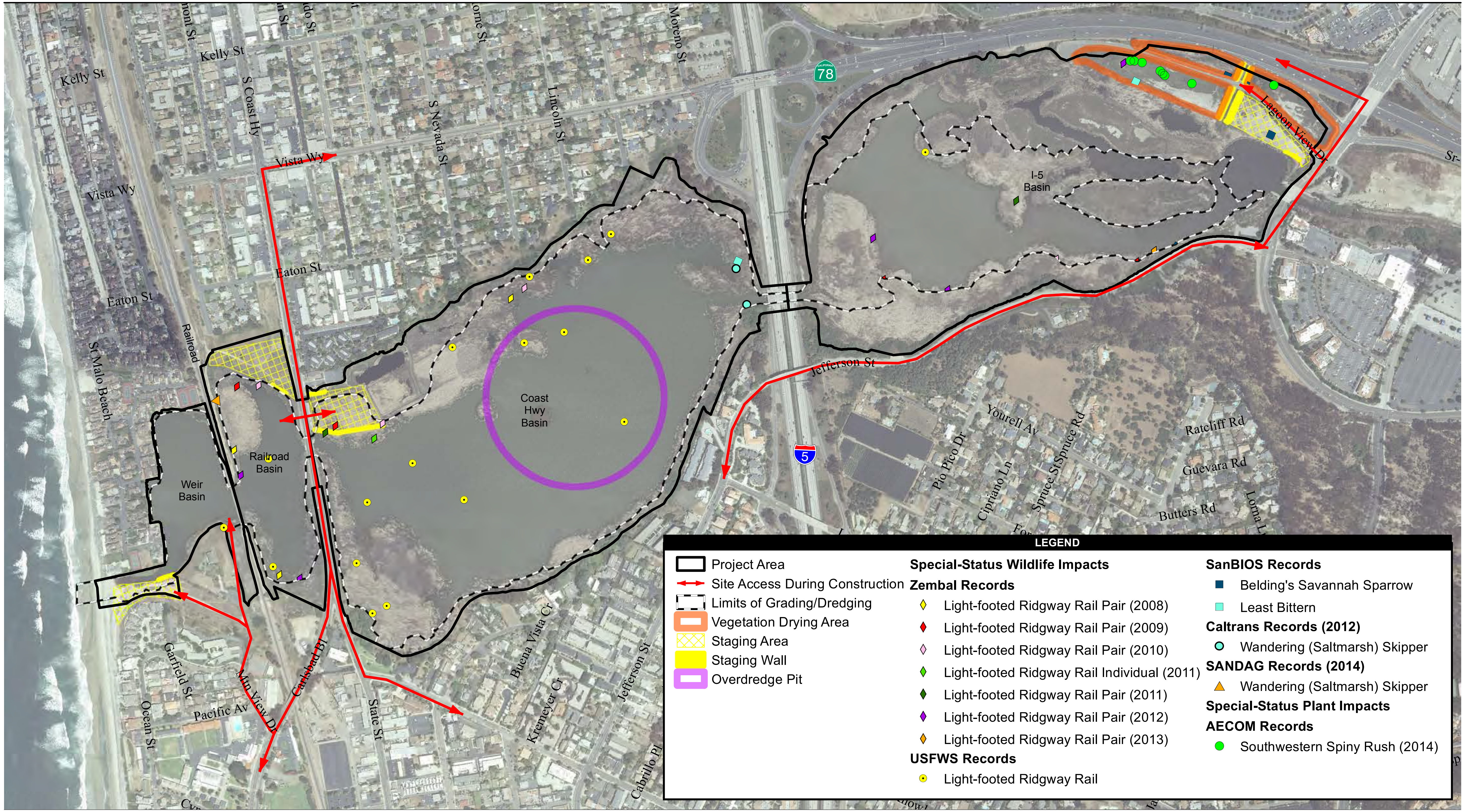
LIGHT-FOOTED RIDGWAY'S RAIL

Light-footed Ridgway's rail is a year-round resident in the lagoon, found in coastal and valley freshwater marsh and southern coastal salt marsh nontidal habitat. The Hybrid Alternative (Options A and B) are considered significant would directly impact 62.39 acres (56 percent) of existing suitable nesting habitat through direct grading/dredging and staging/soil drying (Table 4-12 and Figure 17). The types of direct temporary impacts would be the same for the Saltwater Alternative as the Freshwater Alternative.

In addition to direct impacts associated with temporary habitat loss, the light-footed Ridgway's rail is a year-round resident in the lagoon and is considered by local experts to be difficult to flush from habitat prior to construction. Therefore, the potential exists for mortality during vegetation removal. The project would initiate construction activities outside of the nesting season and would allow adequate time for Ridgway's rail and other wildlife to move into areas designated as sensitive "no construction" zones that would be identified and fenced or flagged to avoid impacts outside of the limits of disturbance. However, temporary impacts to greater than 50 percent of the suitable habitat with implementation of the Hybrid Alternative (Options A and B) are considered significant.

WESTERN SNOWY PLOVER

The western snowy plover suitable habitat is limited to the beach habitat west of the weir; impacts to 0.5 acre (83 percent) of beach habitat for this species would occur during construction. As noted in Chapter 3, western snowy plover does not forage frequently within the BSA and likely no longer breeds there as historic nesting sites within the BSA have been altered by anthropogenic factors. As mudflat habitats suitable for foraging do not occur within the BSA, plover is currently not likely to occur; thus this species is not likely to be impacted. Therefore, temporary direct impacts to western snowy plover from the Hybrid Alternative (Options A and B) would be less than significant.



Source: SANDAG 2012; Sangis 2014; Everest 2014; AECOM 2014

600 300 0 600 Feet

Scale: 1 = 7,200; 1 inch = 600 feet

Figure 17
Hybrid Alternative Options A&B Impacts to Special-Status Species

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Table 4-12
Direct Project Impacts to Special-Status Wildlife Species Habitat from Implementation of the Hybrid Alternative (Options A and B) (acres)[1]

Special-Status Species	Vegetation Community	Existing Habitat	Habitat Impacted by Soil Drying/Staging			Habitat Impacted by Grading/ Dredging		Total Direct Impact to Existing Habitat	
			Soil Drying	Staging Areas	Percent	Grading/ Dredging	Percent	Total	Percent
Light-footed Ridgway's rail	Coastal and valley freshwater marsh	96.2	1.22	0.63	2%	55.15	57%	57	59%
	Southern coastal salt marsh nontidal	14.78	3.5	1.52	34%	0.37	3%	5.39	36%
	Light-footed Ridgway's rail total	110.98	4.72	2.15	6%	55.52	50%	62.39	56%
Western snowy plover	Beach	0.6	0	0.05	8%	0.45	75%	0.5	83%
	Western snowy plover total	0.6	0	0.05	8%	0.45	75%	0.5	83%
California least tern	Beach	0.6	0	0.05	8%	0.45	75%	0.5	83%
	Open Water	106.8	0	0.05	0%	100.07	94%	100.12	94%
	California least tern Total	Total	107.4	0	0.1	0%	100.52	94%	100.62
Least Bell's vireo and southwestern willow flycatcher	Southern willow scrub	2.2	0.07	0	3%	0	0%	0.09	4%
	Least Bell's vireo and southwestern willow flycatcher total	2.2	0.07	0	3%	0	0%	0.09	4%
Belding's savannah sparrow	Southern coastal salt marsh nontidal	14.78	3.5	1.52	34%	0.37	3%	5.39	36%
	Belding's savannah sparrow total	14.78	3.5	1.52	34%	0.37	3%	5.39	36%

Special-Status Species	**Vegetation Community**	**Existing Habitat**	**Habitat Impacted by Soil Drying/Staging**			**Habitat Impacted by Grading/ Dredging**		**Total Direct Impact to Existing Habitat**	
			Soil Drying	**Staging Areas**	**Percent**	**Grading/ Dredging**	**Percent**	**Total**	**Percent**
Coastal California gnatcatcher	Coastal scrub	0.6	0.36	0	60%	0	0%	0.36	60%
	Diegan coastal sage scrub: *Baccharis*-dominated	1.3	0.41	0.28	53%	0	0%	0.69	53%
	Coastal California gnatcatcher total	1.9	0.77	0.28	55%	0	0%	1.05	55%

[1] Numbers may not sum exactly due to rounding.

CALIFORNIA LEAST TERN

California least tern is documented as annually foraging at Buena Vista Lagoon but is not known to breed in the lagoon. Impacts to 0.46 acre (77 percent) of beach and 100.84 acres (94 percent) of open water would occur as a result of grading/dredging and staging/soil drying for the Hybrid Alternative (Options A and B) (Table 4-12). Approximately 100.62 acres (94 percent) total acres of California least tern foraging habitat would be impacted as a result of construction for the Hybrid Alternative (Options A and B). No suitable nesting habitat occurs within the lagoon.

Sediment mobilization, increased turbidity, and the resulting impaired water quality could affect fish, which is the primary food of California least tern. However, foraging species are highly mobile and move throughout the lagoon as well as up and down the coast; as such, the temporary loss of their potential foraging habitat is not expected to have a significant impact on these species. In addition, areas west of I-5 post-implementation are expected to transition to saltwater habitats with improved conditions as a result of improved hydrology and tidal influx. The regular influx of tidal waters west of I-5 is expected to deliver larvae to the site, which may in turn increase densities and species richness of the benthic community. Therefore, temporary direct impacts to California least tern from the Hybrid Alternative (Options A and B) would be less than significant.

LEAST BELL’S VIREO AND SOUTHWESTERN WILLOW FLYCATCHER

One least Bell’s vireo was observed during 2013 protocol surveys, and southwestern willow flycatcher was detected at a historic location outside of the project area. Both of these detections occurred within southern willow scrub habitat in the 500-foot buffer of the BSA. Southern willow flycatcher was not detected during 2013 surveys and is not known to occur within the BSA. Neither species has been documented to breed on-site although there is the potential that vireo breeding may occur as suitable southern willow scrub is present. Implementation of the Hybrid Alternative (Options A and B) would directly impact 0.09 acre (4 percent) of the southern willow scrub riparian habitat within the BSA (Table 4-5). Both least Bell’s vireo and southwestern willow flycatcher are migratory birds. As vegetation would be removed outside of the breeding season and both species may use the riparian scrub for foraging during summer months, the short-term impact to 4 percent of the southern willow scrub riparian habitat is not substantial and would not result in a decline in the local population below self-sustaining levels (as a local population does not exist). Therefore, temporary direct impacts to least Bell’s vireo and southwestern willow flycatcher from the Hybrid Alternative (Options A and B) would be less than significant.

BELDING'S SAVANNAH SPARROW

Belding's savannah sparrow currently occupies southern coastal salt marsh nontidal habitat. Observations are particularly dense in the eastern portion of the I-5 Basin where pickleweed-dominated marsh habitat is prevalent. It is intended that southern coastal salt marsh nontidal habitat in the I-5 Basin would be left undisturbed to the extent feasible; however, in a worst-case scenario, the entirety of this habitat type may be impacted. As a result of vegetation removal and grading/dredging and staging within the soil drying areas and staging areas, the Hybrid Alternative (Options A and B) would temporarily impact 5.39 acres (36 percent) of southern coastal salt marsh nontidal habitat across the four basins (Table 4-12 and Figure 17).

Temporary direct impacts to Belding's savannah sparrow are expected to be the same as the Freshwater Alternative and Saltwater Alternative. The Hybrid Alternative (Options A and B) would not have a significant temporary direct impact on Belding's savannah sparrow.

COASTAL CALIFORNIA GNATCATCHER

Implementation of the Hybrid Alternative (Options A and B) would directly impact 0.36 acre (60 percent) of the coastal scrub habitat and 1.05 acre (55 percent) of Diegan coastal sage scrub: *Baccharis*-dominated at the eastern end of the BSA as a result of staging within the soil drying areas (Table 4-12). As vegetation would be removed outside of the breeding season and both species would likely use the site for foraging during summer months, the short-term impact to 1.05 acres (55 percent) of suitable scrub habitats on-site is greater than 50 percent. However, this would not be substantial and would not result in a decline in the local population below self-sustaining levels (as a local population does not exist). Additionally, habitat within the soil drying areas would be restored to pre-construction conditions after project implementation. Therefore, temporary direct impacts to coastal California gnatcatcher from the Hybrid Alternative (Options A and B) would be less than significant.

Temporary Indirect

Indirect short-term/temporary impacts on sensitive species may include increases in exposure to predators as a result of nighttime lighting. These impacts are identical to those described for the Freshwater Alternative. Temporary indirect impacts to sensitive species from nighttime lighting would be considered significant.

Indirect noise impacts associated with the Hybrid Alternative (Options A and B) would be similar to those described for the Freshwater Alternative. The construction (grading/dredging) footprint for the Hybrid Alternative (Options A and B) is similar to the Freshwater Alternative. The overall construction approach is similar for both alternatives. Similar to the Freshwater Alternative, short-term noise impacts on sensitive birds from implementation of the Hybrid Alternative (Options A and B) would result in a significant impact.

As with the Freshwater Alternative, noise from increased vehicular traffic associated with implementation of the Hybrid Alternative (Options A and B) may also occur and would be similar. Noise impacts to birds from vehicular traffic are therefore considered less than significant.

Permanent Direct

Direct permanent impacts to sensitive species include the active conversion of nesting and/or foraging habitat to another habitat type (west of I-5), modified lagoon conditions, and long-term maintenance and operation, including cattail maintenance. As described above, suitable habitat for sensitive species would be changed and/or converted as a result of the proposed project, west of I-5. The direct permanent changes to suitable habitat for sensitive species are summarized in Table 4-13. These changes may include a direct increase or decrease in the total acreage of a specific habitat type post-enhancement. Proposed special-status wildlife species habitat is provided in Table 4-13.

Long-term monitoring and maintenance would be part of the Enhancement Project. This may include, but is not limited to, biological monitoring, nonnative species treatment, and other adaptive management strategies. Although each of these actions is intended to help the success of the enhancement effort, there is the potential for impacts to sensitive birds in the lagoon.

LIGHT-FOOTED RIDGWAY’S RAIL

Light-footed Ridgway’s rail nesting and foraging habitat would be decreased as a result of the Hybrid Alternative (Options A and B). Post-enhancement, habitats would decrease by a total of 56 percent, due primarily to the loss of coastal and valley freshwater marsh habitat. However, implementation of the Hybrid Alternative (Options A and B) would result in the creation of five new habitat types considered suitable for light-footed Ridgway’s rail, including mudflats, and low/mid/high southern coastal salt marsh habitat that would result in total post-implementation of 85.9 to 86.7 acres suitable for the rail. The loss of 25.1 to 24.3 acres is approximately 22 percent of the existing available habitat (Table 4-13).

The existing southern coastal salt marsh nontidal and coastal and valley freshwater marsh habitat occupied by light-footed Ridgway's rail is denoted under existing conditions by the overall poor conditions of the lagoon resulting from poor tidal flushing and sediment accumulation, and these less than optimal conditions would continue without implementation of the Hybrid Alternative (Options A and B). As discussed in Chapter 3, light-footed Ridgway's rail observations have generally declined in the last 5 years (Zembal et al. 2013). This may correlate to the overall effect through time of the weir preventing the natural ocean-lagoon tidal processes. It is possible that, through opening of the channel and allowing for tidal influx west of I-5, changes to lagoon hydrology under the Hybrid Alternative (Options A and B) would also improve the condition of the foraging and nesting habitat for light-footed Ridgway's rail by providing habitat stratification, within and adjacent to the construction limits. It would be expected that the Ridgway's rail population would increase as the result of increased availability of optimal habitat. Ultimately, the project is expected to benefit light-footed Ridgway's rail populations at Buena Vista Lagoon. Therefore, permanent impacts to light-footed Ridgway's rail with implementation of the Hybrid Alternative (Options A and B) are considered less than significant.

Long-term monitoring and maintenance would be part of the Enhancement Project.. This may include, but is not limited to, biological monitoring, nonnative species treatment, and other adaptive management strategies. Although each of these actions is intended to enhance the success of the restoration effort, there is the potential for impacts to sensitive birds in the lagoon. To minimize impacts, the project would prepare an adaptive management, maintenance, and monitoring program that would include avoidance measures to minimize impacts to sensitive wildlife on-site. As such, long-term monitoring and maintenance activities are not expected to have a substantial effect on any sensitive species and permanent impacts from the Hybrid Alternative (Options A and B) are considered less than significant

The project would prepare an adaptive management, maintenance, and monitoring program that would include avoidance measures to minimize impacts to sensitive wildlife on-site, as described in Section 2.9. However, during cattail maintenance, there is potential for year-round mortality of birds in addition to take of nests during the breeding season. As such, long-term maintenance activities would be considered significant.

WESTERN SNOWY PLOVER

Western snowy plover nesting and foraging habitat would be increased as a result of the Hybrid Alternative (Options A and B). Post-enhancement, habitats would increase by an approximate

Table 4-13
Hybrid Alternative (Options A and B) Existing and Post-Implementation Acreage of Suitable Habitat for Special-Status Wildlife Species (acres)[1]

Special-Status Species	Vegetation Community	Existing Habitat	Habitat Acreage Post-Implementation (Option A/Option B[2])	Net Change in Habitat Acreage Post-Implementation (Option A/Option B[2])	Percent Change Post-Implementation (Option A/Option B[2])
Light-footed Ridgway's rail	Coastal and valley freshwater marsh	96.2	0	-96.2	-100%
	Mudflat	0.0	4.7/4.9	4.7/4.9	0%/0%
	Southern coastal salt marsh nontidal	14.8	14.7	-0.1	-1%
	Southern coastal salt marsh high	0.0	26.5	26.5	0%
	Southern coastal salt marsh low	0.0	6.3/6.5	6.3/6/5	0%/0%
	Southern coastal salt marsh mid	0.0	20.3/20.6	20.3/20.6	0%/0%
	Total	111.0	72.5/73.2	-38.5/-37.8	-35%/-34%
Western snowy plover	Beach	0.6	0.8	0.2	33%
	Mudflat	0.0	4.7/4.9	4.7/4.9	0%/0%
	Total	0.6	5.5/5.7	4.9/5.1	817%/850%
California least tern	Beach	0.6	0.8	0.2	33%
	Deep open water	0.0	5	5.0	0%
	Mudflat	0.0	4.7/4.9	4.7/4.9	0%/0%
	Open water	106.8	67.1/66.2	-39.7/-40.6	-37%/-38%
	Total	107.4	77.6/76.9	-29.8/-30.5	-28%/-28%
Least Bell's vireo and southwestern willow flycatcher	Southern willow scrub	2.2	0	-2.2	-100%
	Total	2.2	0.0	-2.2	-100%

Special-Status Species	Vegetation Community	Existing Habitat	Habitat Acreage Post-Implementation (Option A/Option B[2])	Net Change in Habitat Acreage Post-Implementation (Option A/Option B[2])	Percent Change Post-Implementation (Option A/Option B[2])
Belding’s savannah sparrow	Mudflat	0.0	4.7	4.7	0%
	Southern coastal salt marsh nontidal	14.8	14.7	-0.1	-1%
	Southern coastal salt marsh high	0.0	26.5	26.5	0%
	Southern coastal salt marsh low	0.0	6.3/6.5	6.3/6/5	0%/0%
	Southern coastal salt marsh mid	0.0	20.3/20.6	20.3/20.6	0%
	Total	14.8	72.5/73.2	57.7/58.4	391%/395%
Coastal California gnatcatcher	Coastal scrub	0.6	0.7	0.1	17%
	Diegan coastal sage scrub	0.1	2.1	2.0	2000%
	Diegan coastal sage scrub: *Baccharis*-dominated	1.3	0	-1.3	-100%
	Total	2.0	2.8	0.8	40%

[1] Numbers may not sum exactly due to rounding.

[2] Values are provided if they differ between Option A and Option B, as applicable.

817/850 percent change, with an increase of 0.6 acre to 0.8 acre of beach habitat (suitable for nesting and foraging), and creation of 4.7/4.9 acres of new mudflat habitat, suitable for foraging (Table 4-13). This species is currently not known to nest within the lagoon but is known to forage; thus this increase in foraging habitat may be a potential benefit to this species. As such, no significant or permanent impacts to western snowy plover would result from implementation of the Hybrid Alternative (Options A and B).

CALIFORNIA LEAST TERN

California least tern is documented as annually foraging at Buena Vista Lagoon. Implementation of the Hybrid Alternative (Options A and B) would permanently decrease suitable foraging habitat for California least tern with a 28 percent change (for Option A and Option B), decreasing what is currently 107.4 acres of suitable habitat by 29.8/30.5 acres (Table 4-13). Also, the result of open tidal influx, creation of mudflats (both west of I-5), and dredging accumulated sediment load may improve conditions for benthic species and fish species, as the improved circulation and mudflat habitat type would enhance environmental conditions for the prey communities that this bird feeds on. The Hybrid Alternative (Options A and B) would directly benefit species like tern that regularly use the lagoon for foraging, by adding diversity and increasing quality of foraging habitat in As such, no significant permanent impacts to California least tern would result with project implementation of the Hybrid Alternative (Options A and B).

LEAST BELL'S VIREO AND SOUTHWESTERN WILLOW FLYCATCHER

Suitable habitat for least Bell's vireo and southwestern willow flycatcher would not be present within the Hybrid Alternative (Options A and B), post-implementation (Table 4-13). However, historic and/or recent locations of these species occur outside of the construction limits and neither of these migratory bird species is known to breed on-site. As such, no significant permanent impacts to least Bell's vireo and southwestern willow flycatcher would result with project implementation of the Hybrid Alternative (Options A and B).

BELDING'S SAVANNAH SPARROW

Belding's savannah sparrow nesting and foraging habitat would be increased as a result of the Hybrid Alternative (Options A and B). Post-enhancement, habitats would increase by an approximate 391/395 percent change, with creation of five new habitat types considered suitable for Belding's savannah sparrow, including mudflats, and low/mid/high southern coastal salt marsh habitat (Table 4-13).

In addition, the changes to lagoon hydrology would increase the condition of the remaining foraging and nesting habitat suitable for Belding’s savannah sparrow. Under current conditions, the frequency and duration of soil saturation in marsh habitat are highly variable and often affected by late season rains and ponding. This results in large fluctuations in the Belding’s savannah sparrow population and nesting success each year, as they can only nest on dry soil. It is possible that, through opening of the channel and allowing for tidal influx west of I-5, changes to lagoon hydrology under the Hybrid Alternative (Options A and B) would also improve the condition of the foraging and nesting habitat for Belding’s savannah sparrow by providing habitat stratification, within and adjacent to the construction limits. Improved hydrology would overall improve circulation and flow, which would facilitate the drying of high-marsh habitat used for ground nesting. The improved conditions post-implementation of the Hybrid Alternative (Options A and B) would ultimately benefit the Belding’s savannah sparrow population at Buena Vista Lagoon and permanent impacts are considered less than significant.

Long-term monitoring and maintenance would be part of the Enhancement Project. This may include, but is not limited to, biological monitoring, nonnative species treatment, and other adaptive management strategies. Although each of these actions is intended to enhance the success of the restoration effort, there is the potential for impacts to sensitive birds in the lagoon. To minimize impacts, the project would prepare an adaptive management, maintenance, and monitoring program that would include avoidance measures to minimize impacts to sensitive wildlife on-site. As such, long-term monitoring and maintenance activities are not expected to have a substantial effect on any sensitive species and permanent impacts from the Hybrid Alternative (Options A and B) are considered less than significant.

COASTAL CALIFORNIA GNATCATCHER

Post-implementation of the Hybrid Alternative (Options A and B), there would be an increase of 0.8 acre of suitable habitat, including a new habitat, Diegan coastal sage scrub (0.8 acre), suitable to support coastal California gnatcatcher. This would increase habitat suitable to support coastal California gnatcatcher by 40 percent change. As such, no significant permanent impacts to coastal California gnatcatcher would result with project implementation.

PERMANENT INDIRECT IMPACTS

The types of long-term permanent impacts as a result of the Hybrid Alternative (Options A and B) would be similar as discussed for the Freshwater Alternative and Saltwater Alternative. Cattail maintenance would occur during daylight hours and outside of the breeding season. Indirect impacts associated with long-term cattail maintenance due to nighttime lighting and noise would not occur. Long-term/permanent indirect impacts to sensitive species resulting from nighttime lighting and noise would be considered less than significant.

Nonfederally Listed Wildlife Species

Impacts to nonlisted special-status wildlife species associated with the implementation of Hybrid Alternative (Options A and B) would be the same as the Freshwater Alternative and Saltwater Alternative as the extent of grading/dredging are similar. Impacts to nonfederally listed wildlife species are not expected to result in the decline of any species below self-sustaining levels. However, potential impacts that may occur include mortality of individuals within the project footprint during the breeding season, and increased predation (as a result of nighttime lighting) and construction noise impacts to nonfederally listed special-status bird species within and adjacent to the project footprint. Short-term direct and indirect impacts would be significant.

Long-term direct and indirect impacts to nonfederally listed special status species may also occur as a result of cattail maintenance activities. Maintenance would be scheduled outside the breeding season and during daytime hours, and the potential for mortality, noise impacts, and increased predation would be minimized. Long-term direct and indirect impacts would be less than significant.

4.2.3.6 Wildlife Corridors/Connectivity

The Hybrid Alternative (Options A and B) would have similar temporary and short-term impacts to wildlife corridors and connectivity as discussed for the Freshwater Alternative and Saltwater Alternative. The lagoon is not considered a regional wildlife corridor, but no long-term impacts are anticipated. The lagoon would still function as a large area of natural open space corridor that would allow for wildlife movement and connectivity similar to existing conditions. Therefore, no significant short-term or long-term impacts to wildlife movements or connectivity are anticipated with implementation of the Hybrid Alternative (Options A and B).

4.2.3.7 Local Ordinances/Policies/Adopted Plans

Similar to the Freshwater Alternative and Saltwater Alternative, all restoration, maintenance, and monitoring plans prepared for the Hybrid Alternative (Options A and B) would be prepared in accordance with the goals of these regional conservation plans, and in consultation with the wildlife agencies. The project is consistent with the goals and objectives of the MHCP, draft Oceanside

Subarea Plan, final Carlsbad subarea plan, City of Carlsbad Habitat Management Plan, and the LCPs of both cities. Therefore, no significant impact would result with implementation of the Hybrid Alternative (Options A and B).

4.2.3.8 Long-term Benefits of the Hybrid Alternative (Options A and B)

The Hybrid Alternative options would provide benefits to biological resources, although not to the extent of the Saltwater Alternative. Under the Hybrid Alternative, available nesting habitat for threatened and endangered species would decrease compared to existing conditions (from 101.5 to 90–91 acres). The quality of remaining habitat is anticipated to increase, however, as the portion of the lagoon west of I-5 is converted to a marine system and vegetated with native salt marsh habitats, and remaining freshwater areas east of I-5 are maintained through the creation of channels that increase proximity to foraging habitat and increase localized water quality. As described for the Freshwater and Saltwater Alternatives, the Hybrid Alternative would also remove encroaching freshwater marsh vegetation and halt the conversion of open water to freshwater marsh that is currently reducing fish habitat and circulation within the lagoon. Fish species, particularly saltwater species west of I-5, would benefit from this improved water quality and from the creation of deep water habitat areas.

4.2.4 No Project Alternative

This alternative would not directly modify the lagoon, inlet, or Carlsbad Boulevard bridge, although modifications would occur by others to the NCTD railroad and I-5. As such, temporary construction impacts would not occur. No sensitive plant or animal species detected within the project area would be directly impacted and the amount of jurisdictional waters and wetlands would not change. The project is, however, designed to modify the current trajectory of habitat conversion. Since the implementation of the weir, the lagoon has been closed off from the natural processes associated with tidal influx. Without enhancement, water quality conditions and wildlife community observed in the lagoon, which are largely salt marsh habitat-dependent, may continue to decline over time, as shown by the declining populations of light-footed Ridgway's rail. Under the No Project Alternative, habitat conversion is expected to trend toward a more monotypic freshwater system.

4.2.4.1 Sensitive Vegetation Communities and Jurisdictional Waters and Wetlands

Habitats, land cover types, and jurisdictional waters and wetlands would remain relatively the same under the No Project Alternative and the present spectrum of environmental constraints would continue to limit the quality and productivity of the lagoon. It's possible the existing southern coastal salt marsh habitat may decline without the continued absence of saltwater influx, and it would likely become freshwater marsh. The No Project Alternative would not improve lagoon ecology and the lagoon would not benefit from the improved water quality and increased habitat diversity provided by the Enhancement Project. Although habitats and wetlands would continue to degrade, there would be no overall net loss of sensitive habitats and a significant impact would not occur

4.2.4.2 Rare, Threatened, or Endangered Animal Species and Wildlife Corridors

The current and potential future southern coastal salt marsh nontidal and coastal and valley freshwater marsh habitat occupied by special status species (i.e., light-footed Ridgway's rail) is characterized under existing conditions by the overall poor conditions of the lagoon resulting from poor tidal flushing and sediment accumulation. These less than optimal conditions would continue without implementation of the Freshwater Alternative, and the quality of habitats would decline. Similarly, anticipated habitat conversion of existing southern coastal salt marsh would result in a net loss of nesting habitat for light-footed Ridgway's rail (low-marsh) and Belding's savannah sparrow (high-marsh) in addition to other migratory birds that use the lagoon for foraging habitat. The extent to which habitat quality would decrease is speculative, and would depend on the rate and pattern of sedimentation and vegetation encroachment. It is anticipated that wildlife corridors would function similarly without implementation of the proposed Enhancement Project. There would be a decrease in the quality of habitats within the construction limits for all of the alternatives; therefore, short-term and long-term impacts to light-footed Ridgway's rail and Belding savannah sparrow would be significant.

The availability for use of the lagoon by wildlife species for local movement would remain the same without implementation of the project. No impacts to wildlife movement would be expected.

4.2.4.3 Local Ordinances/Policies/Adopted Plans

The MHCP and the Oceanside LCP refer to the opportunity for restoration at Buena Vista Lagoon. While the No Project Alternative represents a lost opportunity for enhancement to a preserve area designated within this plan, the lack of enhancement does not specifically represent a conflict with these plans. Efforts for preserve management and monitoring would continue consistent with the goals and objectives of this plan.

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CHAPTER 5.0
MITIGATION MEASURES

Mitigation measures to address significant impacts are identified as Biological Resources-1 through Biological Resources-8, and discussed below. Significance of impacts after mitigation is then identified.

Biological Resources-1: Prior to construction, a preconstruction survey shall be conducted to confirm the number of individual southwestern spiny rush plants and their locations within the construction footprint. Each plant, after mapping, shall be salvaged to avoid direct impacts and held at a nursery during the entirety of construction. Post construction, salvaged plants shall be replanted in habitats similar to pre-construction conditions.

Biological Resources-2: A qualified biologist shall flush birds by walking ahead of construction equipment prior to grading in all undeveloped, terrestrial habitats suitable to support sensitive birds to avoid mortality of bird species during construction activities.

Biological Resources-3: Vegetation grubbing and removal shall occur outside of the bird breeding season (February 1 through September 15) to avoid mortality and potential take of nesting birds.

Biological Resources-4: A qualified biologist shall prepare and implement a targeted predator control plan for light-footed Ridgway's rail and Belding's savannah sparrow. Activities would include fencing, public signage, selective vegetation removal (i.e., invasive species or native species not preferred by Belding's savannah sparrow), nesting platforms, perch removal, predator trapping/control, and/or other techniques to minimize predation of the species.

Biological Resources-5: Lights shall be downshielded to direct the light down toward the area of work and minimize spillage or glare (same as Visual-2).

Biological Resources-6: All construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers (same as Noise-1).

Biological Resources-7: Exposed engines on dredging equipment shall be housed to the greatest extent possible (same as Noise-2).

Biological Resources-8: (Freshwater and Hybrid Alternative Only) During cattail maintenance, a qualified biologist shall flush birds by walking ahead of construction equipment prior to grading in all undeveloped, terrestrial habitats suitable to support Ridgway's rail to avoid mortality.

With the implementation of the mitigation measures above, specific impacts would remain significant and unmitigated, as identified in Table 3.5-16 and described below. Because this project is an enhancement project focused on improving the water quality and biological diversity of the lagoon, substantial time and effort went into the planning for, and avoidance of, short-term and long-term impacts to species and their habitats. Because the temporal loss of habitats may threaten local populations of sensitive resident species, this short-term direct impact is considered significant and adverse. NO feasible mitigation is available for the short-term direct loss of these habitats and the impact would remain significant, the short-term impacts would be balanced out by the long-term benefits of lagoon restoration, as the overall ecological benefits from lagoon restoration would provide long-term improved habitat quality. Short-term direct impacts to vegetation communities would remain significant.

Short term impacts to southwestern spiny rush would be reduced to less than significant through salvage and replanting of individuals within the construction footprint (Biological Resources-1), but impacts to Ridgway's rail would remain significant due to removal of habitat, for which no feasible mitigation is available. Impacts due to risk of mortality to Ridgway's rail, Belding's savannah sparrow, and take of nests for breeding birds would be reduced to below a level of significance through the restriction of grubbing and vegetation removal to outside the breeding season and flushing birds in suitable habitat prior to grading during the remainder of the year (Biological Resources-2 and 3).

Short term indirect impacts associated with increased predation due to lighting would be mitigated to below a level of significance through Biological Resources-4 and 5, which require predator control and shielding of lighting. Although noise control would be required on construction equipment through Biological Resources-6 and 7 and would reduce noise levels during construction, there is still the potential for indirect impacts to sensitive species due to dredge equipment during the breeding season.

Long-term/permanent direct impacts to Ridgway's rail and nesting birds during cattail maintenance would be mitigated to less than significant through the implementation of Biological Resources-8, which requires flushing birds from cattails prior to maintenance activities.

With the implementation of the feasible mitigation measures identified above, it is anticipated that short-term impacts to the loss of vegetation communities and habitat loss for Ridgway's rail would remain significant and unmitigated. Indirect noise impacts during construction would also remain significant. Other impacts to biological resources would be reduced to below a level of significance. No mitigation measures have been identified that would reduce short-term impacts to vegetation, although the loss would be temporary. Mitigation measures identified that could potentially reduce indirect noise impacts to sensitive species to below a level of significance were considered to reduce this impact, but were rejected, as described below. Noise impacts from nighttime dredging and materials placement remain significant and unavoidable with implementation of the Freshwater, Saltwater, and Hybrid Alternatives.

> Noise walls-In an upland environment, temporary noise walls are often required as mitigation, and constructed between the construction site and adjacent habitat. These walls typically are stationary features with strong footings for support and constructed of plywood. This physical buffer can lower noise levels in adjacent areas, including habitat. Because the dredge would be moving through the lagoon during construction, and the habitat of concern is directly adjacent freshwater marsh habitat, construction of a noise wall would occur in wet and unstable soil conditions. The wall would be required along a substantial length of the lagoon on both north and south sides. Construction of the walls, with footings in a wet environment and strength for 2-year-long duration, would result in direct impacts to adjacent habitat that would otherwise not be distrubed, and could affect marsh species from accessing open water areas or adjacent habitat areas within the lagoon itself. The impacts associated with construction of the noise walls, and the introduced barrier to lagoon access, would reduce or eliminate the value of this mitigation measure. Noise walls are considered an infeasible mitigation measure.
>
> Limiting work to outside nesting season – A work schedule requiring work to be conducted outside of the bird nesting season was considered to avoid increased noise during the breeding season, completely halting construction between February 15 and September 1. The stop and start schedule would extend the overall construction duration substantially (depending on dredge volumes). The longer duration of construction would result in additional contiguous years of disruption to foraging birds (including two sensitive resident birds—Belding's savannah sparrow and light-footed Ridgway's rail). A longer duration would potentially result in greater impacts than temporary construction noise during the breeding season, in part because the dredge is mobile and only a portion of nesting habitat would be within the range of the dredge noise at any given time. A

mitigation measure requiring work outside of the nesting season was determined to be biologically undesirable and therefore infeasible.

Establishing buffers around nests – Conducting surveys for nests of sensitive species and establishing 500-foot buffers around each nest was considered to limit the exposure of nesting birds to noise. Conducting surveys in the existing dense cattail areas would be extremely difficult to complete effectively, and the number of birds is anticipated to be high enough that construction during the breeding season would effectively be prevented once all nests were buffered to 500 feet. As discussed above, limiting construction to outside the breeding season would extend the construction period overall and ultimately be ineffective in reducing impacts to resident species such as light-footed Ridgway’s rail and Belding’s savannah sparrow. Establishing buffers around active nests was determined to be infeasible and ultimately ineffective in reducing biological impacts.

CHAPTER 6.0
SUMMARY OF CONCLUSIONS

A summary of lagoon impacts by Alternative is provided in Table 6-1. Mitigation measures to address significant impacts are also identified as Biological Resources-1 through Biological Resources-8 within the table, as discussed in Section 5.0.

Table 6-1
Summary of Impacts to Biological Resources by Alternative

CEQA Threshold of Significance Category			**Alternatives**		
			Freshwater	**Saltwater**	**Hybrid A/**B
Sensitive Riparian and Natural Vegetation Communities	Short Term		Significant Direct Impact (beach, coastal and valley freshwater marsh, open water, coastal scrub, Diegan coastal sage scrub, and nonnative grassland)	Significant Direct Impact (beach, coastal and valley freshwater marsh, open water, coastal scrub, Diegan coastal sage scrub, and nonnative grassland)	Significant Direct Impact (beach, coastal and valley freshwater marsh, open water, coastal scrub, Diegan coastal sage scrub, and nonnative grassland)
	Long Term		Less than significant direct impact	Less than significant direct impact	Less than significant direct impact
Jurisdictional Waters and Wetlands	Short Term		Less than significant direct impact	Less than significant direct impact	Less than significant direct impact
	Long Term		Less than significant	Less than significant	Less than significant
Sensitive Species	Short Term	Flora	Less than significant	Less than significant	Less than significant
		Fauna	Significant direct impact to Ridgway's rail Significant indirect impact (construction noise)	Significant direct impact to Ridgway's rail Significant indirect impact (construction noise)	Significant direct impact to Ridgway's rail Significant indirect impact (construction noise)
		Wildlife Corridors/ Connectivity	Less than significant	Less than significant	Less than significant
	Long Term	Flora	Less than significant	Less than significant	Less than significant
		Fauna	Less than significant direct and indirect impact	Less than significant direct and indirect impact	Less than significant direct and indirect impact
		Wildlife Corridors/ Connectivity	Less than significant	Less than significant	Less than significant
Local Ordinances, Policies, Adopted Plans	Short Term		No impact	No impact	No impact
	Long Term		No impact	No impact	No impact

Enhancement construction would result in greater than 50 percent temporal loss of sensitive habitats that would be significantly impacted by construction activities, including sensitive riparian habitat (coastal and valley freshwater marsh, open water vegetation types) and sensitive upland habitat (coastal scrub and Diegan coastal sage scrub: *Baccharis*-dominated) and is considered a short-term significant and adverse direct impact to these types of habitats. Because the temporal loss of these habitats may threaten local populations of sensitive resident species, this short-term direct impact is considered significant. Additionally, significant short-term impacts were identified for all enhancement alternatives to light-footed Ridgway's rail and Belding's savannah sparrow, due to the temporary loss of greater than 50 percent of their nesting habitat, direct mortality, and/or the potential for noise. While no feasible mitigation is available to reduce these impacts to less than significant, the overall ecological benefits from lagoon enhancement would provide long-term improved habitat quality.

Significant and unavoidable short-term impacts to sensitive bird species, both direct and indirect, would occur as a result of construction activities under all enhancement alternatives. When in proximity to wildlife, the effects of dredge and other construction noise may disrupt sensitive birds foraging or breeding behavior. The dredge is slow and would be operating in one basin at a time; as such, most birds could relocate to quieter habitat. However, relocation during the breeding season is not feasible for nesting birds and, even with the numerous project design features to reduce noise levels, this is considered a significant and unavoidable impact.

The No Project Alternative would result in a significant permanent impact to biological resources because the quality of habitat for light-footed Ridgway's rail (low-marsh), Belding's savannah sparrow (high-marsh) and other migratory birds that use the lagoon for foraging habitat, would continue to decline. This decline would be due in part to the continued poor conditions of the lagoon resulting from poor tidal flushing and sediment accumulation. Additionally, anticipated habitat conversion of existing southern coastal salt marsh would result in a net loss of nesting habitat.

CHAPTER 7.0
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APPENDIX A

PLANT SPECIES DETECTED WITHIN THE BUENA VISTA LAGOON ENHANCEMENT PROJECT BSA

APPENDIX A
Plant Species Detected Within the Buena Vista Lagoon Enhancement Project BSA

Family	Scientific Name	Common Name	Data Source[1]
Aizoaceae	*Aptenia cordifolia**	baby sun-rose	AECOM
	*Carpobrotus edulis**	freeway iceplant	AECOM
	*Mesembryanthemum crystallinum**	crystalline iceplant	AECOM
	*Mesembryanthemum nodiflorum**	slender-leaved iceplant	AECOM
	Sesuvium verrucosum	sea-purslane	BVLLMP
	*Tetragonia tetragonioides**	New Zealand spinach	AECOM
Amaranthaceae	*Amaranthus blitoides*	procumbent pigweed	AECOM
Anacardiaceae	*Malosma laurina*	laurel sumac	AECOM
	Rhus integrifolia	lemonade berry	AECOM
	*Schinus terebinthifolius**	Brazilian pepper tree	AECOM
Apiaceae	*Apium graveolens**	common celery	AECOM
	*Foeniculum vulgare**	fennel	AECOM
Apocynaceae	*Nerium oleander**	common oleander	AECOM
Arecaceae	*Phoenix dactylifera**	date palm	AECOM
	Washingtonia filifera	California fan palm	AECOM
Asparagaceae	*Asparagus asparagoides**	African asparagus fern	AECOM
	*Asparagus setaceus**	fern asparagus	BVLLMP
Asteraceae	*Ambrosia psilostachya*	western ragweed	AECOM
	Artemisia californica	California sagebrush	AECOM
	Artemisia douglasiana	mugwort	AECOM
	Atriplex lentiformis	big saltbush	BVLLMP
	Atriplex patula	spear oracle	BVLLMP
	*Atriplex semibaccata**	Austrailian saltbush	BVLLMP
	Baccharis pilularis ssp. *consanguinea*	coyote bush	AECOM
	Baccharis salicifolia ssp. *salicifolia*	mule fat	AECOM
	Baccharis sarothroides	broom baccharis	AECOM
	*Bidens laevis**	bur-marigold	BVLLMP
	*Cirsium vulgare**	bull thistle	AECOM
	*Cotula australis**	Australian cotula	AECOM
	Deinandra fasciculate	fascicled tarweed	AECOM
	Encelia californica	California encelia	AECOM
	*Glebionis coronaria**	crown daisy	AECOM
	*Hedypnois cretica**	Crete weed	AECOM
	*Helminthotheca echioides**	bristly ox-tongue	AECOM
	Heterotheca grandiflora	telegraph weed	AECOM
	Isocoma menziesii	coastal goldenbush	AECOM
	Jaumea carnosa	salty susan	AECOM
	*Matricaria discoidea**	pineapple weed	AECOM
	*Oncosiphon piluliferum**	stinknet	AECOM
	Pluchea sericea	arrow-weed	AECOM
	Pseudognaphalium californicum	California everlasting	AECOM
	*Sonchus oleraceus**	common sow thistle	AECOM
	Symphyotrichum subulatum	annual saltmarsh aster	AECOM

Family	Scientific Name	Common Name	Data Source[1]
	Xanthium strumarium	cocklebur	AECOM
	*Echium candicans**	pride of Madeira	AECOM
Boraginaceae	*Heliotropium curassavicum* var. *oculatum*	alkali heliotrope	AECOM
Brassicaceae	*Brassica nigra**	black mustard	AECOM
	*Cakile maritime**	European sea rocket	AECOM
	Caulanthus lasiophyllus	California mustard	BVLLMP
	*Hirschfeldia incana**	short-pod mustard	AECOM
	Lepidium densiflorum var. *densiflorum*	common peppergrass	AECOM
	*Lobularia maritima**	sweet alyssum	AECOM
	Peritoma arborea	bladderpod	AECOM
	*Raphanus sativus**	radish	AECOM
	*Sisymbrium irio**	London rocket	AECOM
Cactaceae	*Opuntia basilaris*	beavertail cactus	BVLLMP
	*Opuntia ficus-indica**	mission prickly-pear	AECOM
	Opuntia littoralis	coastal prickly pear	BVLLMP
	Cylindropuntia littoralis	coast prickly pear	AECOM
Ceratophyllaceae	*Ceratophyllum demersum*	hornwort	AECOM
Chenopodiaceae	*Arthrocnemum subterminale*	Parish’s pickleweed	AECOM
	*Atriplex glauca**	waxy saltbush	AECOM
	Atriplex lentiformis	big saltbush	AECOM
	*Atriplex semibaccata**	Austrailian saltbush	AECOM
	*Bassia hyssopifolia**	five-hook bassia	AECOM
	Chenopodium californica	soap plant	BVLLMP
	Chenopodium rubrum	Red goosefoot	BVLLMP
	Salicornia pacifica	Pacific pickleweed	AECOM
	*Salsola tragus**	Russian tumbleweed	AECOM
Commelinaceae	*Tradescantia fluminensis**	spiderwort	BVLLMP
Convolvulaceae	*Cressa truxillensis*	alkali weed	AECOM
Crassulaceae	*Aeonium arboreum*	tree aeonium	BVLLMP
	Crassula connata	pygmy-weed	AECOM
	Dudleya lanceolata	lance-leaved dudleya	AECOM
Cucurbitaceae	*Cucurbita foetidissima*	calabazilla	AECOM
	Marah macrocarpa	manroot	AECOM
Cyperaceae	*Cyperus involucratus**	African umbrella plant	AECOM
	Cyperus niger	nutsedge	AECOM
	Schoenoplectus americanus	olney's three-square bulrush	AECOM
	Schoenoplectus californicus	southern bulrush	AECOM
Euphorbiaceae	*Euphorbia serpyllifolia* ssp. *serpyllifolia*	thyme-leaf spurge	AECOM
	Croton californicus	California croton	AECOM
	*Ricinus communis**	castor bean	AECOM
Fabaceae	*Acacia longifolia**	sydney golden wattle	AECOM
	Acmispon glaber var. *brevialatus*	deerweed	AECOM
	Lupinus succulentus	arroyo lupine	BVLLMP
	*Medicago polymorpha**	burclover	AECOM

Family	Scientific Name	Common Name	Data Source[1]
	Medicago sativa	alphalfa	BVLLMP
	*Melilotus indicus**	indian sweet clover	AECOM
Fagaceae	*Quercus ilex**	holly oak	BVLLMP
Frankeniaceae	*Frankenia pulverulenta**	European sea heath	AECOM
	Frankenia salina	alkali heath	AECOM
Hydrocharitaceae	*Najas marina*	spiny naiad	BVLLMP
Juncaceae	*Juncus acutus* ssp. *leopoldii*[α]	southwestern spiny rush	AECOM
Lamiaceae	*Salvia apiana*	white sage	BVLLMP
	Salvia mellifera	black sage	AECOM
Malvaceae	*Malva parviflora**	cheeseweed	AECOM
	Malvella leprosa	alkali mallow	AECOM
Meliaceae	*Melia azedarach**	China berry	AECOM
Myrtaceae	*Eucalyptus globulus**	blue gum	AECOM
	*Eucalyptus polyanthemos**	silver dollar gum	AECOM
Oleaceae	*Olea europaea**	European olive	AECOM
Onagraceae	*Camissoniopsis cheiranthifolia*	beach evening-primrose	AECOM
	*Ludwigia peploides**	water primrose	AECOM
Oxalidaceae	*Oxalis pes-caprae**	Bermuda buttercup	AECOM
Papaveraceae	*Fumaria officinalis**	fumitory	AECOM
Plantaginaceae	*Plantago lanceolata**	English plantain	AECOM
Platanaceae	*Platanus ×hispanica**	London plane tree	AECOM
	Platanus racemosa	western sycamore	BVLLMP
Plumbaginaceae	*Limonium californicum*	California sea-lavender	AECOM
	*Limonium perezii**	Perez's sea-lavender	AECOM
	*Plumbago auriculata**	cape leadwort	BVLLMP
Poaceae	*Agrostis stolonifera**	European redtop	BVLLMP
	*Arundo donax**	giant reed	AECOM
	*Avena barbata**	slender wild oat	AECOM
	*Bromus diandrus**	ripgut grass	AECOM
	Bromus madritensis ssp. *rubens**	red brome	AECOM
	*Cortaderia selloana**	pampas grass	AECOM
	*Cynodon dactylon**	Bermuda grass	AECOM
	*Distichlis spicata**	salt grass	AECOM
	*Ehrharta erecta**	panic veldt grass	AECOM
	*Festuca perennis**	rye grass	AECOM
	*Hordeum murinum**	wall barley	AECOM
	*Paspalum dilatatum**	dallis grass	AECOM
	*Pennisetum setaceum**	African fountain grass	AECOM
	*Polypogon monspeliensis**	rabbitfoot grass	AECOM
Polygonaceae	*Eriogonum fasciculatum var. fasciculatum*	flat-topped buckwheat	AECOM
	*Rumex crispus**	curly dock	AECOM
Rosaceae	*Heteromeles arbutifolia*	toyon	AECOM
	Prunus ilicifolia ssp. *lyonii*	catalina cherry	AECOM
Rubiaceae	*Galium aparine*	goose grass	AECOM
Ruppiaceae	*Ruppia maritima*	ruppia	BVLLMP

Family	**Scientific Name**	**Common Name**	**Data Source**[1]
Salicaceae	*Populus fremontii* ssp. *fremontii*	Fremont's cottonwood	AECOM
	Salix gooddingii	Goodding's black willow	AECOM
	Salix lasiolepis	arroyo willow	AECOM
Saururaceae	*Anemopsis californica*	yerba mansa	AECOM
Scrophulariaceae	*Myoporum laetum**	myoporum, ngaio tree	AECOM
Selaginellaceae	*Selaginella bigelovii*	Bigelow's mossfern	BVLLMP
Simaroubaceae	*Ailanthus altissima**	tree of heaven	AECOM
Solanaceae	*Datura wrightii*	jimson weed	AECOM
	*Nicotiana glauca**	tree tobacco	AECOM
	Solanum douglasii	Douglas's nightshade	AECOM
Tamaricaceae	*Tamarix parviflora**	smallflower tamarisk	AECOM
Tropaeolaceae	*Tropaeolum majus**	garden nasturtium	AECOM
Typhaceae	*Typha domingensis*	southern cattail	AECOM
Urticaceae	*Urtica urens**	dwarf nettle	AECOM
Verbenaceae	*Lantana camara**	lantana	AECOM
	Phyla nodiflora	common lippia	BVLLMP
Vitaceae	*Vitus girdiana*	grape vine	BVLLMP

[1] AECOM – Plants detected by AECOM biologists during Spring 2013 surveys.
BVLLMP – Plant species listed in Appendix A of Buena Vista Lagoon Land Management Plan Elements Biological Analysis (Coastal environments 2000).

*Nonnative

[α] California Native Plant Society (CNPS) Rare Plant Rank 4.2: Uncommon in California

APPENDIX B

SPECIAL STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR WITHIN THE BUENA VISTA LAGOON ENHANCEMENT PROJECT BSA

APPENDIX B
Special-status Plant Species With Potential to Occur Within the Buena Vista Lagoon Enhancement Project BSA

Common Name Scientific Name	Scientific Name	Sensitivity Status[1]	Habitat requirements[2]	Microhabitat Description[3]	Detected (D) or Not Detected (ND)	Probability of Occurrence
Plants						
San Diego thorn-mint	*Acanthomintha ilicifolia*	FESA: Threatened CESA: Endangered CNPS: 1B.1 MSCP: Covered	Clay soils, openings in chaparral, coastal scrub, valley and foothill grassland, and vernal pools. Elevation 10–960 meters. Annual herb. Blooms April–June.	Grassy openings in chaparral or sage scrub with broken clay soils. All sites have a crumbly or deeply fissured soil, which noticeably compresses when treaded upon even during the dry season.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA.
Nuttall's lotus	*Acmispon prostratus*	CNPS 1B.1	Coastal dunes. Elevation 0–10 meters. Annual herb. Blooms March–July.	Costal dunes and well-protected back dunes with minimal foot traffic. Soils include beach sand.	ND	Low. Marginally suitable habitat is present within the BSA. This species was not detected during rare plant surveys.
California adolphia	*Adolphia californica*	CNPS: 2.1	Clay soils, chaparral, coastal scrub, and valley and foothill grassland. Elevation 45–740 meters. Perennial deciduous shrub. Blooms December–May.	Peripheral chaparral habitat with Diegan sage scrub, particularly near hillsides and next to creeks. California adolphia is associated with California buckwheat and California sagebrush.	ND	Moderate. Suitable habitat is found within the Diegan coastal sage scrub within the BSA. This species was not detected during rare plant surveys.
San Diego ambrosia	*Ambrosia pumila*	FESA: Endangered CNPS 1B.1 MSCP: Covered	Sandy loam or clay, often in disturbed areas, sometimes alkaline chaparral, coastal scrub, valley and foothill grassland, and vernal pools. Elevation 20–415 meters.	Creek beds, seasonally dry drainages, floodplains, on the periphery of willow woodland. Soils include sandy alluvium.	ND	Low. Marginally suitable habitat is present within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	Scientific Name	Sensitivity Status[1]	Habitat requirements[2]	Microhabitat Description[3]	Detected (D) or Not Detected (ND)	Probability of Occurrence
			Perennial rhizomatous herb. Blooms April–October.			
Del Mar manzanita	*Arctostaphylos glandulosa* ssp. *crassifolia*	FESA: Endangered CNPS 1B.1	Chaparral (maritime, sandy). Elevation 0-365 meters. Perennial evergreen shrub. Blooms December-June.	Found in substrate with eroding sandstone, and chaparral vegetation is relatively low-growing. Soils include Terrace Escarpments and Loamy alluvial land of Huerhuero complex.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
San Diego sagewort	*Artemisia palmeri*	CNPS: 4.2	Sandy, mesic soils, chaparral, coastal scrub, riparian forest, riparian scrub, riparian woodland. Elevation 15–915 meters. Perennial deciduous shrub. Blooms February–September.	Found along creeks and drainages near the coast. Found in rocky, sandy loams. Grows commonly in shaded understory beneath willow, sycamore and cottonwood.	ND	Low. Marginally suitable habitat is present within the BSA. This species was not detected during rare plant surveys.
Coastal dunes milk-vetch	*Astragalus tener* var. *titi*	FESA: Endangered CESA: Endangered CNPS: 1B.1	Vernally mesic areas, coastal bluff scrub (sandy), coastal dunes and mesic coastal prairie. Elevation 1-50 meters. Blooms March-May.	Coastal dunes describe the historical locations of Coastal dunes milk vetch.	ND	Low. Marginally suitable habitat is present within the BSA. This species was not detected during rare plant surveys.
Coulter's saltbush	*Atriplex coulteri*	CNPS:1B.2	Alkaline or clay soils, coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland. Elevation 3–460 meters. Perennial herb.	Sea bluff habitat is preferred.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	Scientific Name	Sensitivity Status[1]	Habitat requirements[2]	Microhabitat Description[3]	Detected (D) or Not Detected (ND)	Probability of Occurrence
			Blooms March–October.			
South Coast salt scale	*Atriplex pacifica*	CNPS:1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, and playas. Elevation 0–140 meters. Annual herb. Blooms March–October.	Xeric, often mildly disturbed locales. Soils are mapped as Linne clay loam and found with California sagebrush.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Encinitas baccharis	*Baccharis vanessae*	FESA: Threatened CESA: Endangered CNPS: 1B.1 MSCP: Covered	Sandstone, maritime chaparral, and cismontane woodland. Elevation 60–720 meters. Perennial deciduous shrub. Blooms August–November.	Found in low-growing chaparral, Corralitos loamy sand, and Cieneba rocky coarse sandy loam.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
San Diego goldenstar	*Bloomeria clevelandii*	CNPS: 1B.1 MSCP: Covered	Clay, chaparral, coastal scrub, valley and foothill grassland, and vernal pools. Elevation 50–465 meters. Perennial bulbiferous herb. Blooms April–May.	Undocumented	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
thread-leaved brodiaea	*Brodiaea filifolia*	FESA: Threatened CESA: Endangered CNPS: 1B.1	Chaparral, cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools. Elevation 25-1120 meters. Perennial herb. Blooms March-June.	Clay soils	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	**Scientific Name**	**Sensitivity Status[1]**	**Habitat requirements[2]**	**Microhabitat Description[3]**	**Detected (D) or Not Detected (ND)**	**Probability of Occurrence**
Orcutt's brodiaea	*Brodiaea orcuttii*	CNPS: 1B.1 MSCP: Covered	Mesic, clay, sometimes serpentinite, closed cone coniferous forest, chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools. Elevation 30–1692 meters. Perennial bulbiferous herb. Blooms April–May.	Mima mound topography, vernally moist grasslands, periphery of vernal pools. Soils consist of stockpen gravelly loam and Redding gravelly loam.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
wart-stemmed ceanothus	*Ceanothus verrucosus*	CNPS: 2.2 MSCP: Covered	Chaparral. Elevation 1–380 meters. Perennial evergreen shrub. Blooms December–May.	Coastal chaparral intermixed with chamise. Soils consist of exchequer rocky silt loams and San Miguel-Exchequer rocky silt loams	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Southern tarplant	*Centromadia parryi* ssp. *australis*	CNPS 1B.1	Margins of marshes and swamps, valley and foothill grassland, vernal pools. Elevation 0-425 meters. Annual herb. Blooms May-November.	Undocumented	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Smooth tarplant	*Centromadia pungens* ssp. *laevis*	CNPS 1B.1	Alkaline habitat, chenopod scrub, meadows and seeps, playas, riparian woodlands, valley and foothill grasslands. Elevation 0-640 meters. Annual herb.	Undocumented	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	**Scientific Name**	**Sensitivity Status[1]**	**Habitat requirements[2]**	**Microhabitat Description[3]**	**Detected (D) or Not Detected (ND)**	**Probability of Occurrence**
			Blooms April-September.			
Orcutt's pincushion	*Chaenactis glabriuscula* var. *orcuttiana*	CNPS: 1B.1	Sandy coastal bluff scrub, and coastal dunes. Elevation 0–100 meters. Annual herb. Blooms January–August.	Undocumented	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Orcutt's spineflower	*Chorizanthe orcuttiana*	FESA: Endangered CESA: Endangered CNPS: 1B.1	Sandy openings, closed coniferous forest, maritime chaparral, coastal scrub. Elevation 3-125 meters. Annual herb. Blooms March-May.	Coastal chaparral openings in chamise with loose sand substrate. Soils include corralitos loamy sand and loamy alluvial land in the Huerhuero complex.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
long-spined spineflower	*Chorizanthe polygonoides* var. *longispina*	CNPS:1B.2	Clay, chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, and vernal pools. Elevation 30–1530. Annual herb. Blooms April–July.	Found on clay lenses that are devoid of shrubs and occasionally found on the periphery of vernal pool habitat. Long-spined spine flower can also be found near the periphery of montane meadows near vernal seeps.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
summer holly	*Comarostaphylis diversifolia* ssp. *diversifolia*	CNPS:1B.2	Chaparral and cismontane woodland. Elevation 30–790 meters. Perennial evergreen shrub. Blooms April–June.	Southern mixed chaparral, usually in mesic areas, north facing slopes. This species is found west of I-15.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	**Scientific Name**	**Sensitivity Status[1]**	**Habitat requirements[2]**	**Microhabitat Description[3]**	**Detected (D) or Not Detected (ND)**	**Probability of Occurrence**
Del Mar Mesa sand aster	*Corethrogyne filaginifolia* var. *linifolia*	CNPS: 1B.1	Sandy habitat, coastal bluff scrub, maritime chaparral, coastal scrub. Elevation 15-150 meters. Perennial herb. Blooms May-September.	Undocumented	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Wiggins' cryptantha	*Cyptantha wigginsii*	CNPS: 1B.2	Coastal sage scrub. Elevation 20-275 meters. Annual herb. Blooms February-June.	Clay soils.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Blochman's dudleya	*Dudleya blochmaniae ssp. blochmaniae*	CNPS: 1B.1	Coastal bluff scrub, chaparral, coastal scrub, valley and foothill grassland. Elevation 5-450 meters. Perennial herb. Blooms April-June.	Rocky, often clay or serpentinite.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
many-stemmed dudleya	*Dudleya multicaulis*	CNPS 1B.2	Chaparral, coastal scrub, valley and foothill grassland. Elevation 15-790 meters. Perrenial herb. Blooms April-July.	Clay soils.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
variegated dudleya	*Dudleya variegata*	CNPS: 1B.2	Clay habitat, chaparral, cismontane woodland, coastal scrub, valley and foothill grassland, and vernal pools. Elevation 3–580 meters. Perennial herb.	Openings in sage scrub, chaparral, open grasslands, isolated rocky substrates and found near vernal pools. Soils include stockpen gravelly loams and Redding gravelly	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	Scientific Name	Sensitivity Status[1]	Habitat requirements[2]	Microhabitat Description[3]	Detected (D) or Not Detected (ND)	Probability of Occurrence
			Blooms April–June.	loams.		
Sticky dudleya	*Dudleya viscida*	CNPS 1B.2	Coastal bluff scrub, chaparral, cismontane woodland, coastal scrub. Elevation 10-550 meters. Perennial herb. Blooms May-June.	Undocumented	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
San Diego button-celery	*Eryngium aristulatum* var. *parishii*	FESA: Endangered CESA: Endangered CNPS 1B.1 MSCP: Covered	Mesic habitat, coastal scrub, valley and foothill grassland, and vernal pools. Elevation 20–620 meters. Annual and perennial herb. Blooms April–June.	Areas with vernal pools, mima mounds and vernally moist conditions. Soils include Redding gravelly loams.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Pendleton button-celery	*Eryngium pendletonense*	CNPS: 1B.1	Coastal bluff scrub, valley and foothill grassland, vernal pools. Elevation 15-110 meters. Perennial herb. Blooms April-July.	Clay, vernally mesic.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
cliff spurge	*Euphorbia misera*	CNPS: 2.2	Rocky habitat, coastal bluff scrub, coastal scrub, and Mojavean desert scrub. Elevation 10–500 meters. Perennial shrub. Blooms December–August.	Low-growing, maritime succulent scrub with a high incidence of cactus. Soils include Olivenhain cobbly loams.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	Scientific Name	Sensitivity Status[1]	Habitat requirements[2]	Microhabitat Description[3]	Detected (D) or Not Detected (ND)	Probability of Occurrence
San Diego barrel cactus	*Ferocactus viridescens*	CNPS: 2.1 MSCP: Covered	Chaparral, coastal scrub, valley and foothill grassland, and vernal pools. Elevation 3–450 meters. Perennial stem succulent. Blooms May–June.	Diegan sage scrub hillsides, often at the crest of slopes and growing in cobbles, occasionally found on the periphery of vernal pools and mima mounds. Soil types include San Miguel-Exchequer rocky silt loams and Redding gravelly loams.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Palmer's grapplinghook	*Harpagonella palmeri*	CNPS: 4.2	Clay habitat, chaparral, coastal scrub, and valley and foothill grassland. Elevation 20–955 meters. Annual herb. Blooms March–May.	Clay vertisols with open grassy slopes and open Diegan sage scrub. Diablo clays are favored on the coast.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Orcutt’s hazardia	*Hazardia orcuttii*	CNPS: 1B.1	Coastal scrub, maritime chaparral. Elevation 80-85 meters. Evergreen shrub. Blooms August-October.	Clay soils.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
beach goldenaster	*Heterotheca sessiliflora* ssp. *sessiliflora*	CNPS 1B.1	Chaparral (coastal), coastal dunes, and coastal scrub. Elevation 0–1225. Perennial herb. Blooms March–December.	Coastal sage scrub in sandy locales. Found on beach bluffs and maritime locales.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	**Scientific Name**	**Sensitivity Status**[1]	**Habitat requirements**[2]	**Microhabitat Description**[3]	**Detected (D) or Not Detected (ND)**	**Probability of Occurrence**
Ramona horkelia	*Horkelia truncata*	CNPS 1B.3	Clay and gabbroic habitat. Elevation 400–1300 meters. Perennial herb. Blooms May–June.	Chamise chaparral. Soil types include Cieneba very rocky coarse sandy loams and gabbro.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
decumbent goldenbush	*Isocoma menziesii* var. *decumbens*	CNPS 1B.2	Chaparral and coastal scrub (sandy, often open in disturbed areas). Elevation 10–135 meters. Perennial shrub. Blooms April–November.	Coastal sage scrub and is found in clay soils.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
San Diego marsh-elder	*Iva hayesiana*	CNPS: 2.2	Marshes, swamps, and playas. Elevation 10–500 meters. Perennial herb. Blooms April–October.	Creeks and intermittent streambeds, open riparian canopy allowing substantial sunlight.	ND	Moderate. Suitable habitat is found within the riparian areas within the BSA. This species was not detected during rare plant surveys.
southwestern spiny rush	*Juncus acutus* ssp. *leoplodii*	CNPS: 4.2	Coastal dunes, meadows and seeps, marshes and swamps.	Undocumented.	D	Present. This species occurs in the salt marsh and freshwater marsh habitat within the BSA.
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*	CNPS 1B.1	Marshes, swamps (coastal salt), playas, and vernal pools. Elevation 1–1220 meters. Annual herb. Blooms February–June.	Tidal marsh areas near the coast at the extreme upper end of tidal inundation and periphery of vernal pools.	ND	Low. Marginally suitable habitat is present within the salt marsh habitat in the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	**Scientific Name**	**Sensitivity Status[1]**	**Habitat requirements[2]**	**Microhabitat Description[3]**	**Detected (D) or Not Detected (ND)**	**Probability of Occurrence**
Robinson's pepper-grass	*Lepidium virginicum* var. *robinsonii*	CNPS 1B.2	Chaparral and coastal scrub. Elevation 1–885 meters. Annual herb. Blooms January–July.	Openings in chaparral and sage scrub, usually found in foothill elevations. Sites are dry, exposed locales.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
sea dahlia	*Leptosyne maritima*	CNPS: 2.2	Coastal bluff scrub and coastal scrub. Elevation 5–150 meters. Perennial herb. Blooms March–May.	Undocumented.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
felt-leaved monardella	*Monardella hypoleuca* ssp. *lanata*	CNPS 1B.2 MSCP: Covered	Chaparral and cismontane woodland. Elevation 300–1575. Perennial rhizomatous herb. Blooms June–August.	Chaparral understory usually under stands of chamise in xeric situations. Soils include San Miguel-Exchequer rocky silt loams often near Otay Mountain.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
little mousetail	*Myosurus minimus* ssp. *apus*	CNPS 3.1	Valley and foothill grassland and alkaline vernal pools. Elevation 20–640 meters. Annual herb. Blooms March–June.	Vernal pools. Soils include Huerhuero loam.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
mud nama	*Nama stenocarpum*	CNPS: 2.2	Marshes and swamps (lake margins, riverbanks). Elevation 5–500 meters. Annual or perennial herb. Blooms January–July.	This herb grows on muddy embankments of ponds and lakes.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	Scientific Name	Sensitivity Status[1]	Habitat requirements[2]	Microhabitat Description[3]	Detected (D) or Not Detected (ND)	Probability of Occurrence
spreading navarretia	*Navarretia fossalis*	FESA: Threatened CNPS 1B.1 MSCP: Covered	Chenopod scrub, marshes and swamps, playas, and vernal pools. Elevation 30–655 meters. Annual herb. Blooms April–June.	Vernal pools and vernal pool swales. Soils include Huerhuero loam	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
coast woolly-heads	*Nemacaulis denudata* var. *denudata*	CNPS 1B.2	Coastal dunes habitat. Elevation 0–100 meters. Annual herb. Blooms April–September.	Coastal sand dunes along beaches.	ND	Low. Marginally suitable habitat is present within the BSA. This species was not detected during rare plant surveys.
slender cottonheads	*Nemacaulis denudata* var. *gracilis*	CNPS: 2.2	Coastal dunes, desert dunes, and Sonoran desert scrub. Elevation 50–400 meters. Annual herb. Blooms March–May.	Well-developed dune habitat in the desert or rarely along coastal beaches.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
California Orcutt grass	*Orcuttia californica*	FESA: Endangered CESA: Endangered CNPS 1B.1 MSCP: Covered	Vernal pools. Elevation 15–660 meters. Annual herb. Blooms April–August.	Vernal pools are the preferred habitat of this prostrate grass. Soils include gravelly clay loam	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Short-lobed broomrape	*Orobanche parishii* ssp. *brachyloba*	CNPS: 4.2	Coastal bluff scrub, coastal dunes and sandy coastal scrub. Elevation 3-305 meters. Blooms April-October.	Coastal bluff scrub, and coastal dunes. Short-lobed broomrape has been found in sandstone soils.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	**Scientific Name**	**Sensitivity Status[1]**	**Habitat requirements[2]**	**Microhabitat Description[3]**	**Detected (D) or Not Detected (ND)**	**Probability of Occurrence**
Brand's star phacelia	*Phacelia stellaris*	FESA: Candidate CNPS 1B.1	Coastal dunes and coastal scrub. Elevation 1–400 meters. Annual herb. Blooms March–June.	Sandy openings in Diegan Sage scrub near the coast. Soils include Marina loamy coarse sand.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
Nuttall's scrub oak	*Quercus dumosa*	CNPS 1B.1	Sandy and clay loam habitat. Elevation 15–400 meters. Perennial evergreen shrub. Blooms February–August.	Coastal chaparral with a relatively open canopy cover and relatively flat terrain.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
chaparral ragwort	*Senecio aphanactis*	CNPS: 2.2	Sometimes alkaline habitat, chaparral, cismontane woodland, and coastal scrub. Elevation 15–800 meters. Annual herb. Blooms January–April.	Coastal sage scrub on cismontane woodlands and alkaline flats.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
purple stemodia	*Stemodia durantifolia*	CNPS: 2.1	Sonoran desert scrub. Elevation 180–300 meters. Perennial herb. Blooms January–December.	Undocumented	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.
estuary seablite	*Suaeda esteroa*	CNPS 1B.2	Marshes and swamps (coastal salt). Elevation 0–5 meters. Perennial herb. Blooms May–January.	Periphery of coastal salt marshes with pickleweed species. Soils are mapped as tidal flats.	ND	Moderate. Suitable habitat is found within the riparian areas within the BSA. This species was not detected during rare plant surveys.

Common Name Scientific Name	Scientific Name	Sensitivity Status[1]	Habitat requirements[2]	Microhabitat Description[3]	Detected (D) or Not Detected (ND)	Probability of Occurrence
Parry's tetracoccus	*Tetracoccus dioicus*	CNPS 1B.2	Chaparral and coastal scrub. Elevation 165–1000 meters. Perennial deciduous shrub. Blooms April–May.	Low-growing chamise chaparral with moderately dense canopy cover. Soils include Las Posas and xeric conditions.	ND	Not Expected. The preferred habitat of this species does not occur within the BSA. This species was not detected during rare plant surveys.

[1] **Sensitivity Status Key**
FESA: Federal Endangered Species Act (ESA) Threatened or Endangered
CESA: California Endangered Species Act (CESA) Threatened or Endangered
CNPS: California Native Plant Society Rare Plant Rank:
1B: Considered rare, threatened, or endangered in California and elsewhere
2: Plants rare, threatened, or endangered in California, but more common elsewhere
3: Plants for which we need more information – review list
4: Plants of limited distribution a watch list
Decimal notations: .1 – Seriously endangered in California, .2 – Fairly endangered in California, .3 – Not very endangered in California
Multiple Species Conservation Program (MSCP)

[2] California Native Plant Society (CNPS). 2014. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society. Sacramento, CA.

[3] Reiser, Craig. 1994. Rare plants of San Diego County. Available at http://sandiego.sierraclub.org/rareplants/003.html.

APPENDIX C

FISH COMMUNITIES UPDATE SURVEY 2003

Appendix C

Fish Communities Update Survey

M&A and SAIC performed the 2003 survey using two gear types, sampling fish throughout all four basins and within four habitat types (Table C-1). Due to the abundance of submerged vegetation, and lack of shoreline, not all gear types could be used in all habitats within each basin. Thus, this survey was intended to provide a look at the overall lagoon, and did not provide replication within each basin.

Table C-1 Gear Type Used and Habitat And Basin Sampled In The 2003 Fish Update Survey

Gear Type	Habitat Type	Basin
Small Beach Seine	Beach	I-5, Weir
	Cattails	I-5
	Channel	I-5, Weir
Experimental Gill Net	Beach	I-5
	Open Water	I-5, PCH, Weir
	Cattails	Railroad
	Channel	I-5, PCH

The 2003 fish survey utilized a combination of an experimental gill net and a small beach seine. The gill net was 125 feet in length and 8 feet deep and consisted of five different mesh sizes ranging from 0.5 inch to 2.5 inches. Gill nets were deployed using a small human-powered inflatable boat and set in areas ranging from 3 to 10 feet deep. A total of eight deployments of the gill net were completed in the Lagoon and each gill net soaked for 4 – 12 hours. The small beach seine was 15 feet long and 4 feet deep with a mesh size of 1.2 inches and was deployed 5 times. The beach seine was used in waters from 0 to 4 feet deep and was typically pulled perpendicular to shore, unless shoreline vegetation necessitated a parallel pull.

Sampling stations for the 2003 survey were selected to represent each possible habitat type and distance from the Lagoon mouth (Figure C-1). Beach sampling stations were located in sites that were free of emergent vegetation and which provided a shore onto which the net could be hauled. The gill net at the beach site in the I-5 Basin was set slightly offshore at a depth equivalent to the other stations. Gillnets at the cattail sites were set as close as possible to the vegetation without becoming entangled. The beach seine at the cattail site was pulled parallel to shore towards a beach where the net could be retrieved. Open water sites were chosen for their distance from shore and relative lack of submerged vegetation. Channel sites were generally closer to shore and were located in a finger or between islands.

Fish count data are summarized in Tables C-2 and C-3 and the raw data for the fish update survey are provided in Table C-4.

Figure C-1 Locations of Gill Net And Beach Seine Sampling Site Throughout Buena Vista Lagoon For The 2003 Fish Survey

Table C-2 Fish Counts By Basin For The 2003 Survey In Buena Vista Lagoon

	Black Bullhead	Bluegill	Brown Bullhead	Carp	Largemouth Bass	Mosquitofish	Smallmouth Bass	Striped Mullet	Golden Shiner	**Total**
I-5	2	74		1	33	56	4	2	1	**173**
PCH		2		1	32					**35**
RR			1		6			1		**8**
Weir		11			43	15		1		**70**
Total	**2**	**87**	**1**	**2**	**114**	**71**	**4**	**4**	**1**	**286**

Table C-3 Fish Counts By Habitat For The 2003 Survey In Buena Vista Lagoon

	Black Bullhead	Bluegill	Brown Bullhead	Carp	Largemouth Bass	Mosquitofish	Smallmouth Bass	Striped Mullet	Golden Shiner	**Total**
Beach		50			24	46			1	**121**
Cattails	2	30	1		27	25	4	1		**90**
Channel		1			2			1		**4**
OW		6		2	61			2		**71**
Total	**2**	**87**	**1**	**2**	**114**	**71**	**4**	**4**	**1**	**286**

Table C-4 Raw Data For The 2003 Fish Survey In Buena Vista Lagoon

Basin	Gear	Habitat	Species	length (mm)	weight (gm)	Date
I-5	Seine	Beach	Largemouth Bass	36	0.7	7/21/03
I-5	Seine	Beach	Largemouth Bass	51	2.9	7/21/03
I-5	Seine	Beach	Largemouth Bass	39	1.2	7/21/03
I-5	Seine	Beach	Largemouth Bass	41	1.4	7/21/03
I-5	Seine	Beach	Largemouth Bass	32	0.7	7/21/03
I-5	Seine	Beach	Largemouth Bass	41	1.3	7/21/03
I-5	Seine	Beach	Bluegill	28	0.6	7/21/03
I-5	Seine	Beach	Bluegill	29	0.9	7/21/03
I-5	Seine	Beach	Bluegill	29	0.9	7/21/03
I-5	Seine	Beach	Bluegill	28	0.8	7/21/03
I-5	Seine	Beach	Bluegill	32	1.2	7/21/03
I-5	Seine	Beach	Bluegill	28	0.8	7/21/03
I-5	Seine	Beach	Bluegill	28	0.6	7/21/03
I-5	Seine	Beach	Bluegill	19	0.4	7/21/03
I-5	Seine	Beach	Bluegill	21	0.4	7/21/03
I-5	Seine	Beach	Bluegill	26	0.8	7/21/03
I-5	Seine	Beach	Bluegill	22	0.7	7/21/03
I-5	Seine	Beach	Bluegill	26	1	7/21/03
I-5	Seine	Beach	Bluegill	20	0.4	7/21/03
I-5	Seine	Beach	Bluegill	27	0.8	7/21/03
I-5	Seine	Beach	Bluegill	22	0.7	7/21/03
I-5	Seine	Beach	Bluegill	20	0.5	7/21/03
I-5	Seine	Beach	Bluegill	23	0.4	7/21/03
I-5	Seine	Beach	Bluegill	24	0.4	7/21/03
I-5	Seine	Beach	Bluegill	29	1	7/21/03
I-5	Seine	Beach	Bluegill	30	0.9	7/21/03
I-5	Seine	Beach	Bluegill	24	0.8	7/21/03
I-5	Seine	Beach	Bluegill	31	0.9	7/21/03
I-5	Seine	Beach	Bluegill	23	0.7	7/21/03
I-5	Seine	Beach	Bluegill	21	0.4	7/21/03
I-5	Seine	Beach	Bluegill	19	0.4	7/21/03
I-5	Seine	Beach	Bluegill	28	0.7	7/21/03
I-5	Seine	Beach	Bluegill	23	0.6	7/21/03
I-5	Seine	Beach	Bluegill	60	0.3	7/21/03
I-5	Seine	Beach	Bluegill	22	0.4	7/21/03

Basin	Gear	Habitat	Species	length (mm)	weight (gm)	Date
I-5	Seine	Beach	Bluegill	21	0.3	7/21/03
I-5	Seine	Beach	Bluegill	21	0.4	7/21/03
I-5	Seine	Beach	Bluegill	18	0.3	7/21/03
I-5	Seine	Beach	Bluegill	13	0.1	7/21/03
I-5	Seine	Beach	Golden Shiner	41	1.1	7/21/03
I-5	Seine	Beach	Mosquitofish	25	0.3	7/21/03
I-5	Seine	Beach	Mosquitofish	33	0.7	7/21/03
I-5	Seine	Beach	Mosquitofish	22	0.3	7/21/03
I-5	Seine	Beach	Mosquitofish	17	0.3	7/21/03
I-5	Seine	Beach	Mosquitofish	18	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	22	0.2	7/21/03
I-5	Seine	Beach	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	10	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	19	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	22	0.2	7/21/03
I-5	Seine	Beach	Mosquitofish	12	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	18	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	17	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	23	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	27	0.4	7/21/03
I-5	Seine	Beach	Mosquitofish	19	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	26	0.4	7/21/03
I-5	Seine	Beach	Mosquitofish	20	0.2	7/21/03
I-5	Seine	Beach	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	18	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	11	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	14	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish	31	0.6	7/21/03
I-5	Seine	Beach	Mosquitofish	22	0.3	7/21/03
I-5	Seine	Beach	Mosquitofish	22	0.3	7/21/03
I-5	Seine	Beach	Mosquitofish	19	0.1	7/21/03
I-5	Seine	Beach	Mosquitofish		0.6	7/21/03
I-5	Seine	Beach	Largemouth Bass	46	1.9	7/21/03

Basin	Gear	Habitat	Species	length (mm)	weight (gm)	Date
I-5	Seine	Beach	Largemouth Bass	41	1.5	7/21/03
I-5	Seine	Beach	Largemouth Bass	36	1.3	7/21/03
I-5	Seine	Beach	Bluegill	26	0.8	7/21/03
I-5	Seine	Beach	Bluegill	28	1.1	7/21/03
I-5	Seine	Beach	Bluegill	22	0.6	7/21/03
I-5	Seine	Beach	Bluegill	26	1	7/21/03
I-5	Seine	Beach	Bluegill	22	0.7	7/21/03
I-5	Seine	Beach	Bluegill	23	0.9	7/21/03
I-5	Seine	Beach	Bluegill	19	0.5	7/21/03
I-5	Seine	Beach	Bluegill	23	0.9	7/21/03
I-5	Seine	Beach	Bluegill	20	0.8	7/21/03
I-5	Seine	Beach	Bluegill	19	0.6	7/21/03
I-5	Seine	Cattails	Largemouth Bass	63	5.3	7/21/03
I-5	Seine	Cattails	Largemouth Bass	47	2.3	7/21/03
I-5	Seine	Cattails	Largemouth Bass	33	1.6	7/21/03
I-5	Seine	Cattails	Largemouth Bass	48	1.9	7/21/03
I-5	Seine	Cattails	Largemouth Bass	47	2	7/21/03
I-5	Seine	Cattails	Largemouth Bass	41	1.5	7/21/03
I-5	Seine	Cattails	Largemouth Bass	51	2.7	7/21/03
I-5	Seine	Cattails	Largemouth Bass	39	1.4	7/21/03
I-5	Seine	Cattails	Largemouth Bass	58	4.6	7/21/03
I-5	Seine	Cattails	Largemouth Bass	46	2.5	7/21/03
I-5	Seine	Cattails	Largemouth Bass	49	2.5	7/21/03
I-5	Seine	Cattails	Largemouth Bass	46	2.1	7/21/03
I-5	Seine	Cattails	Largemouth Bass	42	2.1	7/21/03
I-5	Seine	Cattails	Largemouth Bass	42	1.9	7/21/03
I-5	Seine	Cattails	Largemouth Bass	46	2.1	7/21/03
I-5	Seine	Cattails	Largemouth Bass	38	1.6	7/21/03
I-5	Seine	Cattails	Largemouth Bass	39	1.7	7/21/03
I-5	Seine	Cattails	Largemouth Bass	50	3	7/21/03
I-5	Seine	Cattails	Largemouth Bass	43	2.1	7/21/03
I-5	Seine	Cattails	Largemouth Bass	42	1.9	7/21/03
I-5	Seine	Cattails	Largemouth Bass	42	1.8	7/21/03
I-5	Seine	Cattails	Smallmouth Bass	37	1.3	7/21/03
I-5	Seine	Cattails	Smallmouth Bass	41	1.5	7/21/03
I-5	Seine	Cattails	Smallmouth Bass	42	1.3	7/21/03
I-5	Seine	Cattails	Smallmouth Bass	35	0.9	7/21/03

Basin	**Gear**	**Habitat**	**Species**	**length (mm)**	**weight (gm)**	**Date**
I-5	Seine	Cattails	Mosquitofish	26	0.5	7/21/03
I-5	Seine	Cattails	Mosquitofish	21	0.2	7/21/03
I-5	Seine	Cattails	Mosquitofish	22	0.2	7/21/03
I-5	Seine	Cattails	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	23	0.2	7/21/03
I-5	Seine	Cattails	Mosquitofish	24	0.3	7/21/03
I-5	Seine	Cattails	Mosquitofish	26	0.3	7/21/03
I-5	Seine	Cattails	Mosquitofish	18	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	11	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	12	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	15	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	15	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	17	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	22	0.2	7/21/03
I-5	Seine	Cattails	Mosquitofish	12	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	11	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	10	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	11	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	22	0.2	7/21/03
I-5	Seine	Cattails	Mosquitofish	12	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	13	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	16	0.1	7/21/03
I-5	Seine	Cattails	Mosquitofish	19	0.1	7/21/03
I-5	Seine	Cattails	Black Bullhead	38	0.9	7/21/03
I-5	Seine	Cattails	Black Bullhead	32	0.7	7/21/03
I-5	Seine	Cattails	Bluegill	112	56.4	7/21/03
I-5	Seine	Cattails	Bluegill	109	45.6	7/21/03
I-5	Seine	Cattails	Bluegill	88	20.4	7/21/03
I-5	Seine	Cattails	Bluegill	128	66.5	7/21/03
I-5	Seine	Cattails	Bluegill	108	45	7/21/03
I-5	Seine	Cattails	Bluegill	118	59.6	7/21/03
I-5	Seine	Cattails	Bluegill	112	58.4	7/21/03
I-5	Seine	Cattails	Bluegill	112	51.2	7/21/03
I-5	Seine	Cattails	Bluegill	109	53.6	7/21/03
I-5	Seine	Cattails	Bluegill	103	44.6	7/21/03

Basin	**Gear**	**Habitat**	**Species**	**length (mm)**	**weight (gm)**	**Date**
I-5	Seine	Cattails	Bluegill	101	37.6	7/21/03
I-5	Seine	Cattails	Bluegill	112	52.6	7/21/03
I-5	Seine	Cattails	Bluegill	61	7.5	7/21/03
I-5	Seine	Cattails	Bluegill	59	6.2	7/21/03
I-5	Seine	Cattails	Bluegill	101	40.6	7/21/03
I-5	Seine	Cattails	Bluegill	51	5.5	7/21/03
I-5	Seine	Cattails	Bluegill	118	57.4	7/21/03
I-5	Seine	Cattails	Bluegill	101	42.8	7/21/03
I-5	Seine	Cattails	Bluegill	96	33.7	7/21/03
I-5	Seine	Cattails	Bluegill	103	38.5	7/21/03
I-5	Seine	Cattails	Bluegill	106	49	7/21/03
I-5	Seine	Cattails	Bluegill	105	44.9	7/21/03
I-5	Seine	Cattails	Bluegill	56	6.9	7/21/03
I-5	Seine	Cattails	Bluegill	62	10.8	7/21/03
I-5	Seine	Cattails	Bluegill	118	3.3	7/21/03
I-5	Seine	Cattails	Bluegill	88	23.7	7/21/03
I-5	Seine	Cattails	Bluegill	62	8	7/21/03
I-5	Seine	Cattails	Bluegill	55	4.5	7/21/03
I-5	Seine	Cattails	Bluegill	73	16.1	7/21/03
I-5	Seine	Cattails	Bluegill	52	4.6	7/21/03
I-5	Gill	Channel	Bluegill	63	7.2	7/21/03
I-5	Gill	Channel	Striped Mullet	650		7/21/03
I-5	Gill	Beach	Largemouth Bass	164	100	7/21/03
I-5	Gill	Beach	Largemouth Bass	153	78	7/21/03
I-5	Gill	OW	Striped Mullet	465	1690	7/21/03
I-5	Gill	OW	Largemouth Bass	335	850	7/21/03
I-5	Gill	OW	Carp	455	1600	7/21/03
PCH	Gill	OW	Largemouth Bass	303	600	7/22/03
PCH	Gill	OW	Largemouth Bass	326	850	7/22/03
PCH	Gill	OW	Largemouth Bass	231	300	7/22/03
PCH	Gill	OW	Largemouth Bass	263	400	7/22/03
PCH	Gill	OW	Largemouth Bass	317	700	7/22/03
PCH	Gill	OW	Largemouth Bass	242	250	7/22/03
PCH	Gill	OW	Largemouth Bass	286	550	7/22/03
PCH	Gill	OW	Largemouth Bass	259	400	7/22/03
PCH	Gill	OW	Largemouth Bass	332	750	7/22/03
PCH	Gill	OW	Largemouth Bass	227	250	7/22/03

Basin	Gear	Habitat	Species	length (mm)	weight (gm)	Date
PCH	Gill	OW	Largemouth Bass	212	250	7/22/03
PCH	Gill	OW	Largemouth Bass	262	450	7/22/03
PCH	Gill	OW	Largemouth Bass	256	400	7/22/03
PCH	Gill	OW	Largemouth Bass	223	250	7/22/03
PCH	Gill	OW	Largemouth Bass	243	350	7/22/03
PCH	Gill	OW	Largemouth Bass	291	500	7/22/03
PCH	Gill	OW	Largemouth Bass	261	400	7/22/03
PCH	Gill	OW	Largemouth Bass	237	300	7/22/03
PCH	Gill	OW	Largemouth Bass	259	450	7/22/03
PCH	Gill	OW	Largemouth Bass	250	350	7/22/03
PCH	Gill	OW	Largemouth Bass	242	350	7/22/03
PCH	Gill	OW	Largemouth Bass	244	300	7/22/03
PCH	Gill	OW	Largemouth Bass	239	300	7/22/03
PCH	Gill	OW	Largemouth Bass	232	250	7/22/03
PCH	Gill	OW	Largemouth Bass	236	300	7/22/03
PCH	Gill	OW	Largemouth Bass	263	400	7/22/03
PCH	Gill	OW	Largemouth Bass	203	150	7/22/03
PCH	Gill	OW	Largemouth Bass	236	250	7/22/03
PCH	Gill	OW	Largemouth Bass	202	200	7/22/03
PCH	Gill	OW	Largemouth Bass	171	150	7/22/03
PCH	Gill	OW	Largemouth Bass	185	155	7/22/03
PCH	Gill	Channel	Largemouth Bass	320	800	7/22/03
PCH	Gill	OW	Carp	440	2000	7/22/03
PCH	Gill	OW	Bluegill	112	49	7/22/03
PCH	Gill	OW	Bluegill	125	79	7/22/03
Weir	Seine	Beach	Bluegill	19	0.3	7/22/03
Weir	Seine	Beach	Bluegill	19	0.2	7/22/03
Weir	Seine	Beach	Bluegill	22	0.3	7/22/03
Weir	Seine	Beach	Bluegill	19	0.1	7/22/03
Weir	Seine	Beach	Bluegill	21	0.2	7/22/03
Weir	Seine	Beach	Bluegill	20	0.3	7/22/03
Weir	Seine	Beach	Bluegill	19	0.2	7/22/03
Weir	Seine	Beach	Mosquitofish	19	0.2	7/22/03
Weir	Seine	Beach	Mosquitofish	23	0.2	7/22/03
Weir	Seine	Beach	Mosquitofish	19	0.3	7/22/03
Weir	Seine	Beach	Mosquitofish	13	0.1	7/22/03
Weir	Seine	Beach	Mosquitofish	19	0.1	7/22/03

Basin	Gear	Habitat	Species	length (mm)	weight (gm)	Date
Weir	Seine	Beach	Mosquitofish	25	0.4	7/22/03
Weir	Seine	Beach	Mosquitofish	26	0.6	7/22/03
Weir	Seine	Beach	Mosquitofish	16	0.1	7/22/03
Weir	Seine	Beach	Mosquitofish	13	0.1	7/22/03
Weir	Seine	Beach	Mosquitofish	16	0.1	7/22/03
Weir	Seine	Beach	Mosquitofish	14	0.1	7/22/03
Weir	Seine	Beach	Mosquitofish	16	0.1	7/22/03
Weir	Seine	Beach	Mosquitofish	26	0.2	7/22/03
Weir	Seine	Beach	Mosquitofish	31	0.7	7/22/03
Weir	Seine	Beach	Mosquitofish	15	0.1	7/22/03
Weir	Seine	Beach	Largemouth Bass	60	4.4	7/22/03
Weir	Seine	Beach	Largemouth Bass	56	3	7/22/03
Weir	Seine	Beach	Largemouth Bass	58	3.6	7/22/03
Weir	Seine	Beach	Largemouth Bass	56	3.2	7/22/03
Weir	Seine	Beach	Largemouth Bass	59	3.8	7/22/03
Weir	Seine	Beach	Largemouth Bass	48	2	7/22/03
Weir	Seine	Beach	Largemouth Bass	50	2.8	7/22/03
Weir	Seine	Beach	Largemouth Bass	46	2.2	7/22/03
Weir	Seine	Beach	Largemouth Bass	52	2.7	7/22/03
Weir	Seine	Beach	Largemouth Bass	62	4.4	7/22/03
Weir	Seine	Beach	Largemouth Bass	49	1.8	7/22/03
Weir	Seine	Beach	Largemouth Bass	58	3.1	7/22/03
Weir	Seine	Beach	Largemouth Bass	57	3.2	7/22/03
Weir	Seine	Channel	Largemouth Bass	25	1.2	7/22/03
RR	Gill	Cattails	Striped Mullet	415	1150	7/22 - 7/23/03
RR	Gill	Cattails	Brown Bullhead	246	450	7/22 - 7/23/03
RR	Gill	Cattails	Largemouth Bass	435	1700	7/22 - 7/23/03
RR	Gill	Cattails	Largemouth Bass	303	700	7/22 - 7/23/03
RR	Gill	Cattails	Largemouth Bass	341	100	7/22 - 7/23/03
RR	Gill	Cattails	Largemouth Bass	181	150	7/22 - 7/23/03
RR	Gill	Cattails	Largemouth Bass	195	150	7/22 - 7/23/03
RR	Gill	Cattails	Largemouth Bass	179	120	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	286	500	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	291	550	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	171	115	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	222	255	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	252	350	7/22 - 7/23/03

Basin	Gear	Habitat	Species	length (mm)	weight (gm)	Date
Weir	Gill	OW	Largemouth Bass	206	210	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	283	550	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	239	250	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	175	120	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	156	85	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	176	120	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	181	110	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	207	160	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	171	100	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	209	170	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	183	135	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	181	130	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	173	110	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	181	145	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	183	150	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	186	130	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	175	100	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	173	110	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	161	70	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	168	85	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	183	130	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	171	105	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	159	90	7/22 - 7/23/03
Weir	Gill	OW	Largemouth Bass	166	91	7/22 - 7/23/03
Weir	Gill	OW	Bluegill	171	215	7/22 - 7/23/03
Weir	Gill	OW	Bluegill	183	220	7/22 - 7/23/03
Weir	Gill	OW	Bluegill	142	115	7/22 - 7/23/03
Weir	Gill	OW	Bluegill	183	240	7/22 - 7/23/03
Weir	Gill	OW	Striped Mullet	420	1350	7/22 - 7/23/03

APPENDIX D

WANDERING (SALT MARSH) SKIPPER PRESENCE/ABSENCE SURVEYS

WANDERING SKIPPER SURVEY

Interstate 5 North Coast Corridor Project

SAN DIEGO COUNTY, CALIFORNIA
DISTRICT 11-SD-5 (PM R28.4/R55.4)
EA 235800 (P ID 11-000-0159)

SEPTEMBER 2012

GeomorphIS

Geomorph Information Systems, LLC
1538 10th Avenue
San Diego, CA 92101
Phone 619-787-7974
Fax 619-702-6225

Reference: Caltrans 11A1967 TO#5 Wandering Skipper Surveys
AECOM Project No. 60272300
GeomorphIS Project No. 9137-008

September 27, 2012

Susan Scatolini
California Department of Transportation
District 11, Environmental Division
4050 Taylor Street, MS 242
San Diego CA 92110

Subject: Results and Findings of Presence/Absence Surveys for the Wandering Skipper (*Panoquina errans*) in the Right-of-Way of California Department of Transportation (Caltrans) within three lagoons in San Diego County

Dear Ms. Scatolini,

The purpose of this letter report is to present findings of presence/absence surveys for Wandering Skipper (*Panoquina errans*) in the Right-of-Way (ROW) of California Department of Transportation (Caltrans) within three lagoons in San Diego County, California. The surveys were conducted by Michael Klein, consulting biologist, USFWS Permit TE039305-4.

Site Location and Description

Three lagoons were surveyed within the Caltrans ROW: Buena Vista Lagoon, Batiquitos Lagoon, and San Dieguito Lagoon (figure 1). Buena Vista Lagoon, the northern-most lagoon surveyed, is within the cities of Oceanside and Carlsbad in north San Diego County. Batiquitos Lagoon is south of the Buena Vista Lagoon, and is located within the communities of Leucadia and Encinitas. San Dieguito Lagoon is the southernmost lagoon surveyed and is located within the City of San Diego near the City of Del Mar.

All three lagoons contain coastal marsh habitat dominated with saltgrass (*Distichlis spicata*), and pickleweed (*Salicornia* sp.), California bulrush (*Schoeneoplectus californicus*) and cattails (*Typha* sp.). Also, all three lagoons contain coastal sage scrub habitat with California sagebrush (*Artemisia californica*) and California buckwheat (*Eriogonum fasciculatum*) as dominate plants.

Wandering Skipper

Biology

This coastal skipper can be seen in marsh habitats not far from its larval host plant, saltgrass. It is found from Santa Barbara to the tip of Baja California Sur on both sides of the peninsula. Even though its larval host plant is fairly common in salt marshes, this skipper is limited in its distribution. Adults fly from April to September and November, and December in Baja California Sur. They are more common from July thru September but will have early flight from April to June if winter rains are good and there is unrestricted tidal flow. Males usually perch on grass blades awaiting females. Both sexes are nectar feeders on flowers. Unlike the east coast species, this skipper is darker with usually larger white-yellowish spots, most of that are hyaline, on the upper surface of the forewing. Ventral hindwings are brown with yellow veins. It also has an irregular diffuse band of about four pale spots.

Spherical eggs are either pale yellow or white and are laid on the host plant or plants adjacent to the host plant. Once eggs hatch larvae feed on the saltgrass blades. As with most grass-feeding skippers, they are nocturnal feeders. When resting during the day as well as during their diapause state, they form a hibernaculum. They have multiple flights during their season and will diapause as mature larvae during their last brood.

Habitat

Panoquina errans is strictly a coastal salt marsh skipper. Marshes with tidal flow are the more likely occupied areas. Wherever saltgrass grows along the coast and within a tidal salt marsh environment, there is the potential to observe this skipper. Estuaries that are closed off to saltwater flushing due to events like sediment build up will not sustain the skipper. It is important to maintain a freshwater / saltwater flushing for sustaining them.

Survey Methods

Surveys were conducted by biologist Michael Klein. Mr. Klein developed a protocol for the skipper requiring that, conditions need to be mostly sunny to sunny, 65°F at one meter above the ground, wind speed is below 15 mph. Survey all patches of saltgrass within the ROW out to 50 feet from the saltgrass and cover no more than 8-acres in one hour. Since this was a presence/absence survey once any life cycle of the skipper, i.e. eggs, larvae, adults or pupa, observed, surveys would not need to continue for that lagoon. However, Mr. Klein inspected both the north and south side of the lagoons as well as the west and east side of the ROW.

A total of three visits were conducted. Dates and conditions are noted in the table 1 below.

Table 1. Wandering Skipper Survey Dates and Site Conditions

Date	Time	Weather Conditions	Lagoons and location
8/2/2012	0945-1415	Partly cloudy to sunny to marine layer, West @ 5-6 mph, 76-75°F	Buena Vista Lagoon and North ROW of Batiquitos Lagoon
8/6/2012	0945-1330	Mostly sunny, West wind @ 5-6 mph, 69-75°F	North and South ROW of Batiquitos Lagoon and North ROW of San Dieguito Lagoon
8/22/2012	0930-1100	Partly Cloudy, West wind @ 2-3 mph, 74-76°F	South ROW of San Dieguito Lagoon

Findings

Buena Vista Lagoon – A total of two Wandering Skippers were observed on the west and north side of the Caltrans ROW (figure 2; photos 1 and 2). The first one was located at 33.17414N 117.34956W accuracy ±7 feet and the second one was located at 33.17399N 117.34944W accuracy ± 7 feet. Conditions were excellent for the skipper where the saltgrass was influenced by the tides. At the time the skippers were observed, high tide had just passed so much of the saltgrass and pickleweed were in the water

No skippers were observed on the north and east side of the lagoon. However, there was one section at location, 33.17557N 117.34950W accuracy ±9 feet that was influenced by the tides, saltgrass was in water but no skippers were observed. This area also affected by non-native grasses and might be one of the reasons why it was not occupied. If Caltrans wants to restore this marsh area for the skipper it would be beneficial.

As one moves east along the north section of the lagoon the cattails and bulrushes get so thick it is difficult to move through it. The south side of the lagoon within the ROW is not suitable skipper habitat. It is dominated with *Eucalyptus* trees and bulrushes. No exposed marsh area within the south side of the ROW.

Batiquitos Lagoon – A total of two Wandering Skippers were observed on the west and north side of the Caltrans ROW (figure 3; photos 3 and 4), and two were observed on the south and west side of the ROW (photo 5). The first on was located at 33.09223N 117.30395W accuracy ±7 feet and the second one was located at 33.09170N 117.30352W accuracy ±9 feet. The third location was on the south and west side of the ROW, and had two skippers. The location is at 33.08767N 117.30085W accuracy ±9 feet. Conditions at this site were very good for the skipper. The tide had just receded and access was easy to reach. The skippers were observed flying through the saltgrass patches which merged into coastal sage scrub habitat .

No skippers were observed on the north and east side of the ROW or in the Batiquitos Lagoon Preserve areas. Restoration of saltgrass habitat on the north and east side appears to be doing very well. Therefore conditions at this site are suitable for the skipper to occupy.

The south and east side of the lagoon were assessed via the Park & Ride parking area. There was also a gate that is normally locked but was open due to a park ranger monitoring snowy plovers. Access to the channel was restricted because of the plovers. However, what was observed appeared to not be the most suitable conditions for skippers. The better habitat was the marsh area near the Park & Ride. The area had limited saltgrass within the marsh area and the area appears to be higher than the channel and it looks like this area would mostly be influenced by tides in the winter months where the high tide is much higher than in the summer months. That being said this marsh area would have marginal suitability for the skipper since it is not influenced daily by the tides.

The south and west side has decent conditions for the skipper closer to the channel. However, the skippers were observed further away from the channel in a mostly disturbed saltgrass habitat adjacent to *Eucalyptus* trees as well as non-native grasses. They were nectaring on flowers of iceplant.

San Dieguito Lagoon – A total of two skippers were observed on the north and west side of the Caltrans ROW within the drainage adjacent to the San Diego County Fairgrounds (figure 4; photo 6). Both were located at 32.97505N 117.25179W accuracy ±7 feet. Even though the observation was a few hundred meters north of the channel, the drainage maintained a consistent influence from the tides. The area had a large patch of saltgrass that grew into the coastal sage scrub habitat.

No skippers were observed on the north and east side of the ROW even though conditions were suitable for the skipper.

The south side of the ROW has suitable habitat for the skipper. However, there is a drainage on the south east side the runs north-south and drains into the channel. The area is dominated by pickleweed and a small patch of approximately 10 saltgrass plants. I would recommend that this area be enhanced with more saltgrass as mitigation for the proposed Caltrans project: improving the area will make the drainage suitable for the skipper.

Conclusions

Wandering Skippers were found at the three lagoons surveyed for Caltrans. Each of the three lagoons had suitable habitat for Wandering Skipper. Some areas where no skippers were detected during the surveys had suitable conditions and may have been occupied by skippers despite non-detection. The results of this presence/absence survey determined that Wandering Skipper are present at the three Caltrans sites. Additional surveys would be required to determine the extent of the skipper presence at the sites.

Other sensitive species heard or observed during the surveys included black-tailed jackrabbit at Batiquitos Lagoon and coastal California gnatcatcher at Batiquitos Lagoon on the north and west sections of the ROW in the sage scrub slopes. At least two gnatcatchers were heard.

Please contact me if you have any other questions related to the surveys and this report at 619-347-3244.

Respectfully submitted,

Michael W. Klein

ATTACHMENTS

Table A- 1. Wildlife Species Observed at Three North County Lagoons, Wandering Skipper Survey – August 2012

Species	Buena Vista Lagoon	Batiquitos Lagoon	San Dieguito Lagoon
INVERTEBRATES			
INSECTS			
Dragonflies & Damselflies - Odonata			
Common Green Darner	√		
Blue-eyed Darner	√	√	√
Western Pondhawk	√	√	
Neon Skimmer		√	
Variegated Meadowhawk		√	√
Grasshoppers, Crickets, Katydids - Orthopera			
Devastating Grasshopper		√	√
True Bug - Hemiptera			
Spittle Bug		√	√
Cicada			√
Butterflies, Moths & Skippers - Lepidoptera			
Custodiata Geometrid Moth		√	
Western Tiger Swallowtail			√
Checkered White	√	√	√
Gray Hairstreak			√
Marine Blue	√	√	
Western Pygmy Blue		√	√
Fatal Metalmark		√	
Mourning Cloak	√	√	√
Lorquin's Admiral			√
Eufala Skipper		√	
Umber Skipper	√		
Fiery Skipper			√
Sandhill Skipper			√
Wandering Skipper	√	√	√
Flies - Diptera			
Cactus Fly	√		
Bombus Bee Fly			√
Exoprosopa Bee Fly			√
Bronze Bottle Fly	√		

Species	Buena Vista Lagoon	Batiquitos Lagoon	San Dieguito Lagoon
Little House Fly			√
Parasarcophaga Flesh Fly			√
Beetles - Coleoptera			
Pacific Tiger Beetle		√	
Wasps, Ants & Bees - Hymenoptera			
Black and Yellow Mud Dauber Wasp	√	√	
Ammophila Thread-waisted Wasp			√
Red Velvet Ant			√
Ligatus Sweat Bee		√	
Valley Carpenter Bee		√	
European Honey Bee		√	√
Golden Polistes Wasp			√

Table A- 2. Invertebrate List for Three North County Lagoons, Wandering Skipper Survey – August 2012

INVERTEBRATES
INSECTS
Dragonflies & Damselflies – Odonata
Family Aeshnidae – Darners
Common Green Darner (*Anax junius*)
Blue-eyed Darners (*Aeshna multicolor*)
Family Libellulidae – Cruisers, Emeralds, Basketails & Skimmers
Western Pondhawk (*Erythemis collocate*)
Neon Skimmer (*Libellula croceipennis*)
Variegated Meadowhawk (*Sympetrum corruptum*)
Grasshopper, Crickets and Katydids – Orthopera
Family Acrididae – Short-horned Grasshoppers
Devastating Grasshopper (*Melanoplus devastator*)
True Bugs – Hemiptera
Family Cercopidae – Spittle Bugs
Spittle Bug (*Aphrophora* sp.)
Family Cicadidae – Cicadas
Cicada (*Okanagan* asp.)
Butterflies, Moths & Skippers – Lepidoptera
Family Geometridae – Geometry Moths
Custodiata Moth (*Perizoma custodiata*)
Family Peridae – Whites, Marbles and Sulphurs
Checkered White (*Pontia protodice*)
Family Lycaenidae – Coppers, Hairstreaks and Blues
Western Gray Hairstreak (*Strymon melinus pudicus*)
Marine Blue (*Leptotes marina*)
Western Pygmy Blue (*Brephidum exile*)
Family Riodinidae – Metalmarks
Dammer's Fatal Metalmark (*Calephelis nemesis dammersi*)
Family Nymphalidae – Brush-footed Butterflies
Mourning Cloak (*Nymphalis antiopa*)
Powell's Lorquin's Admiral (*Limenitis lorquini powelli*)
Family Hesperidae – Skippers
Fiery Skipper (*Hylephila phyleus*)
Eufala Skipper (*Lerodea eufala*)

Umber Skipper (*Poanes melane*)
Sandhill Skipper (*Polites sabuketi*)
Wandering Skipper (*Panoquina errans*)
Flies – Diptera
Family Bombyliidae – Bee Flies
Bombus Bee Fly (*Bombus* sp.)
Exoprosopa Bee Fly (*Exoprosopa* sp.)
Family Syrphidae – Hover Flies
Cactus Fly (*Copestylum mexicana*)
Family Calliphoridae – Blow Fly
Bronze Bottle Fly (*Phaeniccia cuprina*)
Family Muscidae – House Flies
Little House Fly (*Fannia canicularis*)
Family Sarchophagidae – Flesh Flies
Parasarchophaga Flesh fly (*Parasarcophaga* sp.)
Beetles – Coleoptera
Family Carabidae – Ground Beetles
Pacific Tiger Beetle (*Cincindela haemorrhagica pacifica*)
Wasps, Ants and Bees – Hymenoptera
Family Sphecidae - Thread-waisted Wasp
Black and Yellow Mud Dauder (*Sceliphon caementarium*)
Threadwaisted Wasp (*Ammophila* sp.)
Family Halictidae – Sweat Bees
Ligatus Sweat Bee (*Halictus ligatus*)
Family Apidae – Bumble and Honey Bees
Valley Carpenter Bee (*Xylocopa varipuncta*)
European Honey Bee (*Apis melifera*)
Family Mutillidae – Velvet Ant
Red Velvet Ant (*Dasymutilla magnifica*)
Family Vespidae – True Wasp
Golden Polistes Wasp (*Polistes fuscatus aurifer*)

Source: GeomorphIS, LLC; Esri Basemaps, 2011

0 1 2 Miles

Scale: 1:126,720 1 inch equals 2 miles

Figure 1
Lagoon Survey Locations

Surveys for Wandering Skippers on Caltrans Right-of-Ways

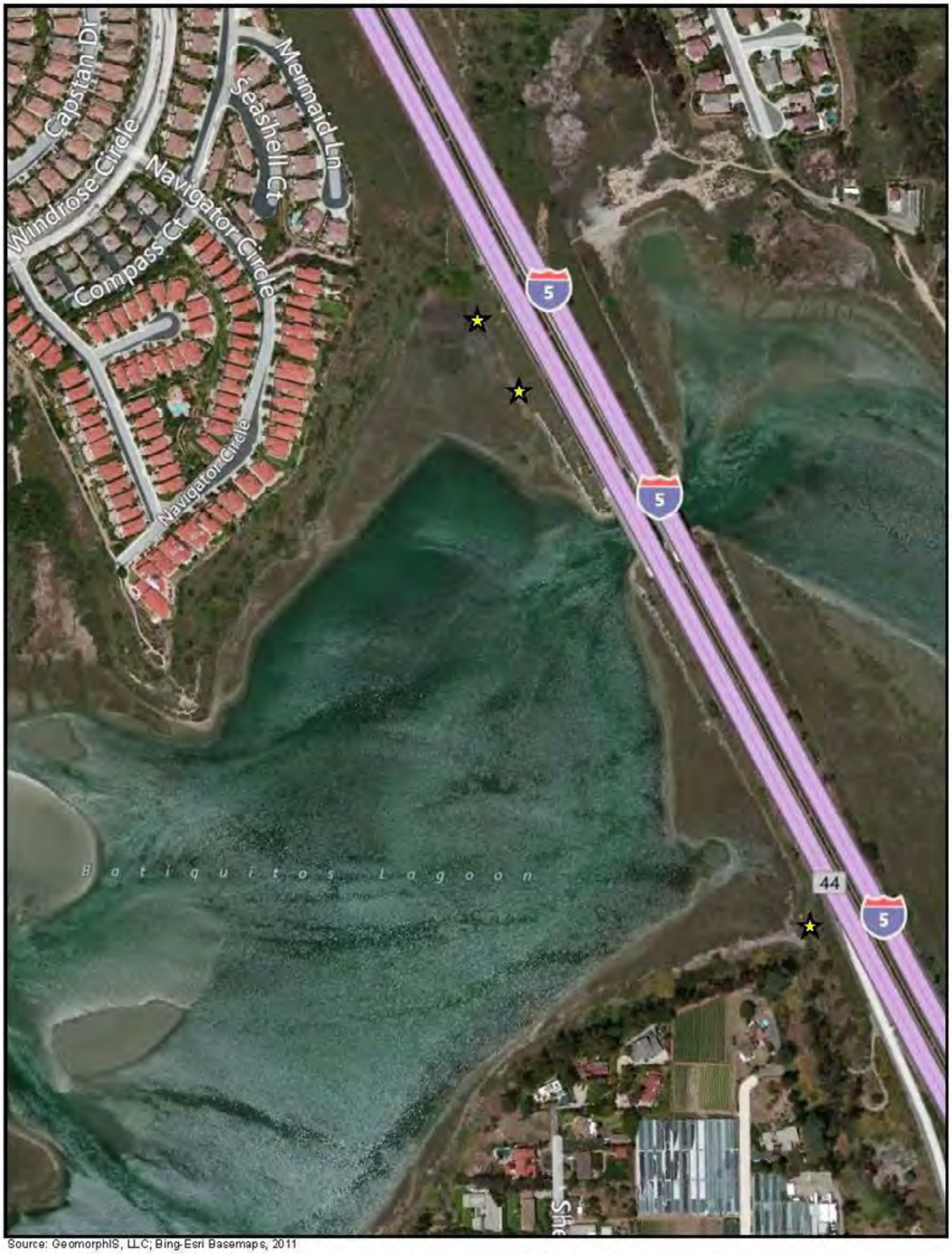
Path: C:\Projects\AECOM\Caltrans_OnCall\Map_MXD\WanderingSkipper_Survey_Fig1.mxd, 8/26/2012, egoff,

Source: GeomorphIS, LLC; Bing-Esri Basemaps, 2011

Figure 2
Buena Vista Lagoon

Surveys for Wandering Skippers on Caltrans Right-of-Ways

Path: C:\Projects\AECOM\Caltrans_OnCall\Map_MXD\WanderingSkipper_Survey_Fig2.mxd, 8/26/2012, egoff,

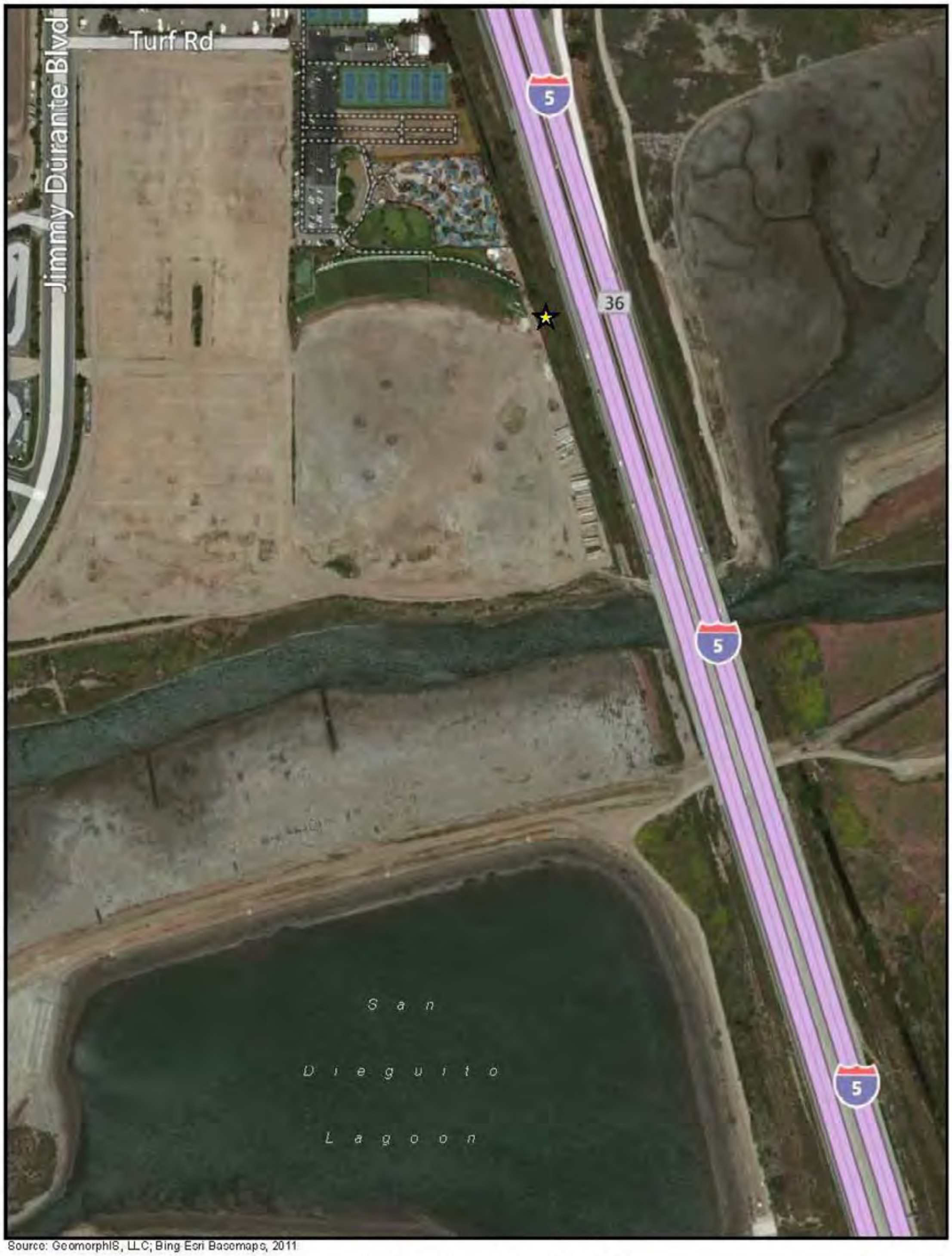


Source: GeomorphIS, LLC; Bing-Esri Basemaps, 2011

Figure 3
Bataquitos Lagoon

Surveys for Wandering Skippers on Caltrans Right-of-Ways

Path: C:\Projects\AECOM\Caltrans_OnCall\Map_MXD\WanderingSkipper_Survey_Fig3.mxd, 8/26/2012, agoff.



Source: GeomorphIS, LLC; Bing Esri Basemaps, 2011

0 200 400 Feet

Scale: 1:4,800 1 inch = 400 feet

Wandering Skipper Survey (Aug 2012)

★ Wandering skipper sighting

Figure 4
San Dieguito Lagoon

Surveys for Wandering Skippers on Caltrans Right-of-Ways
Path: C:\Projects\AECOM\Caltrans_OnCall\Map_MXD\WanderingSkipper_Survey_Fig4.mxd, 8/26/2012, egoff,

Photo 1. Buena Vista Lagoon Wandering Skipper location – August 2, 2012

Photo 2. Wandering Skipper from Buena Vista Lagoon – August 2, 2012

Photo 3. Wandering Skipper location at north Batiquitos Lagoon – August 2, 2012

Photo 4. Wandering Skipper from north Batiquitos Lagoon - August 2, 2012

Photo 5. Wandering Skipper from south Batiquitos Lagoon – August 6, 2012

Photo 6. Wandering Skipper from north San Dieguito Lagoon – August 6, 2012

APPENDIX E

WILDLIFE SPECIES DETECTED WITHIN THE BUENA VISTA LAGOON ENHANCEMENT PROJECT BSA

APPENDIX E
Wildlife Species Detected within the Buena Vista Lagoon BSA

Common Name	Scientific Name	Source
Invertebrates		
Umber Skipper	*Poanes melane*	Geomorphis/Caltrans (2012)
Wandering (=Saltmarsh) Skipper	*Panoquina errans*	Geomorphis/Caltrans (2012)
Marine Blue	*Leptotes marina*	Geomorphis/Caltrans (2012)
Mourning Cloak	*Nymphalis antiopa*	Geomorphis/Caltrans (2012)
Checkered White	*Pontia protodice*	Geomorphis/Caltrans (2012)
Blue-eyed Darner	*Aesha multicolor*	Geomorphis/Caltrans (2012)
Common Green Darner	*Anax junius*	Geomorphis/Caltrans (2012)
Cactus Fly	*Copestylum mexicana*	Geomorphis/Caltrans (2012)
Western Pondhawk	*Erythemis collocate*	Geomorphis/Caltrans (2012)
Bronze Bottle Fly	*Phaeniccia cuprina*	Geomorphis/Caltrans (2012)
Black-and-yellow Mud Dauder	*Sceliphon caementarium*	Geomorphis/Caltrans (2012)
Aquatic Invertebrates		
	Daphnia pulex	(Coastal Environments 2000)
	Hyallela azteca	(Coastal Environments 2000)
	Tendipes sp.	(Coastal Environments 2000)
	Physa gyrina	(Coastal Environments 2000)
	Trichocorixa reticulate	(Coastal Environments 2000)
	Oligochaeta	(Coastal Environments 2000)
	Helisoma sp.	(Coastal Environments 2000)
	Palaemonetes paludosus	(Coastal Environments 2000)
	Planorbidae	(Coastal Environments 2000)
	Rana aurora	(Coastal Environments 2000)
	Corbicula fluminea	(Coastal Environments 2000)
	Odonata	(Coastal Environments 2000)
	Diptera	(Coastal Environments 2000)
	Chironomidae	(Coastal Environments 2000)
	Platyhelmenthis	(Coastal Environments 2000)
	Astacidae	(Coastal Environments 2000)
	Plumatella repens	(Coastal Environments 2000)
Fish		
Black Bullhead	*Ameiurus melas*	(Coastal Environments 2000); (Everest International Consultants 2004)
Yellow Bullhead	*Ameiurus nebulosus*	(Coastal Environments 2000); (Everest International Consultants 2004)
Goldfish	*Carassius auratus*	(Coastal Environments 2000); (Everest International Consultants 2004)
Common Carp	*Cyprinus carpio*	(Coastal Environments 2000); (Everest International Consultants 2004)
California Killifish	*Fundulus parvipinnis*	(Coastal Environments 2000); (Everest International Consultants 2004)
Mosquitofish	*Gambusia affinis*	(Coastal Environments 2000); (Everest International Consultants 2004)
Green Sunfish	*Lepomis cyanellus*	(Coastal Environments 2000); (Everest International Consultants 2004)
Bluegill Sunfish	*Lepomis macrochirus*	(Coastal Environments 2000); (Everest International Consultants 2004)
Redeye Bass	*Micropterus dolomieu*	(Coastal Environments 2000); (Everest International Consultants 2004)

Common Name	Scientific Name	Source
Largemouth Bass	*Micropterus salmoides*	(Coastal Environments 2000); (Everest International Consultants 2004)
Striped Mullet	*Mugil cephalus*	(Coastal Environments 2000); (Everest International Consultants 2004)
Golden Shiner	*Notemigonus crysoleucas*	(Coastal Environments 2000); (Everest International Consultants 2004)
Reptiles & Amphibians		
Western Toad	*Bufo boreas*	(Coastal Environments 2000)
California Chorus Frog	*Pseudacris cadaverina*	(Coastal Environments 2000)
Bullfrog	*Rana catesbeiana*	(Coastal Environments 2000)
Western Spadefoot	*Spea hammondii*	(Coastal Environments 2000)
Garden Slender Salamander	*Batrachoseps major*	(Coastal Environments 2000)
Coast Horned Lizard	*Phrynosoma blainvillii*	(Coastal Environments 2000)
Western Fence Lizard	*Sceloporus occidentalis*	(Coastal Environments 2000)
Side-Blotched Lizard	*Uta stansburiana*	(Coastal Environments 2000)
Two-Striped Garter Snake	*Thamnophis hammondii*	(Coastal Environments 2000)
Racer	*Coluber constrictor*	(Coastal Environments 2000)
California Kingsnake	*Lampropeltis californiae*	(Coastal Environments 2000)
Gopher Snake	*Pituophis catenifer*	(Coastal Environments 2000)
Southern Pacific Rattlesnake	*Crotalus oreganus helleri*	(Coastal Environments 2000)
Western Pond Turtle	*Emys marmorata pallida*	(Coastal Environments 2000)
Slider	*Trachemys scripta*	(Coastal Environments 2000)
Avian		
Pink-footed Shearwater	*Puffinus creatopus*	(Coastal Environments 2000)
Sooty Shearwater	*Puffinus griseus*	(Coastal Environments 2000)
Black-vented Shearwater	*Puffinus opisthomelas*	(Coastal Environments 2000)
Pomarine Jaeger	*Stercorarius pomarinus*	(Coastal Environments 2000)
Cooper's Hawk	*Accipiter cooperii*	(Coastal Environments 2000)
Sharp-shinned Hawk	*Accipiter striatus*	(Coastal Environments 2000)
Golden Eagle	*Aquila chrysaetos*	(Coastal Environments 2000)
Red-tailed Hawk	*Buteo jamaicensis*	(Coastal Environments 2000)
Red-shouldered Hawk	*Buteo lineatus*	(Coastal Environments 2000)
Northern Harrier	*Circus cyaneus*	(Coastal Environments 2000)
White-tailed Kite	*Elanus leucurus*	(Coastal Environments 2000)
Osprey	*Pandion haliaetus*	(Coastal Environments 2000)
Turkey Vulture	*Cathartes aura*	(Coastal Environments 2000)
Wood Duck	*Aix sponsa*	(Coastal Environments 2000)
Northern Pintail	*Anas acuta*	(Coastal Environments 2000)
American Wigeon	*Anas americana*	(Coastal Environments 2000)
Northern Shoveler	*Anas clypeata*	(Coastal Environments 2000)
Green-winged Teal	*Anas crecca*	(Coastal Environments 2000)
Cinnamon Teal	*Anas cyanoptera*	(Coastal Environments 2000)
Blue-winged Teal	*Anas discors*	(Coastal Environments 2000)
Eurasian Wigeon	*Anas penelope*	(Coastal Environments 2000)
Mallard	*Anas platyrhynchos*	(Coastal Environments 2000)
Gadwall	*Anas strepera*	(Coastal Environments 2000)
Greater White-fronted Goose	*Anser albifrons*	(Coastal Environments 2000)
Lesser Scaup	*Aythya affinis*	(Coastal Environments 2000)
Redhead	*Aythya americana*	(Coastal Environments 2000)
Ring-necked Duck	*Aythya collaris*	(Coastal Environments 2000)
Greater Scaup	*Aythya marila*	(Coastal Environments 2000)
Canvasback	*Aythya valisineria*	(Coastal Environments 2000)
Brant	*Branta bernicla*	(Coastal Environments 2000)

Common Name	Scientific Name	Source
Canada Goose	*Branta canadensis*	(Coastal Environments 2000)
Bufflehead	*Bucephala albeola*	(Coastal Environments 2000)
Common Goldeneye	*Bucephala clangula*	(Coastal Environments 2000)
Snow Goose	*Chen caerulescens*	(Coastal Environments 2000)
Ross' S Goose	*Chen rossii*	(Coastal Environments 2000)
Tundra Swan	*Cygnus columbianus*	(Coastal Environments 2000)
Hooded Merganser	*Lophodytes cucullatus*	(Coastal Environments 2000)
Black Scoter	*Melanitta americana*	(Coastal Environments 2000)
Surf Scoter	*Melanitta perspicillata*	(Coastal Environments 2000)
Red-breasted Merganser	*Mergus serrator*	(Coastal Environments 2000)
Ruddy Duck	*Oxyura jamaicensis*	(Coastal Environments 2000)
White-throated Swift	*Aeronautes saxatalis*	(Coastal Environments 2000)
Vaux's Swift	*Chaetura vauxi*	(Coastal Environments 2000)
Black-chinned Hummingbird	*Archilochus alexandri*	(Coastal Environments 2000)
Costa's Hummingbird	*Calypte costae*	(Coastal Environments 2000)
Rufous Hummingbird	*Selasphorus rufus*	(Coastal Environments 2000)
Allen's Hummingbird	*Selasphorus sasin*	(Coastal Environments 2000)
Common Poorwill	*Phalaenoptilus nuttallii*	(Coastal Environments 2000)
Western Snowy Plover	*Charadrius alexandrinus nivosus*	(Coastal Environments 2000)
Semipalmated Plover	*Charadrius semipalmatus*	(Coastal Environments 2000)
Killdeer	*Charadrius vociferus*	(Coastal Environments 2000)
Black-bellied Plover	*Pluvialis squatarola*	(Coastal Environments 2000)
Black Tern	*Chlidonias niger*	(Coastal Environments 2000)
Bonaparte's Gull	*Chroicocephalus philadelphia*	(Coastal Environments 2000)
Caspian Tern	*Hydroprogne caspia*	(Coastal Environments 2000)
Herring Gull	*Larus argentatus*	(Coastal Environments 2000)
California Gull	*Larus californicus*	(Coastal Environments 2000)
Mew Gull	*Larus canus*	(Coastal Environments 2000)
Ring-billed Gull	*Larus delawarensis*	(Coastal Environments 2000)
Glaucous-winged Gull	*Larus glaucescens*	(Coastal Environments 2000)
Heermann's Gull	*Larus heermanni*	(Coastal Environments 2000)
Western Gull	*Larus occidentalis*	(Coastal Environments 2000)
Black Skimmer	*Rynchops niger*	(Coastal Environments 2000)
Forster's Tern	*Sterna forsteri*	(Coastal Environments 2000)
Common Tern	*Sterna hirundo*	(Coastal Environments 2000)
California Least Tern	*Sternula antillarum browni*	(Coastal Environments 2000)
Elegant Tern	*Thalasseus elegans*	(Coastal Environments 2000)
Royal Tern	*Thalasseus maxima*	(Coastal Environments 2000)
Black-necked Stilt	*Himantopus mexicanus*	(Coastal Environments 2000)
American Avocet	*Recurvirostra americana*	(Coastal Environments 2000)
Spotted Sandpiper	*Actitis macularius*	(Coastal Environments 2000)
Surfbird	*Aphriza virgata*	(Coastal Environments 2000)
Ruddy Turnstone	*Arenaria interpres*	(Coastal Environments 2000)
Black Turnstone	*Arenaria melanocephala*	(Coastal Environments 2000)
Sanderling	*Calidris alba*	(Coastal Environments 2000)
Dunlin	*Calidris alpina*	(Coastal Environments 2000)
Baird's Sandpiper	*Calidris bairdii*	(Coastal Environments 2000)
Western Sandpiper	*Calidris mauri*	(Coastal Environments 2000)
Least Sandpiper	*Calidris minutilla*	(Coastal Environments 2000)
Wilson's Snipe	*Gallinago delicata*	(Coastal Environments 2000)
Short-billed Dowitcher	*Limnodromus griseus*	(Coastal Environments 2000)
Long-billed Dowitcher	*Limnodromus scolopaceus*	(Coastal Environments 2000)

Common Name	Scientific Name	Source
Marbled Godwit	*Limosa fedoa*	(Coastal Environments 2000)
Long-billed Curlew	*Numenius americanus*	(Coastal Environments 2000)
Whimbrel	*Numenius phaeopus*	(Coastal Environments 2000)
Red Phalarope	*Phalaropus fulicarius*	(Coastal Environments 2000)
Red-necked Phalarope	*Phalaropus lobatus*	(Coastal Environments 2000)
Wilson's Phalarope	*Phalaropus tricolor*	(Coastal Environments 2000)
Lesser Yellowlegs	*Tringa flavipes*	(Coastal Environments 2000)
Wandering Tattler	*Tringa incana*	(Coastal Environments 2000)
Greater Yellowlegs	*Tringa melanoleuca*	(Coastal Environments 2000)
Willet	*Tringa semipalmata*	(Coastal Environments 2000)
Parasitic Jaeger	*Stercorarius parasiticus*	(Coastal Environments 2000)
Wood Stork	*Mycteria americana*	(Coastal Environments 2000)
Rock Pigeon	*Columba livia*	(Coastal Environments 2000)
Spotted Dove	*Streptopelia chinensis*	(Coastal Environments 2000)
Mourning Dove	*Zenaida macroura*	(Coastal Environments 2000)
Belted Kingfisher	*Megaceryle alcyon*	(Coastal Environments 2000)
Greater Roadrunner	*Geococcyx californianus*	(Coastal Environments 2000)
Merlin	*Falco columbarius*	(Coastal Environments 2000)
American Peregrine Falcon	*Falco peregrinus anatum*	(Coastal Environments 2000)
American Kestrel	*Falco sparverius*	(Coastal Environments 2000)
California Quail	*Callipepla californica*	(Coastal Environments 2000)
Common Loon	*Gavia immer*	(Coastal Environments 2000)
Pacific Loon	*Gavia pacifica*	(Coastal Environments 2000)
Red-throated Loon	*Gavia stellata*	(Coastal Environments 2000)
American Coot	*Fulica americana*	(Coastal Environments 2000)
Common Gallinule	*Gallinula galeata*	(Coastal Environments 2000)
Sora	*Porzana carolina*	(Coastal Environments 2000)
Virginia Rail	*Rallus limicola*	(Coastal Environments 2000)
Light-footed Clapper Rail	*Rallus longirostris levipes*	(Coastal Environments 2000)
Bushtit	*Psaltriparus minimus*	(Coastal Environments 2000)
Horned Lark	*Eremophila alpestris*	(Coastal Environments 2000)
Cedar Waxwing	*Bombycilla cedrorum*	(Coastal Environments 2000)
Lazuli Bunting	*Passerina amoena*	(Coastal Environments 2000)
Blue Grosbeak	*Passerina caerulea*	(Coastal Environments 2000)
Black-headed Grosbeak	*Pheucticus melanocephalus*	(Coastal Environments 2000)
Western Tanager	*Piranga ludoviciana*	(Coastal Environments 2000)
Brown Creeper	*Certhia americana*	(Coastal Environments 2000)
Western Scrub-Jay	*Aphelocoma californica*	(Coastal Environments 2000)
American Crow	*Corvus brachyrhynchos*	(Coastal Environments 2000)
Common Raven	*Corvus corax*	(Coastal Environments 2000)
Southern California Rufous-crowned Sparrow	*Aimophila ruficeps canescens*	(Coastal Environments 2000)
Grasshopper Sparrow	*Ammodramus savannarum*	(Coastal Environments 2000)
Lark Sparrow	*Chondestes grammacus*	(Coastal Environments 2000)
Dark-eyed Junco	*Junco hyemalis*	(Coastal Environments 2000)
Lincoln's Sparrow	*Melospiza lincolnii*	(Coastal Environments 2000)
Song Sparrow	*Melospiza melodia*	(Coastal Environments 2000)
California Towhee	*Melozone crissalis*	(Coastal Environments 2000)
Savannah Sparrow	*Passerculus sandwichensis*	(Coastal Environments 2000)
Belding's Savannah Sparrow	*Passerculus sandwichensis beldingi*	(Coastal Environments 2000)
Fox Sparrow	*Passerella iliaca*	(Coastal Environments 2000)
Spotted Towhee	*Pipilo maculatus*	(Coastal Environments 2000)

Common Name	Scientific Name	Source
Chipping Sparrow	*Spizella passerina*	(Coastal Environments 2000)
Golden-crowned Sparrow	*Zonotrichia atricapilla*	(Coastal Environments 2000)
White-crowned Sparrow	*Zonotrichia leucophrys*	(Coastal Environments 2000)
House Finch	*Haemorhous mexicanus*	(Coastal Environments 2000)
Purple Finch	*Haemorhous purpureus*	(Coastal Environments 2000)
Lawrence's Goldfinch	*Larus atricilla*	(Coastal Environments 2000)
Lawrence's Goldfinch	*Spinus lawrencei*	(Coastal Environments 2000)
Pine Siskin	*Spinus pinus*	(Coastal Environments 2000)
Lesser Goldfinch	*Spinus psaltria*	(Coastal Environments 2000)
American Goldfinch	*Spinus tristis*	(Coastal Environments 2000)
Barn Swallow	*Hirundo rustica*	(Coastal Environments 2000)
Cliff Swallow	*Petrochelidon pyrrhonota*	(Coastal Environments 2000)
Bank Swallow	*Riparia riparia*	(Coastal Environments 2000)
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	(Coastal Environments 2000)
Tree Swallow	*Tachycineta bicolor*	(Coastal Environments 2000)
Violet-green Swallow	*Tachycineta thalassina*	(Coastal Environments 2000)
Red-winged Blackbird	*Agelaius phoeniceus*	(Coastal Environments 2000)
Tricolored Blackbird	*Agelaius tricolor*	(Coastal Environments 2000)
Brewer's Blackbird	*Euphagus cyanocephalus*	(Coastal Environments 2000)
Bullock's Oriole	*Icterus bullockii*	(Coastal Environments 2000)
Hooded Oriole	*Icterus cucullatus*	(Coastal Environments 2000)
Brown-headed Cowbird	*Molothrus ater*	(Coastal Environments 2000)
Great-tailed Grackle	*Quiscalus mexicanus*	(Coastal Environments 2000)
Western Meadowlark	*Sturnella neglecta*	(Coastal Environments 2000)
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	(Coastal Environments 2000)
Loggerhead Shrike	*Lanius ludovicianus*	(Coastal Environments 2000)
Northern Mockingbird	*Mimus polyglottos*	(Coastal Environments 2000)
California Thrasher	*Toxostoma redivivum*	(Coastal Environments 2000)
American Pipit	*Anthus rubrescens*	(Coastal Environments 2000)
Oak Titmouse	*Baeolophus inornatus*	(Coastal Environments 2000)
Mountain Chickadee	*Poecile gambeli*	(Coastal Environments 2000)
Wilson's Warbler	*Cardellina pusilla*	(Coastal Environments 2000)
Macgillivray's Warbler	*Geothlypis tolmiei*	(Coastal Environments 2000)
Common Yellowthroat	*Geothlypis trichas*	(Coastal Environments 2000)
Yellow-breasted Chat	*Icteria virens*	(Coastal Environments 2000)
Orange-crowned Warbler	*Oreothlypis celata*	(Coastal Environments 2000)
Nashville Warbler	*Oreothlypis ruficapilla*	(Coastal Environments 2000)
Blackpoll Warbler	*Dendroica striata*	(Coastal Environments 2000)
Black-and-white Warbler	*Mniotilta varia*	(Coastal Environments 2000)
Yellow-rumped Warbler	*Setophaga coronata*	(Coastal Environments 2000)
Black-throated Gray Warbler	*Setophaga nigrescens*	(Coastal Environments 2000)
Hermit Warbler	*Setophaga occidentalis*	(Coastal Environments 2000)
Yellow Warbler	*Setophaga petechia brewsteri*	(Coastal Environments 2000)
American Redstart	*Setophaga ruticilla*	(Coastal Environments 2000)
Townsend's Warbler	*Setophaga townsendi*	(Coastal Environments 2000)
House Sparrow	*Passer domesticus*	(Coastal Environments 2000)
Blue-gray Gnatcatcher	*Polioptila caerulea*	(Coastal Environments 2000)
Coastal California Gnatcatcher	*Polioptila californica californica*	(Coastal Environments 2000)
Ruby-crowned Kinglet	*Regulus calendula*	(Coastal Environments 2000)
European Starling	*Sturnus vulgaris*	(Coastal Environments 2000)
Wrentit	*Chamaea fasciata*	(Coastal Environments 2000)

Common Name	Scientific Name	Source
Marsh Wren	*Cistothorus palustris*	(Coastal Environments 2000)
Rock Wren	*Salpinctes obsoletus*	(Coastal Environments 2000)
Bewick's Wren	*Thryomanes bewickii*	(Coastal Environments 2000)
House Wren	*Troglodytes aedon*	(Coastal Environments 2000)
Hermit Thrush	*Catharus guttatus*	(Coastal Environments 2000)
Swainson's Thrush	*Catharus ustulatus*	(Coastal Environments 2000)
Western Bluebird	*Sialia mexicana*	(Coastal Environments 2000)
American Robin	*Turdus migratorius*	(Coastal Environments 2000)
Olive-sided Flycatcher	*Contopus cooperi*	(Coastal Environments 2000)
Western Wood-Pewee	*Contopus sordidulus*	(Coastal Environments 2000)
Pacific-slope Flycatcher	*Empidonax difficilis*	(Coastal Environments 2000)
Hammond's Flycatcher	*Empidonax hammondii*	(Coastal Environments 2000)
Willow Flycatcher	*Empidonax traillii*	(Coastal Environments 2000)
Ash-throated Flycatcher	*Myiarchus cinerascens*	(Coastal Environments 2000)
Black Phoebe	*Sayornis nigricans*	(Coastal Environments 2000)
Say's Phoebe	*Sayornis saya*	(Coastal Environments 2000)
Western Kingbird	*Tyrannus verticalis*	(Coastal Environments 2000)
Cassin's Kingbird	*Tyrannus vociferans*	(Coastal Environments 2000)
Least Bell's Vireo	*Vireo bellii pusillus*	(Coastal Environments 2000)
Cassin's Vireo	*Vireo cassinii*	(Coastal Environments 2000)
Warbling Vireo	*Vireo gilvus*	(Coastal Environments 2000)
Hutton's Vireo	*Vireo huttoni*	(Coastal Environments 2000)
Plumbeous Vireo	*Vireo plumbeus*	(Coastal Environments 2000)
Great Egret	*Ardea alba*	(Coastal Environments 2000)
Tricolored Heron	*Egretta tricolor*	(Coastal Environments 2000)
Great Blue Heron	*Ardea herodias*	(Coastal Environments 2000)
American Bittern	*Botaurus lentiginosus*	(Coastal Environments 2000)
Cattle Egret	*Bubulcus ibis*	(Coastal Environments 2000)
Green Heron	*Butorides virescens*	(Coastal Environments 2000)
Snowy Egret	*Egretta thula*	(Coastal Environments 2000)
Least Bittern	*Ixobrychus exilis*	(Coastal Environments 2000)
Black-crowned Night-Heron	*Nycticorax nycticorax*	(Coastal Environments 2000)
American White Pelican	*Pelecanus erythrorhynchos*	(Coastal Environments 2000)
California Brown Pelican	*Pelecanus occidentalis californicus*	(Coastal Environments 2000)
White-faced Ibis	*Plegadis chihi*	(Coastal Environments 2000)
Northern Flicker	*Colaptes auratus*	(Coastal Environments 2000)
Nuttall's Woodpecker	*Picoides nuttallii*	(Coastal Environments 2000)
Downy Woodpecker	*Picoides pubescens*	(Coastal Environments 2000)
Hairy Woodpecker	*Picoides villosus*	(Coastal Environments 2000)
Red-naped Sapsucker	*Sphyrapicus nuchalis*	(Coastal Environments 2000)
Red-breasted Sapsucker	*Sphyrapicus ruber*	(Coastal Environments 2000)
Clark's Grebe	*Aechmophorus clarkii*	(Coastal Environments 2000)
Western Grebe	*Aechmophorus occidentalis*	(Coastal Environments 2000)
Horned Grebe	*Podiceps auritus*	(Coastal Environments 2000)
Eared Grebe	*Podiceps nigricollis*	(Coastal Environments 2000)
Pied-billed Grebe	*Podilymbus podiceps*	(Coastal Environments 2000)
Burrowing Owl	*Athene cunicularia*	(Coastal Environments 2000)
Great Horned Owl	*Bubo virginianus*	(Coastal Environments 2000)
Barn Owl	*Tyto alba*	(Coastal Environments 2000)
Brandt's Cormorant	*Phalacrocorax penicillatus*	(Coastal Environments 2000)

Common Name	Scientific Name	Source
Mammals		
Western Red Bat	*Lasiurus blossevillii*	(Coastal Environments 2000)
Long-Eared Myotis	*Myotis evotis*	(Coastal Environments 2000)
Coyote	*Canis latrans*	(Coastal Environments 2000)
Bobcat	*Lynx rufus*	(Coastal Environments 2000)
Striped Skunk	*Mephitis mephitis*	(Coastal Environments 2000)
Raccoon	*Procyon lotor*	(Coastal Environments 2000)
Virginia Opossum	*Didelphis virginiana*	(Coastal Environments 2000)
Black-Tailed Jackrabbit	*Lepus californicus*	(Coastal Environments 2000)
Desert Cottontail	*Sylvilagus audubonii*	(Coastal Environments 2000)
Brush Rabbit	*Sylvilagus bachmani*	(Coastal Environments 2000)
Botta's Pocket Gopher	*Thomomys bottae*	(Coastal Environments 2000)
Northwestern San Diego Pocket Mouse	*Chaetodipus fallax fallax*	(Coastal Environments 2000)
California Vole	*Microtus californicus*	(Coastal Environments 2000)
Dusky-Footed Woodrat	*Neotoma fuscipes*	(Coastal Environments 2000)
Southern Grasshopper Mouse	*Onychomys torridus*	(Coastal Environments 2000)
Deer Mouse	*Peromyscus maniculatus*	(Coastal Environments 2000)
Western Harvest Mouse	*Reithrodontomys megalotis*	(Coastal Environments 2000)
California Ground Squirrel	*Spermophilus beecheyi*	(Coastal Environments 2000)

Wildlife Species Detected by AECOM within the Buena Vista Lagoon BSA (2013)

Common Name	Scientific Name	Source
Avian		
Mallard	*Anas platyrhynchos*	AECOM (2013)
Ruddy Duck	*Oxyura jamaicensis*	AECOM (2013)
Anna's Hummingbird	*Calypte anna*	AECOM (2013)
Allen's Hummingbird	*Selasphorus sasin*	AECOM (2013)
Killdeer	*Charadrius vociferus*	AECOM (2013)
Caspian Tern	*Hydroprogne caspia*	AECOM (2013)
Western Gull	*Larus occidentalis*	AECOM (2013)
Forster's Tern	*Sterna forsteri*	AECOM (2013)
California Least Tern	*Sternula antillarum browni*	AECOM (2013)
American Avocet	*Recurvirostra americana*	AECOM (2013)
Bushtit	*Psaltriparus minimus*	AECOM (2013)
Black-headed Grosbeak	*Pheucticus melanocephalus*	AECOM (2013)
Western Scrub-Jay	*Aphelocoma californica*	AECOM (2013)
Least Bell’s Vireo	*Vireo bellii pusillus*	AECOM (2013)
California Towhee	*Melozone crissalis*	AECOM (2013)
House Finch	*Haemorhous mexicanus*	AECOM (2013)
Barn Swallow	*Hirundo rustica*	AECOM (2013)
Cliff Swallow	*Petrochelidon pyrrhonota*	AECOM (2013)
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	AECOM (2013)
Tree Swallow	*Tachycineta bicolor*	AECOM (2013)
Red-winged Blackbird	*Agelaius phoeniceus*	AECOM (2013)
Hooded Oriole	*Icterus cucullatus*	AECOM (2013)
Great-tailed Grackle	*Quiscalus mexicanus*	AECOM (2013)
Northern Mockingbird	*Mimus polyglottos*	AECOM (2013)
Common Yellowthroat	*Geothlypis trichas*	AECOM (2013)
Yellow Warbler	*Setophaga petechia brewsteri*	AECOM (2013)
House Sparrow	*Passer domesticus*	AECOM (2013)
Marsh Wren	*Cistothorus palustris*	AECOM (2013)
Bewick's Wren	*Thryomanes bewickii*	AECOM (2013)
Pacific-slope Flycatcher	*Empidonax difficilis*	AECOM (2013)
Black Phoebe	*Sayornis nigricans*	AECOM (2013)
Cassin's Kingbird	*Tyrannus vociferans*	AECOM (2013)
Warbling Vireo	*Vireo gilvus*	AECOM (2013)
Great Egret	*Ardea alba*	AECOM (2013)
Great Blue Heron	*Ardea herodias*	AECOM (2013)
Snowy Egret	*Egretta thula*	AECOM (2013)
Black-crowned Night-Heron	*Nycticorax nycticorax*	AECOM (2013)
Clark's Grebe	*Aechmophorus clarkii*	AECOM (2013)
Western Grebe	*Aechmophorus occidentalis*	AECOM (2013)
Pied-billed Grebe	*Podilymbus podiceps*	AECOM (2013)
Double-crested Cormorant	*Phalacrocorax auritus*	AECOM (2013)

APPENDIX F

MONTHLY BIRD COUNT DATA FOR
BUENA VISTA LAGOON,
BUENA VISTA AUDUBON SOCIETY (2009-2013)

APPENDIX F
Buena Vista Audubon Monthly County (2009-2013)

2009

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LOONS												
Red-throated Loon												
Pacific Loon												
Common												
loon sp.												
GREBES												
Pied-billed	7	2	10	2	2	12	9	15	6	3	3	10
Horned												
Eared	7	3	3							1		5
Western	13	7	23	20	22	8	21+1im	12	30	12	38	40
Clark's			1							1		2
Western/Clark's						20						
FULMARS												
Northern												
SHEARWATERS												
Sooty												
Black-vented												
PELICANS												
White	6	4	6							2	4	11
Brown			34	6	18	1	7	30	12	6	24	10
CORMORANTS												
Double-crested	9	10	19	7	8	7	22	11	6	8	93	30
Brandt's												
Pelagic												
BITTERNS												
American												
Least												
HERONS												
Great Blue	1		4	1	4	4	7	10	2	4	5	6
Great Egret	2	1	3		2	1	6	15	2	4	3	5
Snowy	2	1	3		3	1	2	15	2		2	7
Cattle Egret												
Green												
Black-crowned Night-Heron	3		1	2	1	3	1	4		5	4	2
White-faced Ibis					5							
GEESE												
Greater White-fronted												
Snow												
Ross's												
Brant												
Canada												
Canada minima subspecies												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
DUCKS												
Wood Duck												
Green-winged Teal												39
Mallard	30	30	23	50	14	20	64	53	20	30	30	50
Northern Pintail										1		16
Blue-winged Teal			1									2
Cinnamon Teal	1	1	2									
Northern Shoveler	250	200	240	6						3	33	85
Gadwall	12	2	4	1	10	27	50	29	50	200	70	100
Eurasian Wigeon												
American Wigeon	1									20	35	
Canvasback	120	50	4	1						23	21	7
Redhead			1							50	30	20
Ring-necked Duck												
Greater Scaup		2										
Lesser Scaup					1							10
Surf Scoter												
White-winged Scoter												
Bufflehead	2	3									1	
Red-breasted Merganser												
Ruddy Duck	70	43	350	100	66	50	59	20	70	8	16	47
VULTURES												
Turkey	1											
HAWKS												
Osprey		1	1			1						
White-tailed Kite					2			1				
Northern Harrier	1	1		2		1		2	1	4	7	3
Sharp-shinned						1						
Cooper's			1					1	1	1		1
Accipiter species												
Red-shouldered Hawk										1	1	
Red-tailed Hawk	1		1	2	2	2	1		1	3	5	2
FALCONS												
Merlin												
American Kestrel	1							1	6	2		2
Peregrine												
Prairie												
QUAILS												
Ring-necked Pheasant												
California Quail												
COOTS, RAILS												
Clapper												
Virginia												
Sora		1	1	2		1	1		1			
Common Moorhen	1	2	4		2	1	1	1	3	1		1
American Coot	150	100	180	20	80	27	140	100	200	300	300+	100

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PLOVERS												
Black-Bellied												
Lesser Golden												
Snowy												
Semipalmated												
Killdeer				1			1	1	2	1		
AVOCETS, STILTS												
Black-necked Stilt												
American Avocet				2								
YELLOWLEGS												
Greater												
Lesser												
SANDPIPERS												
Willet												
Spotted Sandpiper												
Whimbrel												
Long-billed Curlew												
Marbled Godwit												
Ruddy Turnstone												
Black Turnstone												
Red Knot												
Sanderling												
Western Sandpiper												
Least Sandpiper												
peep species												
Dunlin												
DOWITCHERS												
Short-billed												
Long-billed												
dowitcher species												
Common Snipe												
PHALAROPES												
Wilson's												
Red-necked												
Red												
GULLS												
Bonaparte's												5
Heermann's											2	
Ring-billed	16	30	35	10	1		3	3	1	30	20	100
California			3				3	3		1	150	210
Herring												
Thayer's												
Western	4	3		1		1	5	1	3		48	67
Glaucous-winged												
gull species			30			2						

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
TERNS												
Caspian				1	2	14	14	10	4			
Royal												
Elegant												
large Tern species												
Common												
Forster's			6	10	16	14	7	15	10	3	25	30
Least Tern				1	5	10	5		2			
small Tern species												
Black Skimmer												
DOVES												
Rock Pigeon	21	25	20	30	20	12	107	15	30	30	50	10
Mourning Dove	11	3	14	2	6	4	8	8	10	4	6	12
Eurasian Collared Dove						2			2	3	2	2
ROADRUNNERS												
Greater												
OWLS												
Common Barn												
Great Horned												
SWIFTS												
Vaux's												
White-throated												
HUMMINGBIRDS												
Black-chinned										2		
Anna's	7	12	16	4	6	4	10	10	8	3	5	14
Costa's												
Rufous										1		
Allen's										1		1
Rufous-Allen's species								1				
Hummingbird species												
KINGFISHERS												
Belted												
WOODPECKERS												
Acorn												
Yellow-bellied												
Red-breasted												
Nuttall's						1	3			1		1
Downy								1				
Northern Flicker										1		
FLYCATCHERS												
Olive-sided												
Western Wood-Pewee										1		
Willow												
Hammond's												
Dusky												
Gray												
Pacific-slope												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Black Phoebe	7	5	12	4	3	7	3	4	3	6	5	7
Say's Phoebe	1						1					1
Ash-throated					1							
KINGBIRDS												
Cassin's	1	2	5		1		2	3		3	3	9
Western								1				
Kingbird species									3			
LARKS												
Horned												
SWALLOWS												
Tree			5									
Violet-green								1				
Rough-winged			400	12								
Cliff			24	200	300	140	4		12			
Barn					2	2		2	3			
Swallow species		2										
JAYS, CROWS, RAVENS												
Western Scrub-Jay	2	1	2	1			1	2		1	2	4
American Crow	11	10	17	6	12	15	7	6	10	10	17	200
Common Raven	1			6		1	3			1		
Mountain Chickadee												
TITMOUSE												
Plain												
BUSHTIT												
Bushtit	13	9	15						30	30		60
WRENS												
Bewick's												
House		1		2		2						2
Marsh	2	4	10	2	2	6	3	1	4	7	1	2
KINGLETS												
Ruby-crowned							3					1
GNATCATCHERS												
Blue-gray												
California												
Gnatcatcher species												
THRUSHES												
Western Bluebird												
Swainson's												
Hermit												
American Robin												
WRENTITS												
Wrentit			1									2
THRASHERS												
Northern Mockingbird		1	3	3	1	2	1	3	1	2	1	2
California Thrasher												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
PIPITS												
American Pipit												
WAXWING												
Cedar Waxwing			25									
PHAINOPEPLA												
Phainopepla												
SHRIKES												
Loggerhead												
STARLINGS												
European	10	2	6	2	16	11	12		10	2	5	25
VIREOS												
Bell's												
Hutton's												
Warbling												
WARBLERS												
Orange-crowned												
Nashville												
Yellow		5										
Yellow-rumped		2	3	1		1				2		20
Black-throated Gray												
Townsend's	2	2	2									2
Hermit												
MacGillivray's												
Blackpoll												
Comm. Yellowthroat	8	3	8	7	6	7	2	3	4	10	1	7
Wilson's												
Yellow-breasted Chat												
TANAGERS												
Summer												1
Western												
GROSBEAKS												
Black-headed												
Blue												
Lazuli Bunting												
TOWHEES												
Spotted												
California	1	1	2	2			2	3		1		2
SPARROWS												
Rufous-crowned												
Chipping				4			1					
Lark												
Sage												
Savannah					1							
Grasshopper												
Fox												
Song	7	3	13	10	10	3	1	4	10	2		14
Lincoln's												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Golden-crowned												
White-crowned	27		6							10	2	4
Dark-eyed Junco												
BLACKBIRDS												
Red-winged	3	6	9	10	20	5	12	1	6	10	3	12
Tricolored												
Western Meadowlark												
Brewer's					20				20	1		
Great-tailed Grackle	2	3	7	20	14	20	24	10	30	6	10	25
Brown-headed Cowbird												
ORIOLES												
Hooded			3		1		2		1			
Bullock's												
FINCHES												
Purple												
House	13	10	31	20	20	28	80	6	10	11	10	22
Pine Siskin												
GOLDFINCHES												
Lesser	3	2	1	1			6				2	
Lawrence's												
American			2	1							5	
OLD WORLD SPARROWS												
House Sparrow		10	9	1	1	17	31	5	20	20	6	6
EXOTICS												
Weather	clear	clear		cldy w	cldy	pt cldy	pt cldy	clear	cldy	sunny	wet	sunny
Lagoon Mouth Open?			no								no	
Temperature?	60-70	70	60-70		50-60	65-70	68	80+		60-70	50	
Wind?					west			none			west	
Water Level												
Counters	5+	6+	4+	6+	9+	5+	5+	4+	9	8	5	51

2010

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LOONS												
Red-throated Loon												
Pacific Loon												
Common												
loon sp.												
GREBES												
Pied-billed	10	8	4	6	3	5	1	4	2	6	6	4
Horned												
Eared	2	2							1			
Western	30	10	20	12	20	10	10	20	20	20	30	35
Clark's					10	2		5				4
Western/Clark's												
FULMARS												
Northern												
SHEARWATERS												
Sooty												
Black-vented												
PELICANS												
White	1	5	6	1	1	1						
Brown	2		5		1		1	6	10	45	2	
CORMORANTS												
Double-crested	6	4	10		2	3	10	10	9	50	80	40
Brandt's												
Pelagic												
BITTERNS												
American												
Least					2	1	2					
HERONS												
Great Blue		1	8	2	4	1	3	3	1	3	3	3
Great Egret	2		1	2	1	1	2	3	1	2	1	2
Snowy		3	1		4	4		2	1	2	2	12
Cattle Egret												
Green					2	2						1
Black-crowned Night-Heron	1		2	1	1	2		1		1	5	7
White-faced Ibis								1				
GEESE												
Greater White-fronted												
Snow												
Ross's												
Brant												
Canada												
Canada minima subspecies												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
DUCKS												
Wood Duck												
Green-winged Teal												
Mallard	30	17	30	20	12	12	20	12	40	12	6	19
Northern Pintail			1								8	
Blue-winged Teal												
Cinnamon Teal			3									3
Northern Shoveler	12	20	50	1							10	30
Gadwall	10	3	20	4			1			1	6	30
Eurasian Wigeon												
American Wigeon	1		6								12	15
Canvasback	1										30	10
Redhead										8	20	12
Ring-necked Duck											14	
Greater Scaup												
Lesser Scaup	2											
Surf Scoter												
White-winged Scoter												
Bufflehead	1	3										
Red-breasted Merganser												
Ruddy Duck	40	18	100	100	10	6	20	53	65	100	70	220
VULTURES												
Turkey												
HAWKS												
Osprey		1							1	1	2	
White-tailed Kite	1							1				
Northern Harrier											1	
Sharp-shinned												
Cooper's					1	1		1		1	1	
Accipiter species												
Red-shouldered Hawk						1	1	3				1
Red-tailed Hawk		2	1	1	1	2		2		3	3	2
FALCONS												
Merlin										2		
American Kestrel						1			1	2	1	
Peregrine												
Prairie												
QUAILS												
Ring-necked Pheasant												
California Quail												
COOTS, RAILS												
Clapper												1
Virginia												
Sora								1	1			
Common Moorhen	3	1	3	1	2	1	3	3	1	4	1	6
American Coot	50	13	50	10	12	20	4	10	12	50	50	45

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
PLOVERS												
Black-Bellied												
Lesser Golden												
Snowy												
Semipalmated												
Killdeer				2		1						1
AVOCETS, STILTS												
Black-necked Stilt			2									
American Avocet				2								
YELLOWLEGS												
Greater												
Lesser												
SANDPIPERS												
Willet						4						
Spotted Sandpiper				1								
Whimbrel				1								
Long-billed Curlew												
Marbled Godwit				1								
Ruddy Turnstone												
Black Turnstone												
Red Knot												
Sanderling												
Western Sandpiper												
Least Sandpiper												
peep species												
Dunlin												
DOWITCHERS												
Short-billed												
Long-billed											3	
dowitcher species												
Common Snipe												1
PHALAROPES												
Wilson's												
Red-necked												
Red							3					
GULLS												
Bonaparte's											6	15
Heermann's												
Ring-billed	40	25	10					10		30	250	110
California									6	6		165
Herring												
Thayer's												
Western	40	3	10				2	20	6	20	25	44
Glaucous-winged												
gull species					3							

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
TERNS												
Caspian			1	10	2	10	6	1				
Royal												
Elegant												
large Tern species												
Common												
Forster's				20	10	30	4	6		6	40	2
Least Tern					2	12	6					
small Tern species												
Black Skimmer												
DOVES												
Rock Pigeon		20	8		12	6	2	12		8	40	30
Mourning Dove	3	5	10	4	20	10	3	12		10	6	30
Eurasian Collared Dove	1	1				1		2	1			1
ROADRUNNERS												
Greater			2									
OWLS												
Common Barn												
Great Horned												
SWIFTS												
Vaux's				2								
White-throated					2							4
HUMMINGBIRDS												
Black-chinned												
Anna's	6	5	6	2	2	4	20	6	15	3	4	20
Costa's												
Rufous				2								
Allen's					2							1
Rufous-Allen's species								1				
Hummingbird species												
KINGFISHERS												
Belted										1	1	1
WOODPECKERS												
Acorn												
Yellow-bellied												
Red-breasted												
Nuttall's								1				
Downy												
Northern Flicker												
FLYCATCHERS												
Olive-sided												
Western Wood-Pewee					1				1			
Willow												
Hammond's												
Dusky												
Gray												1
Pacific-slope												

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Empidonax species												
Black Phoebe	4	4			4	3	3	4	3	10	10	12
Say's Phoebe										1	1	
Ash-throated					1							
KINGBIRDS												
Cassin's	3	1	2	1							5	3
Western			2									
LARKS												
Horned												
SWALLOWS												
Tree				1							20	50
Violet-green												
Rough-winged								12				
Cliff			100	12	40	100	40	2				
Barn												
Swallow species	36	15										
JAYS, CROWS, RAVENS												
Western Scrub-Jay				2	1	2	5	5	3	1		1
American Crow	12	3	6	10	6	10	8	20	7	50	30	120
Common Raven	1	2	1		1	1		2				3
Mountain Chickadee												
TITMOUSE												
Plain												
BUSHTIT												
Bushtit	12	30+	30		10		100	3		50	30	
WRENS												
Bewick's												
House											1	
Marsh	3	1	3	1	1	1	2	5	6	2	2	1
KINGLETS												
Ruby-crowned												1
GNATCATCHERS												
Blue-gray											1	2
California												
Gnatcatcher species												
THRUSHES												
Western Bluebird												
Swainson's												
Hermit												
American Robin												
WRENTITS												
Wrentit												
THRASHERS												
Northern Mockingbird	1	1	1				3	1	1	1	2	3
California Thrasher												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
PIPITS												
American Pipit												
WAXWING												
Cedar Waxwing		30+										
PHAINOPEPLA												
Phainopepla												
SHRIKES												
Loggerhead												
STARLINGS												
European	50	4	6	1	5		20		1		2	2
VIREOS												
Bell's												
Hutton's												
Warbling												
WARBLERS												
Orange-crowned					1	1						
Nashville												
Yellow					1							4
Yellow-rumped	10	5	6	1						10	20	5
Black-throated Gray												
Townsend's												
Hermit												
MacGillivray's												
Blackpoll												
Comm. Yellowthroat	3	3	5	2	4	6	2	3	1	5	4	4
Wilson's				1								
American Redstart												
Yellow-breasted Chat												
TANAGERS												
Western					1							
GROSBEAKS												
Black-headed												
Blue												
Lazuli Bunting												
TOWHEES												
Spotted												
California	2		1			3		1	1	2	1	3
SPARROWS												
Rufous-crowned												
Chipping												
Lark												
Sage												
Savannah												
Grasshopper												
Fox												
Song	10	5	4	6	20	15	5	10	2	10		2
Lincoln's												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Golden-crowned												
White-crowned	5	3	6							12	12	10
Dark-eyed Junco												
BLACKBIRDS												
Red-winged	2	40+	2	5	8	10	1	3	1	1	4	4
Tricolored												
Western Meadowlark												
Brewer's							1					
Great-tailed Grackle	12	17	12	20	10	50	10	15	1	1	10	50
Brown-headed Cowbird				1	2	1						
ORIOLES												
Hooded			2	1	1	2		1				
Bullock's			1									
FINCHES												
Purple												
House	10	14	30	30	20	15	30	30	16	12	12	30
Pine Siskin												
GOLDFINCHES												
Lesser	1			5	1	2	3	1				
Lawrence's												
American				2								
OLD WORLD SPARROWS												
House Sparrow	6	3	5	30	3	1	1		1		3	16
EXOTICS												
Weather	sunny	pt cldy	sunny	sunny	sunny	cdy/cl	o'cast	o'cast	sunny	rain/su		
Lagoon Mouth Open?	no	no	no									no
Temperature?	60	60	50-80	65	70		65	65	70-80	65	50	sunny
Wind?	slight					10 east					calm	
Water Level		high							high			v high
Counters	7+	2	6+	2+	5+	4+	4+	4+	4+	5+	5+	5+

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SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LOONS												
Red-throated Loon												
Pacific Loon												
Common										1		
loon sp.												
GREBES												
Pied-billed	2	1	3	4	1	4	5	3	3	4	6	4
Horned												
Eared												1
Western	15	5	20	30	20	10	100	8	30 wy		30	30
Clark's	1			10	4	10	6			4	4	3
Western/Clark's										60		
FULMARS												
Northern												
SHEARWATERS												
Sooty												
Black-vented												
PELICANS												
White											24	
Brown	12	1	50	60	60	15	50	20	2	15	10	6
CORMORANTS												
Double-crested	10	3	2	6	4	5	20	7	2	10	60	36
Brandt's												
Pelagic												
BITTERNS												
American												
Least							2	2				1
HERONS												
Great Blue	2	1	3	4	6	6	7	6	1	2	3	5
Great Egret	2	3		1	3	2	2	4	2	2	1	1
Snowy		1	3	2	6	1	5		6	1	5	1
Cattle Egret												
Green					2	1	1	1	2			
Black-crowned Night-Heron		1	2	5	1	3	4	1	1	3	2	3
White-faced Ibis										2		
GEESE												
Greater White-fronted												
Snow												
Ross's												
Brant												
Canada												
Canada minima subspecies												

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DUCKS												
Wood Duck												
Green-winged Teal												2
Mallard	30	10	25	20	6	15	20	10	6	3	10	19
Northern Pintail	1										10	33
Blue-winged Teal												
Cinnamon Teal	2											
Northern Shoveler	100	12	20							6	10	114
Gadwall	15	6							6	4	2	6
Eurasian Wigeon												
American Wigeon	6									6	40	
Canvasback	6	6									40	15
Redhead		2								10		14
Ring-necked Duck											5	
Greater Scaup												
Lesser Scaup	2											4
Surf Scoter												
White-winged Scoter												
Bufflehead											10	
Red-breasted Merganser												
Ruddy Duck	80	50	100	30	6	15	12	10	8	100	50	244
VULTURES												
Turkey												
HAWKS												
Osprey												
White-tailed Kite								1			1	
Northern Harrier	2	1	1				1				1	1
Sharp-shinned												
Cooper's			1		1	3	3			1		1
Accipiter species												
Red-shouldered Hawk			1	2	1			2	1		2	1
Red-tailed Hawk	3	1	3	2	1	1	1	3	2	1	2	3
FALCONS												
Merlin										1		
American Kestrel	1				1		1			1	3	
Peregrine												
Prairie												
QUAILS												
Ring-necked Pheasant												
California Quail												
COOTS, RAILS												
Clapper				1				1				
Virginia												1
Sora	1	1									2	2
Common Moorhen	2	1	2	2	1	4				3	2	4
American Coot	20	30	10	1	3		8	3	1	40	5	15

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PLOVERS												
Black-Bellied												
Lesser Golden												
Snowy												
Semipalmated												
Killdeer				1	1	1		1	20			
AVOCETS, STILTS												
Black-necked Stilt												
American Avocet												4
YELLOWLEGS												
Greater												
Lesser												
SANDPIPERS												
Willet												
Spotted Sandpiper												
Whimbrel							2					
Long-billed Curlew												
Marbled Godwit												
Ruddy Turnstone												
Black Turnstone												
Red Knot												
Sanderling												
Western Sandpiper												
Least Sandpiper												
peep species												
Dunlin												
DOWITCHERS												
Short-billed												
Long-billed												4
dowitcher species												
Common Snipe												
PHALAROPES												
Wilson's							1					
Red-necked												
Red												
GULLS												
Bonaparte's												2
Heermann's											1	1
Ring-billed	50	20	12	1		1	2	2	10	50	40	66
California		1							1		200	60
Herring												
Thayer's												
Western				10	2	6	20	2		10		5
Glaucous-winged												
gull species												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
TERNS												
Caspian				1	5	6	10	2				
Royal												
Elegant												
large Tern species												
Common												
Forster's				20	1	12	2		1		1	
Least Tern						6	2					
small Tern species												
Black Skimmer												
DOVES												
Rock Pigeon	4	20	1	3	10	2	80	12	4	30	12	20
Mourning Dove	4	2	3	10	6	4	12	6	25	3	5	8
Eurasian Collared Dove	1		2	5		1						1
ROADRUNNERS												
Greater												
OWLS												
Common Barn												1
Great Horned												
SWIFTS												
Vaux's				1	2							
White-throated										8		
HUMMINGBIRDS												
Black-chinned												
Anna's	15	4	20	20	4	1	4	8	1	10	6	6
Costa's												
Rufous		1										
Allen's			2		1						1	
Rufous-Allen's species												
Hummingbird species												
KINGFISHERS												
Belted										1		
WOODPECKERS												
Acorn												
Yellow-bellied												
Red-breasted												
Nuttall's				1				2		1		1
Downy												
Northern Flicker												
FLYCATCHERS												
Olive-sided					1							
Western Wood-Pewee					1							
Willow												
Hammond's												
Dusky												
Gray												
Pacific-slope												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Empidonax species												
Black Phoebe	2		3	1	1	1	3		1	1	6	2
Say's Phoebe										1		1
Ash-throated				2	1			1				
KINGBIRDS												
Cassin's								4		1	1	6
Western			4									
Kingbird species	1			5								
LARKS												
Horned												
SWALLOWS												
Tree	10	40	200			20			300	10		3
Violet-green												
Rough-winged				5								
Cliff				30	50	10	60					
Barn					5	1						
Swallow species												
JAYS, CROWS, RAVENS												
Western Scrub-Jay			1	1	1			1		1		3
American Crow	26	12	12	20	12	30	50	12	60	20	40	130
Common Raven	20		2	1			1					1
Mountain Chickadee												
TITMOUSE												
Plain												
BUSHTIT												
Bushtit	30	40	5				8	20	30	70	50	76
WRENS												
Bewick's				1								
House	1				1						1	1
Marsh	1	6	10	10	4	3	3		4	2	6	3
KINGLETS												
Ruby-crowned												
GNATCATCHERS												
Blue-gray											1	1
California												
Gnatcatcher species												
THRUSHES												
Western Bluebird												
Swainson's												
Hermit												
American Robin												
WRENTITS												
Wrentit												
THRASHERS												
Northern Mockingbird	2	1		3	3	1	1			2	3	2
California Thrasher												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
PIPITS												
American Pipit											1	
WAXWING												
Cedar Waxwing			1									8
PHAINOPEPLA												
Phainopepla												
SHRIKES												
Loggerhead												
STARLINGS												
European	1		10	5	1		1			25	16	1
VIREOS												
Bell's												
Hutton's												
Warbling	1											
WARBLERS												
Orange-crowned	2			2				2				1
Nashville												
Yellow												
Yellow-rumped	3	2	20		1	3				12	12	29
Black-throated Gray												
Townsend's									1			1
Hermit												
MacGillivray's												
Blackpoll												
Comm. Yellowthroat	6	2	12	10	6	4	1	1	1	2	20	15
Wilson's												
American Redstart												
Yellow-breasted Chat												
TANAGERS												
Western				4								
GROSBEAKS												
Black-headed					1							
Blue												
Lazuli Bunting												
TOWHEES												
Spotted												
California	6	1	2				3			1		3
SPARROWS												
Rufous-crowned												
Chipping												
Lark												
Sage												
Savannah											2	
Grasshopper												
Fox												
Song	10	6	10	6	6	5	4	2	4	2	10	17
Lincoln's												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Golden-crowned												
White-crowned	15	1	6						4	10	20	22
Dark-eyed Junco												
BLACKBIRDS												
Red-winged	5	20	6	8	2	1	12	6	4	3		6
Tricolored												
Western Meadowlark												
Brewer's			20	6								
Great-tailed Grackle	10	1	10	30	20	4				6	20	5
Brown-headed Cowbird			1	1	1							
ORIOLES												
Hooded			1	6	3		2					
Bullock's												
FINCHES												
Purple												
House	10	2	10	30	30	12	60	6	10	6	30	21
Pine Siskin												
GOLDFINCHES												
Lesser	2			3	2			3				
Lawrence's												
American												
OLD WORLD SPARROWS												
House Sparrow		1	2	5	1	2				6	3	1
EXOTICS												
Weather	sunny	sunny	pt sun	sunny	pt sun	cldy	o'cast	sunny	foggy	clear	sunny	
Lagoon Mouth Open?			no			no					no	
Temperature?	60	60	62	70	60-65	60	70	80	60	65	65	
Wind?		light		east	east	10mph			0	0	light	
Water Level		v.high	high	high	high	low	high				high	
Counters	4+	4+	5+	7+	7+	8+	8+	8+	4+	9+	2+	7+

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SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LOONS												
Red-throated Loon												
Pacific Loon												
Common					1							
loon sp.												
GREBES												
Pied-billed	8	5	3	2	1	8	2	3	2	2	4	15
Horned									1			
Eared									1	1		1
Western	2	1	13	20	1	12	15	12	30	25	12	30
Clark's			2		1	1	1					1
Western/Clark's												
FULMARS												
Northern												
SHEARWATERS												
Sooty												
Black-vented												
PELICANS												
White			1	1	1	1	1	1	28	15	1	5
Brown	2	12	4	4	6	100	25	25	1	2	16	3
CORMORANTS												
Double-crested	4	4	15	20	3	6	6	20	12	10	40	17
Brandt's												
Pelagic												
BITTERNS												
American												
Least									1			
HERONS												
Great Blue	2	1	5	2	6	2	1			4	2	2
Great Egret	2	2	4		1		1	1	1	6	3	4
Snowy		2	6		4	2		2	5	1	1	2
Cattle Egret												
Green						1						
Black-crowned Night-Heron		1		1	2	2			2			4
White-faced Ibis												
GEESE												
Greater White-fronted												
Snow												
Ross's												
Brant												
Canada												
Canada minima subspecies												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
DUCKS												
Wood Duck												
Green-winged Teal												
Mallard	6	12	30	12	12	10	6	25	6	2	2	25
Northern Pintail	5											30
Blue-winged Teal												7
Cinnamon Teal			2								1	
Northern Shoveler	3	40	150	6					12	6	4	68
Gadwall		6	7		1	3			4	2		22
Eurasian Wigeon												
American Wigeon												9
Canvasback	6									12	12	14
Redhead	12							1	10	30	8	2
Ring-necked Duck										6		
Greater Scaup										1		
Lesser Scaup	2											12
Surf Scoter												
White-winged Scoter												
Bufflehead											1	
Red-breasted Merganser												
Ruddy Duck	40	50	150	30	12	10	2	6	30	30	30	
VULTURES												
Turkey		2										
HAWKS												
Osprey			1				1					
White-tailed Kite				1			1					
Northern Harrier							1		1		2	
Sharp-shinned		1	1								1	
Cooper's					2				1		1	
Accipiter species												
Red-shouldered Hawk		2	1	1			1	2	1		2	2
Red-tailed Hawk	4	2	3	2	1				2	2	2	2
FALCONS												
Merlin			1									
American Kestrel		1	2		1			1	2		1	1
Peregrine												
Prairie												
QUAILS												
Ring-necked Pheasant												
California Quail												
COOTS, RAILS												
Clapper					1hrd		1	1	1			2 hrd
Virginia												1 hrd
Sora			1						1			
Common Moorhen		1	2	1							1	1
American Coot	10	10	15	6	6	1	6	12	60	40	12	10

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
PLOVERS												
Black-Bellied												
Lesser Golden												
Snowy												
Semipalmated												
Killdeer			2						1			
AVOCETS, STILTS												
Black-necked Stilt		20	10		1							
American Avocet		12	5	4	3						6	5
YELLOWLEGS												
Greater												
Lesser												
SANDPIPERS												
Willet									6			
Spotted Sandpiper								1				
Whimbrel					1			30	1			
Long-billed Curlew												
Marbled Godwit									8			
Ruddy Turnstone												
Black Turnstone												
Red Knot												
Sanderling												
Western Sandpiper												
Least Sandpiper											1	
peep species												
Dunlin											6	
DOWITCHERS												
Short-billed												
Long-billed												
dowitcher species												
Common Snipe												
PHALAROPES												
Wilson's												
Red-necked												
Red												
GULLS												
Bonaparte's												1
Heermann's								25	1			2
Ring-billed	80	10	20	4	2			4	2	6	20	6
California	8	10	1			6		6	2	12	12	140
Herring												
Thayer's												
Western	4	2		1	2	10	4	1	6	3		12
Glaucous-winged												
gull species												600

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
TERNS												
Caspian			6	1		6	6	1	1			
Royal												1
Elegant												
large Tern species												
Common												
Forster's			1	10	2	2	25	1	3			1
Least Tern					1		6					
small Tern species												
Black Skimmer												
DOVES												
Rock Pigeon	40	5	1	2		3	6		12	30	20	35
Mourning Dove	6	10	6	6	3	4	6	6	4	3	6	30
Eurasian Collared Dove	2		1	2			6		1		1	5
ROADRUNNERS												
Greater												
OWLS												
Common Barn												
Great Horned												1
SWIFTS												
Vaux's												
White-throated				1								3
HUMMINGBIRDS												
Black-chinned												
Anna's	10	6	10	6	11	4	6	8	3	6	6	20
Costa's												
Rufous				1				1				
Allen's	1					2	2		2			2
Rufous-Allen's species		1	1	1			1					
Hummingbird species												
KINGFISHERS												
Belted												
WOODPECKERS												
Acorn												
Yellow-bellied												
Red-breasted												
Nuttall's			2		1							2
Downy												
Northern Flicker												
FLYCATCHERS												
Olive-sided												
Western Wood-Pewee					1							
Willow												
Hammond's												
Dusky												
Gray												
Pacific-slope												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Empidonax species									1			
Black Phoebe	4	4	7	1	2		1	4	2	4	6	9
Say's Phoebe									1			1
Ash-throated				1		1	1					
KINGBIRDS		sp.2			sp1							
Cassin's			20	2		2		4			3	2
Western			20						1			
LARKS												
Horned												
SWALLOWS												
Tree	10	6	100		2							8
Violet-green												
Rough-winged				2		12			1			
Cliff			300	20	100		4	3		4		
Barn			1	2					2			
Swallow species												
JAYS, CROWS, RAVENS												
Western Scrub-Jay					2			1	1			2
American Crow	18	20	30	12	6	10	12	20	10		50	55
Common Raven			1						1		2	2
Mountain Chickadee												
TITMOUSE												
Plain												
BUSHTIT												
Bushtit		70	60	12		10	50	3	30		20	60
WRENS												
Bewick's												1
House					2							2
Marsh	1	4	6	2	6		1hrd		1	1		2
KINGLETS												
Ruby-crowned												2
GNATCATCHERS												
Blue-gray			2									
California												
Gnatcatcher species												
THRUSHES												
Western Bluebird												
Swainson's												
Hermit												5
American Robin												
WRENTITS												
Wrentit								1	1			
THRASHERS												
Northern Mockingbird			1	2	1	4	2	1	1			5
California Thrasher												2

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
PIPITS												
American Pipit												
WAXWING												
Cedar Waxwing		10										
PHAINOPEPLA												
Phainopepla												
SHRIKES												
Loggerhead												
STARLINGS												
European	10	10	5	6	3	2	1		2		1	15
VIREOS												
Bell's												
Hutton's		1										
Warbling												
WARBLERS												
Orange-crowned				1	1				1			2
Nashville												
Yellow				2	1							
Yellow-rumped	5	60	50	4	6				1	20	30	75
Black -and-white												1
Townsend's												1
Hermit												
MacGillivray's												
Blackpoll												
Comm. Yellowthroat	5	3	5	10	6	4	5	2	1			11
Wilson's			1	4					1			1
American Redstart												
Yellow-breasted Chat												
TANAGERS												
Western												
GROSBEAKS												
Black-headed												
Blue												
Lazuli Bunting												
TOWHEES												
Spotted					5							
California	1	5	6				1	1			1	2
SPARROWS												
Rufous-crowned												
Chipping												
Lark												
Sage												
Savannah												
Grasshopper												
Fox												
Song	6	30	20	20	5	3	2	4	2	1	10	30
Lincoln's												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Golden-crowned												
White-crowned	6	8			2				2	10	10	35
Dark-eyed Junco												
BLACKBIRDS												
Red-winged	1	15	10	10	10		2	2	25			4
Tricolored		1										
Western Meadowlark												
Brewer's			1		1		2		2	1	1	13
Great-tailed Grackle	1	1	22	12	6	10		1	2		30	15
Brown-headed Cowbird				2		2						
ORIOLES												
Hooded			1	4	1	2	5	1				
Bullock's												
FINCHES												
Purple												
House	12	20	20	20	8	12	30	12	6	4	50	35
Pine Siskin												
GOLDFINCHES												
Lesser	4	30	1	4	2	2	3	6			3	
Lawrence's				2								
American												
OLD WORLD SPARROWS												
House Sparrow		1	12	20	7	1	2	30	2		1	5
EXOTICS												
Weather	sun	sun clr	drizzle	clear	o'cast		prtsun	cldy	prt cld	sun	clear	
Lagoon Mouth Open?	no			no				no	no	yes	yes	
Temperature?	60-70	70	55	60			72	65	70	75	65	
Wind?	west	n 10		5					light	east	5	
Water Level	poll'td							high	high		normal	
Counters	5	5	7	5+	7	8	4+	5	8+	5	6+	10

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SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
LOONS												
Red-throated Loon												
Pacific Loon												
Common												
loon sp.												
GREBES												
Pied-billed		1	1	1	1	1	1	1	6	5	6	7
Horned												
Eared									6	6	2	2
Western		12	20	25	8	15	25	4	5	1	12	6

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Clark's			1	1		1	1					2
Western/Clark's												
FULMARS												
Northern												
SHEARWATERS												
Sooty												
Black-vented												
PELICANS												
White		3							1		1	1
Brown		19	75	100	18	78	70	1	12		20	19
CORMORANTS												
Double-crested		2	20	3	5	9	15	2	3	5	6	15
Brandt's											1	
Pelagic												
BITTERNS												
American												
Least									1			1
HERONS												
Great Blue		7	1		4	8	5		2	2	1	2
Great Egret				2	1	3	10	1	3	2	1	1
Snowy					2	1	35		2		1	
Cattle Egret												
Green												
Black-crowned Night-Heron							1		1	1		
White-faced Ibis												
GEESE												
Greater White-fronted												
Snow												
Ross's												
Brant												
Canada												
Canada minima subspecies												
DUCKS												
Wood Duck												
Green-winged Teal												
Mallard		6	10	6		12	10	1	1	30	14	51
Northern Pintail												50
Blue-winged Teal									3			1
Cinnamon Teal												
Northern Shoveler		200	50					25	1	30	30	400
Gadwall		4										17
Eurasian Wigeon												
American Wigeon											20	15
Canvasback											15	12
Redhead												
Ring-necked Duck												
Greater Scaup												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Lesser Scaup	2											
Surf Scoter											4	
White-winged Scoter												
Bufflehead												
Red-breasted Merganser												
Ruddy Duck		100	40	20		4	10	6	40	70	20	100
VULTURES												
Turkey					1						1	1
HAWKS												
Osprey					1	1			2	1	1	1
White-tailed Kite												
Northern Harrier									1	1	2	
Sharp-shinned												1
Cooper's		1	1		1							
Accipiter species												
Red-shouldered Hawk								1	1	2	1	2
Red-tailed Hawk		6	3		3		2		1	1	4	4
FALCONS												
Merlin											1	1
American Kestrel		1		1					1	2	1	2
Peregrine												
Prairie												
QUAILS												
Ring-necked Pheasant												
California Quail		1										
COOTS, RAILS												
Clapper						1						
Virginia												
Sora									1			
Common Moorhen												2
American Coot		15	6	4			1	1	1	35	20	43
PLOVERS												
Black-Bellied												
Lesser Golden												
Snowy												
Semipalmated												
Killdeer		1		1				1	10			1
AVOCETS, STILTS												
Black-necked Stilt												
American Avocet												
YELLOWLEGS												
Greater												
Lesser												
SANDPIPERS												
Willet				6								
Spotted Sandpiper				3								
Whimbrel							20	4			2	

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Long-billed Curlew												
Marbled Godwit												
Ruddy Turnstone												
Black Turnstone												
Red Knot												
Sanderling											12	
Western Sandpiper												
Least Sandpiper				1								
peep species												
Dunlin												
DOWITCHERS												
Short-billed												
Long-billed												
dowitcher species												
Common Snipe												
PHALAROPES												
Wilson's									2			
Red-necked												
Red												
GULLS												
Bonaparte's												4
Heermann's							20				1	
Ring-billed		20	15	3			20	6		12	300	10
California		10	20	3			10	6	10	12	300	150
Herring												
Thayer's												
Western		4	1		2	3	6	6	12	10		13
Glaucous-winged												
gull species												
TERNS												
Caspian			1	4	3	2	20	1				1
Royal												
Elegant												
large Tern species												
Common												
Forster's				20	2	4	2					
Least Tern					1	12	20					
small Tern species												
Black Skimmer												
DOVES												
Rock Pigeon		20	30	24		50	40		200	25	75	100
Mourning Dove		8	3	20	6	6	12		10	6	8	9
Eurasian Collared Dove			1	1		1	4		1	20	2	5
ROADRUNNERS												
Greater												
OWLS												
Common Barn												

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Great Horned												
SWIFTS												
Vaux's												
White-throated		1	1	4	1							20
HUMMINGBIRDS												
Black-chinned												
Anna's		2	3	6	5	10	6	3	4	10	8	8
Costa's												
Rufous			3	1				1		1		
Allen's		1	1	3		3	3	1	4		6	6
Rufous-Allen's species					3							
Hummingbird species												
KINGFISHERS												
Belted									1			
WOODPECKERS												
Acorn												
Yellow-bellied												
Red-breasted												
Nuttall's					1	1			1			1
Downy												
Northern Flicker												1
FLYCATCHERS												
Olive-sided												
Western Wood-Pewee				1	2							
Willow												
Hammond's												
Dusky												
Gray												
Pacific-slope					2				1			
Empidonax species												
Black Phoebe		2	1	1	5	1	6	1	3	2	4	6
Say's Phoebe												1
Ash-throated												
KINGBIRDS												
Cassin's		3	20						1	1	3	3
Western			6					1	1	1		
kingbird sp							3					
Horned												
SWALLOWS												
Tree		20		10				12	4			1
Violet-green												
Rough-winged				6	6	1			20			
Cliff			70	300n	10	30	1					
Barn						2			20			
Swallow species							50			6		
JAYS, CROWS, RAVENS												
Western Scrub-Jay			1	1	1					1	1	1

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
American Crow		30	30	20	12	20	12	20	24	200	26	500
Common Raven			1	1		1			2			
Mountain Chickadee												
TITMOUSE												
Plain												
BUSHTIT												
Bushtit		50	40	30	15	30	30		15	60	60	50
WRENS												
Bewick's								1				
House					1	1			1			
Marsh			4	4	5	2		2	3	1	1	2
KINGLETS												
Ruby-crowned												1
GNATCATCHERS												
Blue-gray											1	
California												
Gnatcatcher species												
THRUSHES												
Western Bluebird		1									2	
Swainson's												
Hermit			1									2
American Robin												
WRENTITS												
Wrentit					1							1
THRASHERS												
Northern Mockingbird		1	5	8	2	5	2	1	1	2	2	3
California Thrasher												
PIPITS												
American Pipit												
WAXWING												
Cedar Waxwing		8										
PHAINOPEPLA												
Phainopepla												
SHRIKES												
Loggerhead												
STARLINGS												
European		12	10	6	5	10			6	20	1	
VIREOS												
Bell's												
Hutton's					1						2	1
Warbling					1							
WARBLERS												
Orange-crowned		1	2	1					1			3
Nashville												
Yellow				2	1							
Yellow-rumped		7	50	4						30	50	50
Black-throated Gray										1		

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Townsend's											1	3
Hermit				1								
MacGillivray's												
Black&White												1
Comm. Yellowthroat		3	10	3		5	4	2	3	1	10	5
Wilson's			1		1				1			1
American Redstart												
Yellow-breasted Chat												
TANAGERS												
Western												
GROSBEAKS												
Black-headed					1							
Blue												
Lazuli Bunting												
TOWHEES												
Spotted										1		
California		1	3				1			1	1	3
SPARROWS												
Rufous-crowned												
Chipping												
Lark												
Sage												
Savannah												
Grasshopper												
Fox												
Song		12	20	10	10	10		1	10	40	20	11
Lincoln's												
Golden-crowned												
White-crowned		3	10						2	50	20	20
Dark-eyed Junco												
BLACKBIRDS												
Red-winged		15	20	4	2	20	10	12	1	12	6	20
Tricolored												
Western Meadowlark												
Brewer's			1			2			3	2		15
Great-tailed Grackle		2	10	30	5	15	10	1	6	6	6	23
Brown-headed Cowbird												
ORIOLES												
Hooded				6	3	6	4	1				
Bullock's			1									
FINCHES												
Purple												
House		12	30	10	20	15	15	6	20	20	20	12
Pine Siskin												
GOLDFINCHES												
Lesser		4	10	1	10	3					4	
Lawrence's						1						

SPECIES	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
American												
OLD WORLD SPARROWS												
House Sparrow		5	15	6	20	5	6		6	3	3	
EXOTICS												
Weather		clr/sun	clear	o'cast	clear	fog/sun	o'cast	hot	sunny	clr/fog	clear	clear
Lagoon Mouth Open?		no	no	no	yes	yes	no	no	no	no	yes	
Temperature?			60	70	70	70-75	70	78	75-80	65	55-65	60
Wind?			0		5	0		light	east	light	w 5	5
Water Level		high	high	high		med	high	high	high	high	high	
Counters		4+	5+	6	4+	7	4	5	4+	4+	4+	4+

APPENDIX G

SPECIAL STATUS WILDLIFE SPECIES WITH POTENTIAL TO OCCUR WITHIN THE BUENA VISTA LAGOON ENHANCEMENT PROJECT BSA

APPENDIX G
Special-Status Wildlife Species With Potential to Occur Within the Buena Vista Lagoon Enhancement Project Biological Study Area

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
Invertebrates				
San Diego fairy shrimp *Branchinecta sandiegonensis*	USFWS: Endangered MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Restricted to vernal pools, hardpan and claypan pools, shallow and small, Orange and San Diego Counties, Baja California, 15-125m but up to 500m, mid Dec – early May, 10-26C, up to 31C	No	Not Expected - Habitat requirements for this species are not found within the BSA.
Riverside fairy shrimp *Streptocephalus woottoni*	USFWS: Endangered MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Restricted to deep, large vernal pools with long periods of inundation, San Diego (w/in 15km of the ocean) and Riverside Counties, 30-415m, seasonal grasslands, emerge later in the season than co-occurring species, 10-25C	No	Not Expected - Habitat requirements for this species are not found within the BSA.
Harbison’s dun skipper *Euphyes vestris harbisoni*	MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Restricted to southern Orange County and San Diego County, with no published records from Mexico. Generally are found in chaparral or riparian areas that have narrow canyons or narrow drainages.	No	Not Expected - Habitat requirements for this species are not found within the BSA.
Hermes copper Lycaena hermes	USFWS: Candidate Species City Carlsbad: Covered	Restricted to San Diego County. Appropriate Hermes habitat is continuous stands of mixed chaparral/sage scrub in well-drained soil. This soil type is usually found on canyon bottoms or on hillsides with a northern exposure (Marschalek and Deutschman 2008).	No	Not Expected - Habitat requirements for this species are not found within the BSA.
Wandering (=saltmarsh) skipper Panoquina errans	MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Strictly a coastal salt marsh skipper. Marshes with tidal flow are the more likely occupied areas. Wherever saltgrass grows along the coast and within a tidal saltmarsh environment.	Yes	Known to Occur – Along San Diego County, all coastal marshes, Buena Vista, Batiquitos, Agua Hedionda, San Elijo Lagoons, Penasquitos, Famosa Slough, San Diego River Flood Channel, Sweetwater Marsh, D Street Fill and Tijuana Estuary, errans

Common Name Scientific Name	Sensitivity Status^1	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
				will be found (Faulkner and Klein 2012).
Quino checkerspot butterfly *Euphydryas editha quino*	USFWS: Endangered MHCP/NCCP: Covered	Known from clay soil meadows, open grasslands, coastal sage scrub, chamise chaparral, red shank chaparral, juniper woodlands, and semi-desert scrub (Ballmer et al. 2001). Elevations up to 5,000 feet (1,524 meters).	No	Not Expected - Habitat requirements for this species are not found within the BSA.
Monarch butterfly *Danaus plexippus*	CDFW Special Animal	Found in conifer forests, grasslands, old fields, dune habitat, scrublands, chaparral, orchards, woodlands, and herbaceous and shrub wetlands. Breeds in patches of milkweed.	No	Known to Occur – Summer residents in Canada and throughout the entire continental U.S. They overwinter along the central and southern California coast, as well as high in the mountains of Mexico.
Fish				
Arroyo chub *Gila orcutti*	CDFW: Species of Special Concern	Prefers slow-moving sections of permanent, small to moderate-sized streams with sand or mud substrate with more than half of the habitat as runs and pools ~ 10 cm deep and reaches of permanent water more than 2 km long.	No	Low- Although the nearby Santa Margarita River supports the largest remaining native populations of Arroyo Chub, appropriate habitat for this species does not exist in the BSA.
tidewater goby *Eucyclogobius newberryi*	USFWS: Endangered CDFW: Species of Special Concern	Brackish water habitats along the CA coast. Found in shallow lagoons and lower stream reaches. Still water with high oxygen.	Yes	Low- Because of the tidal weir at Buena Vista Lagoon, the tidewater goby is not anticipated within this lagoon. Surveys in this lagoon in 2012 did not identify any tidewater goby (North Coast Corridor PWP/TREP Draft Final: November 2013). Buena Vista lagoon has not supported known populations of ti dewater gobies for over 10 years (CDFW 2013),

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
Reptiles and Amphibians				
western spadefoot toad *Spea hammondii*	MHCP/NCCP: Covered CDFW: Species of Special Concern City Oceanside: Covered	Temporary ponds, vernal pools, and backwaters of slow-flowing creeks. Also upland habitats such as grasslands and coastal sage scrub where burrows are constructed.	Yes	Historically detected
arroyo toad *Bufo microscaphus californicus*	USFWS: Endangered CDFW: Species of Special Concern MHCP/NCCP: Covered City Oceanside: Covered	Gravelly or sandy washes, stream and river banks, and arroyos. Also upland habitat near washes and streams such as sage scrub, mixed chaparral, Joshua tree woodland, and sagebrush habitats.	No	Not Expected - Habitat requirements for this species are not found within the BSA.
southwestern pond turtle *Actinemys marmorata pallid*	CDFW: Species of Special Concern MHCP/NCCP: Covered City Oceanside: Covered	Associated with permanent water or nearly permanent water from sea level to 6,000 feet. Prefers habitats with basking sites such as floating mats of vegetation, partially submerged logs, rocks, or open mud banks.	Yes	Known to occur – Suitable habitat for this species occurs within the BSA.
San Diego coast horned lizard *Phrynosoma coronatum* (*blainvillei*)	CDFW: Species of Special Concern MHCP/NCCP: Covered	A variety of habitats including sage scrub, chaparral, and coniferous and broadleaf woodlands. Found on sandy or friable soils with open scrub. Requires open areas, bushes, and fine loose soil.	Yes	High – Historically detected within the BSA.
Coronado skink *Eumeces skitonianus interparietalis*	CDFW: Species of Special Concern	Most commonly found in open areas, sparse brush, and in oak woodlands, usually under rocks, leaf litter, logs, debris, or in the shallow burrows it digs (CDFW 1988).	Yes	Moderate - No historical detections; However suitable habitat occurs within the BSA.
orange-throated whiptail *Aspidoscelis hyperythra beldingi*	CDFW: Species of Special Concern MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	A variety of habitats including sage scrub, chaparral, and coniferous and broadleaf woodlands. Found on sandy or friable soils with open scrub. Requires open areas, bushes, and fine loose soil.	Yes	Moderate - No historical detections; However suitable habitat occurs within the BSA.
coastal western whiptail *Aspidoscelis tigris stejnegeri*	CDFW: Special Animal	Often associated with dense vegetation such as chaparral and sage scrub especially in and around sandy washes and streambeds.	Yes	Moderate - No historical detections; However suitable habitat occurs within the BSA.

Common Name **Scientific Name**	**Sensitivity Status[1]**	**Habitat Requirements**	**Potential to Breed within BSA**	**Probability of Occurrence**
silvery legless lizard *Anniella pulchra pulchra*	CDFW: Species of Special Concern	Loose soil in a number of vegetation communities including coastal dunes; chaparral; pine-oak woodland; and streamside growth of sycamores, cottonwoods, or oaks. Small shrubs such as bush lupine (*Lupinus* sp.) growing in sandy soils indicate suitable conditions. Occurs often near intermittent and permanent streams.	Yes	Moderate - No historical detections; However suitable habitat occurs within the BSA.
rosy boa *Charina trivirgata*	CDFW: Special Animal	Distributed in desert and chaparral habitats, especially in areas with dense vegetation and rocky cover such as those associated with coastal canyons and hillsides, desert canyons, washes and mountains.	No	Low – Habitat to support this species in the BSA does not occur.
San Diego ringneck snake *Diadophis punctatus similis*	CDFW: Special Animal	Found in San Diego County along the coast and Peninsular range and SW San Bernardino County. It prefers moist habitats including wet meadows, rocky hillsides, gardens, chaparral, mixed coniferous forests, and woodlands.	Yes	Moderate - No historical detections; However suitable habitat occurs within the BSA.
coast patch-nosed snake *Salvadora hexalepis virgultea*	CDFW: Species of Special Concern	A variety of habitats including coastal sage scrub, chaparral, riparian, grasslands, and agricultural fields (CDFW 1988). Prefers open habitats with friable or sandy soils, burrowing rodents for food, and enough cover to escape predation.	Yes	Moderate – Suitable habitat present; however, this species is sensitive to fragmentation and edge effects from urban habitat.
two-striped gartersnake *Thamnophis hammondii*	CDFW: Species of Special Concern NCMSCP: Covered	Aquatic habitats, preferably rocky streams with protected pools, cattle ponds, marshes, vernal pools, and other shallow bodies of water lacking large aquatic predators.	Yes	High – Historically detected (Coastal Elements 2000).
south coast garter snake *Thamnophis sirtalia* ssp.	CDFW: Species of Special Concern	Utilizes a wide variety of habitats - forests, mixed woodlands, grassland, chaparral, farmlands, often near ponds, marshes, or streams.	Yes	Moderate - No historical detections; However suitable habitat occurs within the BSA.

Common Name **Scientific Name**	**Sensitivity Status**[1]	**Habitat Requirements**	**Potential to Breed within BSA**	**Probability of Occurrence**
red-diamond rattlesnake *Crotalus ruber ruber*	CDFW: Species of Special Concern NCMSCP: Covered	Chaparral, coastal sage scrub, along creek banks, and in rock outcrops or piles of debris. Habitat preferences include dense vegetation in rocky areas.	Yes	Moderate – Habitat is present within the BSA: however, this species is sensitive to edge effects.
Birds				
brant *Branta bernicla*	CDFW: Species of Special Concern (wintering, staging)	Breeds in the high Arctic. Winters along the coast and within estuaries on the Pacific coast. Feeds on eel grass and seaweed within estuaries.	No	Known to Occur – Detected by AECOM biologist in 2013. (eBird.org 2014) Usually occurs within in BSA during winter or migration (Unitt 2004).
redhead *Aythya Americana*	CDFW: Species of Special Concern (nesting)	Breeding habitat is marshes and prairie potholes in western North America. Winters in Mission Bay, though has been recorded breeding in north coastal area of San Diego County.	Yes	Known to occur – Historically bred within the BSA (Unitt 2004). Individuals, including pairs have been recorded within the BSA during the breeding season in recent years, however breeding has not been confirmed (eBird 2014). Detected during monthly bird counts.
common loon *Gavia immer*	CDFW: Species of Special Concern (nesting)	Widespread along the coast both in the ocean and within tidal bays and estuaries.	No	Known to Occur – (eBird 2014). Detected during monthly bird counts. Common winter resident in San Diego County, but does not breed within the BSA (Unitt 2004).
wood stork *Mycerterua anerucana*	CDFW: Species of Special Concern	Fresh water marsh and mudflats.	No	Low – Historically detected with up to 300 individuals in 1953 (Unitt 2004).There are no recent records at Buena Vista Lagoon, but two had been resident in the county since 1986 and nesting attempts have been documented at the San Diego Safari Park formerly Wild Animal Park (Unitt 2004). These individuals have since expired.

Common Name **Scientific Name**	**Sensitivity Status[1]**	**Habitat Requirements**	**Potential to Breed within BSA**	**Probability of Occurrence**
double-crested cormorant *Phalacrocorax auritus*	CDFW: Watch List (nesting)	This species is found in marine and estuary environments. Needs water and perching areas to dry out.	No	Known to Occur – (eBird 2014). Detected during monthly bird counts. Foraging habitat occurs within the BSA. Breeding has not been confirmed within the BSA (Unitt 2004). Known to nest offshore islands (Unitt 2004).
American white pelican *Pelecanus erythrorhynchos*	CDFW: Species of Special Concern (nesting)	Breeds in northeastern California, winters throughout central and southern California. Rivers, lakes, estuaries, bays, marshes, and nests usually in brackish or freshwater lake islands.	No	Known to Occur – (eBird 2014). Detected during monthly bird counts. This species is a migrant and winter visitor within the BSA (Unitt 2004).
California brown pelican *Pelecanus occidentalis californicus*	USFWS: Delisted CDFW: Delisted CDFW: Fully Protected MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Common along the coast where they dive for fish. They are known to congregate in areas that provide secure roost sites such as coastal bluffs, or man-made structures near fertile fishing grounds. Breeds on dry, rocky offshore islands in n. Gulf of California and along Pacific coast of California and Baja California	No	Known to Occur – (eBird 2014). Detected during monthly bird counts. Present year-round; however, non-breeders only present during the breeding season. The nearest nesting colony nearest to San Diego County is on the Los Coronados Islands off Tijuana (Unitt 2004).
least bittern *Ixobrychus exilis*	CDFW: Species of Special Concern (nesting) USFWS: BCC	Marsh habitats or large emergent wetlands with cattails (*Typha* sp.) and tules.	Yes	Known to occur – Historically has bred within the BSA, and is detected annually within the BSA during the breeding season, likely representing breeding individuals (Unitt 2004; eBird 2014). Detected during monthly bird counts.
white faced ibis *Plegadis chihi*	CDFW: Watch List MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Found in shallow areas of freshwater marshes and wet grass. Colonial nesters, with two known colonies in San Diego County, along Guajome Lake and near a pond in San Luis Rey River valley.	Yes	Known to Occur – (eBird 2014). Detected during monthly bird counts. Historically nested within the BSA with six breeding pairs reported in 1979 (Unitt 2004). Only two known nesting colonies (Guajome Lake and San Luis Rey River) in San Diego County. Foraging habitat present within the BSA.

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
light-footed clapper rail *Rallus longirostris levipes*	USFWS: Endangered CDFW: Endangered CDFW: Fully Protected MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Found in southern California in coastal salt marshes, especially those dominated by cordgrass. The Tijuana River estuary is an especially important site.	Yes	Known to Occur –Suitable breeding habitat exists within the BSA, with at least two pairs located in 2013 (Zembal 2013). Detected during monthly bird counts.
sandhill crane *Crus canadensis*	CDFW: Species of Special Concern or Fully Protected (nesting)	Winter residents or visitors. Typical in farm fields and marsh areas.	No	Low – Very few records in recent history in San Diego County. Two records, in 2008 one individual seen from San Elijo Lagoon approximately 11 miles south of the BSA, and another individual in 2009 in Del Mar approximately 12 miles southeast of the BSA (BVAS 2013; eBird 2014).
western snowy plover *Charadrius alexandrinus nivosus*	USFWS: Threatened CDFW: Species of Special Concern MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Nests on beaches, dunes, and salt flats in San Diego County, with the highest concentrations in two areas: Camp Pendleton and Silver Strand. Outside the breeding season species is more widespread but not common along the county's coast.	No	Low – Historically bred within the BSA (USFWS 2001b). The BSA has been so altered in recent years by development, erosion or human use, that habitat no longer exists for nesting Snowy Plovers (Western Birds 1981).
long-billed curlew *Numenius americanus*	USFWS: BCC CDFW: Watch List	Nests primarily in short-grass or mixed-prairie habitat with flat to rolling topography	No	Known to Occur – (eBird 2014). Detected during monthly bird counts. Foraging habitat exists within the BSA.
laughing gull *Larus atricilla*	CDFW: Watch List (nesting)	Nests on sandy or rocky shores and on salt-marsh islands.	No	Low – Not detected within the BSA; however, an individual was observed for two months at the Oceanside harbor located approximately 3 miles northwest of the BSA (eBird 2014). San Diego County is outside this species' breeding range (Unitt 2004).

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
California gull *Larus californicus*	CDFW: Watch List (nesting)	Breeding colonies nearly always on islands on natural lakes or rivers or in reservoirs, which vary from fresh oligotrophic lakes and rivers to saline lakes.	No	Known to Occur – (eBird 2014). Detected during monthly bird counts. Only nonbreeding individuals are present in San Diego Country (Unitt 2004).
California least tern *Sternula antillarum browni*	USFWS: Endangered CDFW: Endangered, Fully Protected (nesting) MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	A ground nesting bird that requires undisturbed stretches of beach and coastline. Adults are highly philopatric to natal colonies, and forage in bays and estuaries near their colonies.	Yes	Known to Occur – Historically bred within the BSA, with last known nesting attempt in 1992 (CDFW 1994). Although not nesting within the BSA, this species does forage within the BSA during the breeding season (eBird 2014). Detected during monthly bird counts.
gull-billed tern *Gelochelidon nilotica*	USFWS: BCC CDFW: Species of Special Concern (nesting)	Most pairs nest on sandy beaches or on sandy barrier islands in coastal waters, especially near ocean inlets.	No	Low –Only known to breed in San Diego Bay (Unitt 2004). There are two records from Camp Pendleton approximately 5 miles northwest of the BSA (eBird 2014).
black tern *Childonias niger*	CDFW: Species of Special Concern (nesting)	Nests in colonies within marshes	No	Low –Recorded as recently as 2013 at the San Luis Rey river mouth, approximately 3 miles northwest of the BSA (eBird 2014).
elegant tern *Sterna elegans*	CDFW: Watch List (nesting) MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Intensely gregarious. Feeds on off shore fish, principally anchovies.	No	Known to Occur – (eBird 2014). Detected during monthly bird counts. Abundant visitor to San Diego County's coast; nesting has not been confirmed within the BSA (Unitt 2004). Only known to nest in San Diego Bay (Unitt 2004).
Caspian Tern *Hydroprogne caspia*	USFWS: BCC (nesting colony)	Breeding habitat is large lakes and ocean coasts.	No	Known to occur – (eBird 2004). Detected during monthly bird counts. For foraging this species ranges widely along San Diego's coast and on its inland lakes (Unitt 2004). Only known to nest in San Diego Bay (Unitt 2004).

Common Name **Scientific Name**	**Sensitivity Status**[1]	**Habitat Requirements**	**Potential to Breed within BSA**	**Probability of Occurrence**
black rail *Laterallus jameicensis coturniculus*	USFWS: BCC CDFW: Threatened	Found in southern California coastal marshes.	No	Not expected –The species is extirpated from San Diego County (Unitt 2004).
black skimmer *Rynchops niger*	USFWS: BCC CDFW: Species of Special Concern (nesting)	Breeds in loose groups on sand banks or bare dirt areas near water sources. May utilize the same habitat as terns.	No	Known to Occur – (eBird 2014). Breeding has not been confirmed within the BSA and observations are presumed migrants or nonbreeding individuals (Unitt 2004).
osprey *Pandion haliaetus*	CDFW: Watch List (nesting) MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Primarily along rivers, lakes, reservoirs, and seacoasts, occurring widely in migration, often crossing land between bodies of water. Nests in dead snags, live trees, cliffs, utility poles, wooden platforms, channel buoys, chimneys, windmills, etc. Usually near or above water.	Yes	Known to Occur – (eBird 2014). Detected during monthly bird counts. Suitable foraging and breeding habitat is present within the BSA.
white-tailed kite *Elanus leucurus majusculus*	CDFW: Fully Protected (nesting)	Wide spread over the coastal slope of San Diego County preferring riparian woodlands, oak groves, or sycamore groves, adjacent to grasslands.	Yes	Known to Occur – (eBird 2014). Detected during monthly bird counts. Suitable nesting and foraging habitat occurs throughout the BSA.
northern harrier *Circus cyaneus*	CDFW: Species of Special Concern (nesting)	Breeds predominantly in wetland habitats, but will also use upland habitats, grasslands and agricultural fields. During migration and in winter The same habitats are preferred.	Yes	Known to Occur – (eBird 2014). Detected during monthly bird counts. Suitable nesting and foraging habitat occurs throughout the BSA.
sharp-shinned hawk *Accipiter striatus*	CDFW: Watch List	A winter visitor, distributed over the coastal slope of San Diego County. The habitat of this species encompasses a variety of vegetation communities and land covers. It requires a certain amount of dense cover, but this can be localized and scattered through relatively open country.	No	Known to Occur – (eBird 2014). Migratory and wintering habitat for the species occurs within the BSA.
Cooper's hawk *Accipiter cooperi*	CDFW: Watch List MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Usually in oak woodlands, but occasionally in willow or eucalyptus woodlands.	Yes	Known to Occur – (eBird 2014). Detected during monthly bird counts. Nesting habitat is present within the BSA.

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
ferruginous hawk *Buteo regalis*	USFWS: BCC CDFW: Watch List (wintering)	Open country, primarily plains, prairies, badlands, sagebrush, shrubland, and desert.	No	Not Expected – Typical foraging habitat for this species is not found within the BSA.
golden eagle *Aquila chrysaetos*	USFWS: BCC CDFW: Fully Protected and Watch List (nesting and wintering) NCMSCP: Covered City MHCP: Covered	Nests on cliff ledges and, trees on steep slopes. Hunts for prey in nearby grasslands, sage scrub, or broken chaparral. Requires very large territories.	No	Not Expected – Typical foraging habitat for this species is not present within the BSA. This species has been detected as close as Whelan Lake, approximately 5 miles northeast of the BSA (eBird 2014).
bald eagle *Haliaeetus leucocephalus*	USFWS: BCC CDFW; Endangered, Fully Protected (nesting and wintering)	Nests in old growth trees near the coast or other bodies of water where fish are available.	No	Low – Not detected within the BSA; however, as recently as 2013, an immature individual was present for one month at Batiquitos Lagoon, approximately 6 miles south of the BSA (eBird 2014). Rare annual winter visitor to San Diego County (Unitt 2004).
merlin *Falco columbarius*	CDFW: Watch List (wintering)	Marshes, deserts, seacoasts, near coastal lakes and lagoons, open woodlands, fields, etc. May roost in conifers.	No	Known to Occur – Detected during monthly bird counts. San Diego County is outside this species' breeding range (Unitt 2004). Detected during monthly bird counts.
American peregrine falcon *Falco peregrinus anatum*	USFWS: Delisted USFWS: BCC CDFW: Delisted CDFW: Fully Protected MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Open areas from tundra, moorlands, steppe, and seacoasts to mountains and open forested regions, especially where there are suitable nesting cliffs.	No	Known to Occur – Historically detected (Coastal Environments 2000) and known to occur periodically (eBird 2014). This species is likely a migrant or wintering bird (Unitt 2004). Suitable nesting habitat does not exist in BSA. Detected during monthly bird counts.
prairie falcon *Falco mexicanus*	USFWS: BCC CDFW: Watch List (nesting)	Forages in open grasslands, agricultural fields, and desert scrub. Prefers ledges on rocky cliffs for nesting.	No	Low –All known nest sites in San Diego County are at least 23 miles from the coast (Unitt 2004). May be a winter visitor.

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
burrowing owl *Athene cunicularia*	USFWS: BCC CDFW: Species of Special Concern (burrowing sites and some wintering sites) City Carlsbad: Covered	Found mainly in grassland and open scrub from the seashore to foothills. Strongly associated with California ground squirrel (*Spermophilus beecheyi*) burrows.	No	Low – Historically Detected. Habitat within the BSA is very minimal.
long-eared owl *Asio otus* (nesting sites)	CDFW: Species of Special Concern (nesting)	Primarily in dense oak and riparian woodland and at the edges of coniferous forests. Typically nests in trees, often in the abandoned nests of corvids or other raptors.	No	Not Expected - May occur as a rare migrant
short-eared owl *Asio flammeus*	CDFW: Species of Special Concern (nesting)	Primarily nests in marshes and grassland.	No	Known to Occur –Detected within the BSA in 2009 (eBird 2014). Only confirmed breeding in San Diego County is from 1906 at San Diego Bay (Unitt 2004).
black swift *Cypseloides niger*	USFWS: BCC CDFW: Species of Special Concern (nesting)	Nests only around waterfalls and sea cliffs.	No	Low –No breeding sites in San Diego County and only occurs as a rare migrant (Unitt 2004). The closest migrants of this species was approximately 13 miles south of the BSA (eBird 2014).
Vaux's swift *Chaetura vauxi*	USFWS: BCC CDFW: Species of Special Concern (nesting)	A common migrant in San Diego County during migration from wintering grounds to breeding grounds in the northwest.	No	Known to Occur – Historically detected, and as recently as 2012 (eBird 2014). Detected during the monthly bird counts. This species is a migrant and does not breed in San Diego County (Unitt 2004). Detected during monthly bird counts.
Rufous Hummingbird *Selasphorus rufus*	USFWS: BCC (nesting)	Breed in open areas, yards, parks, and forests up to treeline in the Pacific Northwest and Alaska.	No	Known to Occur – (eBird 2014). Detected during monthly bird counts. Detected within the BSA as migrant, and could occur as a very rare winter visitor.
Allen's Hummingbird *Selasphorus sasin*	USFWS: BCC (nesting)	Breeds only along a narrow strip of coastal California and southern Oregon. Winters in forest edge and scrub clearings with flowers.	Yes	Known to Occur – (eBird 2014). Detected during monthly bird counts.

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
Nuttall's Woodpecker *Picoides nuttallii*	USFWS: BCC (nesting)	Occurs in oak woodlands, live oak forests, and chaparral, and in canyons with sycamores, alders, cottonwoods, and bay trees growing along streams lined with live oaks. However, not limited to these habitats.	Yes	Known to Occur – (eBird 2014). Detected during monthly bird counts.
Lewis's Woodpecker *Melanerpes lewis*	USFWS: BCC (nesting)	Open ponderosa pine forest, open riparian woodland dominated by cottonwood, and logged or burned pine forest; however breeding birds are also found in oak woodland, nut and fruit orchards, pinyon pine-juniper woodland, a variety of pine and fir forests	No	Not Expected – Habitat typically preferred by this species does not occur within the BSA. It could occur within the BSA as a very rare migrant.
olive-sided flycatcher *Contopis cooperi*	USFWS: BCC CDFW: Watch List (nesting)	An uncommon summer resident of coniferous woodlands in San Diego County.	No	Known to Occur – Historically detected (Coastal Environments 2000). Detected during monthly bird counts. This species can occur as a migrant within the BSA; however habitat within the BSA is not typical for breeding.
southwestern willow flycatcher *Empidonax traillii extimus*	USFWS: Endangered CDFW: Endangered (nesting) MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Restricted to a few colonies in riparian woodlands scattered throughout southern California. Riparian forests are integral to this species' persistence.	No	Not Expected - No confirmed sightings of this subspecies have been confirmed within the BSA. Willow flycatcher can use the BSA as a stopover during migration; however what subspecies is unknown. There is no typical nesting habitat within the BSA.
Vermilion flycatcher *Pyrocephalus rubinus*	CDFW: Species of Special Concern (nesting)	Prefers open riparian woodland, arid lands, and mesquite bosques on desert floodplains. Nests in native trees such as willows and cottonwoods.	No	Low – This species may occur as a rare migrant, or winter visitor within the BSA.
loggerhead shrike *Lanius ludovicanus*	USFWS: BCC CDFW: Species of Special Concern (nesting)	Uncommon year- round resident of San Diego County. Found in grassland, chaparral, desert, and desert edge scrub, particularly near dense vegetation that it uses for concealing and protecting the nest.	No	Known to Occur – Historically detected within the BSA (Coastal Environments 2000; eBird 2014) The species is known to winter within the region (Unitt 2004).

Common Name **Scientific Name**	**Sensitivity Status[1]**	**Habitat Requirements**	**Potential to Breed within BSA**	**Probability of Occurrence**
least Bell's vireo *Vireo bellii pusillus*	USFWS: Endangered CDFW: Endangered (nesting) MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Riparian woodland with understory of dense young willows or mulefat and willow canopy. Nests often placed along internal or external edges of riparian thickets (USFWS 1986).	Yes	Known to Occur – Detected by AECOM biologist in 2013 during focused survey s for this species. Marginally suitable nesting habitat is present within the BSA. The individual present in 2013 was a migrant, and did not breed within the BSA.
gray vireo *Vireo vicinior*	USFWS: BCC CDFW: Species of Special Concern (nesting)	Chaparral habitats in mountainous areas 3,000 to 5,000 feet in elevation.	No	Not Expected –Habitat within the BSA to support this species does not occur. Not likely to breed within the BSA due to the low elevations (Unitt 2004). May occur as a very rare migrant.
California horned lark *Eremophila alpestris actia*	CDFW: Watch List	Found year-round in coastal strand, grasslands, and sandy deserts of San Diego County. Typically a disturbance regime species exploiting the open ground following plowed fields or fire in search of insects.	Yes	Low –Historically detected (Coastal Environments 2000; CNDDB). Marginal quality habitat present within the BSA.
purple martin *Progene subis*	CDFW: Species of Special Concern (nesting)	Found throughout the United States but is, rare in San Diego. Restricted to mountain region of San Diego County. Nests in isolated snags with holes.	No	Low –Individuals within the BSA are likely migrants as this species nests in the higher mountain ranges (Unitt 2004).
bank swallow *Riparia riparia*	CDFW: State Threatened (nesting)	Inhabits riverbanks and gravel pits where sandy, vertical bluffs are available for the birds to dig their burrows and nest in colonies. Breeding season is from March through April.	No	Low –Only known colony extirpated from San Diego County and last reported nesting anywhere in southern California was in 1976 (Unitt 2004). This species may occur as a rare migrant within the BSA.
coastal cactus wren *Campylorhynchus brunneicapillus couesi*	USFWS:BCC CDFW: Species of Special Concern MHCP/NCCP: Covered City Oceanside: Covered	Coastal sage scrub with extensive stands of tall prickly pear or cholla cacti (*Opuntia* sp.).	No	Not Expected –Habitat to support this species does not occur within the BSA. The nearest breeding locations are approximately 5 miles north of the BSA, on Camp Pendleton (Unitt 2004; eBird 2014).

Common Name **Scientific Name**	**Sensitivity Status**[1]	**Habitat Requirements**	**Potential to Breed within BSA**	**Probability of Occurrence**
Clark's marsh wren *Cistothorus palustris clarkae*	CDFW: Species of Special Concern	Coastal wetlands and freshwater marsh.	Yes	Known to Occur- Detected by AECOM biologists during focused bird surveys in 2013, during the breeding season. Occurs year-round in freshwater and brackish marshes mainly along or near the San Diego coast (Unitt 2004).
coastal California gnatcatcher *Polioptila californica californica*	USFWS: Threatened CDFW: Species of Special Concern MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Diegan coastal sage scrub dominated by California sagebrush (*Artemisia californica*) and flat-topped buckwheat (*Eriogonum fasciculatum*) below 2,500 feet elevation in Riverside County and below 1,000 feet elevation along the coastal slope; generally avoids steep slopes above 25% and dense, tall vegetation for nesting.	Yes	Known to Occur – Historically detected (Coastal Environments 2000; Final Report; CNDDB). Although habitat for this species occurs within the BSA, it is marginal and may not be able to support breeding. Last known detections are from 1997 (eBird 2014).
western bluebird *Sialia mexicana*	MHCP/NCCP: Covered City Oceanside: Covered	Frequents open woodlands for foraging, but requires suitable roosting and nesting cavities usually in snags. Availability of snags may limit population density.	Yes	Known to Occur – Historically detected and as recently as 2013(eBird 2014). Suitable breeding and foraging habitat is present within the BSA.
Bendire's thrasher *Toxostoma bendirei*	USFWS: BCC CDFW: Species of Special Concern	Local spring/summer resident in flat areas of desert succulent shrub/Joshua tree habitats in the Mojave Desert (CDFW 2003).	No	Not Expected – May occur within the BSA as a very rare migrant.
Virginia's warbler *Vermivora virginiae*	USFWS: BCC CDFW: Watch List (nesting)	Steep-sloped, xeric, piñon-juniper (*Pinus edulis*-*Juniperus* spp.) and oak (*Quercus*) woodland–dominated habitat.	No	Not Expected – May occur within the BSA as a rare migrant.
Lucy's Warbler *Oreothlypis luciae*	USFWS: BCC CDFW: Species of Special Concern	Southwestern deserts, especially among cottonwoods and streamside trees and mesquite in washes or canyons.	No	Not Expected – May occur within the BSA as a rare migrant.
yellow warbler *Dendroica petechia brewsteri*	USFWS: BCC CDFW: Species of Special Concern (nesting)	A fairly common summer breeding resident found along mature riparian woodlands consisting of cottonwood, willow, alder, and ash trees. Restricted to this increasingly patchy habitat.	Yes	Known to Occur – Historically detected, and detected by AECOM biologists during focused bird surveys in 2013. Wintering individuals observed as recently as 2013 (eBird 2014). Suitable breeding and foraging habitat is present within the BSA

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
yellow-breasted chat *Icteria virens*	CDFW: Species of Special Concern (nesting) MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Riparian woodland, with a dense undergrowth.	Yes	Known to Occur – Low Potential for breeding within the BSA. Breeding habitat is marginal within the BSA; however foraging habitat does exist. This species likely only uses the BSA as stopover habitat during migration. Records as recently as 2010 are documented (eBird 2014).
southern California rufous-crowned sparrow *Aimophila ruficeps canescens*	CDFW: Watch List MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Grassy or rocky slopes with open scrub at elevations from sea level to 2,000 feet. Occurs mainly in coastal sage scrub.	No	Known to Occur – Historically detected within the BSA (Coastal Environments 2000). Nearest recent observation of this species is approximately 3.5 miles east of the BSA (eBird 2014).
Bell's sage sparrow *Amphispiza belli belli*	USFWS:BCC CDFW: WatchList MHCP/NCCP: Covered City Oceanside: Covered	Occurs mainly in coastal sage scrub and chaparral habitats.	No	Not Expected – Typical habitat to support this species does not occur within the BSA. It may occur as a very rare migrant within the BSA.
Belding's savannah sparrow *Passerculus sandwichensis beldingi*	CDFW: Endangered City MHCP: Covered MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Locally common in open grassy or weedy areas throughout San Diego County.	Yes	Known to Occur – Historically known to breed within the BSA (Zembal 2010).
large-billed savannah sparrow *Passerculus sandwichensis rostratus*	CDFW: Species of Special Concern (wintering) MHCP/NCCP: Covered City Oceanside: Covered City Carlsbad: Covered	Found along beaches and shores with marsh habitat.	No	Low – Records from as recently as 2014 from Del Mar boat basin on Camp Pendleton, approximately 4 miles northwest of the BSA (eBird 2014). Does not breed in San Diego County (Unitt 2004).
grasshopper sparrow *Ammodramus savannarum perpallidus*	CDFW: Species of Special Concern (nesting)	Arid grasslands with shrubs.	No	Not Expected – Typical habitat to support this species does not occur within the BSA. It may occur as a very rare migrant within the BSA.

Common Name **Scientific Name**	**Sensitivity Status^1**	**Habitat Requirements**	**Potential to Breed within BSA**	**Probability of Occurrence**
Brewer's Sparrow *Spizella breweri*	USFWS: BCC	Closely associated with sagebrush, preferring dense stands broken up with grassy areas.	No	Low – Historically detected within the BSA (eBird 2014). May occur as a rare migrant or winter visitor.
summer tanager *Piranga rubra*	CDFW: Species of Special Concern (nesting)	Inhabits the Mojave Desert and riparian woodlands that contain dense cotton wood canopy, Winters in the coastal lowlands.	No	Known to Occur –Detected during the winter season within the BSA as recently as 2011(eBird 2014). Known to winter within the BSA (Unitt 2004).
tricolored blackbird *Agelaius tricolor*	USFWS: BCC CDFW: Species of Special Concern (nesting)	Freshwater marshes with cattails and other emergent vegetation.,	No	Known to Occur – Historically detected as a migrant and a winter visitor (eBird 2014). No nesting colonies are known within the BSA (Unitt 2004).
yellow-headed blackbird *Xanthocephalus xanthocephalus*	CDFW: Species of Special Concern (nesting) City MHCP: Covered	Freshwater marshes with cattails and other emergent vegetation, Nests in deeply flooded freshwater marshes.	No	Low –Only one known nesting colony in San Diego County at Tule Lake (Unitt 2004). This species may be a migrant or winter visitor to the BSA.
Lawrence's goldfinch *Carduelis lawrencei*	USFWS: BCC	Typical nesting habitat is dry and open woods that are near both brushy areas and fields of tall annual weeds, usually within half a mile (0.8 km) of a small body of water.	No	Known to Occur – Detected during monthly bird counts. A nomadic species and typically rare along the coast. May be encountered during migration and as a winter visitor. Observed as recently as 2012 in the winter season (eBird 2014).
Mammals				
Mexican long-tongued bat *Choeronycteris mexicana*	CDFW: Species of Special Concern	In San Diego County, this bat species occurs primarily in urban areas. In Arizona and Mexico, the species is found in deep canyons and in the mountains, foraging in riparian, desert scrub, and pinyon-juniper habitats, in particular on *Yucca* sp.	Yes	Moderate – Suitable breeding and foraging habitat for this species is present within the BSA.
California (western) mastiff bat *Eumops perotis californicus*	CDFW: Species of Special Concern City MHCP: Covered	Chaparral, live oaks, and arid, rocky regions. Requires downward-opening crevices.	No	Low – Habitat within the BSA is not consistent with habitat requirements of the species. May forage within the BSA during migration

Common Name **Scientific Name**	**Sensitivity Status**[1]	**Habitat Requirements**	**Potential to Breed within BSA**	**Probability of Occurrence**
California leaf-nosed bat *Macrotus californicus*	CDFW: Species of Special Concern	Preferred habitats are caves, mines, and rock shelters.	No	Low – Habitat within the BSA is not consistent with habitat requirements of the species. May forage within the BSA during migration
pocketed free-tailed bat *Nyctinomops femorosaccus*	CDFW: Species of Special Concern	Rugged cliffs, rocky outcrops, and slopes in desert shrub and pine oak forests.	No	Low – Habitat within the BSA is not consistent with habitat requirements of the species. May forage within the BSA during migration
pallid bat *Antrozous pallidus*	CDFW: Species of Special Concern NCMSCP: Covered	Deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect them from high temperatures.	Yes	Moderate – Suitable breeding and foraging habitat exists within the BSA.
Western yellow bat *Lasiurus xanthinus*	CDFW: Species of Special Concern	Found in valley foothills riparian, desert riparian, desert wash, and palm oases. Forages among trees and over water. Roosts in trees.	Yes	High – A historic record in CNDDB is present; however, it is unclear where in the Carlsbad/Oceanside area the record occurred.
Big free-tailed bat *Nyctinomops macrotis*	CDFW: Species of Special Concern	Pinyon-juniper and Douglas fir forests, chaparral and oak forests in rugged, rocky habitats, low-lying arid areas.	No	Low – Habitat within the BSA is not consistent with habitat requirements of the species. May forage within the BSA during migration
Townsend's (western) big-eared bat *Corynorhinus townsendii pallescens*	CDFW: Species of Special Concern NCMSCP: Covered City MHCP: Covered	Coastal conifer and broad-leaf forests, oak and conifer woodlands, arid grasslands and deserts. Most common in mesic sites with caves or other roost cavities.	No	Low – Large trees have potential to support roosting bats
western red bat *Lasiurus blossevillii*	CDFW: Species of Special Concern	Feeds over grasslands, shrublands, open woodlands, forests, and croplands. Roosts primarily in trees and at times, shrubs, often in edge habitats along streams, fields, or urban areas.	Yes	Known to Occur- Historically detected
Spotted bat (*Euderma maculatum*)	CDFW: Species of Special Concern	Occurs in foothills, mountains, grasslands, and deserts in southern California.	Yes	Low – Large trees have potential to support roosting bats
San Diego black-tailed jackrabbit *Lepus californicus bennettii*	CDFW: Species of Special Concern MHCP/NCCP: Covered City Oceanside: Covered	Typical habitats include early stages of chaparral, open coastal sage scrub, and grasslands near the edges of brush.	Yes	Moderate – Historically recorded within BSA

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Potential to Breed within BSA	Probability of Occurrence
Dulzura California pocket mouse *Chaetodipus californicus femoralis*	CDFW: Species of Special Concern	Slopes covered with chaparral and live oaks.	No	Low – Habitat to support this species does not occur within the BSA
northwestern San Diego pocket mouse *Chaetodipus fallax fallax*	CDFW: Species of Special Concern MHCP/NCCP: Covered City Oceanside: Covered	Inhabits coastal sage scrub, sage scrub/grassland ecotones, and chaparral communities.	Yes	Moderate – This species was historically detected
southern grasshopper mouse *Onychomys torridus Ramona*	CDFW: Species of Special Concern	This species inhabits a variety of low, open and semi-open scrub habitats, including coastal sage scrub, mixed chaparral, low sagebrush, riparian scrub, and annual grassland with scattered shrubs.	Yes	Moderate – This species was historically detected
Pacific pocket mouse *Perognathus longimembris pacificus*	USFWS: Endangered CDFW: Species of Special Concern City MHCP: Covered	Plant communities suitable for the Pacific pocket mouse consist of shrublands with firm, fine-grain, sandy substrates in the immediate vicinity of the ocean. These communities include coastal strand, coastal dunes, river alluvium, and coastal sage scrub growing on marine terraces.	No	Low – Suitable habitat to support this species does not occur within the BSA
Pallid San Diego pocket mouse *Chaetodipus fallax pallidus*	CDFW: Species of Special Concern	Found in deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect them from high temperatures.	No	Not Expected
Stephen’s kangaroo rat *Dipodomys stephansi*	USFWS: Endangered CDFW: Threatened MHCP/NCCP: Covered City Oceanside: Covered	Within its range, Stephens' kangaroo rat occurs at elevations below about 610 m (2000') in flat or gently rolling, often degraded, annual grassland. Trapping showed that it is associated with locations where grass cover and bare ground are abundant but where bush and rock are uncommon.	No	Not Expected

Common Name **Scientific Name**	**Sensitivity Status**[1]	**Habitat Requirements**	**Potential to Breed within BSA**	**Probability of Occurrence**
San Diego desert woodrat *Neotoma lepida intermedia*	CDFW: Species of Special Concern	Common to abundant in Joshua tree, piñyon-juniper, mixed and chamise-redshank chaparral, sagebrush, and most desert habitats.	No	Low – Habitat to support this species within the BSA is very minimal
American badger *Taxidea taxus*	CDFW: Species of Special Concern	Coastal sage scrub, mixed chaparral, grassland, oak woodland, chamise chaparral, mixed conifer, pinyon-juniper, desert scrub, desert wash, montane meadow, open areas, and sandy soils.	No	Not Expected.
mountain lion *Felis concolor*	CDFW: Legally protected species MHCP/NCCP: Covered City Oceanside: Covered	Rugged mountains, forests, deserts, and swamps.	No	Not Expected.
southern mule deer *Odocoileus hemionus fulginata*	CDFW: Harvest species MHCP/NCCP: Covered City Oceanside: Covered	Coniferous forests, desert scrub, chaparral, and grassland with shrubs.	No	Low – Historically detected.

[1] **Sensitivity Status Key**

Federal	U.S. Fish and Wildlife Service (USFWS)
State	California Department of Fish and Wildlife (CDFW)
City: Covered	Draft City of Oceanside Subarea Plan Proposed Covered Species, and or, City of Carlsbad Subarea Plan Covered Species
MHCP/NCCP Covered	Draft North County MSCP Proposed Covered Species

APPENDIX H

LIGHT-FOOTED CLAPPER RAIL MANAGEMENT, STUDY, AND PROPAGATION IN CALIFORNIA, 2009

State of California
Natural Resources Agency
Department of Fish and Game
Wildlife Branch

Light-footed Clapper Rail Management, Study, and Propagation in California

2009 Season

By
Richard Zembal, Susan M. Hoffman, John Konecny
Laurie Conrad, Charles Gailband, and Michael Mace

Nongame Wildlife Program, 2010-07

Final Report

To

State of California
Department of Fish and Game
South Coast Region
4949 Viewridge Avenue
San Diego, CA 92123

Light-footed Clapper Rail Management, Study, and Propagation in California

2009 Season

Richard Zembal, Susan M. Hoffman, John Konecny
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Prepared 21 January 2010

State of California
Natural Resources Agency
Department of Fish and Game

Light-footed Clapper Rail Management, Study, and Propagation in California
2009 Season[1]

by

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ABSTRACT

The thirtieth annual census of the Light-footed Clapper Rail in California was conducted from the 22nd of February to the 13th of May 2009. Thirty coastal wetlands were surveyed by assessing call counts from Carpinteria Marsh in Santa Barbara County, south to Tijuana Marsh National Wildlife Refuge (NWR) on the Mexican border.

A total of 320 pairs of Light-footed Clapper Rails exhibited breeding behavior in 16 marshes in 2009. This is a 37% increase over the breeding population detected in 2008, but 28% lower than the high count in 2007. Upper Newport Bay with 148 pairs was once again the largest subpopulation in California with 68% more rails exhibiting breeding behavior than in 2008 and only 15% fewer than the high count found in 2005 of 174 pairs. Tijuana Marsh NWR did not recover significantly toward the record high level of 142 pairs in 2007 but did increase from 2008 by 21% to 57 breeding pairs in 2009. The Newport subpopulation comprised 46.3% of the state population in 2009 and the subpopulation in the Tijuana Marsh NWR comprised 17.8%, together accounting for 64.1% of the breeding population of this rail in California.

Ten of the small subpopulations increased in size from the 2008 totals by a combined total of 28 breeding pairs in 2009. The subpopulation in Batiquitos Lagoon reached a new total high of 26 breeding pairs. Three of the smaller subpopulations were reduced by one to nine pairs. Point Mugu increased by 80% to nine pairs and the Seal Beach tally was up slightly to19

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[1] Zembal, R., S.M. Hoffman, J. Konecny, L. Conrad, C. Gailband, and M. Mace. 2010. Light-footed Clapper Rail Management, Study, and Propagation in California, 2009. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report, 2010-07. Sacramento, CA 31pp.

pairs. Buena Vista Lagoon had an all-time high count of nine breeding pairs in 2008 and 2009. Excluding the two largest subpopulations, there were three subpopulations in the double figures, ranging from 12 to 26 pairs and totaling 57 breeding pairs or 17.8% of the state total. The remaining 11 subpopulations ranged from one to nine pairs and totaled 58 breeding pairs of clapper rails, or 18.1% of the total.

Additional nesting activity was observed in seven of nine breeding territories at Point Mugu. Incubation nests were found in six territories, chicks were sighted in two territories, and there was evidence of chick feeding in five territories. On the Seal Beach NWR there were 19 clutches of eggs laid on 15 rafts and 28 brood nests were built on 27 rafts. Overall nesting success was 92%. Nest searches at Upper Newport Bay revealed six incubation nests: three were active incubation nests; the eggs in one of those three were infertile; and three were depredated by raccoons, *Procyon lotor*. Four eggs were taken from Newport to augment the captive flock in spite of limited Newport nesting and heavy egg losses to raccoons. At the Kendall-Frost Reserve nine of 16 rafts held nests with 10 clutches of eggs, of which eight hatched. Finally, in Sweetwater Marsh NWR there was no use of the nesting rafts, five new rafts were placed but at least one of three bird pairs nested successfully evidenced by the sighting of chicks with their parents.

Four of six captive pairs laid eggs in 2009. As a result, 42 Clapper Rails were released to the wild, five at Point Mugu, five in the Seal Beach NWR, seven at UC Kendall-Frost Reserve, 16 into San Elijo Lagoon, and nine into Los Penasquitos Lagoon. This brings the total number of rails released to the wild since 2001 to 252.

There were trapping and banding sessions at Upper Newport Bay, Seal Beach NWR, and Tijuana Slough NWR. Two males were captured at Newport, banded and released and the single female captured in Tijuana Marsh was taken into captivity at Sea World. All of the captive-reared rails released to the wild were banded. The annual banding code for 2009 was a gold anodized band on the birds left leg. There were multiple sightings of banded rails, of particular interest were: a breeding female banded in 2007 and sighted with three chicks in 2009 in Los Penasquitos; a rail banded in 2007, probably at Point Mugu sighted in 2009 on the Seal Beach NWR; and another banded rail sighted well above Point Mugu at the Vern Freeman Diversion on the Santa Clara River.

INTRODUCTION

The Light-footed Clapper Rail (*Rallus longirostris levipes*) is a state and federally listed endangered species that is resident in coastal wetlands in southern California and northern Baja, California, Mexico. Loss and degradation of habitat threaten the continued existence of this bird, in spite of ongoing management efforts. The California population of this endangered rail was at a former high of 325 pairs in 15 marshes in 1996, the largest number detected breeding since statewide annual surveys were begun in 1980 until 2004 when 350 pairs were detected in 15 marshes. Since then there were annual increases reaching the record high in 2007 when 443 breeding pairs were detected within the 19 marshes. There was a population crash in 2008 followed by a 37% recovery in 2009 with 320 breeding pairs observed.

One of the first major investigations of this rail identified the lack of suitable nesting habitat as a major, widespread limiting factor (Massey and Zembal 1980). Subsequent work demonstrated the need for emergency actions and recommended management strategies to stem the alarming population decline of this endangered bird in southern California. The actions taken have included: 1) habitat restoration, particularly through enhancement of tidal action to former wetlands; 2) study and control of introduced predators and unnaturally high predator populations; 3) provision of nesting sites in marshes with good habitat but limited options for protected nesting locations; 4) studies that have led to adaptive management strategies, benefiting the rail and the other co-inhabitants of these biologically rich ecosystems; 5) development of a protocol for captive breeding and genetic and demographic augmentation of smaller subpopulations; and 6) surveys of the California population, in part to track the effects of management on annual recruitment.

Implementation of these measures has succeeded in protecting and maintaining most of the small subpopulations and in supporting the expansion of a few. However, the benefits of this attention go far beyond this single species. These endangered birds thrive in our most productive, remaining coastal wetlands. Measures that benefit this rail and its environs enhance conditions for a myriad of other species as well, including people. These places and their wildlife are cherished by hundreds of thousands of southern Californians for their inherent aesthetic, recreational, economic, scientific, educational, and ecological values. Furthermore, there are essential links between the coastal wetlands and vast acres of diverse upland habitats and wildlife located many miles from the coast (Soule et al. 1988, Zembal 1993). Consequently, restoring and maintaining the diversity and vital productivity of the coastal wetlands, while achieving the recovery of the Light-footed Clapper Rail, may only be possible in an environment that includes coastal southern California’s complete wildlife heritage.

Hundreds of wetland acres have undergone, or are being planned for restoration. However, full recovery and functionality of coastal wetland habitats may take decades to achieve. In the meantime, habitat suitability for the clapper rail may be quite marginal. All but a few of the current subpopulations of Light-footed Clapper Rails depend upon a marginal habitat base and are too small to be expected to maintain themselves without management.

Population monitoring and management efforts are essential in stewardship of this critically endangered bird toward recovery. Reported herein are the results of the 2009 survey, management, and propagation efforts for the Light-footed Clapper Rail.

Study Areas

Descriptions of all the marshes recently occupied by Light-footed Clapper Rails are available (U.S. Fish and Wildlife Service 1985 and Zembal and Massey 1981). Three of the current principle study areas are at the Naval Air Station Point Mugu (NASPM, also Point Mugu), the Seal Beach NWR, and Upper Newport Bay State Ecological Reserve.

The marsh at Point Mugu is located in southeastern Ventura County on the 1,821 ha (4,500 acre) NBVC, about 13 km (8 miles) west of the Los Angeles County line. There are 1,012 ha (2,500 acres) of jurisdictional wetlands in Point Mugu (USACOE/EPA 1994), including the largest functioning salt marsh in coastal southern California today. Considering the combined acreages of marshes that are regularly occupied, the vegetated marsh and most closely associated habitats at Mugu Lagoon represent more than 25% of the clapper rail's potential habitat base. The marsh is subject to nearly full tidal action in the central and eastern arms with an amplitude of about nine ft. The tides are dampened by constrictions at Laguna Road and farther west, resulting in a tidal amplitude of only four to five feet. The wetland vegetation is dominated by pickleweed (*Salicornia virginica*) but scattered stands of spiny rush (*Juncus acutus* ssp. *leopoldii*) are critical for rail nest placement.

The Seal Beach NWR covers 369 ha (911 acres) of the 2,024 ha (5,000 acre) Seal Beach Naval Weapons Station in Orange County near the City of Seal Beach. About 299 ha (739 acres) of the refuge lands are subject to regular inundation by the tides. There are about 229 ha (565 acres) of salt marsh vegetation, 24 ha (60 acres) of mudflats that are exposed daily, and 46 ha (114 acres) of channel and open water. The wetlands are fully tidal, with a range of about -0.5 m (1.7 ft) to + 2.2 m (7.2 ft) MLLW, and very productive with a high diversity and abundance of wildlife.

Upper Newport Bay is an Ecological Reserve of the California Department of Fish and Game (CDFG), located approximately 22 km (13.7 mi) down coast of the Seal Beach NWR. Approximately 304 ha (750 acres) are fully tidal, including 105 ha (260 acres) of marsh. The bay is bordered by bluffs, nine - 18 m (30 - 59 ft) high, and surrounded by houses and roads. There are approximately 100 ha (247 acres) of shrublands remaining undeveloped on the edge of the wetlands and two local drainages with some cover along them coursing into the bay.

METHODS

Population Assessment

The thirtieth consecutive annual census of Light-footed Clapper Rails in California was conducted from February 22 through May 13, 2009. Thirty coastal wetlands were surveyed by mapping territorial pairs based on their calls (Zembal and Massey 1981, 1985; Zembal 1992). All of the coastal marshes with known or suspected rail subpopulations were surveyed until an evening or early morning with good calling activity was encountered. Small wetlands with no recent clapper rail sightings that again yielded negative results were surveyed at least twice as were marsh parcels with lower than expected results on the first call count. Additionally, nesting data were considered in the assessment of the subpopulations inhabiting the three wetlands wherein such data were gathered in 2009. A pre-nesting high tide count was accomplished on November 12, 2008 on the Seal Beach NWR followed by a post-nesting high tide count on November 3, 2009. This NWR is the only wetland inhabited by clapper rails that is inundated thoroughly enough during a 6.5 ft. tide or higher to get a relatively complete visual survey of the rails.

In the two marshes with abundant clapper rails, mapping spontaneous calls was the prevalent technique. In marshes with fewer rails and along long, narrow strips of habitat, playbacks of taped "dueting" were used sparingly to elicit responses. In the Tijuana Marsh NWR, enough observers were stationed within potential hearing range of any calling rail to cover the entire marsh on a single evening. However, most of the marshes were surveyed by a single observer visiting discrete patches of habitat on consecutive evenings until all available habitat had been covered. Most of the observations were those of three observers, but primarily the principal investigator. Additional observers participated primarily in three of the year 2009 counts, those at Seal Beach NWR, Tijuana Slough NWR and Sweetwater Marsh NWR.

The more movement required of an observer during a survey, the more likely that breeding, but infrequently calling, rails would be missed. Calling frequency and the detection of calls are influenced by the observer's hearing ability and experience with the calls, the stage of breeding of individual pairs, rail density, and weather conditions (Zembal and Massey 1987). Many surveys attempted on stormy, windy days needed to be repeated. When calling frequency is high with many rounds of calling as adjacent pairs respond to one another, it is possible to map the rails accurately and move on to survey more marsh. However, under usual circumstances approximately 20 ha (50 acres) of marsh can be adequately covered during a single survey.

Surveys are usually conducted in the two hours before dark, but some are done at first light to about two hours after sunrise. In the past, early morning and late evening surveys have been comparable, although evening calling by the rails is more intense and often ends with one or more flurries of intense calling (Zembal et al 1989).

The playback of a taped "clappering" call appears to elicit behavior from the rails as if a living pair is calling nearby. However, work done with Yuma Clapper Rails (*Rallus longirostris yumanensis*) strongly suggests that this closely related species can become conditioned to the tape if it is used excessively (B. Eddleman, pers. comm.). During prime calling times in the evening or early morning, a playback sometimes elicits a single response or a round of calling. However, there are sometimes no vocal responses to the tape occur. If played at a time of day when the rails are not particularly prone to call, the only response likely to be elicited is territorial behavior. Sometimes the response is non-vocal investigation by the pair or one member. Repeated playbacks are likely to elicit aggression. When used only once per year at a given marsh and with minimal repetition, playbacks have yielded important results. Unmated clapper rails, for example, often respond at considerable distances and may approach the tape. Isolated single rails often approach very closely and remain in the vicinity unless displaced.

In assessing the rail population, duets and some single "clapperings" were treated as territories. Since advertising singles are not indicative of an occupied territory with reproductive potential at the time of the survey, they are not included in the population total. However, a single “clappering” is as good an indicator of a territory as a duet, when advertising is not heard later from the same territory because during a two to four hour census period, pairs often dueted from territories where only single pair members had called earlier. However, the fewer rails in a marsh, the more important it is to count only duets as pairs to avoid over-estimating the breeding subpopulation.

The 2009 call counts were conducted on 27 days and totaled approximately 312 field-hours.

Management and Monitoring of Nesting Sites

Fleischer et al (1995) documented low genetic variability in Light-footed Clapper Rails and recommended translocations from larger to small subpopulations for the inherent genetic and demographic benefits. We are still vigilant for potential translocation opportunities with eggs but have mostly used captive-bred juveniles in recent years (see below).

A review of the literature and examination of the feasibility of translocation was completed for this rail (Hoffman 1995). A maximum of nine males and six females were proposed in that study for translocation from Newport to Seal Beach NWR. This is a lower number than usually proposed for translocation but might represent a reasonable approach, given the rarity of this rail. In 1997, for example 15 rails equaled 5% of the breeding population at Upper Newport Bay (Table 1). Moving 15 adult rails from Newport to each of the five marshes represents moving 25% of this largest subpopulation. That is more birds than should be moved in a single year. We proposed to move fewer, up to 10 rails each to as many of the target marshes as possible each year. It should be noted that there is some precedence for positive results, even with very low numbers of relocated birds. For example, translocations of Red-cockaded Woodpeckers (*Picoides borealis*) have involved only one to four birds and resulted in successful breeding and recruitment (Allen et al. 1993).

Potential egg translocations necessitated nest searching and monitoring at Upper Newport Bay and the five marshes to potentially receive eggs. Nest searches and observations were begun in February and continued into July 2009. The activities were conducted as they have been in the past (Massey and Zembal 1980, Massey et al. 1984). Extreme care was taken to minimize visitation and disturbance.

Nest searches at two of the six wetlands potentially involved in translocations were focused mostly on the artificial nesting rafts deployed in them for the rails. Three other wetlands used to have rafts deployed, maintained, and monitored annually in each but the efforts were abandoned because of low use. Point Mugu was one such marsh; 25 floatable rafts were deployed there in 1988. However, there was never any evidence that the rails used the rafts until recently (see below). Although many marshes occupied by rails suffer from a poor supply of good nesting sites, artificial nesting rafts have been used by the birds in only four of seven marshes where they have been installed. Those four and the number of rafts in each during the 2009 season were Point Mugu with 10 rafts (five of which were installed in May, 2009), the Seal Beach NWR with 87 rafts, Kendall-Frost Reserve with 16 rafts, and Sweetwater Marsh NWR with five rafts. The rafts in Kendall-Frost and Seal Beach were refurbished in February and early March and visited approximately every three weeks during the breeding season into July. The rafts at Point Mugu and Sweetwater NWR were visited five and two times, respectively. Raft maintenance and monitoring involved a minimum of 281 field-hours.

A new nest raft design and cover were deployed in 2008 and 2009. The raft looks like a small palette measuring 33 in X 24 in. The top is made of four 1in X 6 in pine boards and the sides and two bottom slats are of 1 in X 3 in boards fastened perpendicular to the top and forming three compartments on the underside of the raft that hold Styrofoam for flotation. The raft is anchored in the marsh by ¾ in pvc fastened to the middle of the long sides and extending 62 in from each side to a cross bar of pvc that is anchored with two 70 in long pieces of 3/8 in rebar driven at an angle into the mud. The covers were woven willows and reeds or constructed of a pvc and wire cage covered in quack grass. The cover was fastened with wood screws and plastic ties. This new design eliminates the upright dowels, potential raptor perching thereon, and renders the rafts less conspicuous in the marsh.

Nest searches and monitoring were focused at Upper Newport Bay, Point Mugu, Seal Beach NWR, Kendall-Frost Reserve, and there were three searches in Tijuana Slough NWR in 2009. At Upper Newport Bay seven field days performed in the months of March through June by four observers resulted in a total of 84 field-hours of nest searching and observation. There were 12 dates at Point Mugu by one to eight participants and 184 field-hours. On the Seal Beach NWR two to five observers accumulated 160 field-hours over 20 days. There were 54 field-hours spent at the Kendall-Frost Reserve by one to 22 observers over five days. Lastly, in Tijuana Slough one to 14 observers expended 59 field-hours nest searching over three days. The nesting and other bird activities at Sweetwater Marsh, the Chula Vista Nature Center, Sea World, and the Wild Animal Park were monitored daily by one to seven observers totaling in hundreds of hours.

Development of a Protocol for Captive Breeding

A wetland aviary was developed at the Chula Vista Nature Center (CVNC or Chula Vista), adjacent to the Sweetwater Marsh NWR to house Clapper Rails and develop a protocol for breeding (Bayfront Conservancy Trust 1995). The first pair of rails was taken into the facility in December 1998. The second pair was taken into captivity in November 2000 and young Light-footed Clapper Rails were produced in captivity for the first time in 2001. Any eggs produced by these captive rails were to be used in the egg translocation efforts or hatched and reared in captivity, preferably by the parents and released into Point Mugu. However, because 28 of 60 captive-reared and released rails had been from one breeding pair, 2001 – 2003, care had to be taken not to genetically swamp the Mugu rails. Consequently, there were four other marshes where captive-reared young could be released initially and five more that were added in 2004 and 2005 (Zembal et al. 2005).

There were six potential breeding pairs in captivity in 2009, two pairs at each of the three facilities. The CVNC housed rails #208/052 and 219/217; Sea World held #089/218 and 359/366 (formerly 155/091); and the Wild Animal Park kept #206/209 and 207/246. The male #208 was banded 103544891 (L) at Newport on October 8, 2005 and mated with female #052 captured from Newport on September 20, 2002. The pair 219/217 were hatched at Sea World on May 23 and 15, 2006, respectively from eggs taken from two different nests at Upper Newport Bay. The male #089 was hatched at Sea World on June 3, 2003 from a Newport egg and mated to #218, a Sea World hatchling on May 22, 2006 from an egg taken from Newport. The pair #155/091 were hatched at Sea World on June 13, 2004 and June 5, 2003, respectively from Newport eggs; 155 was retired on August 5 and 091 was found dead on March 26. The male 359 was hatched from a Newport egg at Sea World on June 19; the female 366 was trapped from Tijuana Estuary on October 5. The male #206 was taken from Newport on September 18, 2005 and mated to #209, another Newport capture from November 29, 2005. The male #207 was trapped from Newport on September 19, 2005 and mated to #197 from a Newport egg hatched at Sea World on May 19, 2005. The female #197 was the only casualty during fire evacuation at the Wild Animal Park and was replaced with a female # 246 captured at Upper Newport Bay on November 25, 2007 and banded #103544924.

We attempt to mix the genetic stock of the captive breeders by adding new rails hatched from Newport eggs collected annually when possible. Sometimes adults are trapped from Newport and added to the captive flock. In 2009 reproduction was mediocre in Newport and depredation by raccoons was still a major issue. Even so, on June 8, four eggs were taken into captivity by removing two eggs from two Newport nests. They were incubated and hatched at Sea World.

Rail chicks that are hand-reared at Sea World are transferred from the hatcher to a brooder box in which the temperature is maintained at 88 – 90° F for the first week, and then gradually decreased to ambient. A recording of outdoor marsh sounds was played in the background. Chicks are fed with a puppet to avoid imprinting. Food items include finely cut lettuce, cricket abdomens, graduating to whole live crickets. As the chicks grow diets change to guppies, herring filets, pieces of capelin without bones or scales, krill with tails and heads removed, live meal worms and wax worms with heads removed, live black and red worms, pinkies, mussels, and "rail mix". Rail mix was composed of Mazuri waterfowl starter, soaked dry dog food, and hard-boiled eggs. Food items were sprinkled with vitamins and fed hourly. As the chicks grew, the commercial diet was phased out and replaced with live foods plus thawed frozen fish and krill. At eight to ten days old the chicks were moved from the brooder boxes to the indoor runs. The runs were lined with dirt and planted with plenty of cover. At one month the young rails were moved to the "conditioning" pens at the Nature Center to prepare for release into the wild. The Sea World diet and protocol was appended to the 2005 annual clapper rail report (Zembal et al. 2005); there were refinements made to the protocol again in 2009.

In 2009, one to four observers monitored the captive rails from several minutes to many hours daily at the Chula Vista Nature Center, Sea World, and Wild Animal Park. Forty thousand visitors were given the opportunity to view the rails at Chula Vista, hear about their plight, and the importance of their ecosystem. The rails at Sea World were incorporated into the educational program curriculum there in 2007 and approximately 15,000 students observed and studied them; the rails at the Wild Animal Park have been isolated from visitor contact as were the Sea World rails in 2008 and 2009.

Banding and Telemetry

Trapping and banding sessions were conducted at Seal Beach NWR, Upper Newport Bay, and Tijuana Marsh in 2009. In the Seal Beach NWR eight participants deployed 20 traps for three hours on October 7. At Newport, eight participants monitored 18 traps for three hours on October 6. In Tijuana Slough on October 5, seven biologists monitored 18 traps for three hours. The primary purpose for trapping at Newport has been to refresh the captive flock. Preferably, old breeders are replaced with young raised from wild eggs, alleviating the need for trapping.

All of the 42 Clapper Rails raised in captivity and released to the wild in 2009 were banded (see Zembal and Massey 1983 for a full discussion of trapping and banding techniques). Five rails were put into Point Mugu on August 25; five into Seal Beach NWR on August 25; 16 into San Elijo Lagoon on June 16; nine into Los Penasquitos on July 22; and seven into Kendall-Frost Reserve on October 27. The annual code for 2009 was an anodized gold metal band on the left leg; the Service band was placed on the right leg. USFWS band numbers on the rails released to Point Mugu were #1065-39860 – 1065-39862 and 1065-39867-868; into the Seal Beach NWR were #1065-39863 – 1065-39866 and 1065-39869; to San Elijo Lagoon were # 1065-39835 – 1065-39850; into Los Penasquitos Lagoon were #1065-39851 – 1065-39859; and into Kendall-Frost Reserve were #1065-39873 – 1065-39878 and #1035-44881. Two males were captured in Upper Newport Bay, banded only with Service bands #1065-39871 – 1065-39872, and immediately released at the points of their captures. A single female was captured in the Tijuana Marsh, banded only with Service band #1065-39870 and taken into captivity at Sea World (Acquisition LFCR 366).

RESULTS and DISCUSSION

A total of 320 pairs of Light-footed Clapper Rails exhibited breeding behavior in 16 marshes in 2009 (Table 1). This is a 37% increase over the breeding population detected in 2008, but 28% lower than the high count found in 2007. The state total has been smaller than in 2009 in 24 of the 30 years on record. The subpopulation in Upper Newport Bay was once again the largest in California up by 68% from the crash in 2008 but lower by 15% than the record year in 2007. The Tijuana Marsh NWR subpopulation recovered slightly from the low in 2008 with an increase of 21% to 57 nesting pairs but well below the record level of 142 pairs in 2007. The Newport subpopulation comprised 46.3% of the state total in 2009 and the Tijuana Marsh NWR subpopulation comprised 17.8%, together accounting for 64.1% of the breeding population of the Light-footed Clapper Rail in California. In addition, five marshes held nine to 26 pairs each for a combined total of 75 pairs or 23.4% of the state total.

The drought continued through the spring of 2009. Vocalizing was stronger than in 2008 but was still weaker than in the past. As in several recent years, particularly in 2008, many surveys were re-scheduled due to poor calling activity in 2009. Calling from many sites was poor during each of several visits.

Six egg nests were found in 2009 in Upper Newport Bay compared to two egg nests in 2008. Nests were examined in the same areas as former years by four observers over seven field-days and 84 field-hours. One of the two 2008 nests was depredated, the other was still active on July 17 which is later than the last re-nest date in usual years. In 2009, three of six egg nests were depredated and the eggs were not viable in a fourth. In 2007 intensive nest searches over 17 days, perhaps 100 acres, and 300 field-hours revealed only six incubation nests, four of which were depredated in the same areas that in 2006 held 24 nests, 12 of which were active egg nests when discovered. Nesting activity and hatching results have gravely deteriorated recently in Upper Newport Bay. There are raccoon (*Procyon lotor*) signs well out into the marsh, spanning the Bay. There was also evidence of stirring of sediments, habitat disturbance, and noise associated with the ongoing dredging activity. How this subpopulation rebounded and is maintaining its numbers is not clear.

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2009.

Part I: 1980 – 1989

Location	Number of Pairs Detected In:									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Santa Barbara County										
Goleta Slough	0	0	-	0	-	-	-	-	0	0
Carpinteria Marsh	16	14	20	18	26	7	4	5#	2#	0
Ventura County										
Ventura River Mouth	-	-	0	0	-	-	-	-	-	0
Santa Clara River Mouth	-	-	0	-	-	-	-	-	-	0
Mugu Lagoon	-	0	-	1	3	7	6	7#	7#	5

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2009.

(continued) **Part I: 1980 – 1989**

Location	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
	Number of Pairs Detected In:									
Los Angeles County										
Whittier Narrows Marsh	-	-	-	*	0	-	-	-	-	0
Orange County										
Seal Beach NWR	30	19	28	20	24	11	5	7	14	6#
Bolsa Chica	0	0	0	0	-	-	-	*	0	0*
Huntington Beach Wetlands	-	0	-	-	-	-	0	0	0	0
Upper Newport Bay	98	66	103	112	112	87	99	119	116	116
San Joaquin Reserve	-	-	5	4	1	2	1	0	0	0
Carlson Rd Marsh	-	-	5	4	2	0	0	1#	0	0
San Diego County										
San Mateo Creek Mouth	-	-	0	0	-	-	0	-	0	0
Las Pulgas Canyon Mouth	-	-	0	0	0	-	-	-	-	0
Las Flores Marsh	-	-	0	0	0	-	0	-	0	0
French Canyon Mouth	-	-	-	0	0	-	-	-	-	0
Cocklebur Canyon Mouth	-	-	1	0	0	-	-	0	0	0
Santa Margarita Lagoon	0	0	2	1	2	1	1	1	1	0
San Luis Rey River Mouth	-	-	0	0	-	-	0	0	0	0
Guajome Lake Marsh	-	-	0	1	2	0	0	0	0	0
Buena Vista Lagoon	0	0	0	*	0	-	-	-	0	0
Agua Hedionda Lagoon	1	2	1	7	6	1	0	0	0	0
Batiquitos Lagoon	0	0	0	0	0	-	-	-	-	0
San Elijo Lagoon	-	5a	4	4	10	1	0	2	5#	7#
San Dieguito Lagoon	-	-	-	-	-	-	-	*	0	0
Los Penasquitos Lagoon	-	0	-	0	0	-	0	-	1a#	0
Kendall-Frost Reserve	18	16	6	20	24	17	12	6a#	4a#	4#
San Diego River	-	3	1	2	2	1	0	0	1a#	0#
Paradise Creek Marsh	1	2	3	1	1	0	0	0	0	0
Sweetwater Marsh	4	5	7	6	14	3	9	5a#	5	5#
E Street Marsh	3	1	3	3	2	2	2	0a	1#	0
F Street Marsh	-	1	1	0	1	0	0	0	0	0
J Street Marsh	-	1	0	0	-	-	0	0	0	0
Otay River Mouth	3	4	5	3	5	1	1	0	0	0
South Bay Marine Reserve	3	3	1	1	2	1	1a	2#	5	5#
Dairymart Ponds	-	-	-	-	-	-	0	*	1a	0#
Tijuana Marsh NWR	26	31	25	41	38	0	2	23a#	14a#	15a#
Total: pairs	203	173	221	249	277	142	143	178	177	163
marshes	11	15	18	18	19	14	12	11	14	8

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2009.
(continued) **Part II: 1990 – 1999**

Location	Number of Pairs Detected In:									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Santa Barbara County										
Goleta Slough	0	0	0	0	-	-	0	0	-	-
Carpinteria Marsh	0	0	0	0#	0	2#	3#	5#	3#	2#
Ventura County										
Ventura River Mouth	0	0	0	0	0	0	0	-	0	-
Santa Clara River Mouth	0	0	0	0	0	0	0	-	0	-
Mugu Lagoon	6#	4#	5#	5	6#	5#	3#	4#	4#	4#
Los Angeles County										
Whittier Narrows Marsh	-	-	-	0	0	-	0	0	-	-
Orange County										
Seal Beach NWR	16	28	36	65	66	51#	52#	37#	16#	15#
Bolsa Chica	0#	0*	0#	0#	0*	0*	0*	0*	0*	0
Huntington Beach Wetlands	0	0	0	0	0	0	0	0	0	-
Upper Newport Bay	131	128	136	142	129	117	158	149#	105#	104#
San Joaquin Reserve	0	0	0#	0	0	0	0	0	-	0
Carlson Rd Marsh	0	0	0	0	0	0	0	0	-	0#?
San Diego County										
San Mateo Creek Mouth	0	0	0	0	0	0	0	-	-	-
Las Flores Marsh	0	0	0	0	0	0	0	-	-	-
Cocklebur Canyon Mouth	0	0	0	0	0	0	0	0	0	0
Santa Margarita Lagoon	0	0	0	0#	0	0	0	0#	0	0
San Luis Rey River Mouth	0#	0	1	0	-	0	0	0	0	0
Guajome Lake Marsh	0	0	0	0	-	0	0	0	-	-
Buena Vista Lagoon	0a#	2#	5	2#	3#	1#	6#	7#	4	5#
Agua Hedionda Lagoon	0	0	0	0	0	0	0	1?	1	0
Batiquitos Lagoon	0#	0#	0	1#	1#	0#	2	2	1	3
San Elijo Lagoon	5#	5	4#	6#	1#	3#	3#	8	3#	5#
San Dieguito Lagoon	0	0	0	0	0	0	0	0	0	-
Los Penasquitos Lagoon	0	0#	0#	0#	1	1	1	2	2#	2
Kendall-Frost Reserve	5#	9	11	5#	5#	4#	1#	2	2	4#
San Diego River	2	5	1a	5	5#	6b	5	5#	4	3
Paradise Creek Marsh	0	0	1a	0a	0	1	2	0	0	0
Sweetwater Marsh	2#	4a	4a	3a	7#	7	8	3#	4	3
E Street Marsh	0	1a	1a	1	0#	2	1	1	1	2
F Street Marsh	0	0	0	0	0	0	0	0	1	0
J Street Marsh	0	0	0	0	0	0	0	0	0	0
Otay River Mouth	0	0	0	0	0	1	3	3	2	1
South Bay Marine Reserve	5	2	3a	1	0	0	0	1#	1	0
Dairymart Ponds	0a#	0#?	0#	1a	0	-	-	-	-	-
Tijuana Marsh NWR	17a#	47a	67a	63a	64	61	77	77#	68#	80#

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2009.
(continued) **Part II: 1990 – 1999**

		Number of Pairs Detected In:									
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total:	pairs	189	235	275	300	288	262	325	307	222	233
	marshes	9	11	13	13	11	14	15	16	17	14

\- indicates that no census was taken.
* indicates a fall or winter occurrence.
\# indicates the detection of unpaired rails (used beginning in 1987).
a Paul Jorgensen Unpublished data; b 2 pairs are in Famosa Slough.

Table 1. Census of the Light-footed Clapper Rail in California, 1980 – 2009.
(continued) **Part III: 2000 – 2009**.

Location	Number of Pairs Detected In:									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Santa Barbara County										
Goleta Slough	-	0	0	0	-	-	-	-	0	0
Carpinteria Marsh	1#	1#	2	0#	0#	0	0	0	0	0
Ventura County										
Ventura River Mouth	-	-	0	0	-	-	-	-	0	-
Santa Clara River Mouth	-	-	0	0	-	-	-	-	0	-
Mugu Lagoon	7#	7#	10#	14#	19#	14#	17#	15#	5#	9#
Los Angeles County										
Whittier Narrows Marsh	-	-	0	-	-	-	-	0	-	0
Orange County										
Seal Beach NWR	10#	11#	24#	23#	16#	15#	21#	24#	17#	19#
Bolsa Chica	0	0	0*	0	0	0	*	*	*	*
Huntington Beach Wetlands	-	0	0	0	0	0	4#	4	1#	5#
Upper Newport Bay	150#	124#	129#	144#	165#	174#	158#	165#	88#	148#
San Joaquin Reserve	0	0	0	0	-	0	0	0	*	0
Carlson Rd Marsh	0#	0	0	0	-	0	0	0	0	0
San Diego County										
San Mateo Creek Mouth	0	0	0	0	0	-	-	-	0	-
Las Flores Marsh	0	0	0	0	0	-	-	-	0	-
Cocklebur Canyon Mouth	0	0	0	0	0	-	-	-	0	-
Santa Margarita Lagoon	0	0	1	2	1	2	1	1	1#	-
San Luis Rey River Mouth	0	0	0	0	0	0	0	0	0	0
Guajome Lake Marsh	0	-	-	0	-	-	0	0	0	-
Buena Vista Lagoon	5#	3#	6#	5#	5#	6#	8#	8#	9#	9#
Agua Hedionda Lagoon	2	2	1	4	5	4#	7#	4	7	6
Batiquitos Lagoon	2#	3#	3#	5	11	16#	19#	22	22	26#
San Elijo Lagoon	1#	1#	2	7#	7#	6#	15#	12#	5#	8
San Dieguito Lagoon	0#	0#	0	0#	6	12#	31#	15#	21#	12#
Los Penasquitos Lagoon	1	1	2	1#	2#	2	7#	12#	2#	4#
Kendall-Frost Reserve	4	4	5#	6#	14	14	5#	4#	2#	7

Table 1. Census of the Light-footed Clapper Rail in California, 1980 – 2009.
(continued) **Part III: 2000 – 2009**.

Location	Number of Pairs Detected In:									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
San Diego River	3#	4	6	6#	8#	5	4	6	4#	3
Paradise Creek Marsh	0	0	0	0	0	0	0	0	0	-
Sweetwater Marsh	2	3#	3#	1#	3#	1	4#	4#	3	5
E Street Marsh	2	0	1	1	0	0	2	1	0	0
F Street Marsh	0	0	0	0	0	0	0	0	0	0
J Street Marsh	1	0	0	1	0	0	0	0	0	0
Otay River Mouth	1	1	1	0	0	1	2	1	0	1
South Bay Marine Reserve	0	0	0	0	0	0	1	2	0	1
Dairymart Ponds	-	-	-	2	1	1	0	1	-	0
Tijuana Marsh NWR	61#	52#	78#	64#	87	87#	102#	142#	47#	57#
Total: pairs	253	217	274	286	350	360	408	443	234	320
marshes	16	14	16	16	15	16	18	19	15	16

- indicates that no census was taken.
* indicates a fall or winter occurrence.
# indicates the detection of unpaired rails (used beginning in 1987).

Tijuana Marsh's subpopulation was 87 pairs strong for two consecutive years prior to the 2006 high count of 102 breeding pairs, followed by an even higher record count of 142 pairs in 2007. That 40-pair increase in 2007 was never seen at any marsh except Upper Newport Bay; the 95 pair decrease in 2008 was simply unprecedented. This subpopulation had not been that small since 1991. The 10 pair increase in 2009 is better than the alternative but still renders this subpopulation smaller than during seven of the nine counts since 2000.

The rails increased gradually in Batiquitos Lagoon as the ecological functionality of the wetland continued to improve over time following the major restoration project implemented there in December 1996. The lagoon has remained tidal and rail habitat has been increasing and improving. Breeding rails were detected on the north side of the lagoon for the first time in 2004 and a total of 11 pairs were detected. Clapper Rail numbers grew to 22 pairs in 2007 and 2008 and Batiquitos Lagoon was the third largest subpopulation in the state in 2008. Then, in 2009, a new high of 26 pairs was reached. In 2009 there were seven breeding pairs vocalizing from habitat adjacent to the western tern island; six pairs along the north edge of the inner lagoon; 12 pairs along the southern edge; and a single pair again in the northeast corner of the basin just west of the freeway. The cordgrass in the west basin is extensive and looks vigorous, although much of it appears to be regularly over-washed. Finally, there was a single response to the tape from freshwater reeds on the southeast creek at Levante and El Camino Real.

The subpopulation of Light-footed Clapper Rail newly discovered in the San Dieguito River Valley in 2004, inland of the lagoon and El Camino Real, was first reported to be comprised of only six breeding pairs. That population estimate was probably low due to the lateness of the census and in 2005 there was evidence of at least 12 pairs, although this too was a conservative estimate. Finally in 2006, there was abundant calling indicative of at least 31 breeding pairs. This ranked San Dieguito as the third largest subpopulation of Light-footed Clapper Rails in 2006 and the largest ever reported in a freshwater marsh system. Calling was poor in 2007 when only 15 pairs were detected, but slightly better in 2008 resulting in a count of 21 pairs. Calling was the poorest yet in 2009 when the population estimate was only 12 pairs along with 13 advertising males. Additional Clapper Rail detections were reported from the San Dieguito Creek Watershed in 2009 along Lusardi Creek, the pond at 4S Ranch Community Park on Dove Creek Road, and at 4 Gee Road just north of Camino Del Sur.

The Seal Beach NWR subpopulation had been more than 20 pairs for several consecutive years up to 2007, based upon call counts augmented by raft nesting data. In 2008, the count was lower by seven pairs. Calling during the evening of the census was limited; therefore, the population estimate was based upon the nesting activity on the rafts. In 2009, the estimate is back up to 19 pairs based again, mostly upon nesting activity. With so much marsh available to the rails, a much larger breeding population is expected. Raptor predation is suspected to be limiting rail survival and raptor monitoring sessions have been reinitiated; high tide counts have also continued. Seal Beach is the only marsh currently occupied by Light-footed Clapper Rails that gets fully inundated during a high tide of about 6.5 ft (MLLW), or higher which would render the rails vulnerable due to reduced cover. Tides of this height occur regularly in the late summer usually in darkness and in the fall and winter in the early morning. The rails are forced onto debris or to the edge of the marsh near busy roads and where there is little cover exposing the rails to potential predation and vehicle collision. However, the completeness of inundation also allows fairly dependable surveying of the subpopulation outside of the breeding season. Accordingly, the rails were counted again from canoes before and after the 2009 breeding season; an attempted post-breeding high tide count was fogged out on November 3 and 50 rails were counted on December 1. The pre-nesting count was on 12 November 2008 and 20 individuals were sighted (Table 2).

Table 2. High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 - 2009.

Date	Tidal Height	Clapper Rails Counted	Breeding Pair Members		Notes
			Before	After	
2 Dec 1975	7.0	22	-	-	
31 Dec 1975	6.7	12	-	-	
21 Nov 1976	7.1	24	-	-	
20 Dec 1976	7.1	35	-	-	
21 Dec 1976	7.0	34	-	-	
10 Dec 1977	7.1	16	-	-	
11 Dec 1977	7.1	40	-	-	
18 Jun 1978	6.8	16	-	42	+6 youngsters

Table 2. High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 – 2009 (continued).

Date	Tidal Height	Clapper Rails Counted	Breeding Pair Members Before	Breeding Pair Members After	Notes
30 Nov 1978	6.7	38	-	42	
1 Dec 1978	6.7	32	-	42	
3 Sep 1979	6.4	20	42	60	Tide too low
3 Nov 1979	6.6	56	42	60	
2 Dec 1979	6.7	32	42	60	
3 Dec 1979	6.7	44	42	60	
21 Nov 1980	6.9	55	60	38	First red fox den found
29 Jun 1981	7.0	34	60	38	Tide too late, dark
12 Nov 1981	6.9	43	38	56	
29 Dec 1982	7.0	23	56	40	
18 Jan 1984	6.9	23	40	48	
21 Nov 1984	6.7	5	48	22	+ 7 red foxes
13 Nov 1985	7.1	2	22	10	+ 2 red foxes
12 Dec 1985	7.2	2	22	10	+ 2 red foxes
22 Nov 1988	6.9	6	28	12	128 red foxes removed in ‘88
16 Oct 1989	6.9	59	12	32	Record High Tide Count; 25 red foxes removed in 1989
5 Oct 1990	6.4	57	32	56	Tide too low
2 Nov 1990	6.8	69	32	56	Record High Tide Count
22 Nov 1991	6.9	98	56	72	Highest Population Total
26 Oct 1992	6.8	159	72	130	Highest Population Total
15 Oct 1993	6.8	143	130	132	Highest Population Total
4 Nov 1994	7.0	150	132	102	220 Red-tailed Hawks counted On the NWS on 11 December 1994
25 Oct 1995	6.5	53	102	104	Tide too low
22 Nov 1995	6.9	55	102	104	
10 Dec 1996	6.7	55	104	74	
17 Oct 1997	6.6	40	74	32	
30 Dec 1986	7.2	7	10	14	Begin red fox trapping, 59 foxes removed in 1986
28 Jan 1987	7.0	7	10	14	63 red foxes removed in 1987
8 Aug 1987	7.3	8	14	14	Tide too late, dark
22 Nov 1987	6.7	12	14	28	
21 Dec 1987	7.0	8	14	28	+ 2 red foxes
16 Feb 1988	6.8	10	14	28	
04 Nov 1998	6.8	30	32	30	
23 Nov 1999	7.0	17	30	20	
11 Dec 2000	6.9	30	20	22	
15 Nov 2001	6.7	35	22	48	
04 Dec 2002	7.1	62	48	46	
26 Oct 2003	6.7	96	46	32	
12 Nov 2004	6.7	52	32	30	

Table 2. High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 – 2009 (continued).

Date	Tidal Height	Clapper Rails Counted	Breeding Pair Members		Notes
			Before	After	
15 Nov 2005	6.7	57	30	42	
09 Oct 2006	6.6	103	42	48	
06 Nov 2006	7.0	95	42	48	
26 Oct 2007	7.1	32	48	34	
12 Nov 2008	6.9	20	34	38	
01 Dec 2009	6.8	50	38	-	Fogged out on Nov 3

The post-season tide count in 2008 was the lowest total since 1999 and did not bode well for the 2009 breeding season which turned out to be the status quo. Some of the rails must have already moved undetected and uncounted into the marsh edges during the 2008 count. The post-nesting count of 50 rails bodes well for the 2010 nesting season. Potential rail predators were out in abundance during the counts, hunting the marsh and edges, including Red-tailed Hawks (*Buteo jamaicensis*), Northern Harriers (*Circus cyaneus*), Peregrine Falcon (*Falco peregrinus*), Cooper's hawk (*Accipiter* cooperi) and American kestrels (*Falco sparverius*). Continued upgrading and maintenance of the artificial rafts on the Seal Beach NWR is essential to the protection of the wintering rails and success of the breeding rails. Usually, at least half of the rails counted during the winter high-tide counts have been safely hidden on rafts.

Counts in Buena Vista Lagoon in 2008 and 2009 indicated that this wetland's former high count of eight pairs had been exceeded by one in both years. Totals of six pairs, five singles (three determined to be paired by the lack of advertising; two might have been paired or unmated males), and three males were detected in 2009. Of these, one pair was in the central lagoon, five were in the inner lagoon, and there were two pairs detected in the little outer lagoon between the coast route and the railroad. There are many management issues at this little freshwater marsh shared with most of the other coastal wetlands, including abundant non-native trees (some of which were being culled) and shrubs that harbor perching predators and homeless humans. The trash and trailing associated with the homeless camp off State Street near Laguna Drive were particularly bad.

The marsh at Agua Hedionda Lagoon has held a maximum of seven pairs of Light-footed Clapper Rails, once in 1983 and again in 2006. The population was down to four pairs in 2007, back up to seven pairs in 2008 and at six pairs in 2009. The brackish marsh inland of the inner lagoon was greatly impacted by a change in drainage in the mid-1980s and the rails were barely detectable through the 1990s. The five pairs located in 2004 was the highest level observed since then and this level was probably sustained in 2005 when four pairs and an advertising female were detected during an early season count. Given the usual presence of unmated males in Agua Hedionda, the female likely found a mate and bred. With the recently increased street runoff from adjacent housing, the main freshwater marsh has rejuvenated to some extent, perhaps to the benefit of the rails as evidenced by the record number in 2006 and again in 2008. Five captive-bred rails were released into Agua Hedionda Lagoon in 2004 on the inland edge of the inner lagoon, but none have been re-sighted since. However, for the first time since the release, a pair and a single rail were vocalizing from the salt marsh in the vicinity of the release site in 2009.

Since doubling in size between 2001 and 2003, the Point Mugu subpopulation fluctuated between 14 and 19 pairs, 2003 - 2007. This subpopulation fluctuated between three and seven pairs for nearly 20 years until recent augmentations fostered its growth. There was a crash in 2008 back down to five pairs, but the population increased to nine pairs in 2009. There is an efficient predator management program in place, consistent rail and marsh management, and the Clapper Rails are still breeding; nevertheless, this subpopulation is not as large as would be hoped for in this, the biggest contiguous patch of potential habitat in the state. There was no breeding detected in the eastern arm of the lagoon. All of the 2009 breeding activity occurred in the marsh from the runway to the vicinity of LeMar Balls.

The year 2009 was another of intermittent vocalizing activity at Point Mugu. Between April 3 and June 26 approximately 150 hours of systematic field observations were accrued, by one to four observers, both in the early morning and late afternoon. During these observations “kecking” was the most common rail vocalization heard. Seven dueting pairs were recorded from seven locations; many single “clapperings“ from four locations (the evidence at two of these locations was too weak to determine breeding); and many incidents of “kecking” from several locations, but mostly from four of them. Four egg nests were found in 2009; there was at least a partial hatch of all four.

There have been occasional re-sightings of banded rails at Point Mugu, indicating that some of the captive-bred rails remained local after being released into the marsh. In 2008, for example Martin Ruane re-sighted a banded rail four days after its release on August 22 near the release site. However, at least one banded rail, a female banded 1035-8878 did not stay at Point Mugu. A photograph was taken of this rail at Upper Newport Bay on December 12, 2004 by Steve Metz. This female was captive-bred at the Chula Vista Nature Center and released into the eastern arm of Point Mugu on August 28, 2004, 106 days before her picture was taken at Newport. This shatters the old long-distance movement of 13.5 miles recorded for the subspecies *levipes* (Zembal et al. 1983). The distance from Point Mugu to Upper Newport Bay is approximately 90 miles along the coast. This indicates that at least one and probably others of the captive-bred rails are more prone to movements between marshes than was previously observed in wild birds. It also indicates that at least one of the released rails chose not to stay at Point Mugu. We speculated that others may have behaved similarly and in 2010 three Clapper Rails were sighted on the Santa Clara River at the Vern Freeman Diversion Dam; at least one of these rails was banded.

The San Elijo Lagoon subpopulation was at its fourth highest level in 2009 with eight pairs of breeding Clapper Rails. Although San Elijo Lagoon has had major efforts to restore tidal function, the lagoon still closes to the ocean with regularity. All of the paired rails were found in fresh water marsh growth along the lagoon edges, seven pairs in the east basin and only one in the Central Basin. The only rails detected on Escondido Creek were advertising males. San Elijo received an augmentation of eight captive-bred rails in 2004, five in 2006, four in 2007, and 16 in 2009 at the dike in the inner lagoon. One of the 2004 rails was re-sighted near the railroad tracks in the central lagoon on December 13, 2004, six months following release, and one of the 2006 rails was observe repeatedly over six months off of the Rios Avenue trail. However, there have been no re-sightings since.

The cordgrass continues to expand and dominate a significant portion of the mouth of the San Diego River and an all-time high of eight pairs of breeding Light-footed Clapper Rails were there in 2004. However, this has not been sustained and only three pairs were detected in 2009. Based upon the extent and current condition of the habitat, it should abound with rails. However, regular high flows may limit the habitat suitability for the rails there. Additionally, during the installation of five nesting rafts in 2008, heavy trailing was noted into the marsh from the adjacent riprap. There appears to be an extremely large infestation of rats living in the riprap and venturing into the marsh to feed. Any eggs laid in the marsh would be extremely vulnerable to predation by rats prior to the initiation of incubation. For the fourth consecutive year there were reports of multiple detections of Clapper Rail 13 miles inland at Kumeyaay Lake. Again the freshwater marsh edging the lakes was checked to no avail. Based upon the reports received, these inland rails may have been conditioned by others over-using playback tapes.

Three of the breeding pairs of Clapper Rails reported for the Sweetwater Marsh NWR were actually inland along the Sweetwater River in fresh water marsh. The only detections in the salt marsh were a pair in the pond east of the volunteer parking lot and another on the southwest edge of the Vener Pond area between the main marsh and E Street Marsh. The pair in the pond bred successfully as evidenced by the observation of a chick swimming from the pond island. The Sweetwater Marsh Complex contains a thriving raptor population detected on every visit. The raptors have good hunting perches spaced regularly along the marsh edge. The marsh growth is low and the rails are quite vulnerable. Eleven captive-bred Clapper Rails were released into Sweetwater in 2005 and six more were released in 2008, but none have been re-sighted.

Los Penasquitos Marsh is dominated by vegetation indicative of prolonged closure to the ocean, particularly pickleweed. However, fresh water influence and freshwater marsh edge are increasing and the rails appear to be using the freshwater habitat increasingly. The detection of 12 pairs was a record high for this wetland in 2007. Unfortunately, this number plummeted to only two pairs in 2008, and back up to four pairs in 2009. There were also four advertising males mixed in with the breeders. Four captive-bred rails were released in 2004, four more in 2007, and nine in 2009. There was a re-sighting of a banded female hatched at the Wild Animal Park and released in 2007 at Los Penasquitos. She was photographed with her mate and three downy chicks on the edge of the pond below the San Diego Water Utilities Pump Station on

Sorrento Valley Road on July 10, 2009 by Eric Kallen.

The subpopulation in the University of California Reserve at Kendall-Frost rebounded significantly in 2004 and 2005, but was significantly reduced in 2006, 2007, and even further reduced in 2008. At seven pairs in 2009, it bounced back to half the size of its recent high count. This marsh is small, totally isolated, and surrounded by urban housing, but benefits from the University of California Reserve System management. The stewardship includes appropriate predator management, habitat restoration, and research management to assure minimal human disturbance to the rails and their habitat. Additionally, nesting rafts have been provided and are used heavily by the rails since 1987. There have also been translocations of eggs and adults. This resulted in the 2004 and 2005 breeding populations of 14 pairs, the highest total there since 1985, but it was not sustained. In spite of the appropriate management of the marsh, it may always be a struggle for the rails in such a tiny, isolated wetland.

One of the highlights of the 2006 survey of Light-footed Clapper Rails was the discovery of yet another breeding location in the Santa Ana River Marsh, also previously known as Newport Slough and listed in Table 1 under the Huntington Beach Wetlands. Four pairs were detected there in 2006 and 2007, only a single pair in 2008, and five pairs in 2009. The Santa Ana Marsh is at the southern terminus of the Huntington Beach Wetland Complex, several wetland patches strung along the coast totaling more than 200 acres. The 92-acre Santa Ana Marsh was restored as part of the Federal Flood Control Project on the Santa Ana River. Dampened tidal influence was re-established and cordgrass was planted primarily along a narrow eastern portion of the marsh that lies between an oil field and the south dike of the river. This cordgrass marsh is extremely well developed and patches have grown in the main marsh that are currently appear suitable for rails, but are unoccupied. Restoration of the Huntington Beach Wetlands is continuing and eventually we are hopeful that the Clapper Rails will occupy these restored wetlands up-coast as well.

The salt marsh at the mouth of the Santa Margarita River typically held a single pair of nesting rails for many years and occasionally there have been two. These pairs are invariably in the same spot(s) year to year. At the river mouth in freshwater marsh in the Sweetwater section of the estuary and/or between Stuart Mesa Road and the railroad tracks on the north side of the river in the freshwater marsh there, rimming a pond. However, in 2008 a single pair was located on the channel surrounding the least tern island at the junction of the inlet channel. Hopefully, Clapper Rails were still there and bred; we did not gain access in time to survey in 2009.

An adult Clapper Rail and a chick were observed in the South Bay Marine Reserve in 2005 after the survey report was compiled. In 2006, there was a strong clappering response to the tape by a single rail with no following advertising, indicating that for the second consecutive year there were breeding rails in the Reserve. In 2007, both a pair and a single responded to the tape; there was silence in 2008, and a single pair was detected in 2009. This small isolated marsh is expected to be regularly occupied once the habitat base in the south bay increases seven years or more after the implementation of the proposed restoration of the new NWR; depending upon how much planting is accomplished.

The last known Clapper Rail call from Carpinteria Marsh was from an unmated female vocalizing constantly with no answering call in 2003. In 2004, there was total silence until April 13 when two males were released in the hope that the female was still alive. Unfortunately, in 2005 through 2008 the silence persists. This northern wetland is plagued with domestic cats in the marsh and other predators of concern. The Carpinteria subpopulation and wetland are in major need of intensive management but the wherewithal and interest appear to be lacking. A local resident recently reported red foxes actively denning on the edge of the marsh at the southern end of the dirt road extension of Esteros Way. Without dealing with the foxes in particular through consistent predator management, the chances for the rejuvenation of a viable subpopulation in Carpinteria Marsh are non-existent.

Clapper Rail vocalizations were reported for Bolsa Chica and the San Joaquin Reserve in 2008. However, breeding is not suspected to have occurred. Attempts to elicit responses to a tape-playback of a duet were unsuccessful at the Reserve in 2009, but were successful finally on October 2, 2009 at Bolsa where an upset bird clappered and kecked agitatedly as it traveled from the south to the vicinity of the walking bridge over the outer lagoon.

Nine of the 16 marshes with breeding Clapper Rails in 2009 had skewed sex ratios; all but one were male-skewed. A total of 66 advertising males and two females were heard during the call counts including: seven unmated males at Point Mugu; 13 single males on the Seal Beach NWR; one male in the Santa Ana Marsh; two males at Upper Newport Bay; three males in Buena Vista; one female in Batiquitos Lagoon; two males in San Elijo on Escondido Creek; 13 males in the San Dieguito River Valley; four males in Los Penasquitos Lagoon; and 23 males and one female in Tijuana Marsh. As in 2009, the usual condition has been a slight male bias during most years in most marshes. An extreme male skew like that in the Seal Beach NWR, San Dieguito River Valley, and Tijuana Marsh in 2009 indicates major issues, unfortunately of an unknown nature.

The continued annual release of additional captive-bred Clapper Rails is co-occurring with increased detections of rails in new locations, particularly inland sites. Highlights of Clapper Rail detections received in 2009 are as follows. Rachel Woodfield photographed a single Clapper Rail at the Ballona Wetlands in August 2008; a portion of the marsh was checked in 2009 with negative results. A Clapper Rail was heard and observed in Bolsa Chica at the foot bridge in October 2009. Sue Hoffman flushed a single Clapper Rail adjacent to the mouth of the Santa Ana River in the plover yard at the Huntington State Beach California Least Tern nesting colony in 2008; a dead rail was reported between PCH and the Tern Colony in July 2009. Clapper Rails are still reportedly vocalizing the reeds at Kumeyaay Lake on the San Diego River, but the calls are not well described and RZ could not get them to call back in response to tapes (this appears to be a case of heavy call-back tape playing there by un-permitted enthusiasts). Jan Nordenberg is still reporting Clapper Rails in the San Dieguito River Watershed well inland of the Polo Club (see description above). Paul Lehman reported seeing a Clapper Rail at the northern end of Upper Otay Lake on April 20, 2009. One of two banded rails sighted on Seal Beach by John Fitch in December 2009 was from the release there; the other was banded in 2007 and either came down from Point Mugu or up from San Elijo. Two Clapper Rails were also sighted at Dog Beach at the Mouth of the San Diego River on September 26, 2009 by BJ Stacey. Lastly, Barry Nerhus reported hearing a Clapper Rail at the UCI Marsh in November 2009.

The Light-footed Clapper Rail population in California recovered with a 37% increase in 2009 from a crash in 2008. Unusual weather patterns appeared to have greatly disrupted the synchronicity of breeding activity in recent years making it difficult to get accurate estimates of rail numbers during call counts. For example, the subpopulation on the Seal Beach NWR is able to be monitored more intensively than any other because of the characteristics of that marsh. Most of the rails nest on rafts that are regularly monitored and high tide counts work there as well. The most successful of the call count efforts yielded an estimate of 12 breeding pairs, whereas a minimum of 19 pairs nested on the Seal Beach rafts. However, the nest search results at Upper Newport Bay have been very poor in recent years. The few egg nests found have been depredated at a rate of at least 50%, mostly by raccoons.

Management and Monitoring of Nesting Sites

Six egg nests were found in 2009 in Upper Newport Bay compared to two egg nests in 2008. Four observers working over seven field-days and 84 field-hours searched the same areas as former years. One of the two 2008 nests was depredated, the other was still active on July 17 which is later than the last re-nest date in usual years. In 2009, three of six egg nests were depredated and the eggs were not viable in a fourth. In 2007, intensive nest searches over 17 days, perhaps 100 acres, and 300 field-hours revealed only six incubation nests, four of which were depredated in the same areas that in 2006 held 24 nests, 12 of which were active egg nests when discovered. Nesting activity and hatching results have gravely deteriorated recently in Upper Newport Bay. There were signs of raccoon (*Procyon lotor)* well out into the marsh, spanning the Bay; as well as stirring of sediments, habitat disturbance, and noise associated with the ongoing dredging activity. How this subpopulation rebounded and is maintaining its numbers is not clear.

Fifteen of the 87 rafts available in 2009 on the Seal Beach NWR held Clapper Rail egg nests, and four of those also held second clutches for a total of 19 clutches of eggs. This compares to last year's 17 clutches and 23, 32, and 20 clutches found on rafts in 2005 – 2007, respectively. There were an additional two unused nests found on rafts and 28 brood nests built on 27 rafts in 2009. Overall nesting success was 92%. Eighteen of the estimated 19 pairs in the NWR nested on rafts and there was one additional active nesting territory near the Heron Tower. The large number of brood nests built on rafts makes us suspicious that there may have been undetected incubation nests in natural habitat.

Rafts were instrumental in the rebounding of the Seal Beach NWR subpopulation in the early 1990s. For example, in 1993 there were 79 nests, 73 clutches of eggs, nine additional brood nests, and 79% hatching success on the 100 rafts available in the NWR. However, since the mid-1990s the numbers have fallen off dramatically for unknown causes. We continue to modify the raft design for better durability and function and to provide up to five times the number of rafts as there are nesting pairs. The rafts are heavily monitored and there have been no indications of unusually severe problems or extremely high predation rates during the nesting season. Post-breeding season survival has been poor on the NWR, perhaps due in part to the huge wintering raptor population. Continued efforts to provide enhanced natural and artificial cover will perhaps make a positive difference over time. Cordgrass cover was greatly enhanced by the unusually high rainfall in the winter of 2004/2005. This may have added enough predator-protection to increase rail survival and productivity in 2006. Unfortunately, this was not sustained into 2007 - 2009. However, 2010 is looking to be another wet year that will perhaps be reflected in enhanced habitat quality in 2010 or 2011 from which the rails can benefit.

Eight of the 16 rafts available for nesting in the University of California's Kendall-Frost Reserve held nests in 2009. There was evidence of eight clutches of eggs on six rafts and an additional two clutches in a tumbleweed lodged in the marsh. Of the 10 clutches, six hatched, the outcomes of three are unknown, and one was depredated by a predator.

Kendall-Frost is small, extremely isolated, and therefore plagued by mesopredator release. Furthermore, irresponsible pet owners allow their cats and dogs to roam into the marsh and misguided animal control officers have apparently released stray animals into the marsh and/or adjacent campground in the past. It is imperative that predator management be continued annually and be started before nesting actually begins each year. Even with the program operational there were fresh cat (*Felis domesticus*) and opossum (*Didelphis* virginianus) tracks on the saltpan and raccoon (*Procyon lotor*) passage on the far outer bank of the marsh. This little wetland had 24 breeding pairs of rails in 1984, evidence of its high potential. This subpopulation has foundered since, but then it rebounded significantly in 2004 and 2005. This area should be a focus of management efforts for rail recovery.

Certain that predator issues that arise cause difficult management dilemmas; a Cooper's hawk (*Accipiter* cooperi) probably caused some of the problems for rails in Kendall-Frost beginning prior to the 2006 breeding season. A large raptor was observed launching from the condominiums perfectly positioned hunting perches, speeding low along the main channel, and crashing into the marsh after unseen quarry. One such regular hunter could take a heavy toll, but trapping and relocating raptors is very specialized work and extremely labor intensive. Also, the removed raptor would likely be quickly replaced by another individual. Other alternatives including removing the suitability of perches, increasing escape cover, or hazing the hunters would be very labor intensive, costly, and might not work. On October 27, a large female Northern harrier attacked a rail and was probably successful; the rails cries eventually ceased and the raptor stayed down, presumably feeding.

None of the rafts at the Sweetwater Marsh NWR was used by Clapper Rails for nesting in 2009. The only nesting documented in the marsh was again on the little island in the pond located directly below the volunteer parking lot and rail aviary. This pair was one of two that vocalized in response to the tape on March 25 from the pond below the aviary and in Vener Pond.

Sweetwater Marsh is another high marsh that is not influenced significantly by high tides, except the extreme highs, particularly when they are storm-driven. Most of this marsh is high and dry enough to provide excellent foraging opportunities for predators and many species of raptors and terrestrial predators take full advantage, as evidenced by the high rate of depredation observed of released rails in 2005 (Zembal et al. 2005). The few rails documented in the marsh in recent years were in those parts of the wetland most regularly influenced by tidal inundation or ponded water.

During the first spring call counts in 2009, nine breeding territories were in evidence at Point Mugu along with seven unmated males. By the end of the breeding season further evidence of breeding activity had been discovered in seven of those territories. Seven nests were found at Point Mugu in 2009: four were egg nests, each with at least a partial hatch; new nests were found in three territories; and active chick feeding was in evidence in five territories associated with brooding spots and at least one brood nest.

Although natural nesting cover was thought to be a limiting factor for the rails at Point Mugu, artificial nesting rafts placed there in 1988 were not used over the several years they were maintained and monitored. Even if rails discovered such structures during high tides, they would not be drawn to them for nesting at Point Mugu because of the significant acreage of natural cover that is not inundated by high tides. However, artificial rafts were tried again in 2008 and one was used successfully by a nesting pair with some evidence of partial use of two others. Given the years of experience at Point Mugu with the rails, the new rafts were placed more strategically. Because of the use observed in 2008, five additional rafts were placed on June 27 bringing the total available at Point Mugu to 10 rafts. The raft that was used by a nesting pair in 2008 was used again in 2009. An 8-egg clutch hatched but four of the chicks were discovered dead in or near the nest. They were collected and delivered to the Contaminants Division of the US Fish and Wildlife Service, Carlsbad Field Office to check for contaminants issues. That analysis is pending.

Captive Breeding

The captive Clapper Rails at the CVNC bred successfully for the first time in 2001, after we brought in a second pair of rails and switched their mates. Each pair laid a single clutch, one of eight and the other of seven eggs. The eight-egg clutch was taken to Sea World to be hatched and reared, hoping that the pair would lay another clutch. They did not. Seven captive-reared rails were released into Mugu Marsh that first year. Additional rails have been added to the captive breeders and their progeny have been released to the wild annually since then.

Six incubation nests were found in Upper Newport Bay in 2009, three were depredated probably by raccoons, and the eggs in a fourth were infertile. Two eggs were taken from the two active nests to Sea World on June 8 where they were artificially incubated, hatched, and the youngsters were reared to adulthood. All four rails turned out to be males. One of these # 362 was used to replace male #206 at the Wild Animal Park after the 2009 breeding season. The pair 206/209 has not been very productive. Since females are harder to obtain than males #209 was retained and mated with one of the newly hatched males from Newport.

<u>SWC Breeding Pair I – Polar Aviary (LFCR359/366)</u> LFCR091 (paired with LFCR359) produced two offspring in 2008 (from clutch of six eggs). She (366) exhibited gait abnormalities and mild abdominal distention in January and was found dead 3/26/09. She did not produce eggs in 2009. Female LFCR366 was collected from Tijuana Estuary on 10/5/09 and transferred to SeaWorld for 30 day quarantine. LFCR366 was paired with LFCR359 in the "Polar Aviary" at SeaWorld for breeding. No chicks were produced from Breeding Pair I in 2009. LFCR155 was transferred to CVNC on 8/5/09 for retirement per recovery plan.

<u>SWC Breeding Pair II (LFCR089/LFCR218)</u> All chicks were hatched under parents. The pair laid four clutches of eggs: Clutch I found 2/15/09 – seven eggs, six hatched 3/11/09; Clutch II found 4/2/09 of 12 eggs, zero were viable; Clutch III found 5/28 of eight eggs, zero were viable; Clutch IV found 7/20 of seven eggs, one chick found dead at hatch, two hatched 8/3 (LFCR363) and 8/5 (LFCR364); LFCR363 and LFCR 364 transported to CVNC on 9/17/09. Non viable eggs had no development, and were examined by candling only. Eggs from Clutch II and III were transferred to USFWS for research.

<u>Egg Transfers:</u> Eggs N2E1, N2E2, N3E3, N3E2 were collected Upper Newport from wild nests and transferred to SeaWorld 6/7/2009. Eggs were incubated in a Humidaire incubator at 99° F with a wet bulb of 82-84° F, transferred to a Grumbach hatcher at 98° F with a wet bulb of 88° F on 6/15 and hatched unassisted on 6/19. The birds were hand-raised using modified puppet rearing techniques. LFCR359 remained at SeaWorld and LFCR362 was transferred to the Wild Animal Park on 9/3/09. The remaining two birds (LFCR360 and 361) were transferred to the CVNC on 9/17/09. All four birds were gender sexed males.

LFCR315 was received as an egg from CVNC on 3/13/09 and artificially hatched and hand reared using modified puppet rearing as a single bird (no clutch mates). LFCR315 was transferred back to the CVNC on 4/23/09.

Four of six captive pairs produced young in 2009, both pairs at the Chula Vista Nature Center and one each at Sea World and the Wild Animal Park resulting in the release of 42 additional Clapper Rails into five marshes (Table 4). This brings the total number of captive-reared Light-footed Clapper Rails released into the wild since 2001 to 252. Point Mugu has been the priority for releases up until 2009 with 107 rails released. However, 2009 may have been the final release date there since the Biological Opinion from the Fish and Wildlife Service mandating US Navy participation in the captive breeding program only required their participation through 2008.

Going into the breeding season in 2010, the three propagation facilities will continue to house two breeding pairs each. Sea World will house pairs LFCR 359/366 and LFCR 089/218; Chula Vista Nature Center has pairs LFCR 219/217 and LFCR 208/052; and the Wild Animal Park has pairs LFCR 362/209 and LFCR 207/246.

Table 3. Clapper Rail Breeding Activity at Sea World, 2009.

Parent IDs	LFCR218/089	LFCR218/089	LFCR218/089	LFCR218/089
Clutch # (1st, 2nd…)	1st	2nd	3rd	4th
Date Clutch Initiation	UNK	UNK	UNK	UNK
Date Clutch Completion	2/18/09	~4/13	5/28/09	7/20/09
# Eggs	7	12	8	7
Incubation Initiation	2/18/09	4/10/09	5/28/09	7/20/09
Hatch Dates (# eggs)	3/11/09 (6)	N/A	N/A	8/3 AND 8/5 (2)
# Eggs Hatched	6	0	0	0
#Chicks 1 Wk. Old	6	N/A	N/A	2
#Chicks 2 Wks. Old	6	N/A	N/A	2
#Chicks 3 Wks. Old	6	N/A	N/A	2
# Moved to Conditioning	6	N/A	N/A	2
Age When Moved	65 days	N/A	N/A	45 days

Table 4. Number of Captive-reared Light-footed Clapper Rails Released into Target Marshes, 2001 – 2009.

Marsh	01	02	03	04	05	06	07	08	09	Total
Point Mugu	7	11	20	12	17	3	5	27	5	107
Seal Beach NWR	-	6	-	5	-	-	-	13	5	29
Sweetwater MNWR	-	4	-	-	11	-	-	6	-	21
Kendall-Frost	-	-	5	-	-	-	-	-	7	12
Batiquitos Lagoon	-	-	-	8	8	-	-	-	-	16
San Elijo Lagoon	-	-	-	8	-	5	4	-	16	33
Agua Hedionda	-	-	-	5	-	-	-	-	-	5
Los Penasquitos	-	-	-	4	-	-	4	-	9	17
Carpinteria Marsh	-	-	-	2	-	-	-	-	-	2
San Diego River	-	-	-	-	5	-	5	-	-	10
Total	7	21	25	44	41	8	18	46	42	252

Table 5. Clapper Rail Breeding Activity at the Chula Vista Nature Center, 2009.

Parent Ids LFCR	208/052	208/052	208/052	219/217	219/217
Clutch# (1st, 2nd…)	1st	2nd	3rd	1st	2nd
Date Clutch Initiation	2/10/09	3/21/09	6/21/09	3/09/09	
Date Clutch Completion	2/20/09 7 eggs	~4/05/09 8 eggs	6/24/09 3 eggs only	3/16/09 7 eggs	Unknown 4 eggs found 4/28/09
Incubation Initiation	?	?	?	?	?
Hatch Dates	3/10/09-3/13/09*	4/24/09 & 4/25/09	7/16/09	4/09/09	5/23/09
# Eggs Hatched	6 of 7	8 of 8	2 of 3	4 of 7	7 of 8
# Chicks 1 Wks. Old	6	7	2	4	7
Parent Ids LFCR	208/052	208/052	208/052	219/217	219/217
# Chicks 3 Wks. Old	6	7	2	4	7
# Moved to Conditioning	5	7	2	4	7
Age When Moved	64 days	~52 days	69 days	67 days	~61 days

*One egg was late to hatch. That egg was transferred to SeaWorld where it hatched in the incubator. The chick was hand reared (LFCR315).

A single egg was found on the nest of LFCR 208/062 6/01/09 but was missing the next day.

This was not considered part of clutch 3.

Banding and Telemetry

The banding session at Upper Newport Bay yielded two males. Both were banded and released at their points of capture. We were unsuccessfully trapping for a female to replace the female that died at Sea World, LFCR 091. This was accomplished at Tijuana Slough NWR, where the only capture was a female LFCR 366 who was immediately banded and moved to quarantine at Sea World. All of the 42 rails released to the wild in 2009 were banded; band numbers are noted in the Methods section herein. Trapping efforts at the Seal Beach NWR were fruitless and there were no telemetry efforts in 2009.

Re-sightings of banded rails were numerous in 2009 as noted under survey results above and summarized as follows. Perhaps the most significant sighting in 2009 was of at least one banded rail among three sighted by Rebecca Kelley at the Vern Freeman Diversion on the Santa Clara River. The river is about 12 miles up the coast from Point Mugu and about 12 miles inland. The sighting constitutes additional corroboration of our suspicion that some of the rails relocated to Point Mugu are traveling elsewhere. In addition, John Fitch photographed two banded rails in the Seal Beach NWR on a raft during high tide. One had the 2009 gold band and was undoubtedly released there; the other carried an anodized blue band on the left leg and so was banded in 2007. Since there were no releases in Seal Beach in 2007, the rail either came south from Point Mugu or north from San Elijo Lagoon. Also of significance was a re-sighting of a female hatched at the Wild Animal Park and released (presumably) in Los Penasquitos in 2007. She was sighted with a male and three chicks that were obviously hers; at least one captive reared rail is contributing to local reproduction. Jim Roberts reported seeing one of our 2009-released and banded rails in the Kendall-Frost Reserve seven days after the release date. The rail was accompanied by another whose legs were unseen and unfortunately both were up against the chain link fence between marsh and uplands below the observation deck. One last unique sighting was of Clapper Rails at Dog Beach near Robb Field at the mouth of the San Diego River. This area will be surveyed in 2010 for potential additional habitat and breeding activity by Light-footed Clapper Rails. Barry Nerhus heard a Clapper Rail calling from the fresh water marsh at the San Joaquin Reserve just upstream of Upper Newport Bay and also reports a Clapper Rail from the footbridge area of the Bolsa Chica Reserve. Lastly, Martin Ruane has noted Clapper Rails on numerous occasions near the up coast boundary of Point Mugu at Ormond Beach along a ditch there with clumps of fresh water reeds. This is well north of any known nesting location in Point Mugu and will be checked in 2010.

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APPENDIX I

LIGHT-FOOTED CLAPPER RAIL MANAGEMENT, STUDY, AND PROPAGATION IN CALIFORNIA, 2010

State of California
Natural Resources Agency
Department of Fish and Game
Wildlife Branch

Light-footed Clapper Rail Management, Study, and Propagation in California

2010 Season

By

Richard Zembal, Susan M. Hoffman, John Konecny
Laurie Conrad, Charles Gailband, and Michael Mace

Nongame Wildlife Program Report 2010-11

Final Report
To

State of California
Department of Fish and Game
South Coast Region
4949 Viewridge Avenue
San Diego, CA 92123

Light-footed Clapper Rail Management, Study, and Propagation in California

2010 Season

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Prepared 21 November 2010

State of California
Natural Resources Agency
Department of Fish and Game

Light-footed Clapper Rail Management, Study, and Propagation in California

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ABSTRACT

The thirty-first annual census of the Light-footed Clapper Rail in California was conducted from 5 February to 26 May, 2010. Thirty coastal wetlands were surveyed by assessing call counts from Mugu Lagoon in Ventura County, south to Tijuana Marsh National Wildlife Refuge (NWR) on the Mexican border.

A total of 376 pairs of Light-footed Clapper Rails exhibited breeding behavior in 19 marshes in 2010. This is the third highest count on record, a 17.5% increase over the breeding population detected in 2009, but 15% lower than the high count in 2007. Upper Newport Bay with 131 pairs was once again the largest subpopulation in California with 11.5% fewer rails exhibiting breeding behavior than in 2009 and 24.7% fewer than the high count in 2005 of 174 pairs. Tijuana Marsh NWR did not recover significantly toward the record high level of 142 pairs in 2007 but did increase from 2009 by 33% to 76 breeding pairs in 2010. The Newport subpopulation comprised 35% of the state population in 2010 and the subpopulation in the Tijuana Marsh NWR comprised 20%, together accounting for 55% of the breeding population of this rail in California.

Thirteen of the small subpopulations increased in size from the 2009 totals, increasing by a combined total of 59 breeding pairs in 2010. The subpopulation in Batiquitos Lagoon reached a

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[1] Zembal, R., S.M. Hoffman, J. Konecny, L. Conrad, C. Gailband, and M. Mace. 2010. Light-footed Clapper Rail Management, Study, and Propagation in California, 2010. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2010-11. Sacramento, CA 28pp.

new high total of 36 breeding pairs. Two of the smaller subpopulations were reduced by three and four pairs, respectively. Point Mugu increased by 33% to 12 pairs and the Seal Beach tally was up slightly to 25 pairs. San Elijo Lagoon reached its all-time high count of 15 breeding pairs in 2006 and again in 2010 and the U.C. Kendall-Frost Reserve held strong at 10 pairs. Excluding the two largest subpopulations, there were six subpopulations in double figures, ranging from 10 to 36 pairs and totaling 126 breeding pairs, or 33.5% of the state total. The remaining 11 subpopulations ranged from one to nine pairs and totaled 43 breeding pairs of clapper rails, or 11.4% of the total.

The annual increases in the population total of the Light-footed Clapper Rail between 2002 and 2007 gave encouragement that restoration and management were contributing to the recovery of this endangered bird. The 2008 crash was presumably weather-related and a harbinger of what could be in store if wide weather fluctuations are the future norm. The boost to 376 pairs of Light-footed Clapper Rails in 2010 is a manifestation of the high reproductive potential of this endangered bird, a tangible demonstration of the resiliency of this subspecies.

Evidence of breeding activity in addition to territorial manifestation by vocalizations was observed in 11 of the 12 breeding territories at Point Mugu. That evidence included: four egg nests, each with at least a partial hatch; four additional hatched nests in four territories; and there was evidence of chick-feeding in 11 territories. On the Seal Beach NWR there were 25 clutches of eggs laid on 19 rafts and 28 brood nests were built on 28 rafts. Overall nesting success was 90%. Nest searches at Upper Newport Bay revealed seven incubation nests: five were active when found with two to nine eggs each; one clutch was hatching when discovered; and two were depredated by raccoons, *Procyon lotor*. Four eggs were taken from Newport for relocation in the face of heavy egg losses to raccoons. At the Kendall-Frost Reserve 16 of 21 rafts held nests with 11 clutches of eggs and an additional three clutches in nests off rafts; hatching success was poor at 64% but also was poorly documented. Finally, in Sweetwater Marsh NWR there was no use of the nesting rafts, but seven nests were found in the habitat including evidence of hatching at four nests.

Three of six captive pairs laid eggs in 2010. As a result, 19 Clapper Rails were released to the wild - six in the San Diego River and 13 into Sweetwater Marsh NWR. This brings the total number of rails released to the wild since 2001 to 271.

There was a single trapping and banding session at Upper Newport Bay. Two males and two females were captured and relocated into captivity at the Chula Vista Nature Center. All of the captive-reared rails released to the wild were banded; the annual code for 2010 was a gold anodized band on the right leg. There were multiple sightings of banded rails and rails in unusual places in 2010: a banded female was observed with chicks in freshwater marsh at Point Mugu; a rail banded in 2009 was recovered at San Elijo Lagoon; two banded rails were observed closely at the San Diego River; a rail was in Famosa Slough; and a female released at Point Mugu in 2009 traveled the 160 miles back to Sweetwater Marsh NWR and the Chula Vista Nature Center where she was hatched and reared.

INTRODUCTION

The Light-footed Clapper Rail (*Rallus longirostris levipes*) is a state- and federally- listed endangered species that is resident in coastal wetlands in southern California and northern Baja, California, Mexico. Loss and degradation of habitat threaten the continued existence of this bird, in spite of ongoing management efforts. The California population of this endangered rail was at a former high of 325 pairs in 15 marshes in 1996, the largest number detected breeding since statewide annual surveys were begun in 1980, until 2004 when 350 pairs were detected in 15 marshes. Since then there were annual increases until the record high in 2007, when 443 breeding pairs were detected in 19 marshes. There was a population crash in 2008 followed by recovery of 37% in 2009 to 320 breeding pairs.

One of the first major investigations of this rail identified the lack of suitable nesting habitat as a major, widespread limiting factor (Massey and Zembal 1980). Subsequent work demonstrated the need for emergency actions and recommended management strategies to stem the alarming population decline of this endangered bird in southern California. The actions taken have included: 1) habitat restoration, particularly through enhancement of tidal action to former wetlands; 2) study and control of introduced predators and unnaturally high predator populations; 3) provision of nesting sites in marshes with good habitat but limited options for protected nesting locations; 4) studies that have led to adaptive management strategies, benefiting the rail and the other co-inhabitants of these biologically-rich ecosystems; 5) development of a protocol for captive breeding and genetic and demographic augmentation of smaller subpopulations; and 6) surveys of the California population, in part to track the effects of management on annual recruitment.

Implementation of these measures has succeeded in protecting and maintaining most of the small subpopulations and in supporting the expansion of a few. However, the benefits of this attention go far beyond this single species. These endangered birds thrive in our most productive, remaining coastal wetlands. Measures that benefit this rail and its environs enhance conditions for a myriad of other species as well, including people. These places and the wildlife are cherished by hundreds of thousands of southern Californians for their inherent aesthetic, recreational, economic, scientific, educational, and ecological values. Furthermore, there are essential links between the coastal wetlands and vast acres of diverse upland habitats and wildlife located many miles from the coast (Soule et al. 1988, Zembal 1993). Consequently, restoring and maintaining the diversity and vital productivity of the coastal wetlands, while achieving the recovery of the Light-footed Clapper Rail, may only be possible in an environment that includes coastal southern California's complete wildlife heritage.

Hundreds of wetland acres have undergone, or are being planned for restoration. However, full recovery and functionality of a coastal wetland may take decades to achieve. In the meantime, habitat suitability for the clapper rail may be quite marginal. All but a few of the current subpopulations of Light-footed Clapper Rails depend upon a marginal habitat base and are too small to be expected to maintain themselves without management. Population monitoring is essential in understanding the effects of other management efforts and in stewardship of this critically endangered bird toward recovery. Reported herein are the results of the 2010 statewide survey, management, and propagation efforts for the Light-footed Clapper Rail.

STUDY AREAS

Descriptions of all the marshes recently occupied by Light-footed Clapper Rails are available (U.S. Fish and Wildlife Service 1985 and Zembal and Massey 1981). Three of the current principle study areas are at the Naval Air Station Point Mugu (NASPM, also Point Mugu), the Seal Beach NWR, and Upper Newport Bay State Ecological Reserve.

The marsh at Point Mugu is located in southeastern Ventura County on the 1,821 ha (4,500 acres) NBVC, about 13 km (8 miles) west of the Los Angeles County line. There are 1,012 ha (2,500 acres) of jurisdictional wetlands in Point Mugu (USACOE/EPA 1994), including the largest functioning salt marsh in coastal southern California today. Considering the combined acreages of marshes that are regularly occupied, the vegetated marsh and most closely-associated habitats at Mugu Lagoon represent more than 25% of the clapper rail's potential habitat base. The marsh is subject to nearly full tidal action in the central and eastern arms with an amplitude of about nine feet. The tides are dampened by constrictions at Laguna Road and farther west, resulting in a tidal amplitude of only four to five feet. The wetland vegetation is dominated by pickleweed (*Salicornia virginica*) but scattered stands of spiny rush (*Juncus acutus* ssp. *leopoldii*) are critical for rail nest placement.

The Seal Beach NWR covers 369 ha (911 acres) of the 2,024 ha (5,000 acres) Seal Beach Naval Weapons Station in Orange County near the City of Seal Beach. About 299 ha (739 acres) of the refuge lands are subject to regular inundation by the tides. There are about 229 ha (565 acres) of salt marsh vegetation, 24 ha (60 acres) of mudflats that are exposed daily, and 46 ha (114 acres) of channel and open water. The wetlands are fully tidal, with a range of about - 0.5 m (1.7 ft) to + 2.2 m (7.2 ft) MLLW, and very productive with a high diversity and abundance of wildlife.

Upper Newport Bay is an Ecological Reserve of the California Department of Fish and Game (CDFG), located approximately 22 km (13.7 mi) down coast of the Seal Beach NWR. Approximately 304 ha (750 acres) are fully tidal, including 105 ha (260 acres) of marsh. The bay is bordered by bluffs, nine to 18 m (30 - 59 ft) high, and surrounded by houses and roads. There are approximately 100 ha (247 acres) of shrublands remaining undeveloped on the edge of the wetlands and two local drainages with some cover along them coursing into the bay.

METHODS

Population Assessment

The thirty-first consecutive annual census of Light-footed Clapper Rails in California was conducted from February 5 through May 26, 2010. Thirty coastal wetlands were surveyed by mapping territorial pairs based on their calls (Zembal and Massey 1981, 1985; Zembal 1992). All of the coastal marshes with known or suspected rail subpopulations were surveyed until an evening or early morning with good calling activity was encountered. Small wetlands with no recent clapper rail sightings that again yielded negative results were surveyed at least twice as were marsh parcels with lower than expected results on the first call count. Additionally, nesting data were considered in the assessment of the subpopulations inhabiting the three wetlands wherein such data were gathered in 2010 and a pre-nesting high tide count was accomplished on December 9, 2009 on the Seal Beach NWR; a post-nesting high tide count will be scheduled for November 5, 2010. This NWR is the only wetland inhabited by clapper rails that is inundated thoroughly enough during a 6.7 ft. tide or higher to get a relatively complete visual survey of the rails.

In the two marshes with abundant clapper rails, mapping spontaneous calls was the prevalent technique. In marshes with fewer rails and along long, narrow strips of habitat, playbacks of taped "dueting" were used sparingly to elicit responses. In the Tijuana Marsh NWR, enough observers were stationed within potential hearing range of any calling rail to cover the entire marsh on a single evening. However, most of the marshes were surveyed by a single observer visiting discrete patches of habitat on consecutive evenings until all available habitat had been covered. Most of the observations were those of three observers, but primarily the principal investigator. Additional observers participated primarily in three of the year 2010 counts, those at Seal Beach NWR, Tijuana Slough NWR and Kendall-Frost Reserve.

The more movement required of an observer during a survey, the more likely that breeding, but infrequently calling, rails would be missed. Calling frequency and the detection of calls are influenced by observer's hearing ability and experience with the calls, the stage of breeding of individual pairs, rail density, and weather conditions (Zembal and Massey 1987). Many surveys attempted on stormy, windy days needed to be repeated. When calling frequency is high with many rounds of calling as adjacent pairs respond to one another, it is possible to map the rails accurately and move on to survey more marsh area. However, under usual circumstances, approximately 20 ha (50 acres) of marsh can be adequately covered during a single survey.

Surveys are usually conducted in the two hours before dark, but some are done between first light and about two hours after sunrise. In the past, early morning and late evening surveys have been comparable, although evening calling by the rails is more intense and often ends with one or more flurries of intense calling (Zembal et al. 1989).

The playback of a taped "clappering" call appears to be responded to by the rails as if a living pair is calling nearby. However, work done with Yuma Clapper Rails (*Rallus longirostris yumanensis*) strongly suggests that this closely-related species can become conditioned to the tape if it is used excessively (B. Eddleman, pers. comm.). During prime calling times in the evening or early morning, a playback sometimes elicits a single response or a round of calling. However, there are sometimes no vocal responses to the tape. If played at a time of day when the rails are not particularly prone to call, the only response likely to be elicited is that of the territorial pair intruded upon. Sometimes the response is non-vocal investigation by the pair or one member. Repeated playbacks are likely to elicit aggression. When used only once per year at a given marsh and with minimal repetition, playbacks have yielded important results. Unmated clapper rails, for example, often respond at considerable distances and may approach the tape. Isolated single rails often approach very closely and remain in the vicinity unless displaced.

In assessing the rail population, duets and some single "clapperings" were treated as territories. Since advertising singles are not indicative of an occupied territory with reproductive potential at the time of the survey, they are not included in the population total. However, a single “clappering” is as good an indicator of a territory as a duet, when advertising is not heard later from the same territory. Eventually, during a two to four hour census period, pairs often dueted from territories where only single pair members had called earlier. However, the fewer rails in a marsh, the more important it is to count only duets as pairs to avoid over-estimating the breeding subpopulation. The 2010 call counts were conducted on 43 dates and totaled approximately 387 field-hours.

Management and Monitoring of Nesting Sites

Fleischer et al (1995) documented low genetic variability in Light-footed Clapper Rails and recommended translocations from larger to small subpopulations for the inherent genetic and demographic benefits. We are still vigilant for potential translocation opportunities with eggs but have mostly used captive-bred juveniles in recent years (see below).

A review of the literature and examination of the feasibility of translocation was completed for this rail (Hoffman 1995). A maximum of nine males and six females were proposed in that study for translocation from Newport to Seal Beach NWR. This is a lower number than usually proposed for translocation but might represent a reasonable approach, given the rarity of this rail. In 1997, for example, 15 rails equaled 5% of the breeding population at Upper Newport Bay (Table 1). Moving 15 adult rails from Newport to each of five marshes represents moving 25% of this largest subpopulation. That is more birds than should be moved in a single year. We proposed to move fewer, up to 10 rails each to as many of the target marshes as possible each year. It should be noted that there is some precedence for positive results, even with very low numbers of relocated birds. For example, translocations of Red-cockaded Woodpeckers (*Picoides borealis*) have involved only one to four birds and resulted in successful breeding and recruitment (Allen et al. 1993).

Potential egg translocations necessitated nest searching and monitoring at Upper Newport Bay and the five marshes to potentially receive eggs. Nest searches and observations were begun in February and continued into July 2010. The activities were conducted as they have been in the past (Massey and Zembal 1980, Massey et al. 1984). Extreme care was taken to minimize visitation and disturbance.

Nest searches at two of the six wetlands potentially involved in translocations were focused mostly on the artificial nesting rafts deployed in them for the rails. Three other wetlands used to have rafts deployed, maintained, and monitored annually in each but the efforts were abandoned because of low use. Point Mugu was one such marsh; 25 floatable rafts were deployed there in 1988. However, there was never any evidence that the rails used the rafts until recently (see below). Although many marshes occupied by rails suffer from a poor supply of good nesting sites, artificial nesting rafts have been used in only four of seven marshes where they have been tried. Those four and the number of rafts in each during the 2010 season were Point Mugu with 10 rafts, Seal Beach NWR with 83 rafts, Kendall-Frost Reserve with 21 rafts, and Sweetwater Marsh NWR with 10 rafts. The rafts in Kendall-Frost and Seal Beach were refurbished in February and early March and visited approximately every three weeks during the breeding season into July. The rafts at Point Mugu and Sweetwater Marsh NWR were visited four and two times, respectively. Raft maintenance and monitoring involved a minimum of 294 field-hours.

A new nest raft design and cover were first deployed in 2008 and 2009. The raft looks like a small palette measuring 33 in X 24 in. The top is made of four 1 in X 6 in pine boards and the sides and two bottom slats are made of 1 in X 3 in boards fastened perpendicular to the top and forming three compartments on the underside of the raft that hold Styrofoam for flotation. The raft is anchored in the marsh by ¾ in PVC fastened to the middle of the long sides and extending 62 in from each side to a cross bar of PVC that is anchored with two 70 in long pieces of 3/8 in rebar driven at an angle into the mud. The covers were woven willows and reeds or constructed of a PVC and wire cage covered in quack grass. The cover was fastened with wood screws and plastic ties. This new design eliminates the upright dowels (potential raptor perches) and renders the rafts less conspicuous in the marsh.

Nest searches and monitoring were focused at Upper Newport Bay, Point Mugu, Seal Beach NWR, Kendall-Frost Reserve, and there were four searches in Tijuana Slough NWR and two in the Sweetwater Marsh NWR in 2010. At Upper Newport Bay, between March and June, three observers conducted six field-days and 60 field-hours of nest searching and observation. There were six dates at Point Mugu during which two to three participants spent 101 field-hours surveying. On the Seal Beach NWR, one to two observers accumulated 172 field-hours over 24 dates. There were 143 field-hours spent at the Kendall-Frost Reserve by three to 17 observers over eight dates. Lastly, in Tijuana Slough, one to five observers expended 114 field-hours nest searching over four dates, and 46 field-hours were expended at Sweetwater Marsh. The nesting and other activities of the captive rails at the Chula Vista Nature Center, Sea World, and the Wild Animal Park were monitored daily by one to seven observers totaling many hundreds of hours.

Development of a Protocol for Captive Breeding

A wetland aviary was developed at the Chula Vista Nature Center (CVNC or Chula Vista), adjacent to the Sweetwater Marsh NWR to house Clapper Rails and develop a protocol for captive breeding (Bayfront Conservancy Trust 1995). The first pair of rails was taken into the facility in December 1998. The second pair was taken into captivity in November 2000 and young Light-footed Clapper

Rails were produced in captivity for the first time in 2001. Any eggs produced by these captive rails were to be used in the egg translocation efforts or hatched and reared in captivity, preferably by the parents and released into Point Mugu. However, because 28 of 60 captive-reared and released rails had been from one breeding pair from 2001 to 2003, care had to be taken not to genetically swamp the Mugu rails. Consequently, there were four other marshes where captive-reared young could be released initially and five more marshes that were added in 2004 and 2005 (Zembal et al. 2005).

There were six potential breeding pairs in captivity in 2010, two pairs at each of the three facilities. The CVNC housed rails #208/052 and 219/217; Sea World held #089/218 and 359/366; and the San Diego Zoo Safari Park kept #362/209 and 207/246. The male #208 was banded 103544891 (L) at Newport on October 8, 2005 and mated with female #052 that was captured from Newport on September 20, 2002. The pair 219/217 were hatched at Sea World on May 23 and 15, 2006, respectively, from eggs taken from two different nests at Upper Newport Bay. The male #089 was hatched at Sea World on June 3, 2003 from a Newport egg and mated to #218, a Sea World hatchling on May 22, 2006 from an egg taken from Newport. The male 359 was hatched from a Newport egg at Sea World on June 11, 2009; the female 366 was trapped from Tijuana Estuary on October 5, 2009. The male #362 was hatched at Sea World on June 19, 2009 from a Newport egg and mated to #209, a Newport capture from November 29, 2005. The male #207 was trapped from Newport on September 19, 2005 and mated to #197 from a Newport egg hatched at Sea World on May 19, 2005. The female #197 was the only casualty during fire evacuation at the Safari Park and was replaced with a female # 246 captured at Upper Newport Bay on November 25, 2007 and banded #103544924.

We attempt to mix the genetic stock of the captive breeders by adding new rails hatched from Newport eggs collected annually when possible. Sometimes adults are trapped from Newport and added to the captive flock. In 2010, reproduction was mediocre in Newport and depredation by raccoons was still a major issue. Even so, four eggs were taken into captivity for relocation from Newport nests, two each from two nests on June 15. They were incubated and hatched at Sea World.

Rail chicks that are hand-reared at Sea World are transferred from the hatcher to a brooder box in which the temperature is maintained at 88 – 90° F for the first week, then gradually decreased to ambient. A recording of outdoor marsh sounds was played in the background. Chicks are fed with a puppet to avoid imprinting. Food items include small cut up pieces of lettuce, cricket abdomens, and as the chicks grow, graduating to whole live crickets, guppies, herring filets, pieces of capelin without bones or scales, krill with tails and heads removed, live meal worms with heads removed, live wax worms with heads removed, live black worms, pinkies, live red worms, mussels, and “rail mix”. Rail mix was composed of Mazuri waterfowl starter, soaked dry dog food, and hard-boiled eggs. Food items were sprinkled with vitamins and fed hourly. As the chicks grew, the commercial diet was phased out and replaced with live foods plus thawed frozen fish and krill. At eight to 10 days the chicks were moved from the brooder boxes to the indoor runs. The runs were lined with dirt and planted with plenty of cover. At one month the young rails were moved to the "conditioning" pens at CVNC to prepare for release into the wild. The Sea World diet and protocol was appended to the 2005 annual clapper rail report (Zembal et al. 2005); there were refinements made to the protocol again in 2009.

In 2010, one to four observers monitored the captive rails from several minutes to many hours daily at the CVNC, Sea World, and Safari Park. Forty thousand visitors were given the opportunity to view the rails at Chula Vista, hear about their plight, and the importance of their ecosystem. The rails at Sea World were incorporated into the educational program curriculum in 2007 and approximately 15,000 students observed and studied them; the rails at the Safari Park have been isolated from visitor contact as were the Sea World rails in 2008 to 2010.

Banding and Telemetry

Trapping and banding sessions were conducted only at Upper Newport Bay and there was no telemetry in 2010. At Newport, six participants monitored 20 traps for three hours on October 7. The primary purpose for trapping at Newport has been to refresh the captive flock. Preferably, old breeders are replaced with young raised from wild eggs, alleviating the need for trapping. However, the breeding performance of hand-reared males has been poor.

All of the 19 Clapper Rails raised in captivity and released to the wild in 2010 were first banded except for one individual that escaped at Sweetwater Marsh prior to banding (see Zembal and Massey 1983 for a full discussion of trapping and banding techniques). Five rails were put into the San Diego River on July 5 and 13 were released into Sweetwater Marsh on 22 September. The annual code for 2010 was an anodized gold metal band on the right leg; the Service band was placed on the left leg. USFWS band numbers on the rails released to the San Diego River were #1065-39879 – 1065-39883 and into the Sweetwater Marsh NWR were #1065-39885 – 1065-39897.

RESULTS and DISCUSSION

A total of 376 pairs of Light-footed Clapper Rails exhibited breeding behavior in 19 marshes in 2010 (Table 1). This is a 17.5% increase over the breeding population detected in 2009, but 15% lower than the high count in 2007. The state total has been smaller than in 2010 in 29 of the 31 years of record. The subpopulation in Upper Newport Bay was once again the largest in California but down by 11.5% from 2009 and 24.7% lower than the record high in 2005.

The Tijuana Marsh NWR subpopulation recovered slightly with an increase of 33% to 76 nesting pairs but was well below the record level of 142 pairs in 2007. The Newport subpopulation comprised 35% of the state total in 2010 and the Tijuana Marsh NWR subpopulation comprised 20%, together accounting for 55% of the breeding population of the Light-footed Clapper Rail in California. In addition, six marshes held 10 to 36 pairs each for a combined total of 122 pairs or 33% of the state total.

Five egg nests were found in 2010 in Upper Newport Bay compared to six in 2009 and two in 2008. Nest searching effort has been similar from year to year and in the same locations with three observers spending 60 field-hours over six field-days in 2010. One of the two 2008 nests was depredated. In 2009, three of six egg nests were depredated and the eggs were not viable in a fourth. In 2007, intensive nest searches over 17 days, perhaps 100 acres, and 300 field-hours revealed only six incubation nests, four of which were depredated in the same areas that in 2006 held 24 nests, 12 of which were active egg nests when discovered. Nesting activity and hatching results have gravely deteriorated recently in Upper Newport Bay in part due to raccoons, *Procyon lotor*. There is raccoon sign well out into the marsh, spanning the bay, and stirring of sediments, habitat disturbance, and noise associated with the ongoing dredging activity. In spite of this, this subpopulation rebounded and is maintaining its numbers, so far.

Tijuana Marsh's subpopulation was 87 pairs strong for two consecutive years prior to the 2006 high count of 102 breeding pairs, followed by an even higher record count of 142 pairs in 2007. That 40-pair increase in 2007 was not detected at any marsh except Upper Newport Bay; the 95 pair decrease in 2008 was simply unprecedented. This subpopulation had not been that small since 1991. The 19-pair increase in 2010 places this subpopulation's size directly in mid-range for the 2000s thus far; it was smaller in five of 11 years and larger in the other five years since 2000. Six of the pairs detected in 2010 were in the restored "Model Marsh" south of the river where several post-hatching nests were found. The rails increased gradually in Batiquitos Lagoon as the ecological functionality of the wetland continued to improve over time following the major restoration project implemented there by December 1996. The lagoon has remained tidal and rail habitat has been increasing and improving. Breeding rails were detected on the north side of the lagoon for the first time in 2004 and a total of 11 pairs was detected. Clapper Rail numbers grew to 22 pairs in 2007 and 2008 and Batiquitos Lagoon was the third largest subpopulation in the state in 2008. New highs were reached in both 2009 and 2010 and with 36 pairs, the Batiquitos subpopulation was again the third largest in the state in 2010.

In 2010, there were two breeding pairs vocalizing from habitat adjacent to the western tern island; 11 pairs along the north edge of the inner lagoon; 21 pairs along the southern edge; and a pair in the northeast corner of the basin just west of the freeway. The cordgrass in the west basin is extensive and looks vigorous, although most of it is too submerged during higher tides to provide adequate nest cover. Finally, a pair responded to the tape from freshwater reeds along the southeast creek at Levante and El Camino Real.

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2010.

Part I: 1980 – 1989

Location	Number of Pairs Detected In:									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Santa Barbara County										
Goleta Slough	0	0	-	0	-	-	-	-	0	0
Carpinteria Marsh	16	14	20	18	26	7	4	5#	2#	0
Ventura County										
Ventura River Mouth	-	-	0	0	-	-	-	-	-	0
Santa Clara River Mouth	-	-	0	-	-	-	-	-	-	0
Mugu Lagoon	-	0	-	1	3	7	6	7#	7#	5
Los Angeles County										
Whittier Narrows Marsh	-	-	-	*	0	-	-	-	-	0
Orange County										
Seal Beach NWR	30	19	28	20	24	11	5	7	14	6#
Bolsa Chica	0	0	0	0	-	-	-	*	0	0*
Huntington Beach Wetlands	-	0	-	-	-	-	0	0	0	0
Upper Newport Bay	98	66	103	112	112	87	99	119	116	116
San Joaquin Reserve	-	-	5	4	1	2	1	0	0	0
Carlson Rd Marsh	-	-	5	4	2	0	0	1#	0	0
San Diego County										
San Mateo Creek Mouth	-	-	0	0	-	-	0	-	0	0
Las Pulgas Canyon Mouth	-	-	0	0	0	-	-	-	-	0
Las Flores Marsh	-	-	0	0	0	-	0	-	0	0
French Canyon Mouth	-	-	-	0	0	-	-	-	-	0
Cocklebur Canyon Mouth	-	-	1	0	0	-	-	0	0	0
Santa Margarita Lagoon	0	0	2	1	2	1	1	1	1	0
San Luis Rey River Mouth	-	-	0	0	-	-	0	0	0	0
Guajome Lake Marsh	-	-	0	1	2	0	0	0	0	0
Buena Vista Lagoon	0	0	0	*	0	-	-	-	0	0
Agua Hedionda Lagoon	1	2	1	7	6	1	0	0	0	0
Batiquitos Lagoon	0	0	0	0	0	-	-	-	-	0
San Elijo Lagoon	-	5a	4	4	10	1	0	2	5#	7#
San Dieguito Lagoon	-	-	-	-	-	-	-	*	0	0
Los Penasquitos Lagoon	-	0	-	0	0	-	0	-	1a#	0
Kendall-Frost Reserve	18	16	6	20	24	17	12	6a#	4a#	4#
San Diego River	-	3	1	2	2	1	0	0	1a#	0#
Paradise Creek Marsh	1	2	3	1	1	0	0	0	0	0
Sweetwater Marsh	4	5	7	6	14	3	9	5a#	5	5#
E Street Marsh	3	1	3	3	2	2	2	0a	1#	0
F Street Marsh	-	1	1	0	1	0	0	0	0	0
J Street Marsh	-	1	0	0	-	-	0	0	0	0
Otay River Mouth	3	4	5	3	5	1	1	0	0	0
South Bay Marine Reserve	3	3	1	1	2	1	1a	2#	5	5#
Dairymart Ponds	-	-	-	-	-	-	0	*	1a	0#
Tijuana Marsh NWR	26	31	25	41	38	0	2	23a#	14a#	15a#
Total: pairs	203	173	221	249	277	142	143	178	177	163
marshes	11	15	18	18	19	14	12	11	14	8

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2010.
(continued) Part II: 1990 – 1999

Location	Number of Pairs Detected In:									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Santa Barbara County										
Goleta Slough	0	0	0	0	-	-	0	0	-	-
Carpinteria Marsh	0	0	0	0#	0	2#	3#	5#	3#	2#
Ventura County										
Ventura River Mouth	0	0	0	0	0	0	0	-	0	-
Santa Clara River Mouth	0	0	0	0	0	0	0	-	0	-
Mugu Lagoon	6#	4#	5#	5	6#	5#	3#	4#	4#	4#
Los Angeles County										
Whittier Narrows Marsh	-	-	-	0	0	-	0	0	-	-
Orange County										
Seal Beach NWR	16	28	36	65	66	51#	52#	37#	16#	15#
Bolsa Chica	0#	0*	0#	0#	0*	0*	0*	0*	0*	0
Huntington Beach Wetlands	0	0	0	0	0	0	0	0	0	-
Upper Newport Bay	131	128	136	142	129	117	158	149#	105#	104#
San Joaquin Reserve	0	0	0#	0	0	0	0	0	-	0
Carlson Rd Marsh	0	0	0	0	0	0	0	0	-	0#?
San Diego County										
San Mateo Creek Mouth	0	0	0	0	0	0	0	-	-	-
Las Flores Marsh	0	0	0	0	0	0	0	-	-	-
Cocklebur Canyon Mouth	0	0	0	0	0	0	0	0	0	0
Santa Margarita Lagoon	0	0	0	0#	0	0	0	0#	0	0
San Luis Rey River Mouth	0#	0	1	0	-	0	0	0	0	0
Guajome Lake Marsh	0	0	0	0	-	0	0	0	-	-
Buena Vista Lagoon	0a#	2#	5	2#	3#	1#	6#	7#	4	5#
Agua Hedionda Lagoon	0	0	0	0	0	0	0	1?	1	0
Batiquitos Lagoon	0#	0#	0	1#	1#	0#	2	2	1	3
San Elijo Lagoon	5#	5	4#	6#	1#	3#	3#	8	3#	5#
San Dieguito Lagoon	0	0	0	0	0	0	0	0	0	-
Los Penasquitos Lagoon	0	0#	0#	0#	1	1	1	2	2#	2
Kendall-Frost Reserve	5#	9	11	5#	5#	4#	1#	2	2	4#
San Diego River	2	5	1a	5	5#	6b	5	5#	4	3
Paradise Creek Marsh	0	0	1a	0a	0	1	2	0	0	0
Sweetwater Marsh	2#	4a	4a	3a	7#	7	8	3#	4	3
E Street Marsh	0	1a	1a	1	0#	2	1	1	1	2
F Street Marsh	0	0	0	0	0	0	0	0	1	0
J Street Marsh	0	0	0	0	0	0	0	0	0	0
Otay River Mouth	0	0	0	0	0	1	3	3	2	1
South Bay Marine Reserve	5	2	3a	1	0	0	0	1#	1	0
Dairymart Ponds	0a#	0#?	0#	1a	0	-	-	-	-	-
Tijuana Marsh NWR	17a#	47a	67a	63a	64	61	77	77#	68#	80#
Total: pairs	189	235	275	300	288	262	325	307	222	233
marshes	9	11	13	13	11	14	15	16	17	14

- indicates that no census was taken.
* indicates a fall or winter occurrence.
\# indicates the detection of unpaired rails (used beginning in 1987).
a Paul Jorgensen Unpublished data; b 2 pairs are in Famosa Slough.

Table 1. Census of the Light-footed Clapper Rail in California, 1980 – 2010.
(continued) Part III: 2000 – 2010.

Location	Number of Pairs Detected In:										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Santa Barbara County											
Goleta Slough	-	0	0	0	-	-	-	-	0	0	0
Carpinteria Marsh	1#	1#	2	0#	0#	0	0	0	0	0	0
Ventura County											
Ventura River Mouth	-	-	0	0	-	-	-	-	0	-	-
Santa Clara River Mouth	-	-	0	0	-	-	-	-	0	-	-
Mugu Lagoon	7#	7#	10#	14#	19#	14#	17#	15#	5#	9#	12#
Los Angeles County											
Whittier Narrows Marsh	-	-	0	-	-	-	-	0	-	0	0
Orange County											
Seal Beach NWR	10#	11#	24#	23#	16#	15#	21#	24#	17#	19#	25
Bolsa Chica	0	0	0*	0	0	0	*	*	*	*	1
Huntington Beach Wetlands	-	0	0	0	0	0	4#	4	1#	5#	6#
Upper Newport Bay	150#	124#	129#	144#	165#	174#	158#	165#	88#	148#	131#
San Joaquin Reserve	0	0	0	0	-	0	0	0	*	0	#
Carlson Rd Marsh	0#	0	0	0	-	0	0	0	0	0	0
San Diego County											
San Mateo Creek Mouth	0	0	0	0	0	-	-	-	0	-	-
Las Flores Marsh	0	0	0	0	0	-	-	-	0	-	-
Cocklebur Canyon Mouth	0	0	0	0	0	-	-	-	0	-	-
Santa Margarita Lagoon	0	0	1	2	1	2	1	1	1#	-	-
San Luis Rey River Mouth	0	0	0	0	0	0	0	0	0	0	2#
Guajome Lake Marsh	0	-	-	0	-	-	0	0	0	-	-
Buena Vista Lagoon	5#	3#	6#	5#	5#	6#	8#	8#	9#	9#	6
Agua Hedionda Lagoon	2	2	1	4	5	4#	7#	4	7	6	2#
Batiquitos Lagoon	2#	3#	3#	5	11	16#	19#	22	22	26#	36#
San Elijo Lagoon	1#	1#	2	7#	7#	6#	15#	12#	5#	8	15#
San Dieguito Lagoon	0#	0#	0	0#	6	12#	31#	15#	21#	12#	28#
Los Penasquitos Lagoon	1	1	2	1#	2#	2	7#	12#	2#	4#	9#
Kendall-Frost Reserve	4	4	5#	6#	14	14	5#	4#	2#	7	10#
San Diego River	3#	4	6	6#	8#	5	4	6	4#	3	7#
Paradise Creek Marsh	0	0	0	0	0	0	0	0	0	-	0
Sweetwater Marsh	2	3#	3#	1#	3#	1	4#	4#	3	5	6#
E Street Marsh	2	0	1	1	0	0	2	1	0	0	2
F Street Marsh	0	0	0	0	0	0	0	0	0	0	0
J Street Marsh	1	0	0	1	0	0	0	0	0	0	0
Otay River Mouth	1	1	1	0	0	1	2	1	0	1	1
South Bay Marine Reserve	0	0	0	0	0	0	1	2	0	1	1
Dairymart Ponds	-	-	-	2	1	1	0	1	-	0	0
Tijuana Marsh NWR	61#	52#	78#	64#	87	87#	102#	142#	47#	57#	76#
Total: pairs	253	217	274	286	350	360	408	443	234	320	376
marshes	16	14	16	16	15	16	18	19	15	16	19

- indicates that no census was taken.
* indicates a fall or winter occurrence.
# indicates the detection of unpaired rails (used beginning in 1987).

The subpopulation of Light-footed Clapper Rail newly discovered in the San Dieguito River Valley in 2004, inland of the lagoon and El Camino Real, was first reported at six breeding pairs and then conservatively, at least 12 pairs in 2005. In 2006, there was abundant calling indicative of at least 31 breeding pairs. This ranked San Dieguito as the third largest subpopulation of Light-footed Clapper Rails in 2006 and the largest ever reported in a freshwater marsh system. Calling was poor in 2007 when only 15 pairs were detected but slightly better in 2008 resulting in a count of 21 pairs. The count was poor again in 2009 and the population estimate was only 12 pairs along with 13 advertising males. Finally in 2010, the second highest count for this little wetland was tallied when vocalizing during the surveys indicated a minimum of 28 breeding pairs. Two of these pairs were calling from habitat rimming ponds on the golf course. Additional Clapper Rail detections were still being reported from the San Dieguito Creek Watershed in 2010 and have yet to be thoroughly investigated. Reported locations have included Lusardi Creek, the pond at 4S Ranch Community Park on Dove Creek Road, and at 4 Gee Road just north of Camino Del Sur.

The Seal Beach NWR subpopulation has probably been 20 pairs or slightly more for most of the 2000s. Evening call count results have generally been dismal and we have had to rely upon nesting data obtained through monthly visits to the nesting rafts, upon which most of this subpopulation nests. With so much marsh available to the rails, there ought to be a much larger breeding population on the Seal Beach NWR. Raptor predation is suspected to be limiting rail survival and raptor monitoring sessions have been reinitiated; high tide counts have also continued. Seal Beach is the only marsh currently occupied by Light-footed Clapper Rails that gets fully inundated during a high tide of about 6.7 ft (MLLW) or higher, which would render the rails vulnerable due to reduced cover. Tides of this height occur regularly in the late summer, usually in darkness, and in the fall and winter in the early morning. The rails are forced onto debris or to the edge of the marsh where there is little cover and busy roads just beyond. This greatly exposes the rails to potential predation and vehicle collision. However, the completeness of inundation also allows fairly dependable surveying of the subpopulation outside of the breeding season. Accordingly, the rails were counted again from canoes before the 2010 breeding season; the post-breeding high tide count was on November 5 and 50 rails were sighted. The pre-nesting count was on 1 December 2009 and 50 individuals were sighted (Table 2).

Table 2. High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 - 2010

Date	Tidal Height	Clapper Rails Counted	Breeding Pair Members Before	After	Notes
2 Dec 1975	7.0	22	-	-	
31 Dec 1975	6.7	12	-	-	
21 Nov 1976	7.1	24	-	-	
20 Dec 1976	7.1	35	-	-	
21 Dec 1976	7.0	34	-	-	
10 Dec 1977	7.1	16	-	-	
11 Dec 1977	7.1	40	-	-	
18 Jun 1978	6.8	16	-	42	+6 youngsters
30 Nov 1978	6.7	38	-	42	
1 Dec 1978	6.7	32	-	42	
3 Sep 1979	6.4	20	42	60	Tide too low
3 Nov 1979	6.6	56	42	60	
2 Dec 1979	6.7	32	42	60	
3 Dec 1979	6.7	44	42	60	
21 Nov 1980	6.9	55	60	38	First red fox den found
29 Jun 1981	7.0	34	60	38	Tide too late, dark
12 Nov 1981	6.9	43	38	56	
29 Dec 1982	7.0	23	56	40	
18 Jan 1984	6.9	23	40	48	
21 Nov 1984	6.7	5	48	22	+ 7 red foxes
13 Nov 1985	7.1	2	22	10	+ 2 red foxes
12 Dec 1985	7.2	2	22	10	+ 2 red foxes
30 Dec 1986	7.2	7	10	14	Begin red fox trapping, 59 foxes removed in 1986
28 Jan 1987	7.0	7	10	14	63 red foxes removed in 1987
8 Aug 1987	7.3	8	14	14	Tide too late, dark
22 Nov 1987	6.7	12	14	28	
21 Dec 1987	7.0	8	14	28	+ 2 red foxes
16 Feb 1988	6.8	10	14	28	
22 Nov 1988	6.9	6	28	12	128 red foxes removed in ‘88
16 Oct 1989	6.9	59	12	32	Record High Tide Count; 25 red foxes removed in 1989
5 Oct 1990	6.4	57	32	56	Tide too low
2 Nov 1990	6.8	69	32	56	Record High Tide Count
22 Nov 1991	6.9	98	56	72	Highest Population Total
26 Oct 1992	6.8	159	72	130	Highest Population Total
15 Oct 1993	6.8	143	130	132	Highest Population Total
4 Nov 1994	7.0	150	132	102	220 Red-tailed Hawks counted On the NWS on 11 December 1994
25 Oct 1995	6.5	53	102	104	Tide too low
22 Nov 1995	6.9	55	102	104	
10 Dec 1996	6.7	55	104	74	
17 Oct 1997	6.6	40	74	32	
04 Nov 1998	6.8	30	32	30	

Table 2 (continued). High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 - 2010

Date	Tidal Height	Clapper Rails Counted	Breeding Pair Members		Notes
			Before	After	
23 Nov 1999	7.0	17	30	20	
11 Dec 2000	6.9	30	20	22	
15 Nov 2001	6.7	35	22	48	
04 Dec 2002	7.1	62	48	46	
26 Oct 2003	6.7	96	46	32	
12 Nov 2004	6.7	52	32	30	
15 Nov 2005	6.7	57	30	42	
09 Oct 2006	6.6	103	42	48	
06 Nov 2006	7.0	95	42	48	
26 Oct 2007	7.1	32	48	34	
12 Nov 2008	6.9	20	34	38	
01 Dec 2009	6.8	50	38	50	Fogged out on Nov. 3
05 Nov 2010	7.0	51	50	-	

The post-nesting high tide count in 2009 was about what would be expected given a subpopulation level of around 20 breeding pairs. Most of the recent high tide counts have been lower. Since the subpopulation has been steady at about 20 pairs, lower counts may be indicative of some of the rails moving undetected into the marsh edges as the tide moves in, prior to being counted by the observers in canoes. In addition, there are patches of marsh that are not entirely inundated and some of the rails flatten out on the water surface and virtually disappear as observers approach; several of them could go undetected, as well. As usual, potential rail predators were out in abundance during the count, hunting the marsh and edges, including red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), Peregrine falcon (*Falco peregrinus*), Cooper's hawk (*Accipiter* cooperi) and American kestrels (*Falco sparverius*). Every so often short-eared owls (*Asio flammeus*) are also observed in the marsh. Continued upgrading and maintenance of the artificial rafts on the Seal Beach NWR is essential to the protection of the wintering rails and success of the breeding rails. Usually at least half of the rails counted during the winter high-tide counts have been sequestered on the rafts.

The San Elijo Lagoon subpopulation was back up to its record high level of 15 nesting pairs in 2010. Although San Elijo Lagoon has had major efforts to restore tidal function, the lagoon still closes to the ocean with regularity resulting in wide fluctuations in habitat suitability for Clapper Rails. All of the vocalizing rails detected in 2010 were in fresh water marsh growth along the lagoon edges; four pairs were in the east basin (only one was directly off the weir) and 11 pairs were in the central basin. The only rails detected on Escondido Creek were advertising males. San Elijo received an augmentation of eight captive-bred rails in 2004, five in 2006, four in 2007, and 16 in 2009 at the dike in the inner lagoon. One of the 2004 rails was re-sighted near the railroad tracks in the central lagoon on December 13, 2004, six months following release, and one of the 2006 rails was observed repeatedly over six months off of the Rios Avenue trail. However, there have been no reported re-sightings of live banded rails since then. A dead rail was retrieved in May of 2010 that was banded and released into San Elijo on June 16, 2009. Since doubling in size between 2001 and 2003, the Point Mugu subpopulation fluctuated between 14 and 19 pairs, from 2003 to 2007. It had fluctuated between three and seven pairs for nearly 20 years until augmentations with captive-bred rails fostered its growth. There was a crash in 2008 back to five pairs but the population was back up to nine pairs in 2009 and 12 pairs in 2010. There is an efficient predator management program in place, consistent rail and marsh management, and the Clapper Rails are still breeding, although this subpopulation is not as large as would be hoped for in the biggest contiguous patch of potential habitat in the state. Again there was no breeding detected in the eastern arm of the lagoon but a pair vocalized from the vicinity of the rafts in the Central Lagoon and a small number of rails bred in freshwater marsh vegetation along a ditch on the west side near Perimeter Road.

There have been occasional re-sightings of banded rails at Point Mugu, indicating that some of the captive-bred rails remained local after being released into the marsh. In 2008, Martin Ruane resighted a banded rail four days after its release on August 22 near the release site. However, at least one banded rail (a female banded 1035-8878) did not stay at Point Mugu. A photograph was taken of this rail at Upper Newport Bay on December 12, 2004 by Steve Metz. This female was captive-bred at the Chula Vista Nature Center and released into the eastern arm of Point Mugu on August 28, 2004, 106 days before her picture was taken at Newport. This shatters the old long-distance movement of 13.5 miles recorded for the subspecies *levipes* (Zembal et al. 1983). The distance from Point Mugu to Upper Newport Bay is approximately 90 miles along the coast. This indicates that at least one and probably others of the captive-bred rails are more prone to movements between marshes than was previously observed in wild birds. It also indicates that at least one of the released rails chose not to stay at Point Mugu; others may have behaved similarly. For instance, there have been recent sightings of Clapper Rails on the Santa Clara River at the Freeman Diversion Dam and at Ormond Beach. In 2010, a female released at Point Mugu in 2009 traveled the 160 miles back to Sweetwater Marsh NWR and the Chula Vista Nature Center where she was hatched and reared.

The subpopulation in the University of California Reserve at Kendall-Frost rebounded well in 2004 and 2005 but was significantly reduced in 2006 to 2008. At seven pairs in 2009 and 10 pairs in 2010 it has recovered again. The height of rail occupation of the Reserve was in the early 1980s; 24 pairs bred there in 1984. This marsh is small, totally isolated, and surrounded by urban housing, but it is well managed under the University of California Reserve System. The stewardship includes appropriate predator management, habitat restoration, and research management to assure minimal human disturbance to the rails and their habitat. Additionally, nesting rafts have been provided and used heavily by the rails since 1987. There have also been translocations of eggs and adults. This culminated in 2004 and 2005 with breeding populations of 14 pairs, the highest total there since 1985. In spite of the appropriate management of the marsh, it may always be a struggle for the rails in such a tiny, isolated wetland.

Clapper Rail vocalizations were reported for Bolsa Chica and the San Joaquin Reserve in 2010. The calling reported in the Reserve was most likely an unmated male. Attempts to elicit responses to a tape-playback of a duet were unsuccessful at the Reserve in 2010 but were successful finally on March 31, 2010 at Bolsa Chica where a pair called in duet from freshwater reeds just up-coast of the walking bridge over the outer lagoon. This is the first recent affirmation of Clapper Rail breeding behavior in the Bolsa Chica. As with this 2010 detection, nearly all of the rails seen and heard at Bolsa have been on the marsh edge adjacent to Pacific Coast Highway (PCH), which is a death trap for the rails. The near constant noise masks predator cues and the fast moving vehicles would dispatch any rail that flushes that way. Unfortunately, a flushed rail would fly low and tend to flush into the adjacent uplands, which is PCH at Bolsa Chica.

One of the highlights of the 2006 survey of Light-footed Clapper Rails was the discovery of yet another breeding location in the Santa Ana River Marsh, also previously known as Newport Slough and listed in Table 1 under the Huntington Beach Wetlands. Four pairs were detected there in 2006 and 2007, only a single pair in 2008, 5 pairs again in 2009, and 6 pairs in 2010 (including one pair in the Brookhurst Marsh). The Santa Ana Marsh is at the southern terminus of the Huntington Beach Wetland Complex, comprised of several wetland patches strung along the coast totaling more than 200 acres. The 92-acre Santa Ana Marsh was restored as part of the Federal Flood Control Project on the Santa Ana River. Dampened tidal influence was re-established and cordgrass was planted primarily along a narrow eastern portion of the marsh that lies between an oil field and the south dike of the river. This cordgrass marsh is extremely well developed and patches have grown in the main marsh that are currently suitable for rails but are apparently unoccupied. This may have something to do with regular romping by neighborhood dogs from just across the main channel.

Restoration of the Huntington Beach Wetlands (HBW) is continuing and one of the pairs counted in the tally for this marsh complex was actually in the Brookhurst Marsh. Lena Hyashi reported a pair on April 19, 2010 vocalizing and observed along the larger stand of spiny rush (*Juncus acutus*) near the dunes and PCH. Other than the rails in the Santa Ana Marsh, this is the first record for a Clapper Rail in the HBW Complex since the 1970s. RZ investigated the pair again in May and was only able to elicit “kecking” from the male.

The salt marsh at the mouth of the Santa Margarita River typically held a single pair of nesting rails for many years and occasionally there have been two. These pairs are invariably in the same spot(s) year to year; at the river mouth in freshwater marsh in the Sweetwater section of the estuary and/or between Stuart Mesa Road and the railroad tracks on the north side of the river in the freshwater marsh that rims a pond. However, in 2008, a single pair was located on the channel surrounding the least tern island at the junction of the inlet channel. Hopefully, Clapper Rails were still there and bred; we did not gain access to do the survey in 2009 or 2010. The Marine Corps has circulated a request for proposals for Camp Pendleton-wide Clapper Rail surveys in 2011. A synopsis of the resulting information will be included in the 2011 report.

The highest rail count on record for Buena Vista Lagoon was nine pairs in both 2008 and 2009. The number was lower by one-third in 2010. The rail’s distribution was two pairs on the north side of the central lagoon between PCH and the 5 Freeway, three were in the inner lagoon, and there was a pair detected in the little lagoon between PCH and the railroad. There are many management issues at this little freshwater marsh and they are shared with most of the other coastal wetlands including abundant non-native trees and shrubs that harbor perching predators and homeless people. The trash and trailing associated with the homeless camp off State Street near Laguna Drive were worse than last year.

The marsh at Agua Hedionda Lagoon has held a maximum of seven pairs of Light-footed Clapper Rails during three different years, most recently in 2008. The count was down to six pairs in 2009 and dropped to only two pairs and a lone male in 2010. The brackish marsh inland of the inner lagoon was greatly impacted by a change in drainage in the mid-1980s and the rails were barely detectable through the 1990s. The five pairs located in 2004 were the highest level observed since then and this level was probably sustained in 2005 when four pairs and an advertising female were detected during an early season count. Given the usual presence of unmated males in this little wetland, the female likely found a mate and bred. With the recently increased street runoff from adjacent housing, the main freshwater marsh has rejuvenated to some extent, perhaps to the benefit of the rails, as evidenced by the record number in 2006 and again in 2008. This subpopulation was augmented with the release of five captive-bred rails in 2004 on the inland edge of the inner lagoon, although none of these banded rails has been re-sighted since.

Los Penasquitos Marsh is dominated by vegetation indicative of prolonged closure to the ocean, particularly pickleweed. However, fresh water influence and freshwater marsh edge are increasing and the rails appear to be using the freshwater marsh habitat increasingly. The detection of 12 pairs was a record high for this wetland in 2007. This number plummeted to only two pairs in 2008, back up to four pairs in 2009, and to nine pairs in 2010. In 2009, there were four advertising males mixed in with the breeders; unfortunately in 2010, there were 2 advertising females, generally indicative of untoward predation of males. Four captively-bred rails were released in 2004, four in 2007, and nine in 2009. There was a re-sighting of a banded female hatched at the Wild Animal Park and released in 2007 at Los Penasquitos. She was photographed with her mate and three downy chicks on the edge of the pond below the San Diego Water Utilities Pump Station on Sorrento Valley Road on July 10, 2009 by Eric Kallen.

The cordgrass continues to expand and dominate a significant portion of the mouth of the San Diego River and an all-time high of eight pairs of breeding Light-footed Clapper Rails were there in 2004. The numbers have varied greatly since then and in 2010 there were seven breeding pairs detected, one of which was all the way out east of the 8 Freeway, north of Robb Field. A previously unknown population of Salt Marsh Bird's Beak, *Cordylanthus maritimus maritimus,* was also discovered in this area just off one of the foot trails. There were several hundred plants, but unfortunately they are being smothered out by the clumped invasive Algerian Sea Lavender, *Limonium ramosissimum*.

Based upon the extent and condition of the habitat in the San Diego River west of the 5 Freeway, it should abound with rails. However, regular high flows may limit the habitat suitability for the rails there. Additionally, during the installation of five nesting rafts in 2008, heavy trailing was noted into the marsh from the adjacent riprap. There appears to be an extremely large infestation of rats living in the riprap and venturing into the marsh to feed. Any eggs laid in the marsh would be extremely vulnerable to predation by rats prior to the initiation of incubation. Raccoons are also extremely abundant and apparently the site is a feral cat feeding station. As usual, there were multiple reports of Clapper Rail detections 13 miles inland at Kumeyaay Lake. Again, reports from the lakes could not be verified probably because these inland rails have been conditioned by rampant over-use of playback tapes by birders. There was also a report of a Clapper Rail sighting at Famosa Slough; the rail was "drawn out" by an unpermitted birder playing a rail tape incessantly.

Two of the breeding pairs of Clapper Rails reported for the Sweetwater Marsh NWR were actually inland along the Sweetwater River in freshwater marsh. The extent of occupation of the salt marsh became known only after nest searching was included in the assessment. There was a pair in the main marsh, a pair on the northwest edge of Vener Pond, and two pairs in the E Street Marsh parcel. Nests were found for all of these territories, including active brood nests in Vener Pond and the main marsh, and two eggs in an E Street nest that were left after hatching. The Sweetwater Marsh Complex has a thriving raptor population, fully in evidence on every visit with ample good hunting perches spaced regularly along the marsh edge. The marsh growth is low and the rails are quite vulnerable. Eleven captive-bred Clapper Rails were released into Sweetwater in 2005 and six more were released in 2008 but none has been re-sighted.

An adult Clapper Rail and a chick were observed in the South Bay Marine Reserve in 2005 after the survey report was compiled. In 2006, there was a strong clappering response to the tape by a single rail with no following advertising, indicating that for the second consecutive year there were breeding rails in the Reserve. In 2007, both a pair and a single responded to the tape; there was silence in 2008; and a single pair again in 2009 and in 2010. This small isolated marsh will likely be regularly occupied when the habitat base in the south bay is greatly increased 7 to 10 years or more after the implementation of the proposed restoration of the new NWR, depending upon how much planting is accomplished.

The last know Clapper Rail call from Carpinteria Marsh was from an unmated female vocalizing constantly with no answering call in 2003. In 2004, there was total silence until April 13 when two males were released in the hope that the female was still alive. Unfortunately, in 2005 through 2010, no rails were detected. This northern wetland is plagued with domestic cats in the marsh and other predators of concern. The Carpinteria subpopulation and wetland are in major need of intensive management. Apparently, red foxes still actively den at the southern end of the dirt road extension of Esteros Way on the very edge of the marsh. Without dealing with the foxes through consistent predator management, the chances for the rejuvenation of a viable subpopulation in Carpinteria Marsh are non-existent.

Eight of the 19 marshes with breeding Clapper Rails in 2010 were male-skewed; three were female-skewed; and two had both advertising males and females. A total of 36 unmated males and 11 females were heard during the call counts including: four advertising males at Point Mugu; seven single males on the Seal Beach NWR; one male in the Huntington Beach Wetlands; four males and six females at Upper Newport Bay; one male in Agua Hedionda; one male in Batiquitos Lagoon; one male and one female in San Elijo Lagoon; six males in the San Dieguito River Valley; two females in Los Penasquitos Lagoon; one female in Kendall-Frost Reserve; 1 female in the San Diego River; one male in Sweetwater Marsh; and 10 males in Tijuana Marsh. The usual condition has been a slight male bias during most years in most marshes. An extreme male skew or even a slight female skew could indicate major issues, unfortunately of an unknown nature.

The continued annual release of additional captive-bred Clapper Rails is co-occurring with increased detections of rails in new locations, particularly inland sites. Some of the recent detections of interest are as follows. Rachel Woodfield photographed a single Clapper Rail at the Ballona Wetlands in August 2008; however, a portion of the marsh was checked in 2009 with negative results. Three Clapper Rails were reported in poor habitat on the Santa Clara River in 2010 at the Freeman Diversion Dam and there have been repeated sightings on the edge of Point Mugu at Ormond Beach. A Clapper Rail was heard and observed in Bolsa Chica at the foot bridge in October 2009 and bred near there in 2010. There was also a rail reported in brackish marsh on Aera Energy property below Sea Point Avenue. Sue Hoffman flushed a single Clapper Rail adjacent to the mouth of the Santa Ana River in the plover yard at the Huntington State Beach California Least Tern nesting colony in 2008; a dead rail was reported between PCH and the Tern Colony in July 2009. Clapper Rails are still reportedly vocalizing from in the reeds at Kumeyaay Lake on the San Diego River but the calls are not well described and DZ could not get them to call back probably due to conditioning by over-use of unpermitted call-back playing. Jan Nordenberg is still reporting Clapper Rails in the San Dieguito River Watershed well inland of the Polo Club (see description above). Paul Lehman reported seeing a Clapper Rail at the northern end of Upper Otay Lake on April 20, 2009. Finally, the longest movement ever recorded for this subspecies was observed in 2010 when a female released at Point Mugu in 2009 made her way back 160 miles to the Chula Vista Nature Center where she had been hatched and reared in captivity.

The Light-footed Clapper Rail population in California rebounded with a 37% increase in 2009 from a crash in 2008 and another 17.5% increase in 2010 to the third highest total since 1980. It has been greatly reinforced during the past many years of annual counts that the more time that can be spent at an individual wetland, the higher the likelihood of a good count. The typical Clapper Rail subpopulation today is small; 14 subpopulations were 15 pairs or smaller in 2010 and in many of those places it is tough to get them to call back and forth. If the rails in a small subpopulation just did a round of calling a few minutes before the counter arrives, they just may not call again together for a while, if at all that day.

Management and Monitoring of Nesting Sites

Nest searches at Upper Newport Bay revealed seven incubation nests in roughly the same area where six nests were found in 2009, but only two egg nests were found in 2008. Five of the 2010 nests were active when found with two to nine eggs each; one clutch was hatching when discovered, and two were depredated by raccoons, *Procyon lotor*. Four eggs were taken from Newport for relocation in the face of heavy egg losses to raccoons. One of the two 2008 nests was depredated, the other was still active on July 17 which is later than the last re-nest date in usual years. In 2009, three egg nests were depredated and the eggs were not viable in a fourth. In 2007, intensive nest searches over 17 days, perhaps 100 acres, and 300 field-hours revealed only six incubation nests, four of which were depredated in the same areas that in 2006 held 24 nests, of which 12 were active egg nests when discovered. Nesting activity and hatching results have gravely deteriorated recently in Upper Newport Bay. There is raccoon, *Procyon lotor* sign well out into the marsh, spanning the bay, and stirring of sediments, habitat disturbance, and noise associated with the ongoing dredging activity. How this subpopulation rebounded and is maintaining its numbers is not clear.

On the Seal Beach NWR there were 25 clutches of eggs laid on 19 rafts in 2010. This compares to last year's 19 clutches and 17, 20, and 32 clutches found on rafts in 2008, 2007, and 2006, respectively. There were an additional four unused nests found on rafts and 28 brood nests built on 28 rafts in 2010. Overall nesting success was 90%. Sixteen of the estimated 25 pairs in the NWR nested on rafts and all of them brooded on rafts. The large number of brood nests built on rafts makes us suspicious that there may have been additional undetected incubation nests in natural habitat.

Rafts were instrumental in the rebounding of the Seal Beach NWR subpopulation in the early 1990s. For example, in 1993 there were 79 nests, 73 clutches of eggs, nine additional brood nests, and 79% hatching success on the 100 rafts available in the NWR. However, since the mid-1990s, the numbers have fallen off from unknown causes but heavy raptor predation is suspected. We continue to modify the raft design for better durability and function and provide several times the number of rafts as there are nesting pairs. The rafts are heavily monitored and there have been no indications of unusually severe problems or extremely high predation rates during the nesting season. Post-breeding season survival has been poor on the NWR, perhaps due in part to the huge wintering raptor population. Continued efforts to provide enhanced cover, both natural and artificial, may make a positive difference over time. Cordgrass cover was greatly enhanced in years following unusually high rainfall, as in the winter of 2004 to 2005. This may have added enough additional predator-protection to increase rail survival and productivity in 2006. December of 2010 brought record rainfall, which will perhaps be reflected in enhanced nesting cover for the 2011 season.

In 2010, at the Kendall-Frost Reserve, 16 of 21 rafts held nests with 11 clutches of eggs and an additional three clutches were in nests off rafts; hatching success was poor at 64% but also was poorly documented. Of the 14 clutches, seven hatched, one was predated, and six were partial hatches or unknown. Kendall-Frost is small, extremely isolated, and therefore plagued by mesopredator release. Furthermore, irresponsible pet owners allow their cats and dogs to roam into the marsh and misguided animal control officers have apparently released stray animals into the marsh and/or adjacent campground in the past. It is imperative that predator management be continued annually and be started before nesting actually begins each year. It is paramount that a reliable source of funding be found for the program. Even with the program operational there were fresh cat (*Felis domesticus*) and opossum (*Didelphis* virginianus) tracks on the saltpan and evidence of raccoon (*Procyon lotor*) along the main tidal creek. This little wetland has high potential and should be a focus of management efforts for rail recovery.

Finally, in Sweetwater Marsh NWR there was no use of the nesting rafts in 2010, but seven nests were found in the habitat including evidence of hatching at four nests. Sweetwater Marsh is another high marsh that is largely not influenced by the tides except for the extremely-high tides, particularly those that are storm-driven. Most of this marsh is high and dry enough to provide excellent foraging opportunities for predators and many species of raptors and terrestrial predators take full advantage, as evidenced by the high rate of depredation observed of released rails there in 2005 (Zembal et al. 2005). The rails documented in the marsh in recent years were in those parts of the wetland most-regularly influenced by tidal inundation or ponded water. However, it also became evident in 2010 that a full assessment of the Sweetwater subpopulation will require annual nest searching. Call counts in 2010 resulted in a population estimate of only four pairs; and there was evidence of two additional pairs during nest searching.

Evidence of breeding activity, in addition to territorial manifestation by calling, was observed in 11 of the 12 breeding territories at Point Mugu in 2010. That evidence included: four egg nests, each with at least a partial hatch; four additional hatched nests in four territories; and chick-feeding in 11 territories. Unique to 2010 was the discovery of nesting rails along a fresh water ditch and largely in reeds in the far western arm, where three of the 11 pairs bred.

Although natural nesting cover was thought to be a limiting factor for the rails at Point Mugu, artificial nesting rafts placed there in 1988 were not used over the several years they were maintained and monitored; the marsh is simply so high that there is significant acreage of natural cover that is not inundated by high tides. However, artificial rafts were tried again in 2008 and one was used successfully by a nesting pair with some evidence of partial use of two others. Given the years of experience at Point Mugu with the rails, the new rafts were placed more strategically. Because of the use observed in 2008, five additional rafts were added in 2009, bringing the total to 10 rafts. The same raft that was used by a nesting pair in 2008 was used again in 2009. An eight-egg clutch hatched but four of the chicks were discovered dead in or near the nest. They were collected and delivered to the Contaminants Division of the U.S. Fish and Wildlife Service, Carlsbad Field Office to check for contaminants issues; that analysis is pending. Unfortunately, there was no rail use of the rafts detected in 2010 and one of the rafts in the Central Arm is gone.

Captive Breeding

The captive Clapper Rails at the CVNC bred successfully for the first time in 2001, after we brought in a second pair of rails and switched their mates. Each pair laid a single clutch, one of eight eggs and the other of seven eggs. The eight-egg clutch was taken to Sea World to be hatched and reared, hoping that the pair would lay another clutch; however, they did not. Seven captive-reared rails were released into Mugu Marsh that first year. Additional rails have been added to the captive breeders and their progeny have been released to the wild annually ever since.

There were six potential breeding pairs in captivity in 2010, two pairs at each of the three facilities. The CVNC housed rails #208/052 and 219/217; Sea World held #089/218 and 359/366; and the San Diego Zoo Safari Park kept #362/209 and 207/246. The male #208 was banded 103544891 (L) at Newport on October 8, 2005 and mated with female #052 captured from Newport on September 20, 2002. The pair 219/217 were hatched at Sea World on May 23 and 15, 2006, respectively from eggs taken from two different nests at Upper Newport Bay. The male #089 was hatched at Sea World on June 3, 2003 from a Newport egg and mated to #218, a Sea World hatchling on May 22, 2006 from an egg taken from Newport. The male #359 was hatched from a Newport egg at Sea World on June 11, 2009. The female #366 was trapped from Tijuana Estuary on October 5, 2009. The male #362 was hatched at Sea World on June 19, 2009 from a Newport egg and mated to #209, a Newport capture from November 29, 2005. The male #207 was trapped from Newport on September 19, 2005 and mated to #197 from a Newport egg hatched at Sea World on May 19, 2005. The female #197 was the only casualty during fire evacuation at the Safari Park and was replaced with a female #246 captured at Upper Newport Bay on November 25, 2007 and banded #103544924. Captive breeding results for 2010 are summarized below and in Tables 3 - 5.

SWC Breeding Pair I LFCR359/366: Produced no eggs or chicks in 2010. The female from Tijuana Marsh died in captivity before reproducing in 2010.

SWC Breeding Pair II LFCR089/LFCR218: Produced three clutches and eight chicks in 2010, all of which survived to be released to the wild. Male #089 was released to the wild in Sweetwater Marsh on 22 September 2010. Non-viable eggs had no development, and were examined by candling only.

CVNC Breeding Pair I LFCR219/217: Produced three clutches and 22 chicks in 2010, 15 of which survived to be released to the wild. Ten of those have been released, and five are being held for future release.

CVNC Breeding Pair II LFCR208/052: Produced no eggs or chicks in 2010. The female LFCR052 died in captivity.

SDZSP Breeding Pair I LFCR362/209: Produced no eggs or chicks in 2010.

SDZSP Breeding Pair II LFCR207/246: Produced nine eggs but no chicks in 2010.

Table 3. Clapper Rail Breeding Activity at Sea World, 2010.

Parent IDs	089/218	089/218	089/218
Clutch # (1st, 2nd…)	1st	2nd	3rd
Date Clutch Initiation	2/17	4/4	5/20
# Eggs	7	9	9
Hatch Dates	3/11	4/29	6/10
# Moved to Conditioning	1	4	3
# Released to Wild	1	3	3

Table 4. Clapper Rail Breeding Activity at the Chula Vista Nature Center, 2010.

Parent IDs	219/217	219/217	219/217
Clutch #	1st	2nd	3rd
Date Clutch Initiation	2/21	-	-
# Eggs	9	9	7
Hatch Dates	3/23	5/12-15	6/22-23
# Moved to Conditioning	6	6	5
# Released to wild	5	5	Holding

Three of six captive pairs produced eggs in 2010, one pair each at each of the three facilities resulting in the release of 19 additional Clapper Rails into two marshes (Table 5). This brings the total number of captive-reared Light-footed Clapper Rails released into the wild since 2001 to 271. Point Mugu has been the priority for releases up until 2009 with 107 rails released. However, 2009 was the final release date there since the Biological Opinion from the Fish and Wildlife Service mandating U.S. Navy participation in the captive breeding program only required their participation through 2008.

The propagation partners noted declines in egg viability at Sea World and the Safari Park where nine eggs were produced in three clutches but none made it to hatching. Some were infertile and some were broken by the adults. These and other data suggest that the breeding rails have a short reproductive life. Infusion of new breeding stock and rotation of breeders in a more regularly scheduled fashion may better address decreased production, nest failure, and abnormal breeding behavior (egg breakage).

Eggs were collected in Upper Newport from wild nests and transferred to Sea World in June 2010 after a translocation opportunity did not work out. Eggs were incubated in a Humidaire incubator at 99° F with a wet bulb of 82-84° F, transferred to a Grumbach hatcher at 98° F with a wet bulb of 88° F on 15 June and hatched unassisted on 19 June. The birds were hand-raised using modified puppet rearing techniques. Of the four chicks, there were two females (385, 386) and two males (384, 388), and all but 388 were from the same clutch.

Table 5. Number of Captive-reared Light-footed Clapper Rails Released into Target Marshes, 2001 – 2010.

Marsh	01	02	03	04	05	06	07	08	09	10	Sum
Point Mugu	7	11	20	12	17	3	5	27	5	-	107
Seal Beach NWR	-	6	-	5	-	-	-	13	5	-	29
Sweetwater Marsh	-	4	-	-	11	-	-	6	-	14	35
Kendall-Frost	-	-	5	-	-	-	-	-	7	-	12
Batiquitos	-	-	-	8	8	-	-	-	-	-	16
San Elijo	-	-	-	8	-	5	4	-	16	-	33
Agua Hedionda	-	-	-	5	-	-	-	-	-	-	5
Los Penasquitos	-	-	-	4	-	-	4	-	9	-	17
Carpinteria Marsh	-	-	-	2	-	-	-	-	-	-	2
San Diego River	-	-	-	-	5	-	5	-	-	5	15
Total	7	21	25	44	41	8	18	46	42	19	271

Going into the breeding season in 2011, the three propagation facilities will continue to house two breeding pairs each although the goal is to get four pairs going at the Safari Park. Sea World will house pairs LFCR359/218 and LFCR403/404; Chula Vista Nature Center will have pairs LFCR219/217 and LFCR208/243; and the Safari Park has pairs LFCR207/246 and LFCR362/346 and will receive two new pairs LFCR407/386 and LFCR 405/406.

Banding

The banding session at Upper Newport Bay yielded two males and two females. Because of the advanced ages of the captive rails, reproductive successes of some, reproductive failure of others, and the deaths of two, all four of the new captives were kept for the 2011 season. Because they were headed for captivity, we did not band them. All but one of the 15 rails released to the wild in 2010 were banded; band numbers are noted in the Methods section herein. Trapping efforts at Tijuana Slough NWR were postponed because of weather and other logistic issues in 2010.

Re-sightings of banded rails were numerous in 2010 as noted under survey results above with highlights as follows. A banded female was observed with chicks in freshwater marsh at Point Mugu; a rail banded in 2009 was recovered at San Elijo Lagoon; two banded rails were observed closely at the San Diego River; a rail was in Famosa Slough; and a female released at Point Mugu in 2009 traveled the 160 miles back to Sweetwater Marsh NWR and the Chula Vista Nature Center where she was hatched and reared.

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APPENDIX J

LIGHT-FOOTED CLAPPER RAIL STATUS AND DISTRIBUTION IN CALIFORNIA, 2011, 2012 AND 2013 SEASONS

State of California
Natural Resources Agency
Department of Fish and Wildlife
Wildlife Branch

Status and Distribution of the Light-footed Clapper Rail in California

2013 Season

By

Richard Zembal, Susan M. Hoffman, and John Konecny

Nongame Wildlife Program, 2013-02

Final Report

To

State of California
Department of Fish and Wildlife
South Coast Region
3883 Ruffin Road
San Diego, CA 92123

Status and Distribution of the Light-footed Clapper Rail in California

2013 Season

Richard Zembal, Susan M. Hoffman, and John Konecny
Clapper Rail Recovery Fund
Huntington Beach Wetlands Conservancy
24821 Buckboard Lane
Laguna Hills, CA 92653

Prepared 2 October 2013
Revised 1 November 2013

State of California
The Resources Agency
Department of Fish and Wildlife

Status and Distribution of the Light-footed Clapper Rail in California

2013 Season[1]

by

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ABSTRACT

The thirty-fourth annual census of the Light-footed Clapper Rail in California was conducted from 2 March to 21 June 2013. Thirty coastal wetlands were surveyed by assessing call counts from Mugu Lagoon in Ventura County, south to Tijuana Marsh National Wildlife Refuge (NWR) on the Mexican border.

For the second year in a row the California population of the Light-footed Clapper Rail exceeded 500 breeding pairs. A total of 525 pairs exhibited breeding behavior in 22 marshes in 2013. This is the highest count on record, representing an increase of four pairs over the breeding population detected in 2012, and 18.5% larger than the former high count in 2007. The tally at Upper Newport Bay was the highest ever recorded at 191 pairs. The Newport subpopulation was once again the largest in California with 15.8% more rails exhibiting breeding behavior than in 2012 and 9.8% more than the former high count in 2005 of 174 pairs. Tijuana Marsh NWR was at its third highest recorded level with 105 breeding pairs, an increase of 4% over the 2012 breeding season but 26% lower than the record high of 142 pairs in 2007. The Newport subpopulation comprised 36.4% of the state population in 2013 and the subpopulation in the Tijuana Marsh NWR comprised 20%, together accounting for 56.4% of the breeding population of this rail in California.

Eight of the small subpopulations increased in size from the 2012 totals, increasing by a combined total of 12 breeding pairs in 2013. Batiquitos Lagoon was at a record high of 45 breeding pairs, ranking it as the third largest subpopulation in California in 2013. Point Mugu

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[1] Zembal, R., S.M. Hoffman, and John Konecny. 2013. Status and Distribution of the Light-footed Clapper Rail in California, 2013. California Department of Fish and Wildlife, Wildlife Management, Nongame Wildlife Unit Report, 2013-02. Sacramento, CA 24 pp.

increased from 16 pairs in 2011 to 22 pairs in 2012, and 23 pairs in 2013, a record high. There were declines totaling 39 pairs at 7 marshes including, most notably at San Elijo Lagoon (-11 pairs), San Dieguito Lagoon (-8 pairs), Kendall-Frost Reserve (-8 pairs), and Buena Vista Lagoon (-7 pairs). Excluding the 2 largest subpopulations, there were 7 subpopulations in double figures, ranging from 10 to 45 pairs and totaling 187 breeding pairs or 35.6% of the state total. The remaining 13 subpopulations ranged from 1 to 8 pairs and totaled 42 breeding pairs of clapper rails, or 8% of the total.

The annual increases in the population total of the Light-footed Clapper Rail between 2002 and 2007 gave encouragement that restoration and management including captive propagation were contributing to the recovery of this endangered bird. The 2008 crash was presumably weather-related and a harbinger of what could be in store if wide weather fluctuations are the future norm. Record high counts of 520 and 525 pairs of Light-footed Clapper Rails in 2012 and 2013 is a manifestation of this subspecies’ resiliency with appropriate management.

INTRODUCTION

The Light-footed Clapper Rail (*Rallus longirostris levipes*) is a state- and federally- listed endangered species that is resident in coastal wetlands in southern California and northern Baja, California, Mexico. Loss and degradation of habitat threaten the continued existence of this bird, although recent management efforts are reversing those trends. The California population of this endangered rail was at a former high of 325 pairs in 15 marshes in 1996, the largest number detected breeding since statewide annual surveys were begun in 1980 until 2004 when 350 pairs were detected in 15 marshes. Since then, there were annual increases until the record high in 2007, when 443 breeding pairs were detected in 19 marshes. There was a population crash in 2008 followed by recovery of 37% in 2009 to 320 breeding pairs, and annual increase since then through 2012 when a new high total of 520 pairs was reached.

One of the first major investigations of this rail identified the lack of suitable nesting habitat as a major, widespread limiting factor (Massey and Zembal 1980). Subsequent work demonstrated the need for emergency actions and recommended management strategies to stem the alarming population decline of this endangered bird in southern California. The actions taken have included: 1) habitat restoration, particularly through enhancement of tidal action to former wetlands; 2) study and control of introduced predators and unnaturally high predator populations; 3) provision of nesting sites in marshes with good habitat but limited options for protected nesting locations; 4) studies that have led to adaptive management strategies, benefiting the rail and the other co-inhabitants of these biologically-rich ecosystems; 5) development of a protocol for captive breeding and genetic and demographic augmentation of smaller subpopulations; and 6) surveys of the California population, in part to track the effects of management on annual recruitment.

Implementation of these measures has succeeded in protecting and maintaining the small subpopulations and in supporting the expansion of many of them, particularly because of the release of captive bred rails. However, the benefits of the associated habitat restoration and management go far beyond this single species. These endangered birds thrive in our most productive, remaining coastal wetlands. Measures that benefit this rail and its environs enhance conditions for a myriad of other species as well, including people. These places and the wildlife are cherished by hundreds of thousands of southern Californians for their inherent aesthetic, recreational, economic, scientific, educational, and ecological values. Furthermore, there are essential links between the coastal wetlands and vast acres of diverse upland habitats and wildlife located many miles from the coast (Soule et al. 1988, Zembal 1993). Restoring and maintaining the diversity and vital productivity of the coastal wetlands, while achieving the recovery of the Light-footed Clapper Rail, may only be possible in an environment that includes coastal southern California's complete wildlife heritage, fostered by a caring public who support the management necessary to maintain the interconnectedness and viability of the system.

Hundreds of wetland acres have undergone, or are being planned for restoration. However, full recovery and functionality of a coastal wetland may take decades to achieve. In the meantime, habitat suitability for the clapper rail may be quite marginal. All but a few of the current subpopulations of Light-footed Clapper Rails depend upon a marginal habitat base and are too small to be expected to maintain themselves without management, particularly population augmentation.

Population monitoring is essential in understanding the effects of our management efforts and in stewardship of this critically endangered bird toward recovery. Reported herein are the results of the 2013 statewide survey of the Light-footed Clapper Rail.

METHODS

The thirty-fourth consecutive annual census of Light-footed Clapper Rails in California was conducted from March 2 through June 21, 2013. Thirty coastal wetlands were surveyed by mapping territorial pairs based on their calls (Zembal and Massey 1981, 1985; Zembal 1992). All of the coastal marshes with known or suspected rail subpopulations were surveyed until an evening or early morning with good calling activity was encountered. Small wetlands with no recent clapper rail sightings that again yielded negative results were surveyed at least twice as were marsh parcels with lower than expected results on the first call count. Additionally, nesting data were considered in the assessment of the subpopulations inhabiting the 3 wetlands wherein such data were gathered in 2013 and a pre-nesting high tide count was accomplished on November 14, 2012 on the Seal Beach NWR; a post-nesting high tide count will be scheduled for Fall/early winter 2013. This NWR is the only wetland inhabited by clapper rails that is inundated thoroughly enough during a 6.7 ft. tide or higher to get a relatively complete visual survey.

In the two marshes with abundant clapper rails, mapping spontaneous calls was the prevalent technique. In marshes with fewer rails and along long, narrow strips of habitat, playbacks of taped "dueting" were used sparingly to elicit responses. In the Tijuana Marsh NWR, enough observers were stationed within potential hearing range of any calling rail to cover the entire marsh on a single evening. However, most of the marshes were surveyed by a single observer visiting discrete patches of habitat on consecutive evenings until all available habitat had been covered. Most of the observations were those of three observers, but primarily the principal investigator. Additional observers participated primarily in three of the year 2013 counts, those at Seal Beach NWR, Tijuana Slough NWR and Kendall-Frost Reserve.

The more movement required of an observer during a survey, the more likely that breeding, but infrequently-calling rails would be missed. Calling frequency and the detection of calls are influenced by the observer's hearing ability and experience with the calls, the stage of breeding of individual pairs, rail density, and weather conditions (Zembal and Massey 1987). Many surveys attempted on stormy, windy days needed to be repeated. When calling frequency is high with many rounds of calling as adjacent pairs respond to one another, it is possible to map the rails accurately and move on to survey more marsh. However, under usual circumstances approximately 20 ha (50 acres) of marsh can be adequately covered during a single survey.

Surveys are usually conducted in the 2 hrs before dark, but some are done from first light to about 2 hrs after sunrise. In the past, early morning and late evening surveys have been comparable, although evening calling by the rails is more intense and often ends with one or more flurries of intense calling (Zembal et al. 1989).

The playback of a taped "clappering" call appears to be responded to by the rails as if a living pair is calling nearby. However, work done with Yuma Clapper Rails (*Rallus longirostris yumanensis*) strongly suggests that this closely-related species can become conditioned to the tape if it is used excessively (B. Eddleman, pers. comm.). During prime calling times in the evening or early morning, a playback sometimes elicits a single response or a round of calling. However, there are sometimes no vocal responses to the tape. If played at a time of day when the rails are not particularly prone to call, the only response likely to be elicited is that of the territorial pair intruded upon. Sometimes the response is non-vocal investigation by the pair or one member. Repeated playbacks are likely to elicit aggression. When used only once per year at a given marsh and with minimal repetition, playbacks have yielded important results. Unmated clapper rails, for example, often respond at considerable distances and may approach the tape. Isolated single rails often approach very closely and remain in the vicinity unless displaced.

In assessing the rail population, duets and some single "clapperings" were treated as territories. Since advertising singles are not indicative of an occupied territory with reproductive potential at the time of the survey, they are not included in the population total. However, a single “clappering” is as good an indicator of a territory as a duet, when advertising is not heard later from the same territory. Eventually, during a 2 – 4 hr census period, pairs often dueted from territories where only single pair members had called earlier. However, the fewer rails in a marsh, the more important it is to count only duets as pairs to avoid over-estimating the breeding subpopulation. The 2013 call counts were conducted on 37 dates and totaled approximately 377 field-hours, mostly from March 2 – June 21, 2013.

Study Areas

Descriptions of all the marshes recently occupied by Light-footed Clapper Rails are available (U.S. Fish and Wildlife Service 1985 and Zembal and Massey 1981). Four of the current principle study areas are at the Naval Air Station Point Mugu (NASPM, also Point Mugu), the Seal Beach NWR, Upper Newport Bay Ecological Reserve, and Tijuana Slough NWR.

The marsh at Point Mugu is located in southeastern Ventura County on the 1,821 ha (4,500 acre) Naval Base Ventura County (NBVC), about 13 km (8 miles) west of the Los Angeles County line. There are 1,012 ha (2,500 acres) of jurisdictional wetlands in Point Mugu (USACOE/EPA 1994), including the largest functioning salt marsh in coastal southern California today. Considering the combined acreages of marshes that are regularly occupied, the vegetated marsh and most closely associated habitats at Mugu Lagoon represent more than 25% of the clapper rail's potential habitat base. The marsh is subject to nearly full tidal action in the central and eastern arms with a tidal amplitude of about 9 ft. The tides are dampened by constrictions at Laguna Road and farther west, resulting in an amplitude of only 4 - 5 ft. The wetland vegetation is dominated by pickleweed (*Salicornia virginica*) but scattered stands of spiny rush (*Juncus acutus* ssp. *leopoldii*) are critical for rail nest placement.

The Seal Beach NWR covers 369 ha (911 acres) of the 2,024 ha (5,000 acre) Seal Beach Naval Weapons Station in Orange County near the City of Seal Beach. About 299 ha (739 acres) of the refuge lands are subject to regular inundation by the tides. There are about 229 ha (565 acres) of salt marsh vegetation, 24 ha (60 acres) of mudflats that are exposed daily, and 46 ha (114 acres) of channel and open water. The wetlands are fully tidal, with a range of about - 0.5 m (1.7 ft) to + 2.2 m (7.2 ft) MLLW, and very productive with a high diversity and abundance of wildlife.

Upper Newport Bay is an Ecological Reserve of the California Department of Fish and Game (CDFG), located approximately 22 km (13.7 mi) down coast of the Seal Beach NWR. Approximately 304 ha (750 acres) are fully tidal, including 105 ha (260 acres) of marsh. The bay is bordered by bluffs, 9 - 18 m (30 - 59 ft) high, and surrounded by houses and roads. There are approximately 100 ha (247 acres) of shrublands remaining undeveloped on the edge of the wetlands and two local drainages, with some cover along them coursing into the bay.

Tijuana Slough NWR consists of 427 ha (1,056 acres) of open water, tidal salt marsh, beach dune, riparian, and maritime scrub habitats in the City of Imperial Beach in the extreme southwest corner of the U.S. The NWR is part of the 1,024 ha (2,530 acre) Tijuana River National Estuarine Research Reserve (NERR), one of only 26 such NERRs in the country. The fully tidal coastal salt marsh (that is influenced by a 7 ft tide MLLW) comprises approximately 159 ha (392 ac) of the total area along with 41 ha (101 ac) of tidal creeks and mudflat. Tijuana Slough is the only coastal wetland in the southern California Bight that is not bisected or greatly impacted by a major paved road or the coast railroad.

RESULTS and DISCUSSION

A total of 525 pairs of Light-footed Clapper Rails exhibited breeding behavior in 22 marshes in 2013 (Table 1). This is the highest count on record, representing a four pair increase over the breeding population detected in 2012 (Zembal et al. 2012), and 18.5% larger than the former high count in 2007. Upper Newport Bay with 191 pairs was once again the largest subpopulation in California with 15.8% more rails exhibiting breeding behavior than in 2012 and 9.8% higher than the former high count in 2005 of 174 pairs.

The Tijuana Marsh NWR subpopulation was at its third highest recorded level with 105 breeding pairs, a 4% increase from the 2012 breeding season but 26% lower than the record high of 142 pairs in 2007. The Newport subpopulation comprised 36.4% of the state population in 2013 and the subpopulation in the Tijuana Marsh NWR comprised 20%, together accounting for 56.4% of the breeding population of this rail in California. In addition, 7 subpopulations ranged in size from 10 to 45 pairs, totaling 187 breeding pairs or 35.6% of the state total. The remaining 13 subpopulations ranged from 1 to 8 pairs and totaled 42 breeding pairs of clapper rails, or 8% of the state total.

Nest searching in Upper Newport Bay has been very unfruitful in recent years. Four to six nests were found annually 2009 – 2013 with 60 field-hours or more of effort but few egg nests were discovered before hatching (none in 2013) and several had been depredated by raccoons. This issue will be investigated more thoroughly and the option of bringing eggs into the US from Mexico is also being examined. Because the Propagation Team made the decision to maintain the captive flock using mostly hatchlings from Newport eggs, finding egg nests will be prioritized.

Tijuana Marsh’s subpopulation was 87 pairs for two consecutive years prior to the 2006 count of 102 breeding pairs, followed by the record count of 142 pairs in 2007. That 40-pair increase in 2007 was unprecedented at any marsh except Upper Newport Bay; likewise, the 95 pair crash in 2008 was simply unprecedented. This subpopulation had not been that small since 1991. The 19-pair increase in 2010 placed this subpopulation’s size directly in mid-range for the 2000s up until then. The 37 pair increase in 2011 to 113 pairs and the second highest count in 32 years of surveys demonstrates the growth and resiliency indicative of a secure subpopulation; this rebound constitutes a 240% recovery from the 2008 crash. The slight decrease in 2012 and increase in 2013 are insignificant in comparison. Four of the pairs detected in 2011 - 2013 were in the restored “Model Marsh” south of the river where nesting was confirmed in 2010 with the discovery of several hatched egg nests.

The rails increased gradually in Batiquitos Lagoon as the ecological functionality of the wetland continued to improve over time following the major restoration project implemented there by December 1996. The lagoon has remained tidal and rail habitat has been increasing and improving. Breeding rails were detected on the north side of the lagoon for the first time in 2004 and a total of 11 pairs was detected. Clapper Rail numbers grew to 22 pairs in 2007 and 2008

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2013.

Part I: 1980 – 1989

Location	Number of Pairs Detected In:									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Santa Barbara County										
Goleta Slough	0	0	-	0	-	-	-	-	0	0
Carpinteria Marsh	16	14	20	18	26	7	4	5#	2#	0
Ventura County										
Ventura River Mouth	-	-	0	0	-	-	-	-	-	0
Santa Clara River Mouth	-	-	0	-	-	-	-	-	-	0
Mugu Lagoon	-	0	-	1	3	7	6	7#	7#	5
Los Angeles County										
Whittier Narrows Marsh	-	-	-	*	0	-	-	-	-	0
Orange County										
Seal Beach NWR	30	19	28	20	24	11	5	7	14	6#
Bolsa Chica	0	0	0	0	-	-	-	*	0	0*
Huntington Beach Wetlands	-	0	-	-	-	-	0	0	0	0
Upper Newport Bay	98	66	103	112	112	87	99	119	116	116
San Joaquin Reserve	-	-	5	4	1	2	1	0	0	0
Carlson Rd Marsh	-	-	5	4	2	0	0	1#	0	0
San Diego County										
San Mateo Creek Mouth	-	-	0	0	-	-	0	-	0	0
Las Pulgas Canyon Mouth	-	-	0	0	0	-	-	-	-	0
Las Flores Marsh	-	-	0	0	0	-	0	-	0	0
French Canyon Mouth	-	-	-	0	0	-	-	-	-	0
Cocklebur Canyon Mouth	-	-	1	0	0	-	-	0	0	0
Santa Margarita Lagoon	0	0	2	1	2	1	1	1	1	0
San Luis Rey River Mouth	-	-	0	0	-	-	0	0	0	0
Guajome Lake Marsh	-	-	0	1	2	0	0	0	0	0
Buena Vista Lagoon	0	0	0	*	0	-	-	-	0	0
Agua Hedionda Lagoon	1	2	1	7	6	1	0	0	0	0
Batiquitos Lagoon	0	0	0	0	0	-	-	-	-	0
San Elijo Lagoon	-	5a	4	4	10	1	0	2	5#	7#
San Dieguito Lagoon	-	-	-	-	-	-	-	*	0	0
Los Penasquitos Lagoon	-	0	-	0	0	-	0	-	1a#	0
Kendall-Frost Reserve	18	16	6	20	24	17	12	6a#	4a#	4#
San Diego River	-	3	1	2	2	1	0	0	1a#	0#
Paradise Creek Marsh	1	2	3	1	1	0	0	0	0	0
Sweetwater Marsh	4	5	7	6	14	3	9	5a#	5	5#
E Street Marsh	3	1	3	3	2	2	2	0a	1#	0
F Street Marsh	-	1	1	0	1	0	0	0	0	0
J Street Marsh	-	1	0	0	-	-	0	0	0	0
Otay River Mouth	3	4	5	3	5	1	1	0	0	0
South Bay Marine Reserve	3	3	1	1	2	1	1a	2#	5	5#
Dairymart Ponds	-	-	-	-	-	-	0	*	1a	0#
Tijuana Marsh NWR	26	31	25	41	38	0	2	23a#	14a#	15a#
Total: pairs	203	173	221	249	277	142	143	178	177	163
marshes	11	15	18	18	19	14	12	11	14	8

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2013.
(continued) Part II: 1990 – 1999

Location	Number of Pairs Detected In:									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Santa Barbara County										
Goleta Slough	0	0	0	0	-	-	0	0	-	-
Carpinteria Marsh	0	0	0	0#	0	2#	3#	5#	3#	2#
Ventura County										
Ventura River Mouth	0	0	0	0	0	0	0	-	0	-
Santa Clara River Mouth	0	0	0	0	0	0	0	-	0	-
Mugu Lagoon	6#	4#	5#	5	6#	5#	3#	4#	4#	4#
Los Angeles County										
Whittier Narrows Marsh	-	-	-	0	0	-	0	0	-	-
Orange County										
Seal Beach NWR	16	28	36	65	66	51#	52#	37#	16#	15#
Bolsa Chica	0#	0*	0#	0#	0*	0*	0*	0*	0*	0
Huntington Beach Wetlands	0	0	0	0	0	0	0	0	0	-
Upper Newport Bay	131	128	136	142	129	117	158	149#	105#	104#
San Joaquin Reserve	0	0	0#	0	0	0	0	0	-	0
Carlson Rd Marsh	0	0	0	0	0	0	0	0	-	0#?
San Diego County										
San Mateo Creek Mouth	0	0	0	0	0	0	0	-	-	-
Las Flores Marsh	0	0	0	0	0	0	0	-	-	-
Cocklebur Canyon Mouth	0	0	0	0	0	0	0	0	0	0
Santa Margarita Lagoon	0	0	0	0#	0	0	0	0#	0	0
San Luis Rey River Mouth	0#	0	1	0	-	0	0	0	0	0
Guajome Lake Marsh	0	0	0	0	-	0	0	0	-	-
Buena Vista Lagoon	0a#	2#	5	2#	3#	1#	6#	7#	4	5#
Agua Hedionda Lagoon	0	0	0	0	0	0	0	1?	1	0
Batiquitos Lagoon	0#	0#	0	1#	1#	0#	2	2	1	3
San Elijo Lagoon	5#	5	4#	6#	1#	3#	3#	8	3#	5#
San Dieguito Lagoon	0	0	0	0	0	0	0	0	0	-
Los Penasquitos Lagoon	0	0#	0#	0#	1	1	1	2	2#	2
Kendall-Frost Reserve	5#	9	11	5#	5#	4#	1#	2	2	4#
San Diego River	2	5	1a	5	5#	6b	5	5#	4	3
Paradise Creek Marsh	0	0	1a	0a	0	1	2	0	0	0
Sweetwater Marsh	2#	4a	4a	3a	7#	7	8	3#	4	3
E Street Marsh	0	1a	1a	1	0#	2	1	1	1	2
F Street Marsh	0	0	0	0	0	0	0	0	1	0
J Street Marsh	0	0	0	0	0	0	0	0	0	0
Otay River Mouth	0	0	0	0	0	1	3	3	2	1
South Bay Marine Reserve	5	2	3a	1	0	0	0	1#	1	0
Dairymart Ponds	0a#	0#?	0#	1a	0	-	-	-	-	-
Tijuana Marsh NWR	17a#	47a	67a	63a	64	61	77	77#	68#	80#
Total: pairs	189	235	275	300	288	262	325	307	222	233
marshes	9	11	13	13	11	14	15	16	17	14

- indicates that no census was taken.
* indicates a fall or winter occurrence.
\# indicates the detection of unpaired rails (used beginning in 1987).
a Paul Jorgensen Unpublished data; b 2 pairs are in Famosa Slough.

Table 1. Census of the Light-footed Clapper Rail in California, 1980 – 2013.
(continued) Part III: 2000 – 2010.

Location	Number of Pairs Detected In:										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Santa Barbara County											
Goleta Slough	-	0	0	0	-	-	-	-	0	0	0
Carpinteria Marsh	1#	1#	2	0#	0#	0	0	0	0	0	0
Ventura County											
Ventura River Mouth	-	-	0	0	-	-	-	-	0	-	-
Santa Clara River Mouth	-	-	0	0	-	-	-	-	0	-	-
Mugu Lagoon	7#	7#	10#	14#	19#	14#	17#	15#	5#	9#	12#
Los Angeles County											
Whittier Narrows Marsh	-	-	0	-	-	-	-	0	-	0	0
Orange County											
Seal Beach NWR	10#	11#	24#	23#	16#	15#	21#	24#	17#	19#	25
Bolsa Chica	0	0	0*	0	0	0	*	*	*	*	1
Huntington Beach Wetlands	-	0	0	0	0	0	4#	4	1#	5#	6#
Upper Newport Bay	150#	124#	129#	144#	165#	174#	158#	165#	88#	148#	131#
San Joaquin Reserve	0	0	0	0	-	0	0	0	*	0	#
Carlson Rd Marsh	0#	0	0	0	-	0	0	0	0	0	0
San Diego County											
San Mateo Creek Mouth	0	0	0	0	0	-	-	-	0	-	-
Las Flores Marsh	0	0	0	0	0	-	-	-	0	-	-
Cocklebur Canyon Mouth	0	0	0	0	0	-	-	-	0	-	-
Santa Margarita Lagoon	0	0	1	2	1	2	1	1	1#	-	-
San Luis Rey River Mouth	0	0	0	0	0	0	0	0	0	0	2#
Guajome Lake Marsh	0	-	-	0	-	-	0	0	0	-	-
Buena Vista Lagoon	5#	3#	6#	5#	5#	6#	8#	8#	9#	9#	6
Agua Hedionda Lagoon	2	2	1	4	5	4#	7#	4	7	6	2#
Batiquitos Lagoon	2#	3#	3#	5	11	16#	19#	22	22	26#	36#
San Elijo Lagoon	1#	1#	2	7#	7#	6#	15#	12#	5#	8	15#
San Dieguito Lagoon	0#	0#	0	0#	6	12#	31#	15#	21#	12#	28#
Los Penasquitos Lagoon	1	1	2	1#	2#	2	7#	12#	2#	4#	9#
Kendall-Frost Reserve	4	4	5#	6#	14	14	5#	4#	2#	7	10#
San Diego River	3#	4	6	6#	8#	5	4	6	4#	3	7#
Paradise Creek Marsh	0	0	0	0	0	0	0	0	0	-	0
Sweetwater Marsh	2	3#	3#	1#	3#	1	4#	4#	3	5	6#
E Street Marsh	2	0	1	1	0	0	2	1	0	0	2
F Street Marsh	0	0	0	0	0	0	0	0	0	0	0
J Street Marsh	1	0	0	1	0	0	0	0	0	0	0
Otay River Mouth	1	1	1	0	0	1	2	1	0	1	1
South Bay Marine Reserve	0	0	0	0	0	0	1	2	0	1	1
Dairymart Ponds	-	-	-	2	1	1	0	1	-	0	0
Tijuana Marsh NWR	61#	52#	78#	64#	87	87#	102#	142#	47#	57#	76#
Total: pairs	253	217	274	286	350	360	408	443	234	320	376
marshes	16	14	16	16	15	16	18	19	15	16	19

- indicates that no census was taken.
* indicates a fall or winter occurrence.
# indicates the detection of unpaired rails (used beginning in 1987).

Table 1. Census of the Light-footed Clapper Rail in California, 1980 – 2013.
(continued) Part IV: 2011 – 2013.

Location	Number of Pairs Detected In:			
	2011	2012	2013	
Santa Barbara County				
Goleta Slough	-	0	0	
Carpinteria Marsh	0	0	0	
Ventura County				
Ventura River Mouth	-	0	0	
Santa Clara River Mouth	-	0	0	
Mugu Lagoon	16#	22#	23	6k
Los Angeles County				
Whittier Narrows Marsh	-	-		
Orange County				
Seal Beach NWR	34#	42#	40	12k
Bolsa Chica	*	*	1	1k
Huntington Beach Wetlands	6#	6	7	
Upper Newport Bay	137#	165#	191	3kb 9k
San Joaquin Reserve	2#	1#	2	2k
Carlson Rd Marsh	0	0	0	
San Diego County				
San Onofre Creek Mouth	0	-	1	
Las Flores Marsh	0	-	0	
Cocklebur Canyon Mouth	0	-	0	
Santa Margarita Lagoon	2	0	0	2kb
San Luis Rey River	3	3	4	
Guajome Lake Marsh	-	-	-	
Buena Vista Lagoon	3#	9#	2	
Agua Hedionda Lagoon	7	9	8	
Batiquitos Lagoon	43#	43#	45	3kb 3k
San Elijo Lagoon	15#	31#	20	2k
San Dieguito Lagoon	12#	45#	37	9k
Los Penasquitos Lagoon	12#	11#	12	2kb
Kendall-Frost Reserve	19	16#	8	9k
San Diego River	6#	6#	10	
Paradise Creek Marsh	0	0	0	
Sweetwater Marsh	7#	4#	4	
E Street Marsh	1	1	1	
F Street Marsh	0	0	0	
J Street Marsh	1	1	1	
Otay River Mouth	1	1	1	
South Bay Marine Reserve	1	3	2	
Dairymart Ponds	-	0	-	
Tijuana Marsh NWR	113#	101#	105	5k
Total: pairs	441	520	525	58k 10kb
marshes	21	20	22	

- indicates that no census was taken.
* indicates a fall or winter occurrence.
# indicates the detection of unpaired rails (used beginning in 1987).
k = Kecking by advertising male; kb = keck-burr by advertising female.

and Batiquitos Lagoon was the third largest subpopulation in the state 2008 - 2010. New annual high counts continued into 2011 and 2012 with 43 pairs detected each year and a new recorded high of 45 pairs was documented in 2013. We attempted using multiple observers stationed along the south side of the marsh in mid-March and calling for those not using taped playback was poor. In 2013, there were 4 breeding pairs vocalizing from habitat adjacent to and south of the western tern island; 12 pairs along the north edge of the inner lagoon plus one advertising female at the east end; 25 pairs along the southern edge; and a pair in the northeast corner of the basin just west of the freeway. The cordgrass in the west basin is extensive and looks vigorous, although most of it is too submerged during higher tides to provide adequate nest cover. Finally, at least three pairs responded to the tape from freshwater reeds along the southeast creek beginning at Levante and El Camino Real and continuing east to near Barcelona Road.

The Seal Beach NWR subpopulation was 20 pairs or slightly more for most of the 2000s until 2011 and 2012 when 34 and 42 pairs bred there. The 2012 total was the highest since 1996 and the fifth highest count ever. The 2013 total was just two pairs short of the 2012 counts with 40 pairs tallied combining the nesting rafts and call count data. Evening call count results have generally been poor and we have had to rely upon nesting data obtained through monthly visits to the nesting rafts, upon which most of this subpopulation nests. With so much marsh available to the rails, there ought to be a much larger breeding population on the Seal Beach NWR than what there has been since the 1990s. Raptor predation is suspected to be limiting rail survival and ongoing raptor monitoring sessions are documenting very high raptor numbers; high tide counts of rails and raptors have also continued. Another observation was made in 2013 by Kirk Gilligan of a rail attacked and eaten by a Northern Harrier (*Circus cyaneus*). Seal Beach is the only marsh currently occupied by Light-footed Clapper Rails that gets fully inundated during a high tide of about 6.7 ft (MLLW), or higher, which would render the rails vulnerable due to reduced cover. Tides of this height occur regularly in the late summer, usually in darkness, and in the fall and winter in the early morning. The rails are forced onto debris or to the edge of the marsh where there is little cover and busy roads just beyond. This greatly exposes the rails to potential predation and vehicle collision. However, the completeness of inundation also allows fairly dependable surveying of the subpopulation outside of the breeding season. Accordingly, the rails were counted again from canoes after the 2012 breeding season, before the 2013 season; the post-breeding high tide count will be done in early winter 2013. The pre-nesting count was on 14 November 2012 and 145 individuals were sighted (Table 2).

The pre-nesting high tide count of 145 rails in 2012 was the third highest on record, and the largest number of rails observed in the marsh since 1994. This total indicated good recruitment and survival up to November. Because of that number, we were hopeful for a much larger than observed breeding population in 2013. Potential rail predators were out in abundance during the winter count, hunting the marsh and edges, including Red-tailed Hawks (*Buteo jamaicensis*), Northern Harriers, Peregrine Falcon (*Falco peregrinus*), Cooper’s hawk (*Accipiter cooperi*), American kestrels (*Falco sparverius*), and five Short-eared Owls (*Asio flammeus*). Continued upgrading and maintenance of the artificial rafts on the Seal Beach NWR is essential to the protection of the wintering rails and success of the breeding rails. Seventy of the rails observed during this winter high-tide count were sequestered on the rafts.

Table 2. High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 - 2012.

Date	Tidal Height	Clapper Rails Counted	Breeding Pair Members Before	Breeding Pair Members After	Notes
2 Dec 1975	7.0	22	-	-	
31 Dec 1975	6.7	12	-	-	
21 Nov 1976	7.1	24	-	-	
20 Dec 1976	7.1	35	-	-	
21 Dec 1976	7.0	34	-	-	
10 Dec 1977	7.1	16	-	-	
11 Dec 1977	7.1	40	-	-	
18 Jun 1978	6.8	16	-	42	+6 youngsters
30 Nov 1978	6.7	38	-	42	
1 Dec 1978	6.7	32	-	42	
3 Sep 1979	6.4	20	42	60	Tide too low
3 Nov 1979	6.6	56	42	60	
2 Dec 1979	6.7	32	42	60	
3 Dec 1979	6.7	44	42	60	
21 Nov 1980	6.9	55	60	38	First red fox den found
29 Jun 1981	7.0	34	60	38	Tide too late, dark
12 Nov 1981	6.9	43	38	56	
29 Dec 1982	7.0	23	56	40	
18 Jan 1984	6.9	23	40	48	
21 Nov 1984	6.7	5	48	22	+ 7 red foxes
13 Nov 1985	7.1	2	22	10	+ 2 red foxes
12 Dec 1985	7.2	2	22	10	+ 2 red foxes
30 Dec 1986	7.2	7	10	14	Begin red fox trapping, 59 foxes removed in 1986
28 Jan 1987	7.0	7	10	14	63 red foxes removed in 1987
8 Aug 1987	7.3	8	14	14	Tide too late, dark
22 Nov 1987	6.7	12	14	28	
21 Dec 1987	7.0	8	14	28	+ 2 red foxes
16 Feb 1988	6.8	10	14	28	
22 Nov 1988	6.9	6	28	12	128 red foxes removed in ‘88
16 Oct 1989	6.9	59	12	32	Record High Tide Count; 25 red foxes removed in 1989
5 Oct 1990	6.4	57	32	56	Tide too low
2 Nov 1990	6.8	69	32	56	Record High Tide Count
22 Nov 1991	6.9	98	56	72	Highest Population Total
26 Oct 1992	6.8	159	72	130	Highest Population Total
15 Oct 1993	6.8	143	130	132	Highest Population Total
4 Nov 1994	7.0	150	132	102	220 Red-tailed Hawks counted On the NWS on 11 December 1994
25 Oct 1995	6.5	53	102	104	Tide too low
22 Nov 1995	6.9	55	102	104	
10 Dec 1996	6.7	55	104	74	
17 Oct 1997	6.6	40	74	32	
04 Nov 1998	6.8	30	32	30	

Table 2 (continued). High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 - 2012.

Date	Tidal Height	Clapper Rails Counted	Breeding Pair Members Before	Breeding Pair Members After	Notes
23 Nov 1999	7.0	17	30	20	
11 Dec 2000	6.9	30	20	22	
15 Nov 2001	6.7	35	22	48	
04 Dec 2002	7.1	62	48	46	
26 Oct 2003	6.7	96	46	32	
12 Nov 2004	6.7	52	32	30	
15 Nov 2005	6.7	57	30	42	
09 Oct 2006	6.6	103	42	48	
06 Nov 2006	7.0	95	42	48	
26 Oct 2007	7.1	32	48	34	
12 Nov 2008	6.9	20	34	38	
01 Dec 2009	6.8	50	38	50	
05 Nov 2010	7.0	51	50	68	
26 Oct 2011	6.9	96	68	84	
14 Nov 2012	7.1	145	84	80	

The subpopulation of Light-footed Clapper Rails discovered in the San Dieguito River Valley in 2004, inland of the lagoon and El Camino Real, was first reported at 6 breeding pairs and then conservatively, at 12 pairs in 2005. In 2006, there was abundant calling indicative of at least 31 breeding pairs. This ranked San Dieguito as the third largest subpopulation of Light-footed Clapper Rails in 2006 and the largest ever reported in a freshwater marsh system. Calling was poor in 2007 when only 15 pairs were detected but slightly better in 2008 resulting in a count of 21 pairs; this freshwater marsh system fared better than the tidal marshes in the crash year of 2008. The count was poor again in 2009 and the population estimate was only 12 pairs along with 13 advertising males. In 2010, the second highest count for this little wetland was tallied at a minimum of 28 breeding pairs. The count in 2011 demonstrated major problems with a count of only 12 pairs along with 33 advertising males. Such an abundance of unmated males is indicative of female-skewed predation, probably suffered during egg depredation. Raccoon sign is very abundant along the marsh. In 2012, the count of 45 pairs was the record high for this freshwater marsh system and ranked this subpopulation as the third largest in the state. The count was down by eight pairs in 2013 but still remarkable for a freshwater system; at 37 pairs this subpopulation was the fifth largest in 2013. As usual, several rails were calling from habitat edging ponds on the golf course. Additional Clapper Rail detections are still being reported from the San Dieguito Creek Watershed but have yet to be corroborated since they would not respond to callback. Reported locations have included Lusardi Creek, the pond at 4S Ranch Community Park on Dove Creek Road, and at 4 Gee Road just north of Camino Del Sur.

The freshwater marsh system in San Dieguito Creek above El Camino Real is enigmatic in the broad swings in rail abundance. However, it is paramount to maintain this important freshwater marsh system for the rails. When the largest rail subpopulations crashed in 2008, the one in San Dieguito went up 40%. The current hydrologic regime provides the conditions sustaining this one-of-a-kind wetland; the current hydrology needs to be understood and maintained. The invasion of non-native plants needs to be countered-managed; the marsh is succeeding slowly toward a woodland. The most pervasive invader is *Tamarix* sp., occurring along with pampas grass (*Cortaderia* sp.), eucalyptus (*Eucalyptus* sp.), palms (mostly *Washintonia* sp.), and more limited giant reed (*Arundo donax*), and castor bean (*Ricinus communis*). The tamarisk in particular provides cover, shelter, and perch sites for raccoons; it needs to be removed.

Since doubling in size between 2001 and 2003, the Point Mugu subpopulation fluctuated between 14 and 19 pairs, from 2003 - 2007. It had been much smaller, 3 - 7 pairs for nearly 20 years until augmentations with captive-bred rails fostered its growth. There was a crash in 2008 back to 5 pairs, but the subpopulation was back up to 9 pairs in 2009, 12 pairs in 2010, a minimum of 16 pairs in 2011, 22 pairs in 2012, and an all-time high of 23 pairs in 2013. There is an efficient predator management program in place, consistent rail and marsh management, but issues perhaps mostly raptor predation prevent this subpopulation from exploding into full occupation of the largest contiguous patch of potential habitat in the state. There were at least two pairs detected in the eastern arm/central lagoon and two pairs attempted to breed in freshwater marsh vegetation on the west side along Perimeter Road, one on and one just off base. Raptor depredation appears to have been a long standing issue in Mugu. Consequently, the rails depend upon the heavy cover provided by spiny rush (*Juncus acutus leopoldii*) but many of the spiny rush stands are greatly degraded by competing vegetation that should be weeded out of these stands. In addition, the freshwater marsh dewaters in dry years and could be kept viable through the entire breeding season with flood irrigation if possible there.

There were regular re-sightings of banded rails at Point Mugu up until 2008 when captive-bred rails were no longer released there. Although some of the captive-bred rails appeared to have stayed in Mugu, some definitely left after release. In 2008, for example, Martin Ruane re-sighted a banded rail 4 days after its release on August 22 near the release site. However, at least one banded rail, a female banded 1035-8878, did not stay at Point Mugu. A photograph was taken of this rail at Upper Newport Bay on December 12, 2004 by Steve Metz. This female was captive-bred at the Chula Vista Nature Center and released into the eastern arm of Point Mugu on August 28, 2004, 106 days before her picture was taken at Newport. This shattered the old long-distance movement of 13.5 miles recorded for the subspecies *levipes* (Zembal et al. 1983). The distance from Point Mugu to Upper Newport Bay is approximately 90 miles along the coast. An even greater distance, 160 miles was traveled by a female banded 1065-39863, released at Point Mugu August 25, 2009 and recaptured on November 4, 2010 at the Chula Vista Nature Center (now the Living Coast Discovery Center). She had returned to the facility where she was hatched and reared.

The San Elijo Lagoon subpopulation was back up to its former record high level of 15 nesting pairs in 2010 and 2011; the former high was more than doubled in 2012 with the detection of 31 breeding pairs; and was down to 20 pairs in 2013, the second highest total for this wetland. San Elijo Lagoon has had major efforts to restore tidal function and the suitable habitat in the central lagoon has expanded greatly. Unfortunately, the lagoon still closes to the ocean with regularity resulting in wide fluctuations in habitat suitability for Clapper Rails particularly inland of the weir during high rainfall years. Of the total, 14 pairs were in the east basin including 2 along the creek and only 4 pairs were in the Central Basin. San Elijo received an augmentation of 8 captive-bred rails in 2004, 5 in 2006, 4 in 2007, 16 in 2009, and 7 in 2012 mostly at the weir in the inner lagoon. One of the 2004 rails was re-sighted near the railroad tracks in the central lagoon on December 13, 2004, 6 months following release, and one of the 2006 rails was observed repeatedly over 6 months off of the Rios Avenue trail. However, there have been no reported re-sightings of live banded rails since then. A dead rail was retrieved in May of 2010 that was banded and released into San Elijo on June 16, 2009.

The subpopulation in the University of California Reserve at Kendall-Frost rebounded well in 2004 and 2005 but was significantly reduced in 2006 - 2008. At 7 pairs in 2009, 10 pairs in 2010, and 19 pairs in 2011, the recent trend had been positive but then the total dropped slightly to 16 pairs in 2012 and was cut in half to 8 pairs in 2013. The height of rail occupation of the Reserve was in the early 1980s; 24 pairs bred there in 1984. This marsh is small, totally isolated, and bordered by urban housing, but it is well managed under the University of California Reserve System. The stewardship includes appropriate predator management, habitat restoration, and research management to assure minimal human disturbance to the rails and their habitat. Additionally, nesting rafts have been provided (22 rafts in 2013) and used heavily by the rails there since 1987. There have also been translocations of eggs and adults (5 captive-bred rails in 2003, 7 in 2009, and more planned for release in 2013). Additional monitoring of this remnant Mission Bay wetland is planned for 2013 with winter high tide counts with the aide of the San Diego Audubon Society.

Los Penasquitos Marsh is dominated by vegetation indicative of prolonged closure to the ocean, particularly pickleweed. However, fresh water influence and freshwater marsh edge are increasing and the rails currently appear to be using mostly the freshwater marsh habitat. The detection of 12 pairs was a record high for this wetland in 2007. The number plummeted to only 2 pairs in 2008, 4 pairs in 2009, 9 pairs in 2010, back up to 12 pairs in 2011 (4 of which were on the creek above the lagoon), down by one pair to 11 pairs in 2012 (6 of which were above the lagoon on the creek), and again at 12 pairs in 2013 (4 were on the creek). In most years but particularly wet ones like 2011, the lagoon fills with runoff and much of the marsh remains inundated until late spring. Under these conditions, the rails do not call much and are difficult to detect until the marsh drains, later in the season; the conditions are too lake-like for breeding and foraging for a good part of the spring and early summer. Four captive-bred rails were released into Los Penasquitos in 2004, 4 more in 2007, and 9 in 2009. There was a re-sighting of a banded female hatched at the Wild Animal Park and released in 2007 at Los Penasquitos. She was photographed with her mate and 3 downy chicks on the edge of the pond below the San Diego Water Utilities Pump Station on Sorrento Valley Road on July 10, 2009 by Eric Kallen.

The highest rail count on record for Buena Vista Lagoon was 9 pairs in both 2008 and 2009. The number was lower by one-third in 2010, by half to 3 pairs in 2011, back up to 9 pairs in 2012, but plummeted to only 2 pairs in 2013. Both pairs were detected in the eastern lagoon; no rails responded from anywhere other than the far southeastern edge opposite the little park off of Jefferson. There had been a 4-ac fire in the marsh adjacent to the interpretive center and the entire wetland abounds with extremely abundant raccoon sign. There are many management issues at this little freshwater marsh and they are shared with most of the other coastal wetlands including abundant non-native trees and shrubs that harbor perching predators and homeless people. In order to potentially bolster the subpopulation in this freshwater system, there was a release of 15 captive-bred Clapper Rails on July 19, 2011; all were released into the central lagoon. No releases have been allowed since then and probably won't be until the planned restoration is completed.

The marsh at Agua Hedionda Lagoon previously held a maximum of 7 pairs of Light-footed Clapper Rails during three different years including 2011. The count was down to 6 pairs in 2009, only 2 pairs and a lone male in 2010, was back up to 7 pairs in 2011, hit an all-time high of 9 pairs in 2012, and was just under that in 2013 with 8 pairs. The brackish marsh inland of the inner lagoon was greatly impacted by a change in drainage in the mid-1980s and the rails were barely detectable through the 1990s. The 5 pairs located in 2004 was the highest level observed since then and this level was probably sustained in 2005 when 4 pairs and an advertising female were detected during an early season count. Given the usual presence of unmated males in this little wetland, the female likely found a mate and bred. With the recently increased street runoff from adjacent housing, the main freshwater marsh has rejuvenated to some extent, perhaps to the benefit of the rails as evidenced by the record number in 2012. This subpopulation was augmented with the release of 5 captive-bred rails in 2004, 6 in 2011, and 16 in 2012 on the inland edge of the inner lagoon. Although none of these banded rails has been re-sighted since, rails are being detected around the edge of the lagoon from marsh patches previously unoccupied.

Clapper Rail vocalizations were reported for Bolsa Chica and the San Joaquin Reserve in 2010 - 2013. The calling reported in the Reserve was likely an unmated male in 2010 but in 2011 breeding was documented by Barry Nerhus. A 9-egg nest was found in the southwest corner of cell 6 in bulrush in April; it subsequently hatched and chicks were observed. At least two pairs bred in the Reserve in 2011, one in 2012, and two again in 2013 along with advertising males. With increased management for edge foraging habitat, this extensive freshwater marsh system has good future potential for rails, marauding raccoons notwithstanding.

Attempts to elicit responses to a tape-playback of a duet were unsuccessful at Bolsa Chica in 2011 and 2012, when only males were detected. Clapper Rail breeding behavior was observed for the first time in recent history in the Bolsa Chica in 2010 and again in 2013. The 2013 pair was in cattails below PCH about 0.3 mi from the boardwalk parking lot. All of the rails seen and heard recently at Bolsa have been on the marsh edge near the boardwalk and adjacent to Pacific Coast Highway (PCH), which is a potential death trap for the rails. The near constant noise masks predator cues and the fast moving vehicles would dispatch any rail that flushes that way. Unfortunately, a flushed rail would fly low and tend to flush into the adjacent uplands, which at Bolsa Chica is PCH. Recent reports of rails vocalizing from south Bolsa below the bluffs in the freshwater reed stands again could not be confirmed.

One of the highlights of the 2006 survey of Light-footed Clapper Rails was the discovery of yet another breeding location in the Santa Ana River Marsh, also previously known as Newport

Slough and listed in Table 1 under the Huntington Beach Wetlands (HBW). Four pairs were detected there in 2006 and 2007, only a single pair in 2008, 5 pairs again in 2009, 6 pairs in 2010 – 2012, and up to 7 pairs in 2013 (again including one pair in the Brookhurst Marsh). The Santa Ana Marsh is at the southern terminus of the Huntington Beach Wetland Complex, comprised of several wetland patches strung along the coast totaling more than 200 acres. The 92-acre Santa Ana Marsh was restored as part of the Federal Flood Control Project on the Santa Ana River. Dampened tidal influence was re-established and cordgrass was planted primarily along a narrow eastern portion of the marsh that lies between an oil field and the south dike of the river. This cordgrass marsh is extremely well-developed and patches have grown into the main marsh as well. Although the main marsh area is heavily impacted by human residents and their dogs from just across the main channel, one of the pairs detected each year in 2011 - 2013 was calling from the largest patch of cordgrass in the center of the main marsh.

Restoration of the Huntington Beach Wetlands is continuing and one of the pairs counted in the tally for this marsh complex was actually in the Brookhurst Marsh in 2010. Lena Hyashi reported a pair on April 19, 2010 vocalizing and observed along the larger stand of Spiny Rush near the dunes and PCH. This was the first record for Clapper Rails potentially breeding in the HBW Complex outside the Santa Ana River Marsh since the 1970s. Unfortunately, late in the 2010 season and in 2011 we were only able to elicit “kecking” from a male, so breeding was not confirmed. However, a pair was back again in the Brookhurst Marsh in 2012 and 2013.

The salt marsh at the mouth of the Santa Margarita River typically held a single pair of nesting rails for many years and occasionally there have been two. These pairs are invariably in the same spots from year to year; at the river mouth in freshwater marsh in the Sweetwater Marsh section of the estuary and/or between Stuart Mesa Road and the railroad tracks on the north side of the river in the freshwater marsh that rims a pond. Unusually, in 2008 a single pair was located on the channel surrounding the least tern island at the junction of the inlet channel. We did not gain access to do surveys in 2009 or 2010 but did a base-wide survey of the potential habitat on base in 2011. Once again, John Konecny found two nesting pairs in the Sweetwater Marsh section of the river mouth and nothing in the many little pocket wetlands scattered along the Pendleton coast. The Sweetwater Marsh Complex was checked once by Barry Nerhus in 2012 with negative results. Tom Ryan checked the Pendleton coast in 2013 and reported three points of calling to the state. Two points were south of the river along the little channels in the vicinity of the tern island and were described as a “purr” which must mean two advertising females; the third rail apparently uttered a single clappering at the mouth of San Onofre Creek.

Historic detections of Clapper Rails on the San Luis Rey River have been rare and mostly confined to the freshwater marsh at the river mouth in Oceanside. Past reports of inland sightings could not be corroborated until recently when John Konecny found two pairs defending inland freshwater marsh habitat in 2010, three pairs in 2011 and 2012 (RZ), and four pairs in 2013. The freshwater marsh is being shaded out by willows and will probably not survive many more years unless the hydrology changes with large flows.

The cordgrass continues to expand and dominate a significant portion of the western end of the San Diego River at the bay and an all-time high of 8 pairs of breeding Light-footed Clapper Rails were there in 2004. The numbers have varied greatly since then with 7 breeding pairs detected in 2010, 6 in 2011 and 2012, and a new record of 10 pairs in 2013. Three of the 10 pairs were detected in little Famosa Slough, south of the 8 Fwy. One of the pairs detected in 2010 was well west of the others, close to the ocean at the dog park. A previously unknown population of Salt Marsh Bird's Beak, *Cordylanthus maritimus maritimus*, was also discovered there in 2010 just off one of the foot trails. There were several hundred plants but unfortunately they are being smothered out by the clumped invasive Algerian Sea Lavender, *Limonium ramosissimum*. Captive-bred rails have been released in the cordgrass marsh to potentially spawn a larger, more viable subpopulation. Five rails were released in each of three years, 2005, 2007, and 2010; 11 rails were released in 2011 including 5 females; and 9 more were released in 2012.

The habitat in the river west of the 5 Freeway appears quite suited for rails but management may be required to reach full potential. There are large rat and ground squirrel populations inhabiting the riprap along the channel, a known drop and feeding station for bolstering the tortured lives of feral domestic cats, and a large raccoon population. We are examining the prospects of filling and vegetating the riprap with pickleweed and maritime scrub, limiting the habitat suitability for egg-eating rats and expanding native habitat. However, the river is operated in part for flood control and regular high flows in wet years could greatly affect the rails therein. Any potential project would need to be well coordinated among many agencies. As usual, there were multiple reports of Clapper Rail detections 13 miles inland at Kumeyaay Lake. Again, reports from the lakes could not be verified by us (probably because these inland rails have been conditioned by rampant over-use of playback calls by birders). There were multiple sightings of the Clapper Rails in Famosa Slough reported by Jim Peugh in 2013 including chicks.

None of the breeding pairs of Clapper Rails reported for the Sweetwater Marsh NWR were inland along the Sweetwater River in 2013. They had been detected annually for many years along the river above 2nd Street. There were two pairs in the main marsh, two pairs below the rail exhibit, and a pair in the E Street Marsh parcel. Breeding was documented on two rafts in 2013 with signs of partial hatches coupled with some depredation. The Sweetwater Marsh Complex is endowed with a thriving raptor population, fully in evidence on every visit with ample good hunting perches spaced regularly along the marsh edge. The marsh growth is low and the rails are quite vulnerable. Four captive-bred Clapper Rails were released into Sweetwater in 2002, 11 in 2005, 6 in 2008, 14 in 2010, 3 in 2011, and 9 in 2012 (8 of 9 in Paradise Marsh) but none has been re-sighted.

The J Street Marsh parcel is the marsh just north of the power plant and salt works, dominated by cordgrass, probably has regular presence by Clapper Rails but is difficult to access and survey. A pair was detected there in 2011, 2012, and 2013 next to the small park at the north terminus of the marsh. This little wetland currently sports some of the most vigorous cordgrass growth in the south bay and should be a focus site for future management.

The Otay River is channelized, typically 100 ft wide or less where it runs under the 5 Freeway, coursing northwest for about 3,200 ft to the salt works. Most of the vegetation along this stretch is dominated by cattails with willow over-story near the freeway. The channel continues another 10,200 ft until it opens to south San Diego Bay. This latter, longer stretch is dominated by upper salt marsh plants. Single pairs of rails were detected in 2011, 2012, and in many previous years calling from the vicinity of the bike trail overcrossing of the channel just south of the salt works. No presence was detectable there in 2013 but a single clappering and a male were heard on Otay Lake on a north finger near Route 9 and Otay Lake Road. The lake is lined with a narrow fringe of reeds that may harbor many more rails than was detected.

An adult Clapper Rail and a chick were observed in the South Bay Marine Reserve in 2005 after the survey report was compiled. In 2006, there was a strong clappering response to the tape by a single rail with no following advertising, indicating that for the second consecutive year there were breeding rails in the Reserve. In 2007, both a pair and a single responded to the tape; the rails were unresponsive in 2008; a single pair was heard again during three annual surveys 2009 – 2011; three pairs were vocal in 2012; and in 2013 there were two pairs. This small isolated marsh has been regularly occupied by 1 – 3 pairs of rails poised to expand into a restored south bay over the 7 - 10 years following restoration of the new NWR.

The last known Clapper Rail call from Carpinteria Marsh was from an unmated female vocalizing constantly with no answering call in 2003. In 2004, there was total silence until April 13, when two males were released in the hope that the female was still alive. Occasional reports of Clapper Rail vocalizations have been investigated in 2005 through 2012 but could not be corroborated. This northern wetland is plagued with domestic cats in the marsh and other predators of concern most notably red fox. At least one red fox den location is known on the very edge of the marsh. Without consistent predator management, the chances for the reoccurrence of a viable subpopulation in Carpinteria Marsh are poor.

Ten of the 22 marshes with breeding Clapper Rails in 2013 were male-skewed and two were female-skewed; 2 of the 10 male-skewed marshes also had two or three advertising females each, a situation that is probably very short lived. Minimum totals of 58 unmated males and 10 females were heard during the call counts including: 6 advertising males at Point Mugu; 12 single males on the Seal Beach NWR; 1 male at Bolsa Chica; 9 males and 3 females at Upper Newport Bay; 2 males at the San Joaquin Reserve; 2 females at the Santa Margarita Lagoon; 3 males and 3 females in Batiquitos Lagoon; 2 males in San Elijo Lagoon; 9 males in the San Dieguito River Valley; 2 females in Los Penasquitos Lagoon; 9 males in the Kendall-Frost Reserve; and 5 males in Tijuana Marsh. The usual condition has been a slight male bias during most years in most marshes. An extreme male skew or even a slight female skew could indicate major issues, unfortunately of an unknown nature but probably involving heavy depredation.

The continued annual release of captive-bred Clapper Rails is co-occurring with increased detections of rails in new locations, particularly inland sites on creeks, rivers, and lake edges. Some of the recent detections of interest are as follows. Rachel Woodfield photographed a single Clapper Rail at the Ballona Wetlands in August 2008; however, a portion of the marsh was checked in 2009 with negative results. There have been repeated sightings on the edge of Point Mugu at Ormond Beach 2009 - 2013. A Clapper Rail was heard and observed in Bolsa Chica at the foot bridge in October 2009, bred near there in 2010, and there are annual reports of sightings since then. There was also a rail reported in brackish marsh on Aera Energy property below Sea Point Avenue. Sue Hoffman flushed a single Clapper Rail adjacent to the mouth of the Santa Ana River in the plover yard at the Huntington State Beach California Least Tern nesting colony in 2008; a dead rail was reported between PCH and the Tern Colony in July 2009. A rail was reported from the lake at Laguna Niguel. Clapper Rails are still reportedly vocalizing in the reeds at Kumeyaay Lake on the San Diego River including at least one advertising female in 2011. Clapper Rails are reported regularly in the San Dieguito River Watershed well inland of the Polo Club. Steve Brad reported a Clapper Rail in Encinitas Creek under the Calle Barcelona Bridge in 2011. Paul Lehman reported seeing a Clapper Rail at the northern end of Upper Otay Lake on April 20, 2009 and there have been occasional reports there for many years.

The Light-footed Clapper Rail population in California increased annually beginning in 2001, coincidentally the year of the first release of captive-bred rails into the wild, to a high count of 443 pairs in 2007 followed by the crash of 2008. The state population recovered from the crash with a 37% increase in 2009, growing annually thereafter to within two pairs of the 2007 record in 2011. In 2012 it reached a new high, for the first time exceeding 500 pairs statewide and added four pairs for a record total of 525 pairs in 2013. However, 67% of the extant Clapper Rail subpopulations today remain too small for long term viability; 15 of 22 subpopulations were 12 pairs or fewer in 2013. On the other hand, the subpopulation in Upper Newport Bay is as large as has ever been manifest; Tijuana Slough has exceeded 100 breeding pairs for three consecutive years; Batiquitos Lagoon has supported 40+ breeding pairs for three consecutive years; and several subpopulations are either expanding, holding, or fluctuating but at relatively high totals, particularly in Seal Beach NWR, Mugu Lagoon, San Elijo, and San Dieguito River Valley. The future outlook for the light-footed Clapper Rail is brighter than at any other prior time.

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APPENDIX K

WESTERN SNOWY PLOVER SUMMER WINDOW SURVEY FOR SNOWY PLOVERS ON U.S. PACIFIC COAST WITH 2005-2011 RESULTS FOR COMPARISON

2012 Summer Window Survey for Snowy Plovers on U.S. Pacific Coast with 2005-2011 Results for Comparison. Note: blanks indicate no survey was conducted.

REGION	SITE	OWNER	Total Adults								2012 Adult Breakdown		
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	***male***	***fem.***	***sex?***
Grays Harbor	Copalis Spit	State Parks		0	0	0	0	0	0	0	*0*	*0*	*0*
	Conner Creek	State Parks		0	0	0	0	0	0	0	*0*	*0*	*0*
	Damon Point/Oyhut	S. Parks, D. Nat R. F & W	5	0	0	0	0	0	0	0	*0*	*0*	*0*
County Total			**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	*0*	*0*	*0*
Pacific	Midway Beach	Private, State Parks	23	25	22	12	16	18	22	11	*6*	*5*	*0*
	Graveyard	Shoalwater Indian Tribe				1	0	0	0	2	*1*	*1*	*0*
	Leadbetter Point NWR	USFWS, State Parks	9	42	28	29	26	20	12	15	*10*	*4*	*1*
	South Long Beach	Private		0	0	0	0	0					
County Total			**32**	**67**	**50**	**42**	**42**	**38**	**34**	**28**	*17*	*10*	*1*
Washington Total			**37**	**67**	**50**	**42**	**42**	**38**	**34**	**28**	***17***	***10***	***1***
Clatsop	Fort Stevens State Park (Clatsop Spit)	ACOE, OPRD	0	0				0	0	1	*0*	*0*	*1*
	Necanicum Spit	OPRD	0	0	0	0		0	0	1	*0*	*0*	*1*
County Total			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	*0*	*0*	*2*
Tillamook	Nehalem Spit	OPRD	0		0	0	0	0	0	0	*0*	*0*	*0*
	Bayocean Spit	ACOE	0	0	0	0	0		0	0	*0*	*0*	*0*
	Netarts Spit	OPRD	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Sand Lake Spit (S)	USFS	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Nestucca Spit	OPRD	0	0	0	0		0		0	*0*	*0*	*0*
County Total			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	*0*	*0*	*0*
Lane	Baker Beach/Sutton Creek	USFS	0	2	0	0		1	0	0	*0*	*0*	*0*
	Sutton Cr./Siuslaw River N Jetty	USFS		0			0		0	0	*0*	*0*	*0*
	Siuslaw River S Jetty to Siltcoos	USFS								4	*4*	*0*	*0*
	Siltcoos Spits N & S	USFS	11	18	16	11	17	18	18	22	*11*	*10*	*1*
County Total			**11**	**20**	**16**	**11**	**17**	**19**	**18**	**26**	***15***	***10***	***1***
Douglas	Siltcoos-Tahkenitch (Dunes Overlook)	USFS	9	2	19	7	6	19	39	42	*22*	*20*	*0*
	Tahkenitch Spit N & S	USFS	5	1	5	0	3	5	13	27	*16*	*11*	*0*
	Umpqua River S Jetty to Tenmile Spit	USFS				0	11		10	12	*5*	*7*	*0*
County Total			**14**	**3**	**24**	**7**	**20**	**24**	**62**	**81**	***43***	***38***	***0***

2012 Summer Window Survey for Snowy Plovers on U.S. Pacific Coast with 2005-2011 Results for Comparison. Note: blanks indicate no survey was conducted.

REGION	SITE	OWNER	Total Adults								2012 Adult Breakdown		
			2005	2006	2007	2008	2009	2010	2011	2012	*male*	*fem.*	*sex?*
Coos	Tenmile Spits	USFS	13	15	27	24	24	36	13	16	*8*	*8*	*0*
	Coos Bay N Spit	BLM, ACOE	27	27	26	30	41	38	39	52	*35*	*17*	*0*
	Whiskey Run to Coquille River	OPRD	0	0	0	0			0	0	*0*	*0*	*0*
	Bandon State Park to New River	OPRD, Private, BLM	22	12	15	8	14	40	16	14	*9*	*5*	*0*
County Total			**62**	**54**	**68**	**62**	**79**	**114**	**68**	**82**	***52***	***30***	***0***
Curry	New River to Floras Lake	BLM, Private, County	13	14	17	25	24	1	20	15	*9*	*6*	*0*
	Blacklock Point to Sixes River (C. Blanco)	BLM, OPRD		0			0	0	0	0	*0*	*0*	*0*
	Elk River	Private			0	0	0	0		0	*0*	*0*	*0*
	Euchre Creek to Greggs Creek	OPRD, Private	0	0			0	0	0	0	*0*	*0*	*0*
	Myers Creek to Pistol River	OPRD, Private			0		0	0	0	0	*0*	*0*	*0*
County Total			**13**	**14**	**17**	**25**	**24**	**1**	**20**	**15**	***9***	***6***	***0***
Oregon Total			**100**	**91**	**125**	**105**	**140**	**158**	**168**	**206**	***119***	***84***	***3***
Total Unit 1			**137**	**158**	**175**	**147**	**182**	**196**	**202**	**234**	***136***	***94***	***4***
Del Norte	Smith River	Pivate, CDPR^{2}	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Lake Earl/Talawa	CDFG^{1}	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Crescent Beach	Crescent City	0	0	0	0	0	0	0	0	*0*	*0*	*0*
County Total			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Humboldt	North Gold Bluffs Beach	USNPS, CDPR	0	0	0	0	0	0		0	0	0	0
	South Gold Bluffs Beach	USNPS, CDPR	0	0	0	0	0	0		0	0	0	0
	Freshwater	USNPS^{5}, CDPR	0	0	0	0	0	0					
	Stone Lagoon	CDPR	0	0	0	0	0	0	2	0	*0*	*0*	*0*
	Dry Lagoon	CDPR	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Big Lagoon	CDPR	3	0	0	0	0	2	5	2	*1*	*1*	*0*
	Moonstone Beach	County			0	0		0	0	0	*0*	*0*	*0*
	Little River, Clam Beach North	County, CDPR, Private	10	15	7	0	4	5	6	5	*3*	*2*	*0*
	Clam Beach South	County	12	5	2	12	5	7	3	7	*4*	*3*	*0*
	Lanphere to Mad River	County, Private	0	0	5	2	0	0	2	0	*0*	*0*	*0*
	Gun Club to Lanphere	BLM/USFWS^{4}	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	n	USBLM, Private		0	0	0	2	0	0	0	*0*	*0*	*0*
	North Spit Humboldt Bay	BLM		0	0	0	0	0	0	0	*0*	*0*	*0*
	Elk River Spit	City of Eureka		0	0	0	0	0	0	0	*0*	*0*	*0*

2012 Summer Window Survey for Snowy Plovers on U.S. Pacific Coast with 2005-2011 Results for Comparison. Note: blanks indicate no survey was conducted.

REGION	SITE	OWNER	Total Adults								2012 Adult Breakdown		
			2005	2006	2007	2008	2009	2010	2011	2012	*male*	*fem.*	*sex?*
	Eel River Gravel Bars	County, CA State	5	10	9	4	3	0	3	0	*0*	*0*	*0*
	South Spit Humboldt Bay	BLM	2	4	0	0	0	1	0	1	*1*	*0*	*0*
	Eel River Wildlife Area, North	CDFG	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Eel River Wildlife Area, South	CDFG	0	5	0	0	1	0	2	0	*0*	*0*	*0*
	Centerville Beach	County, Private	0	3	0	0	0	5	4	5	*2*	*3*	*0*
	McNult Gulch	Prviate											
	Mattole River	BLM[3]		0	0		0		0				
County Total			**32**	**42**	**23**	**18**	**15**	**20**	**27**	**20**	***11***	***9***	***0***
Mendocino	Usal Beach	CDPR		0	0			0					
	MacKerricher SB, 10 Mile	CDPR	7	0	1	0	0	1	1	1	*0*	*1*	*0*
	Virgin Creek	CDPR	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Manchester SB, Alder & Brush Crs.	CDPR	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Manchester SB, Brush C. to Garcia R.	CDPR	2	3	2	0	0	0	0	0	*0*	*0*	*0*
County Total			**9**	**3**	**3**	**0**	**0**	**1**	**1**	**1**	**0**	**1**	**0**
Total Unit 2			**41**	**45**	**26**	**18**	**15**	**21**	**28**	**21**	***11***	***10***	***0***
San Francisco Bay													
Alameda	Baumberg/Eden Landing	CDFG	91	84	162	94	88	184	185	82	48	33	1
	Coyote Hills	USFWS NWR	0	0	0	0	0	0	0	0	0	0	0
	Dumbarton	USFWS NWR	0	0	2	0	0	0	0	0	0	0	0
	Hayward	City of Hayward	0	0	0	1	4	12	8	9	3	3	3
	Warm Springs	USFWS NWR	23	7	0	3	14	27	17	3	2	1	0
Napa	Napa	CDFG	0			0	12	10	1	0	0	0	0
San Mateo	Ravenswood/West Bay	USFWS NWR	3	3	23	24	21	42	27	33	23	9	1
Santa Clara	Alviso	USFWS NWR	7	8	20	11	8	0	11	20	6	5	9
Total Unit 3			**124**	**102**	**207**	**133**	**147**	**275**	**249**	**147**	***82***	***51***	***14***
Sonoma	Salmon Creek SB	CDPR	5	0	0	1	8	0	0	0	*0*	*0*	*0*
	Doran County Park	County	0	0	0	0	0	0	0	0	*0*	*0*	*0*
County Total			**5**	**0**	**0**	**1**	**8**	**0**	**0**	**0**	**0**	**0**	**0**
Marin	Dillon Beach	Private	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Kehoe Beach	USNPS	7	7	9	12	9	8	3	3	*2*	*1*	*0*

2012 Summer Window Survey for Snowy Plovers on U.S. Pacific Coast with 2005-2011 Results for Comparison. Note: blanks indicate no survey was conducted.

REGION	SITE	OWNER	Total Adults								2012 Adult Breakdown		
			2005	2006	2007	2008	2009	2010	2011	2012	*male*	*fem.*	*sex?*
	North Beach	USNPS	15	9	11	13	12	11	8	9	*4*	*5*	*0*
	South Beach	USNPS	0	0	0	0	0	2	1	0	*0*	*0*	*0*
	Lighthouse Beach	USNPS	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Drakes Beach	USNPS	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Limantour Spit	USNPS	0	0	0	0	0	2	1	0	*0*	*0*	*0*
	Bolinas Lagoon	County	0	0	0	0	0	0			*0*	*0*	*0*
County Total			**22**	**16**	**20**	**25**	**21**	**23**	**13**	**12**	**6**	**6**	**0**
San Francisco	Ocean Beach	County	1	0	0	0	0	0	0	0	*0*	*0*	*0*
	Crissy Field	GGNRA				0	0	0	0	0	*0*	*0*	*0*
County Total			**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
San Mateo	Pacifica SB	CDPR	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Pillar Point	County	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Half Moon Bay SB (Francis Beach)	CDPR	2	1	2	1	0	0	5	1	*0*	*1*	*0*
	Tunitas Creek	Private	0	4	0	0	0	0	0	0	*0*	*0*	*0*
	San Gregorio	CDPR	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Pomponio	CDPR	0	0	0	0	0	0		0	*0*	*0*	*0*
	Pescadero SB	CDPR	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Pigeon Point	CDPR?	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Gazos Creek	CDPR	0	2	1	0	0	0	0	3	*2*	*1*	*0*
	Ano Nuevo	CDPR	0	0	0	0	0		0	0	*0*	*0*	*0*
County Total			**2**	**7**	**3**	**1**	**0**	**0**	**5**	**4**	**2**	**2**	**0**
Santa Cruz	Waddell SB	CDPR, Private	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Scott Creek Beach	County	3	4	4	2	0	0	0	0	*0*	*0*	*0*
	Laguna Creek	CDPR	0	0	0	0	0	0	0	0	*0*	*0*	*0*
	Wilder SB	CDPR	0	0	0	0	0	0		0	*0*	*0*	*0*
	Seabright SB	CDPR	0	0					0				
	Private Beaches	Private		13	1	0	2	4	0	0	*0*	*0*	*0*
	Sunset SB	CDPR	17	9	18	7	8	**5**	3	11	*6*	*4*	*1*
	Palm Beach	CDPR		5	0	4	3	0	1	16	*11*	*4*	*1*
	Pajaro Spit	CDPR	48	55	52	23	17	25	24	32	*19*	*12*	*1*
County Total			**68**	**86**	**75**	**36**	**30**	**34**	**28**	**59**	**36**	**20**	**3**

2012 Summer Window Survey for Snowy Plovers on U.S. Pacific Coast with 2005-2011 Results for Comparison. Note: blanks indicate no survey was conducted.

REGION	SITE	OWNER	Total Adults								2012 Adult Breakdown		
			2005	2006	2007	2008	2009	2010	2011	2012	*male*	*fem.*	*sex?*
Monterey	Zmudowski SB	CDPR	12	8	0	17	24	34	12	21	*7*	*10*	*4*
	Moss Landing SB	CDPR	28	20	11	20	27	19	16	31	*19*	*12*	*0*
	Moss Landing Salt Ponds	CDFG	30	41	21	32	31	41	84	44	*20*	*24*	*0*
	Salinas SB	CDPR	57	56	37	36	30	31	42	35	*19*	*13*	*3*
	Salinas River North Spit	CDPR	19	25	22	15	17	8	14	19	*11*	*6*	*2*
	Salinas River NWR	USFWS	44	36	29	23	39	50	38	43	*24*	*13*	*6*
	Martin/Lone Star Areas	Big Sur Land Trust, Private	30	20	31	26	21	25	33	34	*19*	*9*	*6*
	Marina SB (Reservation Rd & Fort Ord)	CDPR	12	26	15	17	24	19	20	18	*10*	*8*	*0*
	Sand City	Private	0	1	0	1	1	2	0	1	*1*	*0*	*0*
	Monterey SB	CDPR	0	2	0	2	0	2	0	0	*0*	*0*	*0*
	Carmel River SB	CDPR		0	0	0	0	0		0	*0*	*0*	*0*
	Asilomar	CDPR		0	0	0	0	0					
	Point Sur Beach	CDPR	7	13	6	5	6	10	6	3	*1*	*2*	*0*
	Little Sur Beach	Private					0						
County Total			**239**	**248**	**172**	**194**	**220**	**241**	**265**	**249**	***131***	***97***	***21***
Total Unit 4			**337**	**357**	**270**	**257**	**279**	**298**	**311**	**324**	***175***	***125***	***24***
San Luis Obispo	San Carpoforo Creek	USFS[6], CDPR	1	3	0	0	0	0	0	2	1	1	0
	Sydneys Lagoon	CDPR	3	2	1	0	4	1	0	0	0	0	0
	Arroyo Laguna Creek	CDPR	2	3	1	1	0	0	0	0	0	0	0
	San Simeon State Beach	CDPR	6	7	2	0	0	1	0	0	0	0	0
	Santa Rosa Creek	CDPR	0	0		0	0	0	0	0	0	0	0
	Estero Bluffs State Beach	CDPR	33	23	17	12	16	14	17	13	5	8	0
	Toro Creek	Private	0	0	0	0	0	0	0	0	0	0	0
	Morro Strand SB	CDPR	21	24	17	17	18	16	9	2	1	1	0
	Morro Rock City Beach	City of Morro Bay	0	0	0	0	0	0	0	0	0	0	0
	Morro Bay Sandspit: State sector	CDPR	181	96	84	59	97	89	114	113	45	48	20
	Morro Bay Sandspit: City of Morro B. sector	Private & City of Morro Bay	24	24	0	11	9	18	14	17	8	9	0
	Pismo State Beach	CDPR	0	0	0	0	0	2	0	0	0	0	0
	Oceano Dunes SVRA	CDPR	92	58	46	89	83	57	100	123	37	55	31
	ODSVRA Oso Flaco Natural Area	CDPR		29	14	13	15	15	12	22	11	4	7
	Guadalupe-Nipomo Dunes NWR	USFWS	25	32	7	25	14	11	27	14	6	8	0
	Chevron (Unocal) Property	Private	25	29	17	35	14	16	19	11	5	5	1
County Total			**413**	**330**	**206**	**262**	**270**	**240**	**312**	**317**	**119**	**139**	**59**

2012 Summer Window Survey for Snowy Plovers on U.S. Pacific Coast with 2005-2011 Results for Comparison. Note: blanks indicate no survey was conducted.

REGION	SITE	OWNER	Total Adults								2012 Adult Breakdown		
			2005	2006	2007	2008	2009	2010	2011	2012	*male*	*fem.*	*sex?*
Santa Barbara	Rancho Guadalupe Dunes Co. Park	County	43	38	46	35	30	24	31	21	8	7	6
	Mussel Rock beach	Private	6	13	10	17	11	14	1	6	3	3	0
	Paradise beach	Private	9	12	12	0			4	0	0	0	0
	Point Sal SB	CDPR	0	0	0	0	0	0	0	0	0	0	0
	Vandenberg AFB North beaches	US Air Force	103	110	65	100	81	79	116	60	30	25	5
	Vandenberg AFB Purisima Point	US Air Force	0	3	2	0	3	2	0	0	0	0	0
	Vandenberg AFB South beaches	US Air Force	156	132	87	107	78	86	113	109	54	51	4
	Jalama Beach County Park	County	0	0	0	0	0	0	0	1	0	1	0
	Gaviota State Beach	CDPR	0	0	0	0	0	0	0	0	0	0	0
	Refugio State Beach	CDPR	0	0	0	0	0	0	0	0	0	0	0
	El Capitan State Beach	CDPR	0	0	0	0	0	0	0	0	0	0	0
	Haskell's beach	Private	0			0	0	0	0	0	0	0	0
	Ellwood Beach	City of Goleta	3	0	8	2	0	4	0	3	0	0	3
	Coal Oil Pt. Reserve	Univ. of Calif.	26	39	39	25	29	26	48	37	0	0	37
	Isla Vista beach	Univ. of Calif.	0	0	0	0	0	0	0	0	0	0	0
	Campus Beach	Univ. of Calif.	0		0	0	0	0	0	3	0	0	3
	Goleta Beach	County	0		0	0	0	0	0	1	0	0	1
	West Beach	City of S. Barbara	0	0	0	0	0	0	0	0	0	0	0
	Santa Barbara Harbor Beach	City of S. Barbara	1	0	0	0	0	0	0	0	0	0	0
	East Beach	City of S. Barbara	0	0	0	0	0	0	0	0	0	0	0
	Santa Claus Lane- Carpinteria spit beaches	Private	0	0	0	0	0	0	0	0	0	0	0
	Carpinteria City Beach	City of Carpinteria	0	0	0	0	0	0	0	0	0	0	0
	Carpinteria State Beach	CDPR	0	0	0	0	0	0	0	0	0	0	0
	Santa Cruz Island	Nature Conservancy		0	0	0	0	0	0	0	0	0	0
	Santa Rosa Island	USNPS	37	19	17	5	9	8	7	8	4	4	0
	San Miguel Island	USNPS		0	0	0			0	0	0	0	0
County Total			**384**	**366**	**286**	**291**	**241**	**243**	**320**	**249**	**99**	**91**	**59**
Ventura	San Buenaventura State Beach	CDPR	0	0	3	0	0	0	0	5	2	3	0
	McGrath State Beach	CDPR	3	17	15	7	5	22	21	34	16	18	0
	Mandalay State Beach	CDPR	3	7	2	5	16	4	0	6	2	4	0
	Hollywood County Beach	County of Ventura	0	0	14	15	10	13	8	7	3	4	0
	Ormond Beach	City of Oxnard, CCC, Private	21	22	27	33	28	27	38	47	20	24	3
	Point Mugu NAS	US Navy	83	79	55	60	68	87	55	62	23	31	8
	San Nicolas Island	US Navy	62	96	68	44	69	50	42	44	18	19	7
County Total			**172**	**221**	**184**	**164**	**196**	**203**	**164**	**205**	**84**	**103**	**18**

2012 Summer Window Survey for Snowy Plovers on U.S. Pacific Coast with 2005-2011 Results for Comparison. Note: blanks indicate no survey was conducted.

REGION	SITE	OWNER	Total Adults								2012 Adult Breakdown		
			2005	2006	2007	2008	2009	2010	2011	2012	*male*	*fem.*	*sex?*
Total Unit 5			**969**	**917**	**676**	**717**	**707**	**686**	**796**	**771**	**302**	**333**	**136**
Los Angeles	Leo Carillo Beach	CDPR*			0	0	0	0	0	0	0	0	0
	Nicolas Canyon	CDPR*			0	0	0	0	0	0	0	0	0
	R.H.Meyer State Beach (entire)	CDPR*			0	0	0	0	0	0	0	0	0
	Zuma SB	CDPR*	0		0	0	0	0	0	0	0	0	0
	Paradise Cove	CDPR				0	0	0	0	0	0	0	0
	Dan Blocker State Beach	CDPR*				0	0	0					
	Malibu Lagoon	CDPR	0		0	0	0	0	0				
	Carbon to Big Rock Beach	CDPR	0		0	0	0	0					
	Las Tunas State Beach	CDPR*	0			0	0	0	0				
	Topanga State Beach	CDPR*	0		0	0	0	0	0				
	N.Will Rogers State Beach	CDPR*	0		0	0	0	0	0				
	S.Will Rogers State Beach	CDPR*			0	0	0	0	0				
	N.Santa Monica State Beach	CDPR*	0		0	0	0	0	0				
	S.Santa Monica Beach	CDPR*			0	0	0	0	0				
	N. Venice Beach	CDPR*			0	0	0	0	0				
	S.Venice Beach	CDPR*			0	0	0	0	1				
	Marina del Rey	CDPR*			0	0	1	0					
	Playa del Rey	CDPR*	0		0	2	0	0					
	N. Dockweiler State Beach	CDPR*	0		0	0	0	0	0	0	0	0	0
	S. Dockweiler State Beach	CDPR*	0		0	0	0	1	0	0	0	0	0
	El Segundo Beach	CDPR*	0		0	0	0	0	0	0	0	0	0
	Manhattan Beach	CDPR*	0		0	0	0	0	0	0	0	0	0
	Hermosa State Beach	CDPR*	0		0	0	0	0	0	0	0	0	0
	Redondo/Torrance Beach	LA County?			0	0		0	0	0	0	0	0
	Cabrillo State Beach	CDPR*			0	0	0	0	0	0	0	0	0
	Long Beach State Beach	CDPR*			0	0	0			0	0	0	0
	San Clemente Island	US Navy				0			2	0	0	0	0
	* managed by LA County												
County Total			**0**	**0**	**0**	**2**	**1**	**1**	**3**	**0**	**0**	**0**	**0**
Orange	Seal Beach	City of Seal Beach				0							
	Seal Beach NWS	US Navy				0	0	2	2	0	0	0	0
	Surfside	City of Seal Beach	0			0	0	0					

2012 Summer Window Survey for Snowy Plovers on U.S. Pacific Coast with 2005-2011 Results for Comparison. Note: blanks indicate no survey was conducted.

REGION	SITE	OWNER	Total Adults								2012 Adult Breakdown		
			2005	2006	2007	2008	2009	2010	2011	2012	*male*	*fem.*	*sex?*
	Sunset	County	0			0		2					
	Bolsa Chica SB	CDPR	0			0	0	1		0	0	0	0
	Bolsa Chica ER/wetlands	State Lands Commission	66	62	36	50	47	54	48	57	31	26	0
	Huntington City Beach	City of Huntington B.											
	Huntington SB	CDPR	0		0	0	0	0		0	0	0	0
	Newport Beach	City of Newport B.											
	Upper Newport Bay	CDFG	0										
	Balboa Beach	City of Newport B.	0			0	1	3	1	0	0	0	0
	Corona Del Mar	CDPR											
	Crystal Cove State Park	CDPR				0							
	Laguna Beach	City of Laguna Beach											
	Salt Creek	County				0	0			0	0	0	0
	Doheny SB	CDPR			0	0				0	0	0	0
	Capistrano	County				0							
	San Clemente City	City of San Clemente				0							
	San Clemente SB	CDPR				0				3	2	0	1
County Total			**66**	**62**	**36**	**50**	**48**	**62**	**51**	**60**	**33**	**26**	**1**
San Diego	San Onofre/Trestles	CDPR	0			0	0		0	0	0	0	0
	Camp Pendleton	US Marine Corps	94	127	94	117	120	169	162	170	85	66	19
	Oceanside	City of Oceanside				0			0	4	0	0	4
	Buena Vista Lagoon	CDFG				0				0	0	0	0
	Agua Hedionda	Private	0			0				0	0	0	0
	Carlsbad SB	CDPR		0	0					0	0	0	0
	S. Carlsbad S.B.	CDPR	1	0	0	1	1	1	0	3	2	0	1
	Batiquitos Lagoon	CDFG	12	14	8	5	3	3	6	2	0	0	2
	San Elijo Lagoon	County/CDFG	0	0	0	0	0	0	0	0	0	0	0
	Cardiff SB	CDPR	0	0	0	0	0	0	0	0	0	0	0
	San Dieguito Lagoon	State	0	0	0	0	0	0	0	0	0	0	0
	Del Mar City Beach	City of Del Mar							0				
	Los Penasquitos Lagoon	CDPR	0	0	0	0	0	0	0	0	0	0	0
	Torrey Pines SB- Blacks	CDPR				0	0	0	0	0	0	0	0
	La Jolla	City of S. Diego											
	S. Mission Beach	City of S. Diego	0		0	0	0	0	0	0	0	0	0
	San Diego River Channel (incl. Dog Beach)	City of S. Diego	0	0	0	0	0	0	0	0	0	0	0

2012 Summer Window Survey for Snowy Plovers on U.S. Pacific Coast with 2005-2011 Results for Comparison. Note: blanks indicate no survey was conducted.

REGION	SITE	OWNER	Total Adults								2012 Adult Breakdown		
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	***male***	***fem.***	***sex?***
	Ocean Beach	City of S. Diego	0										
	Mariner's Point	City of S. Diego	0			0	0	0	0	0	0	0	0
	Fiesta Island	City of S. Diego	0			0	0	0	0				
	Sweetwater NWR	USFWS/Port of SD	0	0	0	0	2	0	0	0	0	0	0
	Chula Vista Wildlife Reserve	SDCo. Airport Authority	0	0	0	0	0	0	0	0	0	0	0
	SD NWR/Salt Works	USFWS	0	4	6	6	3	7	16	19	11	8	0
	NAS North Island	US Navy	4	22	4	15	17	23	29	24	18	6	0
	Coronado Beach	City of Coronado											
	Naval Amphibious Base-Ocean	US Navy	21	36	11	33	28	10	15	25	8	11	6
	NAB Bay-Delta Beach	US Navy	0	2	2	0	0	0	0	0	0	0	0
	Silver Strand SB-Ocean	CDPR	5	9	7	15	10	8	11	13	5	6	2
	Silver Strand SB-Bay	CDPR	0	0		0	0	0	0				
	Naval Radio Receiving Facility	US Navy	0	8	3	8	8	8	9	12	5	6	1
	South Bay Biological Reserve	County of San Diego	0										
	Imperial Beach	City of Imperial Beach	0										
	Tijuana Estuary/Tijuana Slough NWR	USFWS	3	12	10	8	5	12	11	10	5	5	0
	Border Field SP	CDPR	3	2	2	9	11	7	18	16	10	6	0
County Total			**143**	**236**	**147**	**217**	**208**	**248**	**277**	**298**	**149**	**114**	**35**
Total Unit 6			**209**	**298**	**183**	**269**	**257**	**311**	**331**	**358**	**182**	**140**	**36**
California Total			**1680**	**1719**	**1362**	**1394**	**1405**	**1591**	**1715**	**1621**	*752*	*659*	*210*
Pacific Coast Total			**1817**	**1877**	**1537**	**1541**	**1587**	**1787**	**1917**	**1855**	*888*	*753*	*214*

CDFG = California Deparment of Fish and Game

CDPR = California Department of Parks and Recreation

BLM = US Bureau of Land Management

USFWS = US Fish and Wildlife Service

USNPS = US National Park Service

USFS = US Forest Service

USACE = US Army Corps Engineers

OPRD = OR Parks and Recreation Dept

GGNRA = Golden Gate Nat. Recreation Area

CCC = California Coastal Conservancy

APPENDIX L

CALIFORNIA LEAST TERN BREEDING SURVEY 1993

State of California
The Resources Agency
Department of Fish and Game
Wildlife Management Division

CALIFORNIA LEAST TERN BREEDING SURVEY

1993 SEASON

by

Carolee Caffrey

Nongame Bird and Mammal Section Report, 94-07

State of California
The Resources Agency
Department of Fish and Game

CALIFORNIA LEAST TERN BREEDING SURVEY

1993 SEASON[1]

by

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Department of Biology
University of California
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ABSTRACT

In 1993, a minimum of 2,400 pairs of the endangered California least tern (Sterna antillarum browni) nested at 35 sites along the coast of California, and produced approximately 1848-2009 fledglings. This 14% increase over 1992 breeding population size continues the trend since 1987 of continued growth of the population, and is directly attributable to the efforts of people working on behalf of recovery of the species. The statewide total of 2,400 pairs is the highest number recorded since systematic monitoring began in 1973, and represents a four-fold increase over the estimated 600 pairs of that year.

Predation on tern eggs, chicks, fledglings, and adults, and abandonment of eggs and chicks as a function of predation pressure, were the major causes of breeding failure in 1993. Monitors at 15 of 22 sites with low fledgling production (<0.9 fledglings/pair) attributed the lack of success to predation. The adverse effects of predation were manifested at all stages of breeding. Many types of human-related disturbance also constrained fledgling production in 1993. Breeding success and failure were strikingly localized; successful (>0.9 fledglings/pair) and unsuccessful sites were distributed throughout the State. Seven sites were particularly successful at fledging high numbers of tern chicks: NAS Alameda, Venice Beach, Seal Beach, Mission Bay/Mariner's Point, and Delta Beach North combined produced approximately 82% of the total fledglings produced statewide.

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[1] Caffrey, C. 1994. California least tern breeding survey, 1993 season. Calif. Dep. Fish and Game, Wildl. Manage. Div., Nongame Bird and Mammal Section Rep. 94-07, Sacramento, CA. 39 pp.

FINAL REPORT TO

California Department of Fish and Game
1416 Ninth Street
Sacramento, CA 95814

CONTRACT FG233 8 (FY92/93)

Partially Supported by Section 6 Federal Grant-in-Aid
Funding for Endangered Species, California, EW92, X-1

CALIFORNIA LEAST TERN BREEDING SURVEY

1993 SEASON

CONTRACTOR

The Regents of the University of California
University of California
Los Angeles, CA 90024

**PRINCIPAL INVESTIGATOR
AND AUTHOR**

Carolee Caffrey, PhD.
Department of Biology

1994

INTRODUCTION

The California least tern (Sterna antillarum browni) is a state- and federal-listed endangered species that nests each spring and summer along the coast from the San Francisco Bay area in the north, south into Baja California, Mexico. Annual estimation of least tern breeding population size and monitoring of breeding activities in the state of California began in 1973; estimation of total annual fledgling production was incorporated into monitoring protocol in 1978. Habitat loss due to human development and climatic events (e.g., storms and flooding), other types of human-related disturbance, predation, and adverse environmental conditions, particularly El Niño, continue to dampen recovery of the species. However, the concerted efforts at identifying, enhancing, protecting and monitoring least tern breeding areas by state and federal agencies, and the many dedicated individuals working therein, have greatly contributed to the three-and-a-half-fold increase in breeding population size from approximately 600 pairs in 1973 to approximately 2106 pairs in 1992. These efforts were continued in 1993, and the data are summarized herein.

METHODS

The following criteria are used to distinguish least tern breeding "sites" from "colonies" (used interchangeably in the past): A site is the name of the location of a discrete and contiguous group of nesting birds. A colony is the name of the location of a breeding area, where colony members share the same foraging and roosting areas, and the same general nesting areas. If all pairs in the colony nest within a single, contiguous area, then colony name and site are the same. In recent years, terns have expanded nesting ranges within colonies, and particular colonies have come to comprise two or more "islands" of nesting areas, i.e., they now include several sites.

Statewide censuses of known California least tern breeding areas have been conducted since 1973. A network of paid and volunteer monitors check all sites on a regular basis and compile data into mid-season and final Site Reports. The present report integrates and summarizes data from all known least tern breeding sites in the state of California for 1993. Further details on methodology (e.g., data collection, fledgling counts, and predator-related issues) are available in the California Department of Fish and Game (CDFG) Least Tern Monitoring Packet (Caffrey 1993a). Additionally, the actual final Site Reports used to prepare this survey are available through CDFG offices in Sacramento. These reports often contain many more details regarding site preparation, data collection, predation and disturbance problems and procedures than can be included here; readers interested in such additional information are encouraged to request copies.

For 1993, data were collected and are reported here for individual sites, with the following exceptions: Total Fledglings and Fledglings/Pair are pooled for the two sites at Ormond Beach, as are 1992 Total Pairs (for comparison) for the then three sites at Ormond Beach (Table 4). No reports were received from Pt. Mugu personnel for 1993, although breeding terns were present, thus data for this site are indicated as "not available." Official names for military lands housing tern breeding sites can be found in the Appendix; throughout this report they are referred to as in Table 1.

Least terns breed along the coast of California from the southern border north to the San Francisco Bay. Breeding site characteristics vary from site to site. Nesting sites are located in areas that experience high levels of human activity to little or none. Fences may be permanent, temporary, or nonexistent. Nests may be approached closely enough for monitors to mark them and actually count eggs/chicks directly, or simply observed from afar. Thus monitoring protocol varies from site to site as well, although at all sites the following information is determined: occupancy status, estimates of total number of breeding pairs present, and estimates of total number of fledglings produced. Fledgling counts are generally made at nocturnal roosting areas at three-week intervals, and summed for the season (Massey 1989, Caffrey 1993a). Attempts are also made at identifying the type and outcome of predation or other disturbance.

Given the diversity of site types, two very general monitoring approaches can be described. Type 1 sites are those that have historically been monitored quite closely. Monitors walk through nesting areas regularly, mark nests with tongue depressors, and record data regarding the status of nests. Monitoring of this type throughout the season provides detailed information on the timing of nesting, the number of active nests, clutch size, hatching success, and the number of chicks produced. In contrast, monitor presence within Type 2 sites is kept to a minimum or does not occur at all. Monitors at these sites observe terns from a distance and determine the presence of nests from the location of incubating adults; therefore many types of data are unavailable, e.g., clutch sizes and actual hatching dates.

Site preparation prior to the arrival of terns also varied from site to site. From information included in mid-season and final Site Reports, vegetation was cleared by hand (PGE Pittsburg, NAS Alameda, Oakland Airport, Seal Beach, San Elijo Lagoon, Mission Bay/Mariner's Point), mechanically (Terminal Island, Huntington Beach, Newport Slough, Mission Bay/FAA Island, Mariner's Point, North Fiesta Island, Crown Point and Stoney Point, Naval Training Center, NAS North Island, Delta Beach North and South, D Street Fill, Chula Vista Wildlife Reserve), or with the use of herbicides

(NAS Alameda). Accumulated litter or storm debris was removed (NAS Alameda, McGrath Beach, Venice Beach), ceramic roofing tiles were placed on site for chick shelter and/or grid marking (VAFB Beach 2, Ormond Beach/Perkins Rd, Venice Beach, Mission Bay/Mariner's Point, NAS North Island, D Street Fill, Chula Vista Wildlife Reserve), dried tumbleweed was placed against the chain link fence around the perimeter of the site to prevent chick escape (Seal Beach), water level control was attempted at San Elijo Lagoon, and sand was cleared away from fencing to expose chick fence (Venice Beach, Delta Beach North) or pushed into berms to restrict human access (Tijuana River North and South). Permanent fencing at sites was erected (PGE Pittsburg) or repaired (VAFB Purisima Point, Venice Beach, Terminal Island, Seal Beach, Mission Bay/FAA Island, Tijuana River North and South), or temporary fencing was erected once terns chose particular nesting areas within sites (Santa Clara River, White Beach, Santa Margarita River/North Beach, Mission Bay/Mariner's Point). A railroad-car barricade was erected and signs were posted at Ormond Beach/Edison to deter pedestrian and ORV traffic; signs were also posted at Mussel Rock Dunes, Batiquitos Lagoon/Park and Ride, San Elijo Lagoon, and Tijuana River North and South. Trees were trimmed at Terminal Island to discourage nesting by kestrels. Crow heads (yes, crow heads) were laid out at Venice to deter crows from entering the site. Sand was provided to enhance the site at Santa Clara River, Mission Bay/North Fiesta Island, and NAS North Island, and decoys were laid out to attract terns to particular areas at Pismo Dunes, VAFB Beach 2, Terminal Island, Newport Slough, Mission Bay/North Fiesta Island and Crown Point, Naval Training Center, NAS North Island, Delta Beach North and South, D Street Fill, and Chula Vista Wildlife Reserve.

Site preparation also included predator removal at several sites. All military sites have permanent Animal Damage Control (ADC) personnel who trap and relocate, or exterminate, a majority of actual or potential predators from least tern nesting areas prior to and throughout the breeding season. In 1993, these sites included NAS Alameda, Vandenberg AFB Beach 2, VAFB Purisima Point, White Beach, Santa Margarita River/North Beach, Saltflats and Saltflats Island, Naval Training Center, NAS North Island, and Delta Beach North and South. ADC was also on site at Mission Bay/FAA Island, Mariner's Point, North Fiesta Island and Crown Point, and D Street Fill prior to tern arrival. Pre-season predator removal occurred at Terminal Island as well.

The following distinction is made between documented and suspected predator species: a documented predator is one actually observed taking a least tern egg, chick, fledgling, or adult, or one indicated according to the following criteria: (1) identifiable tracks led to least tern remains or empty nest where eggs were not expected to hatch for at least three more days, (2) if expected hatching date was unknown, tracks led to more than one empty nest, and (3) any evidence left had to be consistent with that expected from the indicated predator. Suspected predators are animals believed to have preyed on terns or eggs, based on substantial but not conclusive evidence (e.g., tracks throughout the site, tern remains characteristic of a particular predator, or predators observed foraging at the site).

The methodology used to determine Total Fledglings for Seal Beach (Table 4) was inconsistent with that employed at all other sites, and inappropriate (Total Eggs - number of abandoned eggs - number of dead chicks found), thus the number provided (and therefore Fledglings/Pair as a consequence) is likely a substantial overestimate.

RESULTS

Distribution - In 1993, California least terns were reported to have nested at 35 sites from the San Francisco Bay area south to the Mexican border (Table 1). Terns returned to Santa Clara River, Terminal Island, and Batiquitos Lagoon/Park and Ride after a hiatus of one year, and to Naval Training Center after several years. Resettlement of three of these sites was attributed to site restoration via sand deposition at Santa Clara River (this site had suffered storm damage in the winter of 1992), the removal of several crows and kestrels (the major predators at Terminal Island) prior to tern arrival, and to years of persistence at site preparation and the use of decoys finally paying off at Naval Training Center. The underlying reason(s) for their return to Batiquitos Lagoon/Park and Ride was not obvious.

Of sites known to have been used by nesting terns in the past, several have been tern-less for several years (Table 1) for various reasons, including an abundance of predators (e.g., Mission Bay/Stoney Point) and/or humans (e.g., Mission Bay/South Shores) in the area, vegetation overgrowth (Mission Bay/Cloverleaf), or all of the above (Mission Bay/Crown Point). In 1993, seven nesting sites used in 1992 also went unused by breeding terns (Tables 1 and 3). For the latter sites, lack of nesting by terns was attributed to (1) all of the above reasons (San Diequito Lagoon), (2) most of the above plus a domestic waterfowl glut (Buena Vista Lagoon), (3) persistent on-shore winds early in the season prohibiting nesting (Pismo Dunes), (4) alteration of the site by storm damage prior to the breeding season (McGrath Beach), and (5) prohibitive levels of human-related disturbance (recreationists with and without pets at Ormond Beach/Middle Site, and vegetation still being cleared as terns arrived at Newport Slough) and/or perceived predator pressure (Newport Slough, Oakland Airport).

Breeding Chronology - First-wave breeders began arriving at breeding areas from mid- to late April through mid-May; nesting began 1-2 weeks later (Table 2). Most sites had eggs in nests by mid-May, chicks by early June, and fledglings by the end of June. Definitive second wave nesting was reported at 24 sites; at four sites the second wave was minimal, and no second wave was evident at 8 sites. Two sites apparently had only second wave nesters (Ormond Beach/Perkins Rd, Batiquitos Lagoon/Northeast). Terns began departing some breeding areas in early July, but remained at others until late August/early September.

First Wave - An estimated 2053 pairs nested in the first wave of breeding in 1993 (Table 3), although this is likely a conservative estimate due to the lack of data from Pt. Mugu. Throughout the State sites experienced increases, relative to 1992, in the number of first wave nesters, with relatively dramatic increases occurring at Mussel Rock Dunes, VAFB Beach 2, Batiquitos Lagoon/Mouth, Mission Bay/Mariner's Point, Delta Beach North and South, Chula Vista Wildlife Reserve, and Tijuana River North and South. Dramatic increases can also be said to have occurred at the sites used in 1993 but not in 1992 (Santa Clara River, Terminal Island, Batiquitos Lagoon/Park and Ride, Naval Training Center).

The dramatic decreases, relative to 1992, in the number of pairs settling to breed in the first wave at San Elijo Lagoon and D Street Fill were attributed to prohibitive predator presence at both sites (including a nearby pair of nesting peregrines at D Street Fill), as well as water level problems at San Elijo Lagoon.

Season Totals - Excluding data from Pt. Mugu, 2305-2337 pairs of California least terns nested statewide in 1993 (Table 4). The estimate for statewide Total Fledglings of 1998-2059 may be inflated by anywhere from 50-150 birds due to the methodology employed at Seal Beach. Thus, statewide fledgling-to-pair ratio, again excluding Pt. Mugu, is likely somewhere in the range between 0.79-0.87. Breeding success was strikingly localized rather than clustered; successful sites (generally accepted as those with fledgling production/pair >l) spanned the entire geographic range. These included ten sites: PGE Pittsburg, NAS Alameda, Venice Beach, Seal Beach, Santa Margarita River/North Beach and Saltflats Island, Batiquitos Lagoon/Mouth, Naval Training Center, Delta Beach North, and Tijuana River North. Seven sites were particularly successful at producing large numbers of fledglings: NAS Alameda, Venice Beach, Seal Beach, Huntington Beach, Santa Margarita River/North Beach, Mission Bay/Mariner's Point, and Delta Beach North combined produced approximately 82% of the total fledglings produced statewide (midpoints of Total Fledgling ranges for the State and individual sites used for calculation).

The greatest relative increases in total number of nesting pairs occurred at the following sites (included are only those where nesting also occurred in 1992, with percent of 1992 number in parentheses): Mussel Rock Dunes (218%), Huntington Beach (170%), Santa Margarita River/North Beach (126%) and Saltflats (186%), Batiquitos Lagoon/Mouth (867%), Mission Bay/Mariner's Point (171%), Delta Beach North (250%) and South (700%), Chula Vista Wildlife Reserve (260%), Saltworks (475%), Tijuana River North (475%) and South (187%). Significant declines occurred at only three sites: Batiquitos Lagoon/Northeast (25%), San Elijo Lagoon (36%), D Street Fill (17%).

Clutch Size - Clutch size at Type 1 sites ranged from 1 to 4 (Table 5), with a statewide $\overline{X}$ = 1.91 (n=2523 nests). Hatching success at Type 1 sites ranged from 0-100%, with a mean of approximately 69.7% (midpoints of ranges for San Elijo Lagoon, D Street Fill, and Chula Vista Wildlife Reserve used for calculation).

Sources of Breeding Failure in 1993 - Predation was the major cause of breeding failure in 1993 (Table 6); documented and suspected predators included by-now familiar species. Sites with the greatest diversity of species preying on terns were located in San Diego County, yet sites where monitors reported that predation had a significant negative effect on tern reproductive success were scattered throughout the State (Mussel Rock Dunes, VAFB Beach 2, VAFB Purisima Point, Terminal Island, Seal Beach, Bolsa Chica, Huntington Beach, Santa Margarita River/North Beach and Saltflats, San Elijo Lagoon, Mission Bay/FAA Island, Mariner's Point and North Fiesta Island, NAS North Island, Delta Beach South, D Street Fill, Chula Vista Wildlife Reserve, Saltworks, and Tijuana River). Monitors at two sites reported that vegetation encroachment into nesting areas exacerbated the already intense predation pressure by providing refuge for predators (San Elijo Lagoon: raccoons, NAS North Island: ants). Predation pressure at San Elijo Lagoon was also intensified by high water levels leaving only a narrow strip of dry land available as nesting substrate; terns became easy prey for predators moving through and foraging in the area. Gull predation at Mission Bay/FAA Island was exacerbated by disturbance to nesting terns as the result of fireworks displays at nearby Seaworld and recreational activities associated with the Over-The-Line Tournament at nearby Fiesta Island; gulls were documented to take at least 35 eggs from 24 nests.

Humans continue to directly cause tern mortality. Nests were inadvertently trampled at Mussel Rock Dunes and Tijuana River South. Eggs and chicks at Tijuana River South were also lost to human-driven bicycles and all-terrain and 4-wheel-drive vehicles. Military aircraft accidentally killed two fledglings on the runway at NAS Alameda, and a helicopter of unknown origin landed on FAA Island at Mission Bay, killing several chicks and blowing several eggs from nests. A fledgling was injured as the result of getting caught up in discarded fishing line at Mission Bay/Mariner's Point, and an adult was unintentionally caught in a trap meant for a depredating owl (Mission Bay/FAA Island).

Eggs and chicks were also lost to hypothermia, and fencing and flooding problems. Sixty chicks were found dead at Mission

Bay/Mariner's Point with no clear evidence as to the cause.

Sources of Disturbance - Sources of site disturbance (Table 7) were believed to either underlie the abandonment of nests or whole breeding areas, or to otherwise contribute directly or indirectly to egg or chick mortality, although unequivocal evidence of the connection was lacking. Because the presence of all tern predators causes disturbance and may cause abandonment, all potential predators observed by monitors in tern nesting areas should be listed here. However, for the sake of unclutteredness, species known or suspected to have preyed on terns (so listed in Table 6) are not included in Table 7.

Disturbance resulting from human intrusion continues to ill-affect terns. Although military exercises in tern nesting areas are infrequent and the effects unclear, monitors reported at least temporary nest abandonment (White Beach), habitat destruction (Santa Margarita River/Saltflats Island), and Marines running through the nesting site (Santa Margarita River/Saltflats) as the result of such procedures. The human-related threats to terns on public lands are more obvious. Pedestrians alone, and/or their pets, cause disturbance/flushing, if not direct mortality. ORV and bicycle riders drive through nesting areas. Monitors reported many other types of human-generated problems, including people walking through the area to feed ducks (Batiquitos Lagoon/Park and Ride), fireworks displays (on-going at Seaworld during summer) and weekend recreational tournaments causing terns to flush (Mission Bay/FAA Island), owners encouraging pet dogs to swim to the island at Batiquitos Lagoon/Northeast, golfers apparently inadvertently smacking balls into tern nesting areas (Batiquitos Lagoon/Park and Ride, Mission Bay/Mariner's Point), fishermen illegally in the area leaving unattended hooked lines (San Elijo Lagoon), and boaters landing on site or people camping overnight next to perimeter fence (Mission Bay/Mariner's Point).

Fourth of July festivities are likely a problem at many sites, although information of this type has not been requested on report forms. However, the disturbance to nesting adults, chicks, and fledglings at Venice Beach each July 4th is so intense that I include it as a new category. A nearby city-run night-time fireworks display brings hundreds of people to the beach, many of whom proceed to ignite their own displays. As it is a public beach, only my informative urging and pleading throughout the night, together with compassionate responses on the part of often inebriated revelors, brings about any lessening of disturbance to terns by increasing the distance between booming fireworks and the perimeter fence, or altering the target direction of bottle rockets. No matter how successful my efforts, however, terns repeatedly fly up in disturbance throughout the night. Although fireworks debris is always found within the fence the next morning, and tern eggs have been abandoned in the days following the Fourth, it is impossible to attribute any particular abandonment to fireworks disturbance.

Vandalism by humans was also reported at several sites. People tore down part of the fence at Mission Bay/North Fiesta Island, and illegally entered sites and stole log books, data sheets, leg bands, decoys, beach chairs, posted signs, or other equipment at Venice Beach, Mission Bay/North Fiesta Island, Delta Beach North, and D Street Fill. In addition, newly posted signs were defaced at Batiquitos Lagoon/Park and Ride, and the slats preventing chick escape were removed from the fence at Mission Bay/Mariner's Point.

The high water level of lagoons in San Diego County reduced the land available to terns for nesting, as did encroachment of vegetation (at Chula Vista Wildlife Reserve, 70-80% of the site was estimated to be covered and unusable). Vegetation encroachment during the season was felt to influence the lack of a second wave at Seal Beach. Vegetation clearing was still underway at Newport Slough as terns arrived; lack of open space plus predator presence was believed to underlie the lack of nesting at that site. Predator presence likely affected the decision of arriving terns to abandon Oakland Airport as well. Heavy rains in June washed out nesting substrate at NAS North Island and likely limited nesting of second wave pairs.

DISCUSSION

The steep increase in the statewide number of California least tern breeding pairs over the last five years continued in 1993. The 2321 approximation (midpoint of range) for statewide Total Pairs may be viewed as a minimum because of the lack of Pt. Mugu data (Pt. Mugu had 133 pairs in 1992); the actual number of breeding pairs of least terns in California can be conservatively estimated at 2400. Thus from a recent low of 944 pairs in 1987, breeding population size had increased by 94% in 1991, to 1830 pairs (Fancher 1992), and by 123% in 1992; the current estimate of 2400 represents a 154% increase in the number of pairs, or more than two-and-a-half times the size of the population only six years ago. This dramatic increase in breeding population size is directly attributable to the efforts of people working on behalf of terns to enhance and protect breeding areas. Fencing repair, vegetation removal, monitor presence, education of the public, and predator management all increase the reproductive potential of least terns. Accurate estimation of statewide Total Fledglings is a bit more difficult due to both the complete lack of data from Pt. Mugu and the "unknown" component of the Seal Beach estimate. Seal Beach has been consistently successful at fledging terns in recent years (Obst and Johnston 1992, Johnston and Obst 1992, Caffrey 1993b), although those fledgling data may now also be viewed with some reservation. Crediting monitors with the ability to assess relative success, and therefore assuming that terns at Seal Beach have maintained a fledgling-to-pair ratio equal to at least 1.0 for the recent past, the number of fledglings produced at that site in 1993 was likely between 214 and 314. Thus, despite heavy predation pressure at many sites, and a variety of human-related constraints on tern reproductive success, a minimum of 1848-2009 fledglings were added to the population in 1993.

The number of sites used by nesting terns throughout the State fluctuates from year to year, as sites become either attractive, through site preparation efforts, or unattractive, as a function of human, predator, or other environmental disturbance, to arriving terns. The drop to 35 from 38 sites in 1992 reflects the (hopefully) temporary loss of seven sites used last year (Table 3), and the addition of four sites, all of which had been used by terns in the past. No new sites were known to have been established in 1993. Site abandonment was attributed to prohibitive levels of disturbance of various kinds (Results: Distribution); terns were actually observed to arrive at both Oakland Airport and Pismo Dunes, and then abandon each site after a few days, apparently because of conspicuous predator presence (particularly red foxes) and intense on-shore winds, respectively. Adult and newly-fledged terns en route south for the winter, however, continued to use Oakland Airport as a post-breeding stop after dispersing from NAS Alameda.

Astute observation and lots of hard work by monitors and Animal Damage Control personnel prior to tern arrival resulted in the sites at Santa Clara River, Terminal Island, Batiquitos Lagoon/Park and Ride, and Naval Training Center being selected by breeding pairs of terns in 1993. The removal of predators, combined with other site preparation procedures (see Methods), seemed to tip the balance at Terminal Island and Naval Training Center.

Throughout the State, sites experienced increases in the number of breeding pairs present as a function of both the general increase in statewide population size, and some shuffling around among sites as some were deemed unusable by arriving terns. Some of the most dramatic increases were attributed to such shuffling: Mussel Rock Dunes was thought to have inherited pairs abandoning Pismo Dunes, and pairs that abandoned D Street Fill were likely the source of the large increases at Delta Beach North and South, Chula Vista Wildlife Reserve, Saltworks, and Tijuana River North and South. Batiquitos Lagoon/Mouth was thought to be the recipient of some of the past success at nearby Camp Pendelton. Mariner's Point is the least problem-laden of the sites at Mission Bay, and consequently experienced high recruitment from that area.

The few dramatic declines in breeding pair numbers were thought to be not only a function of intense human and pet presence (Batiquitos Lagoon/Northeast), or predator presence and/or water problems (San Elijo Lagoon, D Street Fill) in 1993, but in the case of D Street Fill, also a response to the heavy predation pressure experienced in 1992.

Mean clutch size for Type 1 sites (1.91) was comparable to that determined in recent years (1992: 1.87, Caffrey 1993b, 1991: 1.98, Johnston and Obst 1992, 1990: 1.94, Obst and Johnston 1992). Monitors at virtually every site with low hatching success attributed the loss of eggs either directly to predation (Mussel Rock Dunes, VAFB Beach 2, VAFB Purisima Point., Santa Margarita River/Saltflats, San Elijo Lagoon, Chula Vista Wildlife Reserve, Tijuana River North and South) or to the combined effects of predation on eggs and nest abandonment in response to predation pressure (NAS North Island). The intrusion into nesting areas by humans and pet or feral dogs and cats was felt to underlie the complete lack of hatching at Batiquitos Lagoon/Northeast and Park and Ride, and 30 eggs were abandoned late in the season at Mission Bay/Mariner's Point for unknown reasons.

Predation took its toll on the production of fledglings from hatchlings as well. Throughout the State, predation was the major cause of breeding failure in 1993. Again, at virtually every site with low fledgling production per pair (in this case, less than approximately 0.9, Table 4), monitors attributed breeding failure to predation. The only exceptions included (1) the two Batiquitos Lagoon sites, where human-related problems resulted in no hatching, (2) the two sites at Ormond Beach, where human-related disturbance was thought to underlie site abandonment in early to mid-July, dooming the offspring of the second wave, (3) Bolsa Chica, where Caspian terns moved in and basically took over the island, (4) Upper Newport Bay, a Type 2 site where determination of the causes of egg and chick loss is impossible, and (5) White Beach, where discussion of the likely cause of low fledgling production was not included in site reports.

The adverse effects of predation on tern reproductive success ranged from prohibiting nesting entirely (Results: Distribution) to limiting the number of pairs at particular sites (Results: First Wave), delaying the onset of nesting (Terminal Island: crows), direct predation on eggs (Table 5) and/or chicks and fledglings (Table 4), as well as causing abandonment of nests at those sites, and causing early abandonment of whole sites (Terminal Island: peregrine falcon, Huntington Beach: crows), which limited second wave nesting and doomed the eggs and dependent offspring still present.

Predation is obviously an important variable in the California least tern recovery story. That approximately 82% of the total fledglings produced statewide came from only seven of the 35 sites used in 1993 is testament to the substantial negative impact predation can have on tern reproductive success. Four of those seven sites (NAS Alameda, Santa Margarita River/North Beach, Mission Bay/Mariner's Point,and Delta Beach North) had permanent ADC personnel removing all potential predators; this was thought to underlie high fledgling production in the face of what would have been intense predation pressure. The other three sites were deemed "lucky", although it was the unconventional means by which predators were controlled at Venice Beach that permitted the success of that site.

Crows have historically been the major predators at Venice Beach, and in 1993, prior to tern arrival, crows were present and crow tracks covered the site. In the past, crow carcasses had been used successfully to thwart crow predation at Venice (e.g., Caffrey 1993b). Due to a freezer-space crunch in the fall of 1992 at UCLA, I let students dissect the 15 carcasses in my possession, and I kept the heads. In mid-April 1993, I placed groups of seven and eight crow heads at the north- and south- east corners of the Venice Beach site, and swept the sand clean. Not a single crow track subsequently appeared inside the fence and no predation occurred, although two families of crows continued to forage, roost, and loaf only meters away for the duration of the tern breeding season.

Such successful non-lethal methods of predator management are the exception rather than the rule; the usual approach to controlling predators involves active removal by ADC. Yet several sites with ADC at work throughout the season (see Methods) endured high levels of predation and produced few fledglings. Therein lies the basis for recent calls for re-evaluation of current predator control policies, and the establishment of a predator management plan that incorporates not only the sustainability of terns, but also evaluation of our ability to accurately assess the impact of predation, consideration of other special-status species, and an understanding of the important role of predation as a force of natural selection acting on terns, and in maintaining ecological balance.

Humans, too, remain a major constraint on tern breeding success. Foot, vehicular, and pet traffic in and around nesting areas cause the loss of eggs and chicks directly through trampling or predation, and indirectly through disturbance, resulting in nest or site abandonment, or exacerbation of predation pressure. Military exercises, accidental captures by ADC, and naive duck-feeding excursions notwithstanding, people and their pets, bicycles, ORVs, helicopters, golfballs, fireworks, and abandoned fishing line, and their penchant for vandalism, continue to negatively impact the reproductive success of California least terns.

RECOMMENDATIONS

Funding - Underlying many of the limits on tern reproductive success is the lack of funds available for site preparation, site maintenance, site enhancement, and monitoring. Sites throughout the State need new fencing, fencing repair, vegetation control, lagoon water level control, educational signs, predator control, and above all, monitor presence, as it is monitors who are familiar with tern breeding requirements as well as the particulars and weaknesses of individual sites. Sources of funding must be found not only for site enhancement and the establishment of new sites, but also to simply maintain the status quo (e.g., the fence at Venice Beach is in dire need of repair). Sources of funding for predator management would also help to alleviate some of the intense predation pressure at CDFG sites without access to ADC. And again, funding for adequate monitor presence must be secured.

Nesting Sites - Acquiring shore-front property is as difficult as it sounds, yet the creation of new sites must proceed to buffer the potentially devastating effects, on a local level, of predation, human disturbance, and future El Niño events. Individual sites are often either successful or not regarding fledgling production, and a single predator can be enough to tip the balance toward the latter. In 1993, fledglings produced at only seven sites comprised approximately 82% of the State total. This points to the vulnerability of the species' recovery to local threats, and begs the establishment of new sites.

Enhancement of well-established, incipient, and potential sites remains a priority. Human-related threats to terns are ostensibly mollifiable; enclosing nesting areas within fencing and educating the public as to the contents is one solution, yet is not always possible in practice. With an eye toward approaching that ideal, however, fencing repair or better fencing, better enforcement, and/or bilingual signs are badly needed at Mussel Rock Dunes, Pismo Dunes, Ormond Beach, Venice Beach, Batiquitos Lagoon/Northeast and Park and Ride, San Elijo Lagoon, San Diequito Lagoon, Mission Bay North Fiesta Island and Mariner's Point, and Tijuana River Estuary. Similarly, a fox-proof fence would go far to make the otherwise lovely site at Oakland Airport almost perfect.

Because terns seek flat, open, sandy areas with little vegetation as nesting sites, overgrown vegetation can constrain, or even prohibit, breeding at otherwise suitable sites. The latter was apparently the case at Newport Slough in 1993, and monitors at several other sites (Oakland Airport, Seal Beach, the islands at Batiquitos Lagoon/Mouth, San Elijo Lagoon, Mission Bay/Mariner's Point and North Fiesta Island, and Chula Vista Wildlife Reserve) felt that more aggressive vegetation clearing would enhance the breeding success of terns. Clearing all vegetation in a buffer zone around nesting areas decreases the attractiveness to predators, and is strongly recommended in appropriate situations. Additionally, getting a handle on water levels in both Batiquitos and San Elijo Lagoons is absolutely required to maintain these areas as California least tern nesting sites.

In the past, terns have returned to breed in areas unused for variable periods of time (e.g., Mission Bay/North Fiesta Island in 1992), and 1993 saw the return of terns to Santa Clara River, Terminal Island, Batiquitos Lagoon/Park and Ride, and Naval Training Center; this underscores the importance of continued protection and enrichment of such sites. The use of decoys has been successful in efforts to attract terns back to previously used areas, such as the Naval Training Center, as well as to new sites (e.g., Mission Bay/Mariner's Point and Delta Beach South in the past). Their use at sites used year after year can direct terns to particularly suitable areas (e.g., Delta Beach North).

Monitoring - Because monitors not only collect data but serve as the direct link between recovery efforts and tern life during the breeding season, it is crucial that monitoring continue at least at current levels, and recommended that those levels increase. It is a given that the more closely a site is monitored, the better the troubleshooting and problem intervention/solving. As often as possible, and for as long as possible, monitors should visit sites, assess the impact of all things that impinge on breeding success and, when possible, respond to negative influences in ways that promote tern survival and reproduction.

A strong attempt was made in 1993 to standardize and improve monitoring and reporting methodology (Caffrey 1993a); this effort will continue in 1994.

Predator Contol - Predation on least tern eggs, chicks, fledglings, and adults has been, and will continue to be, a major problem at most sites. Wiping out all potential predators prior to the onset of nesting would clearly benefit terns, but is unnatural, unacceptable, and not possible anyway. Presently, at CDFG tern breeding sites, predator management consists mostly of "crisis control", where predators are removed only after damage is done and the predator(s) can be identified. Sometimes, even after predators have been identified, predator removal is not attempted. The decision as to the fate of the offender(s) is based on several criteria, including the status of the predator (e.g., "endangered" or "species of special concern"), the estimate of its potential effects on tern breeding success, the site history, and financial and local residential considerations. All of these are important variables, and in most cases, the ultimate decision is neither easy nor straightforward. Yet the time, and additional terns, lost in the decision-making process (as well as the paperwork quagmire), and the frustration and helplessness felt by monitors with no control over the situation are issues that can be addressed directly. Thus, some sort of ecologically- and ethically- sound predator management program must be worked out.

With an eye toward such a program, we have attempted to improve our base of information on predator behavior and effects, and site histories, by standardizing the reporting of actual or potential predation, and requesting the filling out of Predator Sighting Sheets (Caffrey 1993a) by all monitors, when appropriate. In the future, these will contribute to the establishment of a predator management program where site histories and documented predator effects dictate a more standardized approach to predator control than exists now.

In the meantime, increased ADC assistance at sites severely affected by predators in the past and at sites experiencing intense predation pressure during any particular breeding season is desperately needed. In 1993, monitors at Oakland Airport, Batiquitos Lagoon/Northeast, and San Elijo Lagoon requested predator-control assistance in their Final Reports. In addition, crow carcasses work so well at Venice Beach at keeping crows out of the nesting area that I strongly recommend we pursue this means of non-lethal intervention at sites plagued by crows (e.g., Huntington Beach would have been even **more** successful if crows had been deterred). Can we get some stuffed ones made so that we can re-use them year after year?

ACKNOWLEDGEMENTS

Much of this section is the same as that of the 1992 report; the people working on behalf of least terns in the state of California continue to be some of the nicest and most compassionate people I am privileged to know. I have added a couple of things, and changed some names, but refuse to remove much. I remain honored to acknowledge the contributions of the many people listed here. Each one truly gave a piece of themselves to this work; their generosity and dedication was overwhelming. I am proud to be associated with all of you.

Field monitors remain the vital link between us and the terns, and the terns and their survival as a species. Monitors pull vegetation, erect fencing, shovel sand, pilot boats, wade through water, trudge through mud, educate the public, and endure whitewashing as they watch and walk to keep data up to date; moreover, they are forced to become coroners of sorts, like it or not, and are our first step in predator crisis management. Through it all, they somehow manage to remain open-minded, level-headed, and upbeat in the face of predation, human recklessness, and that sometimes nightmarish phenomenon we like to call bureaucracy. Thanks to all of you: Laura Collins, Leora Feeney, Mary Perry,

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APPENDIX: MILITARY SITES

Naval Air Station, Alameda (NAS Alameda)
Vandenberg Air Force Base (VAFB Beach 2, and Purisima Point)
Marine Corps Base, Camp Pendelton (White Beach, and Santa Margarita River/North Beach, Saltflats, and Saltflats Island)
Naval Training Center, San Diego (Naval Training Center)
Naval Air Station, North Island (NAS North Island)
Naval Amphibious Base, Coronado (Delta Beach North and South)

Table 1. Type, primary contact, and number of breeding season visits for each site in the state of California. Type 1 sites are monitored from inside; Type 2 from the outside. An asterisk next to site name indicates it is either a new site this year, or one used for the first time in several years. Unused indicates historically used sites unoccupied by nesting terns in 1993 (1: site unused for several-many years, 2: site used in recent past). Primary contacts can be reached through CDF&G office in Sacramento.

	Type	Primary Contact	# Visits
San Francisco Bay Area			
PGE, Pittsburg	2	Laura Collins	9
Port Chicago (Allied)	unused1	Laura Collins	
NAS Alameda	1&2	Laura Collins	66
Oakland Airport	unused2	Leora Feeney	99
San Luis Obispo/Santa Barbara Counties			
Mussel Rock Dunes	1	Morgan Boucke	36
Pismo Dunes	unused2	Rob Burton	54
San Antonio Creek	unused1	Morgan Boucke	
Vandenberg AFB, Beach 2	2	Allan Naydol	52
VAFB Purisima Point	2	Allan Naydol	54
Santa Ynez River Mouth	unused1	Morgan Boucke	
Ventura County			
Santa Clara River*	1	Morgan Boucke	56
McGrath Beach	unused2	Morgan Boucke	
Ormond Beach: Edison	2	Morgan Boucke	28
Middle Site	unused2	Morgan Boucke	
Perkins Rd	2	Morgan Boucke	17
Point Mugu	2	Ron Dow	na
Los Angeles/Orange Counties			
Venice Beach	1	Carolee Caffrey	58
Terminal Island*	1	Kathy Keane	28
Seal Beach	1	Tom Alexander	24
Bolsa Chica	1	Carolee Caffrey	27
Huntington Beach	1	Doreen Stadtlander	36
Newport Slough	unused2	Doreen Stadtlander	36
Upper Newport Bay	2	Carolee Caffrey	18

San Diego County			
White Beach	1	L Belluomini	63
Santa Margarita River:			
North Beach	1	L Belluomini	66
Saltflats	1	L Belluomini	65
Saltflats Isl	1	L Belluomini	65
Buena Vista Lagoon	unused2	Elizabeth Copper	
Aqua Hedionda	unused1	Elizabeth Copper	
Batiquitos Lagoon: NE	1	Elizabeth Copper	18
Park and Ride*	1	Elizabeth Copper	18
Mouth	1	John Konecny	18
San Elijo Lagoon	1	Robert Patton	18
San Diequito Lagoon	unused2	John Konecny	
Los Penasquitos	unused1	Elizabeth Copper	
Mission Bay: FAA Isl	1	Brian Foster	30
Mariner's Point	1	Ginger Johnson	58
N Fiesta Isl	1	Brian Foster	18
Crown Point	unused1	Elizabeth Copper	
Stony Point	unused1	Elizabeth Copper	
South Shores	unused1	Elizabeth Copper	
Cloverleaf	unused1	Elizabeth Copper	
Lindbergh Field	unused1	Elizabeth Copper	
Naval Training Center*	1	Elizabeth Copper	59
NAS North Island	1	Elizabeth Copper	117
Delta Beach: North	1	Elizabeth Copper	112
South	1	Elizabeth Copper	41
Grand Caribe Island	unused1	Elizabeth Copper	
D Street Fill	1	Brian Foster	61
Chula Vista Wldlf Res	1	Brian Foster	50
Salt Works	1&2	Jennifer Price	26
Tijuana River: North	1	Robert Patton	24
South	1	Robert Patton	24

Table 2. Chronology of California Least Tern reproductive activities, 1993. For date of arrival, "earlier than or equal to" indicates terns were already present on the first day of monitoring. "Later than or equal to" for departure indicates last day terns observed, although actual departure date could be later. Second wave occurrence was determined for each colony: if yes, beginning date is provided; if no, date provided is that through which "lack of" determination was made; nr reflects a "not really" sentiment on mid-season or final Site Report (no clear-cut demarcation between waves existed). First Egg, Chick, and Fledgling dates indicate actual date, if known, or the first date observed ("earlier than or equal to"). Blank spaces indicate no eggs, chicks, or fledglings produced.

Table 2.

	Activity Period			Date of First		
	Arrive	Depart	Second Wave?	Egg	Chick	Fledgling
PGE, Pittsburg	5/3	8/23	yes,7/4	≤5/10	≤6/3	≤6/23
NAS Alameda	4/26	7/31	nr,6/10	≤5/4	5/27	≤6/16
Oakland Airport	4/28	8/8	no			
Mussel Rock Dunes	5/3	8/3	yes,6/21	≤5/14	≤6/11	≤7/5
Pismo Dunes	5/5	8/15	no			
Vandenberg AFB, Beach 2	≤5/27	7/23	no,7/23	≤5/27	6/11	≤7/3
VAFB Purisima Point	4/30	8/6	no,8/6	≤5/27	6/16	≤7/2
Santa Clara River	4/30	na	yes,7/17	≤6/23	7/2	7/17
Ormond Beach: Edison	≤5/21	≥7/10	yes,7/1	5/31	6/18	7/7
Perkins Rd	4/26	8/28	yes,≤6/26	na	7/11	na
Point Mugu	na	na	na	na	na	na
Venice Beach	4/20	≥8/17	nr,6/8	≤4/30	5/17	≤6/10
Terminal Island	4/22	7/18	yes,6/12	5/17	6/9	6/26
Seal Beach	4/29	7/7	yes,6/16	4/29	5/9	6/16
Bolsa Chica	4/21	7/27	yes,6/10	≤5/4	5/11	≤7/5
Huntington Beach	4/23	7/14	yes,6/7	5/4	5/24	6/14
Upper Newport Bay	4/27	7/15	no,7/15	≤5/4	≤6/10	6/29

White Beach	4/29	8/7	yes,6/3	5/4	5/29	6/19
SM River: North Beach	4/17	8/14	yes,6/1	5/4	5/25	6/15
Saltflats	4/17	8/1	yes,6/1	5/4	5/25	6/20
Saltflats Isl	4/17	8/1	yes,6/2	5/6	5/27	6/20
Batiquitos Lagoon: NE	5/8	8/14	yes,7/11	≤7/11	≤7/24	
Park and Ride	5/15	8/1	no,8/21	≤5/31		
Mouth	5/1	8/14	yes,6/20	≤5/15	≤5/31	≤6/26
San Elijo Lagoon	4/12	9/11	yes,6/23	5/15	≤6/17	
Mission Bay: FAA Isl	4/30	7/30	yes,6/4	5/7	6/3	6/22
Mariner's Point	4/26	8/16	no,8/16	5/2	5/24	6/14
N Fiesta Isl	4/25	7/5	no,8/6	5/12	6/6	6/28
Naval Training Center	4/26	8/4	yes,6/10	5/15	6/6	6/25
NAS North Island	4/18	8/13	yes,6/13	5/8	6/2	6/28
Delta Beach: North	4/15	7/27	yes,6/7	5/6	5/29	6/15-19
South	4/21	7/25	yes,6/30	5/15	6/6	6/23
D Street Fill	4/17	7/15	yes,6/10	5/7	5/28	6/23
Chula Vista Wldlf Res	4/29	7/31	yes,6/9	5/14	6/9	6/28
Saltworks	5/5	8/20	yes,6/27	5/12	6/2	6/25
Tijuana River: North	≤4/22	9/3	nr,6/25	≤5/14	6/3	≤7/1
South	≤4/22	9/3	nr,6/25	≤5/7	≤6/3	6/25

Table 3. First wave totals for 1993 California Least Tern breeding season; included are all sites with nesting terns in either 1993 or 1992. Type 1 colonies are monitored from the inside; Type 2 from the outside. Total Nests includes known renests of first wave pairs. Total Pairs are followed by numbers of first wave pairs at each colony in 1992 (in parentheses). Total Eggs generally not available at Type 2 colonies.

	Colony Type	**Total Pairs**	**Total Nests**	**Total Eggs**
PGE, Pittsburg	2	2 (2)	2	5
NAS Alameda	1&2	113-116 (111)	120	247
Oakland Airport	1&2	0 (2)	0	0
Mussel Rock Dunes	1	45 (22)	45	92
Pismo Dunes	1	0 (4)	0	0
VAFB Beach 2	2	10 (2)	15	31
VAFB Purisima Point	1	9 (15)	13	23
Santa Clara River	1	14 (0)	14	28
McGrath Beach, 3 sites	1	0 (17)	0	0
Ormond Beach: Edison	2	9 (4)	na	na
Middle Site	2	0 (5)	0	0
Perkins Rd	2	0 (9)	0	0
Point Mugu	2	na (107)	na	na
Venice Beach	1	219 (193)	219	459
Terminal Island	1	5 (0)	5	11
Seal Beach	1	198 (189)	198	391
Bolsa Chica	1	142 (122)	142	274
Huntington Beach	1	144 (130)	144	275
Newport Slough	1	0 (1)	0	0
Upper Newport Bay	2	50 (46)	50	na

White Beach	1	27 (31)	27	56
Santa Margarita River:				
North Beach	1	308 (269)	308	604
Saltflats	1	59 (36)	59	108
Saltflats Island	1	27 (29)	27	53
Buena Vista Lagoon	2	0 (3)	0	0
Batiquitos Lagoon:				
Northeast	1	0 (1)	0	0
Park and Ride	1	4 (0)	4	8
Mouth	1	18 (3)	18	34
San Elijo Lagoon	1	7 (22)	7	17
San Diequito Lagoon	1	0 (7)	0	0
Mission Bay: FAA Island	1	112 (158)	112	207
Mariner's Point	1	205 (120)	205	382
N. Fiesta Island	1	6 (5)	6	12
Naval Training Center	1	1 (0)	1	2
NAS North Island	1	43 (49)	43	88
Delta Beach: North	1	69 (23)	69	132
South	1	7 (1)	7	14
D Street Fill	1	20 (135)	29	55
Chula Vista Wldlf. Res.	1	48 (0)	48	93
Saltworks	1	38 (8)	40	77
Tijuana River: North	1	19 (4)	25	49
South	1	73 (39)	82	155
Total		2051-2054 (1930)		>3982 (>3386)

Table 4. Totals for 1993 California Least Tern breeding season; only those sites with nesting pairs included. Total Pairs and Fledglings/Pair numbers are followed by mean 1992 data (in parentheses). Seal Beach Total Fledglings (364*), and therefore Fledglings/Pair (1.84*), are overestimates (see Methods). Total Fledglings and Fledglings/Pair for the 2 sites at Ormond Beach are pooled, as are 1992 comparison data for the (then) 3 sites at Ormond Beach. Any discrepancy between 1993 Total Pairs and Total Nests reflects renesting attempts by pairs.

Table 4.

	Total Pairs	Total Nests	Total Fledglings	Fledglings/ Pair
PGE, Pittsburg	2 (2)	3	4	2 (.50)
NAS Alameda	126-128 (125)	135	204-210	1.59-1.66(1.73)
Mussel Rock Dunes	61 (28)	66	35-40	.57-.66 (.32)
VAFB Beach 2	10	15	5-9	.50-.90 (.50)
VAFB Purisima Point	9 (12)	13	7	.78 (.08)
Santa Clara River	14-16 (0)	16	14	.88-1.0 (1.35)
Ormond Beach: Edison	14 (18)	na	9 (17)	.64 (.94)
Perkins Rd	3	na		
Point Mugu	na (133)	na	na (72)	na (.54)
Venice Beach	246 (229)	246	280	1.14 (1.07)
Terminal Island	10 (0)	10	8-12	.67-.80
Seal Beach	198 (219)	201	364*	1.84* (1.25)
Bolsa Chica	142 (131)	155	26-47	.18-.33 (.24)
Huntington Beach	234 (138)	235	157	.67 (.23)
Upper Newport Bay	50 (46)	50	12-20	.24-.40 (.24)

White Beach	31 (31)	38	15	.48 (.36)
SM River: North Beach	338 (269)	404	396	1.17 (.62)
Saltflats	67 (36)	84	21	.31 (.53)
Saltflats Isl	30 (29)	35	33	1.10 (.55)
Batiquitos Lagoon: NE	2 (8)	2	0	0 (.51)
Park and Ride	4 (0)	4	0	0
Mouth	26 (3)	29	32-38	1.23-1.46 (0)
San Elijo Lagoon	8 (22)	9	0	0 (.09)
Mission Bay: FAA Isl	133 (158)	150	45-50	.34-.38 (≥.33)
Mariner's Point	205 (120)	205	140	.68 (.58)
N Fiesta Isl	6 (5)	6	2	.33 (.40)
Naval Training Center	2-3 (0)	3	3-5	1.0-2.5
North Island NAS	43 (49)	52	14	.33 (.10)
Delta Beach: North	95 (38)	127	130	1.37 (.66)
South	7 (1)	8	2-4	.29-.57 (1)
D Street Fill	23 (135)	32	1	.04 (.14)
Chula Vista Wldlf Res	52 (20)	61	4-6	.08-.12 (.92)
Saltworks	38 (8)	62	8	.21 (≥.63)
Tijuana River: North	13-25 (4)	39	36	1.44-2.77 (1.75)
South	63-82 (39)	93	2	.02-.03 (.80)
Total	>2305-2337 (2106)		1998-2059 (1362-1448)	.85-.89 (.65-.69)

Table 5. Clutch sizes and hatching success for nests in Type 1 colonies. Santa Margarita River/Saltflats Island and Mission Bay/Mariner's Point each had one nest with a clutch size of 4 (not shown). "Unsure" denotes either the number of nests abandoned or preyed upon prior to completion at Type 1 colonies (thus actual clutch size unknown), or the total number of nests at Type 2 colonies (thus Total Number of Eggs not available). Mean clutch size provided for known clutch sizes only.

Table 5.

Clutch Size

	1	2	3	Unsure	Mean	Total Eggs	% Hatch
PGE, Pittsburg	1	1	1		2.00	6	100
NAS Alameda	5	112	12	6	2.13	275	86
Mussel Rock Dunes	8	53	5		1.95	129	54
VAFB Beach 2	1	12	2		2.07	31	68
VAFB Purisima Point	2	9	2		2.00	26	58
Santa Clara River	1	15			1.94	31	na
Ormond Beach: Edison				14		na	na
Perkins Rd				3		na	na
Point Mugu	na	na	na	na		na	na
Venice Beach	28	204	14		1.94	478	96
Terminal Island	1	7	2		2.10	21	81
Seal Beach	20	161	20		1.97	396	97
Bolsa Chica	24	123	8		1.90	294	94
Huntington Beach	65	162	8		1.22	286	86
Upper Newport Bay				50		na	na

White Beach	6	29	3		1.92	73	78
SM River: North Beach	61	333	10		1.87	757	88.9
Saltflats	27	57			1.68	141	25.5
Saltflats Isl	7	27			1.86	56	86.2
Batiquitos Lagoon: NE	1	1			1.50	3	0
Park and Ride		4			2.00	8	0
Mouth	6	22	1		1.83	53	83
San Elijo Lagoon		6	3		2.33	21	14-24
Mission Bay: FAA Isl	37	111	2		1.77	265	82
Mariner's Point	38	158	8		1.86	382	68
N Fiesta Isl	2	2	2		2.00	12	92
Naval Training Center		3			2.00	6	83
NAS North Island	8	37	7		1.98	103	48
Delta Beach: North	20	107			1.84	234	80
South		8			2.00	16	100
D Street Fill	5	26	1		1.88	60	77-92
Chula Vista Wldlf Res	12	48	1		1.82	111	58-76
Saltworks	13	38	2		2.21	117	86
Tijuana River: North	6	33			1.85	72	60
South	16	75	2		1.85	172	38

Table 6. Causes of California Least Tern breeding failure. Documented and suspected avian and mammalian predators are indicated, as well as other sources of mortality. An asterisk next to predator species indicates that predator-control measures were taken (the predator was removed), most often by ADC. Birds: BcNH - Black-crowned Night Heron, BnO - Barn Owl, BwO - Burrowing Owl, CT - Caspian Tern, Cr - American Crow, G -gull species, GBH - Great Blue Heron, GbT - Gull-billed Tern, GE - Great Egret, GHO - Great Horned Owl, H -Harrier, K - American Kestrel, LS -Loggerhead Shrike, M - Meadowlark, Os - Osprey, Ow - owl species, PF - Peregrine Falcon, R - Raven, RtH - Red-tailed Hawk, SE - Snowy Egret. Mammals: BC - Bobcat, C - Domestic Cat, Cy - Coyote, D - Domestic Dog, F - Red Fox, FC - Feral Cat, FD - Feral Dog, GS - Ground Squirrel, Op - Opossum, Rc - Raccoon, Spk - Spotted Skunk, Stk - Striped Skunk. Other: A - Ant, Fl - Flooding (nests innundated as the result of 1: high water level in lagoon, 2: heavy rain, 3: spring tides), FP - Fencing Problems (3: adverse weather exposed bottom of fence and chicks escaped/died, 4: rusted bottom of fence caused moderate to severe injuries in several chicks), Hu - Human-related mortality (1: pedestrians caused egg or chick mortality, 2: aircraft killed two fledglings, 3: trap intended for depredating owl fatally injured adult tern, 4: helicopter (unknown origin) landed on site, HU5 - fishing line found wrapped around leg of injured fledgling, Hy - Hypothermia, Rn - Heavy rains and resultant mud contributed to death of one chick, Unk - Unknown, V - Human-driven vehicles.

Table 6.

	Predation				
	Documented		**Suspected**		**Other**
	Bird	**Mammal**	**Bird**	**Mammal**	
PGE, Pittsburg			GE,SE,LS,K		
NAS Alameda			G,R,K		Hy,Hu2
Mussel Rock Dunes				Cy	Hu1
VAFB Beach 2		Cy			
VAFB Purisima Point			H,Cr,G		
Santa Clara River					
Ormond Beach: Edison					
Middle Site					
Perkins Rd					
Venice Beach					
Terminal Island			K*		
Seal Beach			GBH,K,LS,RtH		
Bolsa Chica	PF		CT,M		Fl2
Huntington Beach	Cr				
Upper Newport Bay					

White Beach	Ow*				
SM River: North Beach	GBH*,H*,Ow*	BC*			
Saltflats	H*,Ow*	Spk			
Saltflats Isl	H*				
Batiquitos Lagoon: NE				Rc,D	
Park and Ride				D,Rc	
Mouth				D	Fl1
San Elijo Lagoon	R,K	Rc,Cy			
Mission Bay: FAA Isl	G*,Ow		PF		Hu3,Hu4, FP3,FP4,A*
Mariner's Point		C	GBH*,G*,K		HU5,Unk
N Fiesta Isl			H,K,R	C	Rn
Naval Training Center			GHO*,BnO*,K*, R*,RTH*	C*	
North Island NAS	BwO*		K*,G*,GBH,R*,PF	C*,GS*	Fl2,A*
Delta Beach: North	H*,GbT*		K*,PF*	FC*	A*
South	GbT*,H*		K*		
D Street Fill	H*		GbT*,K*,LS*	FD*,Cy	
Chula Vista Wldlf Res			GbT*,PF,H,K*,G*	FD*	
Saltworks			PF,GbT,CT,H,G	FD*	
Tijuana River: N and S	LS,R*,M,K*	D*	H,PF,Os,G,GbT	GS*,C*,Stk*	Hu1,V,Fl3

Table 7. Sources of nesting site disturbance: there was no direct evidence of actual predation or mortality caused by indicated sources, however, sources were believed to underlie lack of nesting, or nest or site abandonment, or exacerbate sources of mortality. Documented or suspected predator species (Table 6) not included here (see text). Predators listed here were either (1) present at site prior to or during season and removed (*), or (2) obvious to monitors and suspected to be the cause of nest or site abandonment. Human disturbance was military or recreational in nature: Mlt - base personnel (on foot or in vehicles) involved in military exercises approached or entered nesting area, Rec1 - pedestrians (beachgoers, surfers, joggers) with or without pets in and/or around nesting area, Rec2 - bicycles and/or ORVs in and/or around nesting area, Rec3 - fishermen left unattended hooked lines in roosting areas on shore, and in foraging areas in channel, Rec4 - fireworks at Seaworld and campers at weekend event flushed terns, Rec5 - boaters landing on site and campers at perimeter fence. Other: J4 - July 4th activities, Vnd - humans intentionally entered and vandalized site, Vg - vegetation overgrowth prohibited or limited nesting, or exacerbated predation pressure, Wnd - persistent strong onshore winds likely prohibited nesting, WL - water level in lagoon high and reduced amount of nesting habitat, WO - heavy rains washed-out nesting habitat. All other abbreviations as in Table 6.

	Human	**Animal**	**Other**
PGE, Pittsburg		RtH,H,R,G,CT	
NAS Alameda		PF,H*,BnO	
Oakland Airport		R,H,F*,Op*,Stk*,C*	Vg
Mussel Rock Dunes	Rec1		
Pismo Dunes	Rec2		Wnd
VAFB Beach 2		RtH,H,K,LS,BC	
VAFB Purisima Point	Mlt	RtH,K,LS,Cy,BC	
Santa Clara River	Rec1		
Ormond Beach: Edison	Rec2		
Perkins Rd	Rec1,Rec2		

Venice Beach			Vnd,J4
Terminal Island		Cr*,PF	
Seal Beach			Vg
Bolsa Chica			F12
Huntington Beach		K	
Newport Slough			Vg
Upper Newport Bay			
White Beach	Mlt		
SM River: North Beach			
Saltflats	Mlt		
Saltflats Isl	Mlt		
Batiquitos Lagoon: NE	Rec1,Rec2	K,LS	WL
Park and Ride	Rec1		
Mouth	Rec1		Vg,WL
San Elijo Lagoon	Rec1,Rec3	GBH,GE,BcNh,Cr,Ow, LS,M,Stk	Vg,WL
Mission Bay: FAA Isl	Rec4		
Mariner's Point	Rec5		
N Fiesta Isl	Rec1		Vnd
Naval Training Center	Mlt,Rec1		
North Island NAS			Vg,WO
Delta Beach: North			Vnd
South			
D Street Fill			Vnd
Chula Vista Wldlf Res			Vg
Saltworks			
Tijuana River: N and S	Rec1		

APPENDIX M

SOUTHWESTERN WILLOW FLYCATCHER, LEAST BELL'S VIREO, AND COASTAL CALIFORNIA GNATCATCHER SURVEY RESULTS, 2013

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November 1, 2013

Ms. Susie Tharratt
Recovery Permit Coordinator
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

RE: 2013 Buena Vista Lagoon Enhancement Project, Southwestern Willow Flycatcher, Least Bell's Vireo, and Coastal California Gnatcatcher 45-Day Summary Report, San Diego County, California

Dear Ms. Tharratt:

In compliance with the Special Terms and Conditions for Endangered and Threatened Wildlife Species Permit TE-820658-6, AECOM submits this letter report summarizing the results of focused surveys conducted during 2013 for the federally listed endangered southwestern willow flycatcher (*Empidonax trailii extimus*; SWFL), federally listed endangered least Bell's vireo (*Vireo belli pulillus*; LBVI), and federally listed threatened coastal California gnatcatcher (*Polioptila californica californica*; CAGN) associated with the Buena Vista Lagoon (BVL) Enhancement Project (Project). Surveys were conducted on behalf of the San Diego Association of Governments (SANDAG). This report includes a Project description; a site description; and a discussion of species background, survey methodology, and results. A list of wildlife species detected throughout all surveys is provided in Appendix A.

Project Description

The Project would restore approximately 220 acres of wetland habitat at BVL, a coastal lagoon and State Ecological Reserve. The Project is located in northwestern San Diego County, California (Figure 1). More specifically, it is in the cities of Carlsbad and Oceanside, California (Figure 2). As a result of a weir (a type of barrier), BVL has been progressively degrading in terms of benefits and value to biological communities, habitats, and human uses. Without enhancement, BVL is anticipated to continue to degrade, and could become a vegetated freshwater marsh or riparian woodland-meadow. The removal and possible relocation of the wier would be part of this enhancement. The Project would address the continued degradation of BVL through enhancement of its biological and hydrologic functions.

Site Description

For the purposes of this report, the term "survey area" refers to the habitat found along the edges of BVL. The Project survey area contains a variety of developed areas, along with native habitats (coastal and valley freshwater marsh, coastal scrub, Diegan coastal sage scrub, southern coastal marsh, and southern willow scrub) and nonnative habitats (nonnative grassland, nonnative riparian, eucalyptus woodland, disturbed habitat, and urban/developed areas).

Although the majority of the lagoon is owned and managed by the California Department of Fish and Wildlife (CDFW), other public agencies and private parties own the remaining portions of land. Due to the coastal wetland habitat and number of wildlife species that use the area, including endangered species, the portion of the lagoon owned by CDFW is designated as an Ecological Reserve as described in Title 14, Section 630 of the California Code of Regulations.

Southwestern Willow Flycatcher

SWFL Background Information

SWFL, a subspecies of willow flycatcher (*Empidonax traillii*), was listed by CDFW as endangered in California in 1991 (CDFG 1991) as part of the state endangered listing of the full species (willow flycatcher). SWFL was federally listed as endangered in 1995 (USFWS 1995). This subspecies can only be separated from other willow flycatcher subspecies in the field geographically by breeding range. SWFL breeds in New Mexico, Arizona, Southern California, Nevada, Utah, and possibly west Texas (Rourke et al. 1999). According to Unitt (2004), fewer than 90 pairs breed in San Diego County. In 2005, the U.S. Fish and Wildlife Service (USFWS) issued the final ruling to designate critical habitat for SWFL, which includes portions of San Diego County (USFWS 2005). No critical habitat occurs within the Project survey area.

The primary factor responsible for the decline of SWFL is habitat loss, exacerbated by nest predation and brood parasitism by brown-headed cowbirds (*Molothrus ater*) (BHCO) (Rourke et al. 1999). SWFL is a neotropical migrant that breeds in riparian forests that have a distinct vegetation structure: a dense understory where nests are built, a moderately closed canopy, and an open foraging area at midstory. SWFL breeding habitat is also characterized by actively changing hydrology, frequently including standing water, but also dry areas that have flooded within the past few years and retain the appropriate vegetation structure. In California, less than 5% of appropriate riparian habitat remains from its previous extent when California achieved statehood in 1850 (Kus 2003).

SWFL begins arriving to breeding territories in San Diego County in early May, but the northern subspecies (*E. t. brewsteri*) may migrate through southern breeding areas through mid-June. Both male and female migrant willow flycatchers frequently sing, and determining whether an individual is a resident (SWFL) or a migrant (willow flycatcher) cannot be accomplished from a single detection. Therefore, a survey protocol for SWFL has been adopted by USFWS (Sogge et al. 2010).

SWFL Survey Methodology

AECOM biologists James McMorran and Brennan Mulrooney conducted SWFL surveys following the current survey protocol adopted by USFWS (Sogge et al. 2010). The SWFL survey area depicted in Figure 3 was surveyed between May 16 and July 14, 2013: once during the first survey period (May 15 through May 31), twice during the second survey period (June 1 through June 24), and twice during the third survey period (June 25 through July 17). The total SWFL survey area is approximately 4.05 acres. Surveys were conducted at least 5 days apart between dawn and 10 a.m., or shortly thereafter. Biologists walked throughout suitable habitat, stopping frequently to listen. After a few minutes of passive listening, if no SWFL were heard, a playback recording of SWFL calls was played (active surveys) to elicit a response from SWFL within or adjacent to the property. As allowed under the AECOM endangered species permits, this survey activity "takes" SWFL through harassment with playback of recorded SWFL vocalizations. No individual SWFLs were captured.

All wildlife species detected were recorded, and non-listed sensitive species were mapped upon their initial sighting in the survey area (Figure 3).

SWFL Results

A summary of the survey effort and field conditions is presented in Table 1. Each survey area was visited five times.

Two sensitive wildlife species were observed within the survey area during SWFL surveys: California least tern (*Sterna antillarum browni*) (federally and state endangered, CDFW fully protected species), and yellow warbler (*Dendroica petechia*) (CDFW species of special concern). The locations of these species is depicted in Figure 3. No BHCO were detected.

Table 1
Southwestern Willow Flycatcher Surveys
Dates, Time, Weather Conditions, Personnel, and Observations

Survey Number	Date	Time	Weather	Personnel	SWFL Observations
1	5/16/2013	0707–0957	Start: 62°F, wind 3 mph, 100% cover End: 64°F, wind 3 mph, 100% cover	James McMorran	No SWFL detected
2	6/7/2013	0621–0921	Start: 62°F, wind 2 mph, 100% cover End: 65°F, wind 3 mph, 95% cover	James McMorran	No SWFL detected
3	6/21/2013	0730–0934	Start: 60°F, wind 1 mph, 100% cover End: 70°F, wind 3 mph, 0% cover	Brennan Mulrooney	No SWFL detected
4	7/5/2013	0658–0959	Start: 66°F, wind 0 mph, 100% cover End: 70°F, wind 2 mph, 90% cover	James McMorran, Brennan Mulrooney	No SWFL detected
5	7/14/2013	0614–0925	Start: 68°F, wind 2 mph, 100% cover End: 71°F, wind 3 mph, 10% cover	James McMorran	No SWFL detected

SWFL Discussion

Although no SWFL or migrant willow flycatchers were detected during focused surveys, it is possible that willow flycatchers did use habitat within the survey area as stop-over habitat during their migration. With five focused surveys completed with no detections, AECOM biologists conclude that SWFL did not breed or have a territory within the survey area.

Least Bell's Vireo

LBVI Background Information

LBVI was listed as endangered by USFWS on May 2, 1986 (USFWS 1986), with designated critical habitat listed in 1994 (USFWS 1994). This listing status applies to the entire population of LBVI. A draft recovery plan was written by USFWS and circulated for review in 1998 (USFWS 1998). No critical habitat occurs within the survey area. CDFW listed this subspecies as endangered on October 2, 1980.

Historically, this subspecies was a common summer visitor to riparian habitat throughout much of California. Currently, LBVI is found only in riparian woodlands in Southern California, with the majority of breeding pairs in San Diego, Santa Barbara, and Riverside Counties. Substantial vireo populations are currently found on five rivers in San Diego County (Tijuana, Sweetwater, San Diego, San Luis Rey, and Santa Margarita Rivers), with smaller populations on other drainages. During 1996, a total of 1,423 territorial males were recorded within San Diego County (Unitt 2004). From 2001–2005, a total of 1,609 pairs were recorded in San Diego County, which accounts for approximately 54% of the total LBVI population within California (USFWS 2006).

LBVI is migratory and arrives in San Diego County in late March/early April; it leaves for its wintering grounds in September. LBVI primarily occupies riparian woodlands with dense cover within 3 to 7 feet of the ground and a dense, stratified canopy. The subspecies inhabits low, dense riparian growth along water or along dry parts of intermittent streams. The understory is typically dominated by species of willow (*Salix* sp.) and mulefat (*Baccharis salicifolia*). Overstory species typically include cottonwood (*Populus* sp.), western sycamore (*Platanus racemosa*), and mature willows. The subspecies typically builds nests in vegetation 3 to 4 feet above the ground (Salata 1984) where there is moderately open midstory cover with an overstory of willows, cottonwoods, sycamores, or coast live oaks (*Quercus agrifolia*). Nests are also often placed along internal or external edges of riparian thickets at an average of 3.3 feet above the ground (Unitt 2004). Riparian plant succession is an important factor in maintaining LBVI habitat.

The decline of LBVI is attributed to loss, degradation, and fragmentation of riparian habitat, combined with brood/nest parasitism by BHCO. LBVI is known to be sensitive to many forms of disturbance, including noise, night-lighting, and consistent human presence. Due to concerted programs focused on preserving, enhancing, and creating suitable nesting habitat, the LBVI population has steadily increased along several of its breeding drainages in Southern California. Significant increases in breeding populations have occurred along the Santa Ana River at Prado Basin and on the Santa Margarita River on Marine Corps Base Camp Pendleton, as well as at several other sites in the region.

LBVI Survey Methodology

AECOM biologists James McMorran and Brennan Mulrooney conducted passive surveillance (i.e., listening and looking for the species) in all potential LBVI habitat within the survey area during the 2013 breeding season. Surveys followed the current USFWS survey guidelines for the species, dated January 19, 2001 (USFWS 2001). The LBVI survey area depicted in Figure 3 was surveyed eight times between April 22 and July 14, 2013. The total LBVI survey area is approximately 4.05 acres. Surveys were conducted at least 10 days apart between dawn and 11 a.m. Biologists walked throughout suitable habitat recording all LBVI detected.

All wildlife species detected were recorded, and non-listed sensitive species were mapped upon their initial sighting in the survey area (Figure 3).

LBVI Results

A summary of survey effort and field conditions is presented in Table 2. Each survey area was visited eight times.

Two sensitive wildlife species were observed within the survey area during LBVI surveys: California least tern and yellow warbler. The locations of these species is depicted in Figure 3. No BHCO were detected.

Table 2
Least Bell's Vireo Surveys
Dates, Time, Weather Conditions, Personnel, and Observations

Survey Number	Date	Time	Weather	Personnel	LBVI Observations
1	4/22/2013	0720–1024	Start: 56°F, wind 2 mph, 100% cover End: 64°F, wind 3 mph, 30% cover	James McMorran	No LBVI detected
2	5/2/2013	0853–1041	Start: 64°F, wind 3 mph, 0% cover End: 68°F, wind 3 mph, 0% cover	James McMorran	One singing male detected
3	5/16/2013	0708–1025	Start: 63°F, wind 3 mph, 100% cover End: 64°F, wind 3 mph, 80% cover	James McMorran	No LBVI detected
4	5/27/2013	0630–0948	Start: 60°F, wind 3 mph, 100% cover End: 65°F, wind 3 mph, 40% cover	James McMorran	No LBVI detected
5	6/7/2013	0620–0920	Start: 62°F, wind 2 mph, 100% cover End: 65°F, wind 3 mph, 95% cover	James McMorran	No LBVI detected
6	6/21/2013	0734–0931	Start: 60°F, wind 1 mph, 100% cover End: 71°F, wind 3 mph, 0% cover	Brennan Mulrooney	No LBVI detected
7	7/5/2013	0657–0958	Start: 66°F, wind 0 mph, 100% cover End: 70°F, wind 2 mph, 90% cover	James McMorran, Brennan Mulrooney	No LBVI detected
8	7/14/2013	0619–0919	Start: 68°F, wind 2 mph, 100% cover End: 71°F, wind 3 mph, 10% cover	James McMorran	No LBVI detected

A single singing LBVI was detected during Survey 2. This individual was observed and adequately photographed to document an obvious bill-deformation. This defect on the LBVI observed would allow biologists to distinguish it if the same individual were present in future surveys. However, this individual was likely migrating and not detected during subsequent surveys.

LBVI Discussion

Suitable breeding habitat for LBVI was minimal. However, habitats being used by this species to breed in recent years has shown larger variation. Therefore, suitable breeding habitat cannot be discounted within the survey area. Considering that only a single observation of LBVI occurred during a single survey, AECOM biologists who conducted surveys have determined that this species did not breed within the survey area.

Coastal California Gnatcatcher

CAGN Background Information

CAGN, a subspecies of the California gnatcatcher (*Polioptila californica*), is federally listed as threatened by USFWS (USFWS 1993) and is considered a species of special concern by CDFW (CDFW 2009). Critical habitat was originally designated by USFWS for CAGN in 2000, but was revised, and a final rule was published in 2007 (USFWS 2007). No recovery plan has been drafted for CAGN. CAGN is an uncommon year-round resident of Southern California. This species is declining proportionately with the continued loss of coastal sage scrub habitat in six Southern California counties (San Bernardino, Ventura, Los Angeles, Orange, San Diego, and Riverside).

The primary cause of the decline of CAGN is the cumulative loss of coastal sage scrub vegetation to urban and agricultural development, poor dispersal, reliance on a specific habitat type, and difficulty in successful breeding. Studies suggest that CAGN may be highly sensitive to the effects of habitat fragmentation and development activity (Atwood 1990; ERCE 1990). USFWS has estimated that coastal sage scrub habitat has been reduced 70% to 90% from its historical extent (USFWS 1991), and little of what remains is protected in natural open space.

CAGN generally inhabits Diegan coastal sage scrub and Riversidian coastal sage scrub dominated by California sagebrush (*Artemisia californica*)and flat-topped buckwheat (*Eriogonum fasciculatum*), generally lower than 1,500 feet in elevation along the coastal slope. When nesting, CAGN typically avoids slopes greater than 25% that have tall, dense vegetation. CAGN pairs will attempt several nests each year, each placed in a different location inside their breeding territory, but most nest attempts are unsuccessful due to depredation by a variety of species (Atwood and Bontrager 2001). Clutch size ranges from one to five eggs, with three or four eggs most common. CAGN tends to have slightly smaller clutches in years with poor rainfall, and will experience a higher rate of mortality during cold winters (Atwood and Bontrager 2001; Grishaver et al. 1998). CAGN will remain paired through the non-breeding season, and will generally expand its home range when not breeding. On average, juvenile CAGN disperse less than 1.2 miles from natal territories, making colonization of distant habitat patches difficult.

CAGN Survey Methodology

AECOM biologists James McMorran and Brennan Mulrooney conducted CAGN surveys following the current Coastal California Gnatcatcher Presence/Absence Survey Guidelines (USFWS 1997; dated February 28, 1997, and amended July 28, 1997). The USFWS breeding-season survey protocol for Natural Community Conservation Plan areas requires a minimum of three surveys conducted at least 1 week apart from February 15 through August 30. Within the survey area, approximately 0.68 acre of potential CAGN habitat was surveyed. Surveys occurred between 6 a.m. and 12 noon.

Biologists conducted passive surveillance (i.e., listening and looking for the species) in all habitats with potential to support CAGN. If an observation was not made after approximately 5 to 10 minutes of passive survey activity, a taped vocalization of CAGN was played for approximately 5 to 10 seconds (i.e., active survey activity), followed by another period of passive observation. As allowed under AECOM's endangered species permit, this survey activity "takes" CAGN through harassment with playback of taped vocalizations. No individual CAGNs were captured. The taped vocalization was discontinued with any positive CAGN response.

Surveys were not conducted during periods of inclement weather such as extreme wind or during a rain event.

CAGN Results

A summary of survey effort and field conditions is presented in Table 3. The survey area was visited three times.

There were no special-status species observed. No CAGN were detected.

Table 3
Protocol Coastal California Gnatcatcher Surveys
Dates, Time, Weather Conditions, Personnel, and Observations

Survey Number	Date	Time	Weather	Personnel	CAGN Observations
1	5/2/2013	0900–0943	Start: 64°F, wind 3 mph, 0% cover End: 65°F, wind 3 mph, 0% cover	James McMorran	No CAGN detected
2	7/24/2013	0801–0919	Start: 68°F, wind 3 mph, 100% cover End: 70°F, wind 3 mph, 50% cover	James McMorran	No CAGN detected
3	8/2/2013	0738–0938	Start: 66°F, wind 2 mph, 100% cover End: 70°F, wind 3 mph, 10% cover	James McMorran, Brennan Mulrooney	No CAGN detected

CAGN Discussion

There was very minimal CAGN habitat within the survey area. Although 0.68 acre of suitable habitat was present within the survey area, the habitat was narrow and is fragmented from any nearby occupied suitable habitat. During the non-breeding season it is possible that dispersing/wandering juveniles and adults using a much larger territory than during the breeding season could forage within this habitat and other habitats within the survey area. AECOM biologists who conducted surveys have determined that this species did not breed within the survey area.

Certification Statement

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

James McMorran

James McMorran
Wildlife Biologist
TE-820658

Certification Statement

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

Brennan Mulrooney
Wildlife Biologist
TE-820658

Attachments

Figure 1 – Regional Map
Figure 2 – Vicinity Map
Figure 3 – Least Bell's Vireo and Other Special-Status Species Observed
Appendix A – Wildlife Species Detected During All Focused Surveys

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FIGURES

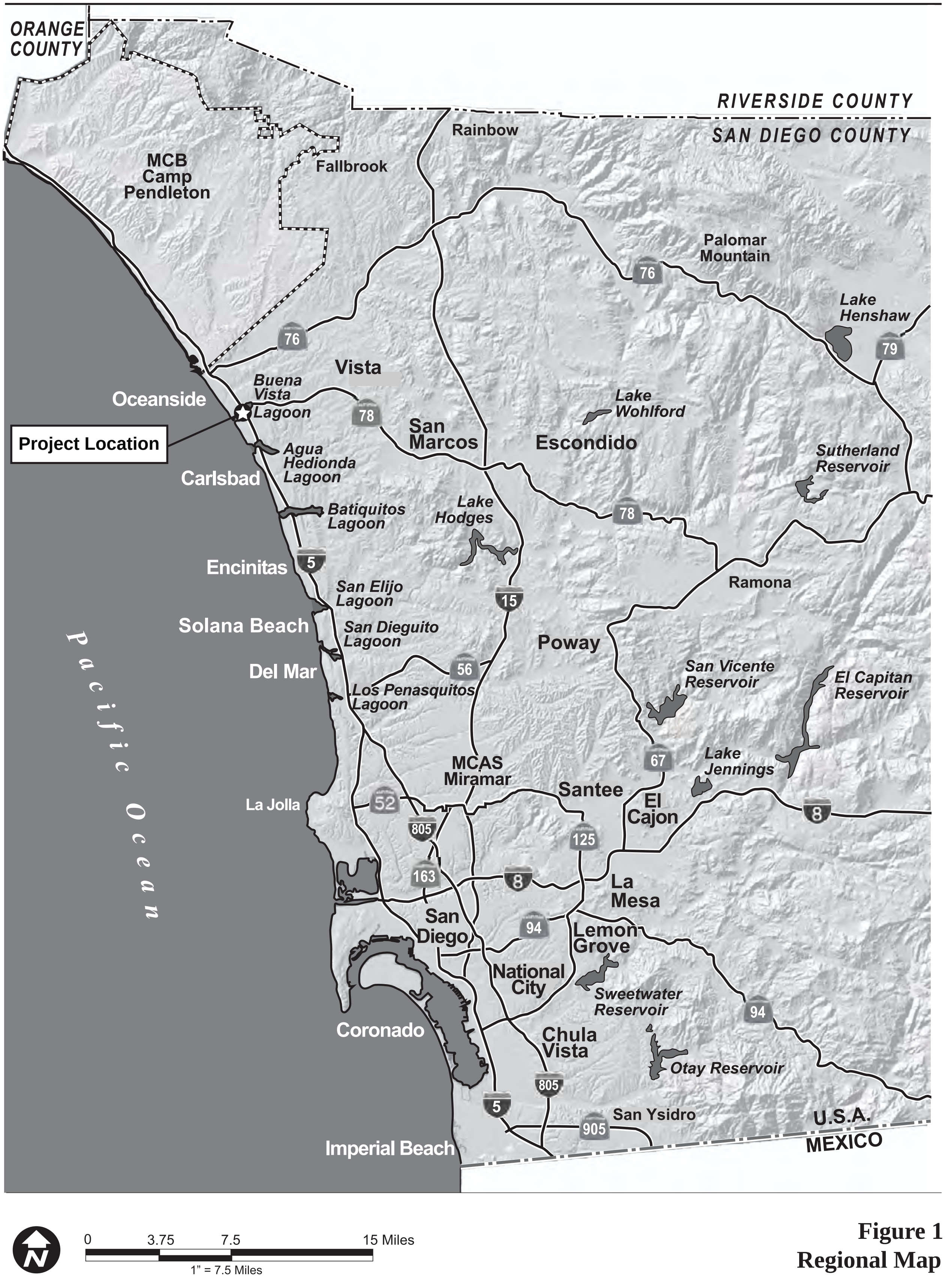
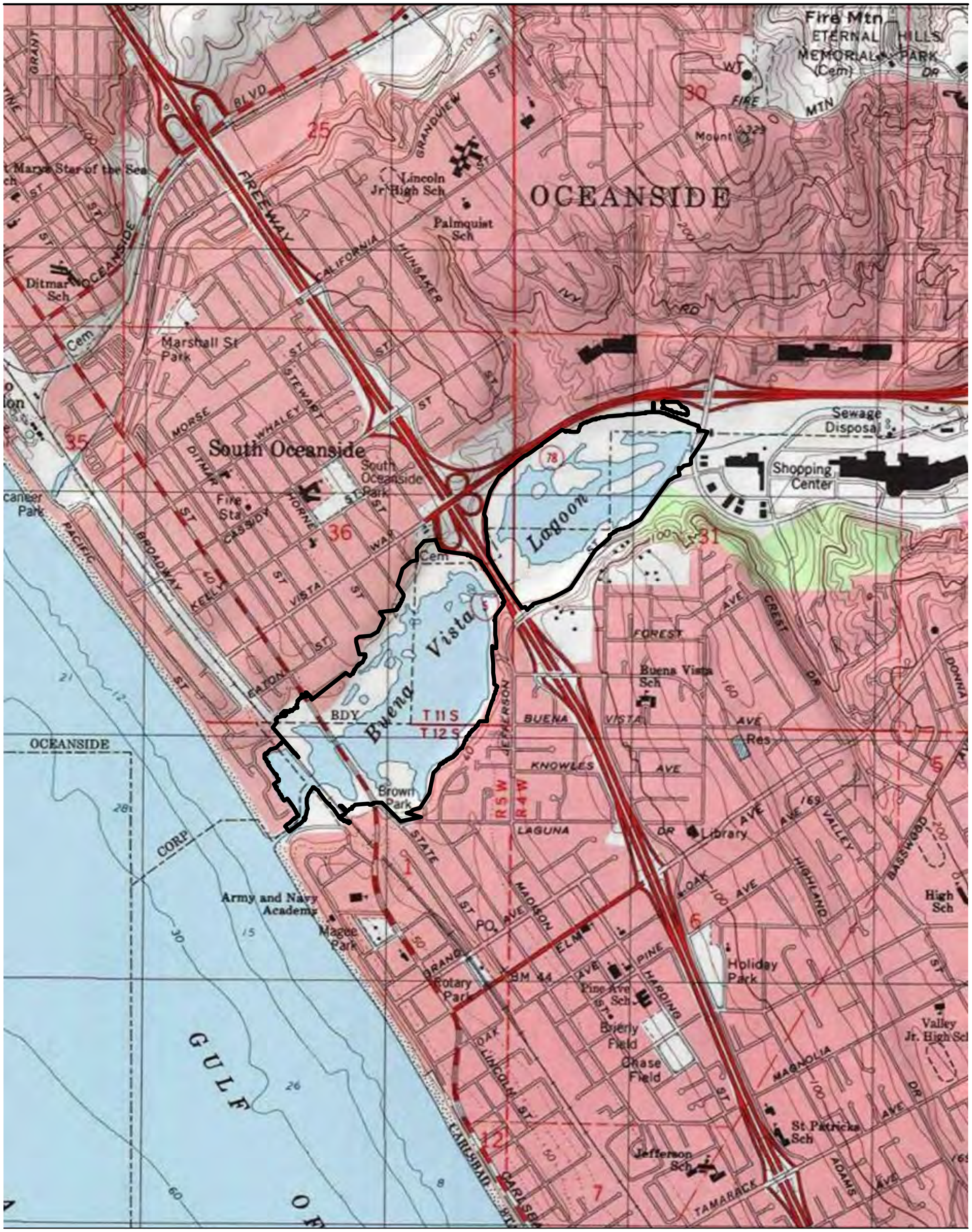


Figure 1
Regional Map



Source: ESRI; AECOM 2013

2,000 1,000 0 2,000 Feet

Scale: 1 = 24,000; 1 inch = 2,000 feet

Figure 2
Vicinity Map

Source: Image courtesy of USGS © 2013 Microsoft Corporation © 2010 NAVTEQ © AND ; AECOM 2013

1,000 500 0 1,000 Feet

Scale: 1 = 12,000; 1 inch = 1,000 feet

Figure 3
Least Bell's Vireo and Other Special-Status Species Observed

Path: P:\2013\60288954_BVLEP_EIR\06GIS\6.3_Layout\Reports\AvianObservations0917.mxd, 9/20/2013, steinb

APPENDIX A

WILDLIFE SPECIES DETECTED DURING ALL SURVEYS

Appendix A. Wildlife Species Detected During All Focused Surveys

Common Name	Scientific Name	Order	Family	Federal Status (Endangered/Threatened)	California Status (Endangered/Threatened)	California Native Plant Society Status (Applies to Plant Species Only)
Avian						
Mallard	*Anas platyrhynchos*	Anseriformes	Anatidae	None	None	N/A
Ruddy Duck	*Oxyura jamaicensis*	Anseriformes	Anatidae	None	None	N/A
Anna's Hummingbird	*Calypte anna*	Apodiformes	Trochilidae	None	None	N/A
Allen's Hummingbird	*Selasphorus sasin*	Apodiformes	Trochilidae	None	None	N/A
Killdeer	*Charadrius vociferus*	Charadriiformes	Charadriidae	None	None	N/A
Caspian Tern	*Hydroprogne caspia*	Charadriiformes	Laridae	None	None	N/A
Western Gull	*Larus occidentalis*	Charadriiformes	Laridae	None	None	N/A
Forster's Tern	*Sterna forsteri*	Charadriiformes	Laridae	None	None	N/A
California Least Tern	*Sternula antillarum browni*	Charadriiformes	Laridae	Endangered	Endangered	N/A
American Avocet	*Recurvirostra americana*	Charadriiformes	Recurvirostridae	None	None	N/A
Bushtit	*Psaltriparus minimus*	Passeriformes	Aegithalidae	None	None	N/A
Black-Headed Grosbeak	*Pheucticus melanocephalus*	Passeriformes	Cardinalidae	None	None	N/A
Western Scrub-Jay	*Aphelocoma californica*	Passeriformes	Corvidae	None	None	N/A
California Towhee	*Melozone crissalis*	Passeriformes	Emberizidae	None	None	N/A
House Finch	*Haemorhous mexicanus*	Passeriformes	Fringillidae	None	None	N/A
Barn Swallow	*Hirundo rustica*	Passeriformes	Hirundinidae	None	None	N/A
Cliff Swallow	*Petrochelidon pyrrhonota*	Passeriformes	Hirundinidae	None	None	N/A
Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*	Passeriformes	Hirundinidae	None	None	N/A
Tree Swallow	*Tachycineta bicolor*	Passeriformes	Hirundinidae	None	None	N/A

Common Name	Scientific Name	Order	Family	Federal Status (Endangered/Threatened)	California Status (Endangered/Threatened)	California Native Plant Society Status (Applies to Plant Species Only)
Red-Winged Blackbird	*Agelaius phoeniceus*	Passeriformes	Icteridae	None	None	N/A
Hooded Oriole	*Icterus cucullatus*	Passeriformes	Icteridae	None	None	N/A
Great-Tailed Grackle	*Quiscalus mexicanus*	Passeriformes	Icteridae	None	None	N/A
Northern Mockingbird	*Mimus polyglottos*	Passeriformes	Mimidae	None	None	N/A
Common Yellowthroat	*Geothlypis trichas*	Passeriformes	Parulidae	None	None	N/A
Yellow Warbler	*Setophaga petechia brewsteri*	Passeriformes	Parulidae	None	None	N/A
House Sparrow	*Passer domesticus*	Passeriformes	Passeridae	None	None	N/A
Marsh Wren	*Cistothorus palustris*	Passeriformes	Troglodytidae	None	None	N/A
Bewick's Wren	*Thryomanes bewickii*	Passeriformes	Troglodytidae	None	None	N/A
Pacific-Slope Flycatcher	*Empidonax difficilis*	Passeriformes	Tyrannidae	None	None	N/A
Black Phoebe	*Sayornis nigricans*	Passeriformes	Tyrannidae	None	None	N/A
Cassin's Kingbird	*Tyrannus vociferans*	Passeriformes	Tyrannidae	None	None	N/A
Warbling Vireo	*Vireo gilvus*	Passeriformes	Vireonidae	None	None	N/A
Great Egret	*Ardea alba*	Pelecaniformes	Ardeidae	None	None	N/A
Great Blue Heron	*Ardea herodias*	Pelecaniformes	Ardeidae	None	None	N/A
Snowy Egret	*Egretta thula*	Pelecaniformes	Ardeidae	None	None	N/A
Black-Crowned Night Heron	*Nycticorax nycticorax*	Pelecaniformes	Ardeidae	None	None	N/A
Clark's Grebe	*Aechmophorus clarkii*	Podicipediformes	Podicipedidae	None	None	N/A
Western Grebe	*Aechmophorus occidentalis*	Podicipediformes	Podicipedidae	None	None	N/A
Pied-Billed Grebe	*Podilymbus podiceps*	Podicipediformes	Podicipedidae	None	None	N/A
Double-Crested Cormorant	*Phalacrocorax auritus*	Suliformes	Phalacrocoracidae	None	None	N/A

APPENDIX N

A SURVEY OF BELDING'S SAVANNAH SPARROW IN CALIFORNIA 2010

State of California
The Resources Agency
Department of Fish and Game
Wildlife Branch

A SURVEY OF THE BELDING'S SAVANNAH SPARROW

(*Passerculus sandwichensis beldingi*)

IN CALIFORNIA 2010

By

Richard Zembal and Susan M. Hoffman

Clapper Rail Recovery Fund
Huntington Beach Wetlands Conservancy
P.O. Box 5903
Huntington Beach, CA 92615

September 2010

NONGAME WILDLIFE PROGRAM REPORT NO. 2010-10

FINAL REPORT TO

California Department of Fish and Game
South Coast Region
4949 Viewridge Avenue
San Diego, CA 92123

A SURVEY OF THE BELDING'S SAVANNAH SPARROW

(*Passerculus sandwichensis beldingi*)

IN CALIFORNIA, 2010

September 2010

By

Richard Zembal
Principal Investigator
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Huntington Beach Wetlands Conservancy
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Huntington Beach, CA 92615

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Susan M. Hoffman
Co-Investigator

Cover photograph courtesy Loren Hays

Contract Final Report **(S0950005)** to California Department of Fish and Game
Supported by State Tax Check-off Funds

State of California
The Resources Agency
Department of Fish and Game

A SURVEY OF THE BELDING'S SAVANNAH SPARROW

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ABSTRACT

Thirty coastal salt marshes were surveyed for state-endangered Belding's Savannah sparrows (*Passerculus sandwichensis beldingi*; Belding's), 5 March – 26 May 2010. Belding's exhibiting breeding behavior were detected in 29 of these wetlands from Devereux and Goleta Sloughs in Santa Barbara County on the north to Tijuana Slough National Wildlife Refuge on the Mexican border. A minimum total of 3,372 breeding territories was detected during approximately 391 field-hours. This is the highest state total reported since periodic counts began in 1973 and is 7.6% higher than the next highest count, reported in 2006. The Point Mugu subpopulation was again the single largest subpopulation; after doubling in size by 2001, it increased another 28.8% by 2006, and held equal numbers in 2010 comprising 31% of the state total.

The major need of this little endangered songbird remains habitat restoration, security, and management. At least 75% of southern California's former coastal wetlands have been lost and the remainder suffers ongoing degradation. The long-term fate of a few of the occupied wetlands is still uncertain and most are affected by trespass and the side effects of so many millions of people living on their edges and in their watersheds. Counteracting these problems by rebuilding a larger habitat base, with better security, and increased management would greatly benefit a significant suite of species with which the Belding's shares its habitat.

Zembal, R. and S. M. Hoffman. 2010. A survey of the Belding's Savannah sparrow (*Passerculus sandwichensis beldin*gi) in California, 2010. Calif. Dep. Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2010-10, Sacramento, CA 17 pp.

INTRODUCTION

The Belding's Savannah sparrow (*Passerculus sandwichensis beldingi*; Belding's) is one of few species of birds that reside year-round in the coastal salt marshes of southern California. This subspecies of Savannah sparrow is a salt marsh endemic, ranging historically from Goleta in Santa Barbara County, California on the north, south to el Rosario, Baja California, Mexico (American Ornithologists Union 1983, Grinnell and Miller 1944, and Van Rossen 1947). Over 75% of the coastal wetland habitats within this range have been lost or highly degraded (Wiley and Zembal 1989) and the remainder suffer from the effects of increasing human populations. The greatly reduced habitat base, increasing human impacts in the remnants, and small population sizes led to the listing as endangered of this little songbird by the State of California in 1974.

Belding's are ecologically associated with dense pickleweed, particularly *Salicornia virginica*, within which most nests are found. Breeding territories can be very small and they nest semi-colonially or locally concentrated within a larger block of habitat, all of which may appear generally suitable. They can be difficult to count accurately since they are secretive and forage throughout a marsh, often well away from nesting sites (Bradley 1973, Massey 1979). Consequently, only half the nesting population may be manifesting territorial behavior near nests at any given time (Massey 1979).

There were seven surveys of the California population of breeding Belding's prior to the current study. The first in 1973 (Bradley 1973) resulted in a total count of 1,084 territories but excluded several occupied marshes. Massey (1977) counted in all of the occupied wetlands but relied upon extrapolations for portions of the population estimates and reported 1,610 territories. In 1986, 2,274 territories were counted in 27 marshes (Zembal et al. 1987). There were late rains in 1991 that interfered with Belding's behavior and survey efforts and the state population estimate was 1,844 territories, although the largest subpopulation was incompletely surveyed (James and Stadtlander 1991). The state population was counted again in 1996, 2001, and 2006, yielding totals of 2,350, 2,902, and 3,135 pairs, respectively (Zembal and Hoffman 2001, 2006). The purpose of this report is to document the 2010 surveys and update the status and distribution of the endangered Belding's in California.

METHODS

Territorial Belding's were counted in 30 wetlands in coastal southern California, 5 March – 26 May 2010. The counts were mostly done in the early morning from sunrise to usually no more than 4 hours later. If overcast or other conditions led to prolonged morning activity, occasionally the surveys continued into the later morning hours.

The survey results are a compilation of breeding territories in each marsh. Manifestation of territoriality was through their singing, scolding, extended perching together of mates, nest building, feeding young, aerial chases, and prolonged posting under certain circumstances. Aerial chases that were straight line indicated a single territory with the bird being chased leaving the area. Aerial chases that were circular often indicated two territories with the bird being chased holding its ground once removed from the original site of confrontation. Occasionally a third adjacent territory holder would get involved but again the chase would loop back over territorial boundaries. Adjacent territory holders would sometimes spar at boundaries, flying straight up and occasionally locking their feet together. Sometimes they fluttered back down into the vegetation, still locked together and sparring. Mates perched together regularly but the female remained mostly hidden below the top of the vegetation. Regularly spaced individuals that were perched high and fully exposed in the *Salicornia* were all counted as territory holders including the few not singing at the time. Prolonged high perching during stronger territorial manifestations by other birds all around the exposed individual is a good indication that the perched individual holds the territory there. Observations on plots at the mouth of the Santa Margarita River demonstrated the need for including these perched birds for an accurate total count (Zembal 1986). Given ample observation time, birds that were perched high and exposed eventually sang or were joined by mates.

Surveys were completed in all of the coastal wetlands containing a few acres or more of *Salicornia* within the California range of the Belding's. A few of the smaller wetlands on the coast of Camp Pendleton, the Ventura River mouth, and Malibu Lagoon are not listed on the table. The habitat at these locations is too marginal, scant, and/or disturbed to support true subpopulations of the sparrows. The situations at McGrath State Beach and Aliso Creek are similar but these marshes are still included because sightings are more regularly reported therein.

Some of the count participants reported foraging and other non-territorial individuals. These birds were not included in the tally because they could have been counted before or after when they were on territory. This survey is intended to give an accurate indication of the breeding potential of the state population by reporting those individuals manifesting breeding behavior. Consequently, territories are tallied on the basis of observed behavior and reported as territories or presumed pairs.

The authors conducted most of the counts but many other individuals participated. The total observation time expended surveying was approximately 391 field-hours. Refer to the marsh summaries below for the count participants, times, dates, and observations.

RESULTS AND DISCUSSION

The 2010 census resulted in a population estimate of 3,372 pairs of Belding's in 29 marshes (Table 1). This is 7.6% higher than the previous highest population estimate reported in 2006. Eleven of the subpopulations were larger in 2010, compared to 2006 and 18 were smaller. The size of the subpopulation in Mugu Marsh doubled between 1996 and 2001, was another 28.8% larger in 2006, and was estimated at that same number in 2010. Point Mugu accounted for 17% of the state population in 1996, 27.9% in 2001, 33.2% in 2006, and 31% in 2010. There have been numerous restoration projects at Point Mugu that have brought a considerable acreage of wetland under enhanced tidal influence. Consequently, this single marsh may represent 20 - 25% of the available coastal marsh habitat in southern California. Furthermore, Belding's are widespread throughout the marsh, perhaps a product of dampened tidal amplitude (see below).

There were 10 marshes with more than 100 pairs each, totaling 2,918 pairs, or 86.5% of the population. Excluding the Mugu subpopulation, the nine marshes held 1,876 territories or 55.6% of the total. Only two additional wetlands held more than 50 pairs each in 2010, accounting for 127 territories, or 3.8% of the total. Finally, 12 marshes housed fewer than 25 pairs, together comprising a total of 130 pairs, or 3.9% of the state population. Although the long-term viability of these little subpopulations may be questionable, it is noteworthy that they have persisted. This may be due to the proximity of larger subpopulations for most of them and potential re-colonization after extirpation. For example, Belding's in 2001 were once again defending territories in 4 marshes where they were undetected in 1996; two of these subpopulations persisted into 2010. So the smallest seem to come and go and the issue in each is the paucity of suitable habitat.

EIGHT SURVEYS OF TERRITORIAL BELDING'S IN CALIFORNIA, 1973 – 2010

LOCATION	NUMBER OF TERRITORIES							
	1973	**1977**	**1986**	**1991**	**1996**	**2001**	**2006**	**2010**
Santa Barbara County								
Devereux Slough	-	-	-	-	-	-	1	3
Goleta Slough	50	28	50	81	48	68	52	55
Carpinteria Marsh	100	34	74	52	64	75	53	46
Ventura County								
McGrath Beach State Park	-	12	0	1	0	0	0	0
Ormond Beach Wetlands	-	17	20	15	61	33	50	36
Mugu Lagoon	175	250	446	239	400	809	1042	1042
Los Angeles County								
Ballona Wetlands	25	37	32	5	37	13	12	11*
Los Cerritos Marsh	-	5	2	9	4	19	33	23
Orange County								
Seal Beach NWR	125	267	244	138	234	293	289	326
Sunset Aquatic Park	-	6	0	0	0	2	6	4
Bolsa Chica Wetland	40	186	163	110	193	154	201	280
Newland Avenue Marsh	-	-	24	32	20	18	6	16
Huntington Beach Wetlands	-	34	47	19	87	71	117	107
Santa Ana River Marsh -Newport Sl	-	-	0	0	17	36	34	29
Upper Newport Bay	130	83	245	199	252	206	105	268
San Diego County								
Aliso Creek Marsh	-	-	5	5	0	1	0	-
Santa Margarita River Estuary	125	106	107	120	185	172	122	100*
Buena Vista Lagoon	0	5	1	0	0	6	5	0
Agua Hedionda Lagoon	37	16	45	13	29	22	24	18
Batiquitos Lagoon	0	20	47	50	36	66	37	44
San Elijo Lagoon	17	30	31	47	42	75	137	72
San Dieguito Lagoon	0	9	39	39	42	40	58	43
Los Penasquitos Lagoon	160	52	156	108	115	129	203	101
(Mission Bay)								
Kendall-Frost Reserve	-	45	13	9	28	38	21	10
San Diego River	-	70	28	9	8	26	16	7
FAA (Beacon) Island	-	4	0	0	0	4	0	1
(San Diego Bay)								
Paradise Marsh	-	16	19	14	6	7	20	18
Sweetwater Marsh NWR	-	40	118	141	78	93	119	97
F Street Marsh	-	18	8	15	12	9	7	6
South Bay Dikes/Otay River	-	100	70	29	71	102	70	169
South Bay Marine Reserve	-	25	15	42	31	26	21	12
Tijuana Marsh NWR	100	95	225	303	250	289	274	317
TOTALS	**1084**	**1610**	**2274**	**1844**	**2350**	**2902**	**3135**	**3372**

*Estimated

Although Belding's occurred in greatest numbers and densities in marshes with full tidal flushing (Zembal et al. 1987), they did not appear to nest abundantly on frequently wetted substrate. For example, in each of the marshes with remaining higher marsh habitat, there are invariably local concentrations of Belding's therein. High marsh goes on for miles still in some of the marshes in northern Baja California, Mexico but was greatly reduced in southern California because it was the easiest filled and converted to other uses. Most of the high marsh left in southern California is artificially separated from full tidal influence by berms and roads. The dampened tidal conditions result in drier substrate that is probably more conducive to successful incubation and early chick survival, particularly during unusually cold, wet springs. However, enough tidal influence to retain salt marsh vegetation and hydrologic characteristics is required to keep upland plants and birds from replacing the Belding's and its habitat (Zembal et al. 1985) and to temper depredation, particularly by snakes.

Most of the southern California marshes are flooded during rains and in those with poor tidal exchange, the impounded water lingers. When the rains come late, slowly draining or stagnant impoundments preclude Belding's nesting in vast areas of upper marsh. San Elijo and Los Penasquitos Lagoons are examples but portions of the high marsh in most wetlands are rendered unsuitable after spring rains. Local runoff from increasing development has had the same effect at several wetlands. Batiquitos Lagoon for example, is so wet and poorly draining on the inland edge that many acres of pickleweed are being invaded by freshwater reeds and marsh birds such as song sparrows (*Melospiza melodia*), common yellowthroats (*Geothlypis trichas*), and marsh wrens (*Cistothorus palustris*). When the substrate is wetted enough to support brackish marsh habitat for these species, Belding's are precluded. One may observe a male singing but nesting will not happen due to the constantly wetted substrate, wrong cover type, and competition particularly with the song sparrows.

On the upper edge of the saltmarsh, Belding's are limited by both the extent and vigor of pickleweed cover and the proximity of other, particularly upland habitats and associated species. Belding's have been observed being displaced from narrow bands of pickleweed by song sparrows many times during a survey year. Typical observations at Upper Newport Bay are particularly poignant. A Belding's flushed as a song sparrow approached and took over the song perch; a Belding's was chased 40 m; and in the final incidence a song sparrow actually body-slammed a Belding's off a song perch and then sang from the same perch. In most instances, narrow habitat belts and edges near uplands and freshwater marsh are simply not occupied by Belding's. Unless the upper marsh belt is much greater than 10 m across, it will either not be occupied by Belding's or occurrence will be extremely spotty. One incredible exception to this can be observed at the Salt Works in south San Diego Bay. The Belding's habitat there is a few to several shrubs thick and in places there is only the nest shrub. The narrow and sparse habitat there is densely occupied by nesting Belding's because food (brine flies) is extremely abundant and there is no upland habitat for, or competition with song sparrows. Similarly, FAA Island has very poor Belding's habitat but in years with no song sparrows, a few Belding's are there.

Based upon the 2010 surveys, Belding's are doing well within their range in California but particularly at Point Mugu, Seal Beach National Wildlife Refuge (NWR), Bolsa Chica, Upper Newport Bay, Sweetwater Marsh NWR, and Tijuana Slough NWR. This is associated in part with the levels and quality of hands-on efforts at these wetlands. For example, Point Mugu has one of the most active and successful Natural Resources Management programs of any of the coastal wetlands in the southern California Bight. At San Elijo and Los Penasquitos Lagoons the ocean inlets are being monitored and kept open as much as possible. This often minimizes flooding and hyper-saline conditions that greatly reduce Belding's nesting success. Unfortunately, in 2010 mouth closure was again an issue and most of the habitat was simply too wet for Belding's nests. Territorial displays were well down at the time of the surveys in both of these wetlands. The ocean inlets were in the process of being opened and perhaps there was a greater level of nesting later than what was indicated during the surveys.

In comparing the 2010 and 2006 survey results, there were 24% more wetlands with reduced numbers of Belding's than with increased or steady population sizes. However, most of those reductions were quite small except at San Elijo and Los Penasquitos. Eighteen marshes held a total of 296 fewer Belding's while 11 marshes increased collectively by 533 breeding pairs. The reductions varied from 1 to 22 territories at individual wetlands but for two, San Elijo Lagoon and Los Penasquitos Lagoon with 65 and 102 fewer territories, respectively. Most of the substrate under the Belding's habitat in both of these wetlands was submerged and had been for some time due to complete or partial closure of the ocean inlets to each. Although both ocean inlets were being mechanically excavated at the time of our surveys, reestablishment of tidal influence may have happened too late in the 2010 nesting season for the Belding's to take full advantage.

Based upon the 2010 observations in 32 coastal wetlands, the most critical management issues for the Belding's remain the maintenance or enhancement of tidal flushing, and the control of sediment, people, their pets, and exotic predators. However, there have also been many accomplishments in securing, restoring, and managing our coastal wetlands. As a result, the overall population trend has been positive and there were more than three times as many breeding Belding's in 2010 as were documented in 1973.

THE MARSHES

Santa Barbara County

Devereux Slough – 3 territories
The 158 acre Coal Oil Point Reserve, University of California Natural Reserve System is currently the northernmost breeding site for *P. s. beldingi*. Public access is prohibited from the Reserve. Mark Holmgren and Dr. Cristina Sandoval, Coal Oil Point Reserve Manager surveyed the slough in 3.5 hours on 5 May 2010. Three Savannah Sparrow territories were detected at the north end of the Devereux Slough, which retains the largest stand of *Salicornia*.

Belding's are known to maintain territories on Devereux Slough since 1993 and they have bred when conditions permit. In 2010, prolonged inundation of the slough killed approximately 30% of the *Salicornia*. The slough finally drained in late April. Predator control providing relief for breeding Snowy Plovers may also benefit the Belding's on the reserve.

Goleta Slough – 55 territories
Goleta Slough was surveyed by Mark Holmgren on 12 and 20 May 2010 for 3.25 field-hours. The primary survey on 20 May was conducted at relatively low tide with little tidal fluctuation during the survey. Approximately 12% of the suitable habitat was not surveyed. The total territories actually counted were 49, leading to a population estimate of 55 territories when adjusted for the suitable habitat that was not covered.

Since 2006, changes have occurred in the slough. The extent of tidal influence has increased as a result of: 1) Lengthening and restructuring of a tidal channel at a 2:1 bank grade accompanying a runway overrun relocation project; and 2) A small basin was re-engineered to accept tidal flow, part of an experiment to examine bird colonization likely to occur if additional non-tidal areas were to be similarly re-engineered. Combined, these actions introduced approximately 7 acres of additional tidal, *Salicornia*-dominated marsh habitat. Impending restoration of another 10 acres to tidal habitat should benefit the Belding's. Sedimentation continues to promote habitat conversion in tidal basins from pickleweed-dominated to upland vegetation. Balancing the opportunities for habitat restoration and enhancement with the constraints of a municipal airport remains the greatest long-term challenge to management of Belding's habitat on this estuary.

Carpinteria Marsh – 46 territories
Carpinteria Marsh was counted by Peter Gaede on 28 April 2010 for 3 field-hours. The sparrows were concentrated in the northwestern section of Basin III (western-most basin) and in the eastern portion of Basin II (this is the central of the three larger basins and located just west of Santa Monica Creek), where tidal influence was lowest. Distribution of 2010 territories was similar to those found during the 2006 surveys, but with fewer territories in the northwest section of Basin III and at the end of the Estero Way Extension (also Basin III). The Nature Park, comprising the eastern-most patch of marsh was not surveyed in 2006, but was surveyed in 2010, and an additional five territories were found.

PG visited Carpineria Marsh approximately three times each month during the past eight years to conduct general bird surveys. Avian predators (mammals) routinely observed included both red fox, *Vulpes fulva* (photographed) and raccoon, *Procyon lotor*. Red fox have bred at the marsh in the past, and tracks are ubiquitous and easily found along the dirt roads dividing the marsh basins. During the pat 5 to 6 years, PG has observed this species during approximately 1 out of every 3 visits. He also frequently encounters bird remains; kills by mammalian predators (sheared feathers, etc.) that are almost certainly the result of red fox predation. Little evidence of feral cats is currently seen. Carpinteria Marsh remains in dire need of active management, particularly control of non-native predators.

Ventura County

McGrath Beach State Park - 0
The small wetland at the park shifts over time between freshwater marsh and pickleweed. It was checked briefly by RZ on 8 May 2010. Occasionally in the pickleweed stage, Belding's are detected. The potential for restoration is low. The adjacent Santa Clara River and proximal Ventura River mouth have patches of pickleweed as well, within which Belding's are occasionally reported. The patches of habitat are so narrow that territorial song sparrows preclude the Belding's from becoming firmly established.

Ormond Beach Wetlands – 36 territories
Ormond Beach was covered by Martin Ruane on 21 June 2010 in about 5 hours and he observed 21 territories along the beach and an additional 15 territories on The Nature Conservancy (TNC) property located west of the Oxnard Drainage Ditch #3, west of the Edison/Reliant Power Plant. With the purchase of the more inland marsh by the Coastal Conservancy and ongoing management by TNC, past issues with human recreation, trash dumping, and homeless encampments are subsiding there but not so much on the beach. The Belding's population has fluctuated from 15 to 61 territories since the 1977 survey. The 2010 total was down 28% from 2006 which had been up by 51.5% from 2001; the current population estimate is down 41% from the high in 1996. Previously, there has been very little control of human activity and off-leash dogs on the beach at Ormond Beach. Hartley (2010) reports that: "The biggest issue with human activity on Ormond Beach in 2010 was trash left on the beach. This attracts predators and contributes to the predation problem. Problems with transients were much less of a problem than in past years. No homeless people lived in the dunes by the nesting area as they did in 2009." and "Between May 1 and September 1 a total of 116 dogs were recorded entering the beach from the Arnold Road parking lot. Observations were made between the hours of 6:30 am and 1:30 pm Monday through Saturday each week. This data does not account for any dogs that entered Ormond Beach via Hueneme

Beach. Compared to data collected in 2008 and 2009, there has been a downward trend each year in dog visits to the beach. For the same time period in 2008 there were 468 dogs entering the beach and in 2009 there was 263. In early 2009, Oxnard City Animal Control started ticketing dog owners with off-leash dogs and has continued the practice in 2010."

Mugu Lagoon (Naval Base Ventura County) – 1,042 territories
Mugu Lagoon was surveyed on 9, 21 – 24, 29, 30 March and 7, 12, 13, 16, 17, 20 April 2010 by Carly Gocal, Sue Hoffman, Michelle Kuter, Nate Lang, Martin Ruane, and Dick Zembal, totaling over 14 field-days and approximately 65 hours of observation. There were 345 territories in the eastern arm of the lagoon, 337 territories in the central arm, and 360 territories in the western arm.

Two hundred thirty-three additional territories were observed during the 2006 surveys compared to 2001 and the same total was counted and reported in 2010. This represents 31% of the entire state population. More than twice as many Belding's were tallied in 2001, compared with the previous highest count taken in 1996. The increase in Belding's probably resulted from a variety of factors, particularly restoration projects that have resulted in limited tidal access to many formerly isolated patches of marsh that were very dry or too wet. There has also been an intensive predator management program employed annually since 1996. Belding's now seem to be everywhere in the marsh. Unfortunately, there are signs of enough sedimentation to render much of Mugu marsh under muted tidal regime, resulting in the hydrological equivalent of high marsh. This habitat is great for the Belding's in the short term but may eventually lead to loss of marsh with upland encroachment.

Los Angeles County

Ballona Wetland (Playa del Rey) – 11 territories
Ballona Wetland, also known as Playa del Rey, was visited briefly from the road by RZ on 15 March 2009 for 4 field-hours. All of the territorial Belding's were in the wetland between Culver Boulevard and Ballona Creek. A few non-singing individuals have been observed in the past in the wetland south of Culver Boulevard. This little wetland is in major need of restoration and management, the planning for which is still underway. The quality of the habitat has actually improved slightly because of recent modifications to the tide gates from Ballona Creek. The water level was raised by 0.2 m. Populations of non-native plants decreased in the marsh with the increased tidal flushing and the vigor of the pickleweed appears to be improving along the north-south channel from the tide gate. Non-native predators (red foxes and feral cats) remain a pervasive problem at Ballona.

Los Cerritos – 23 territories
Los Cerritos Marsh was surveyed on 9 April 2010 by RZ for 3 hours. The numbers were up in 2006 by 73.7% from 2001 levels which was the previous high count. The numbers were very similar in 2010 when 23 territories were detected in the main marsh compared to 26 in 2006. The main marsh is the area surveyed in all previous counts except 2006 when 7 territories were documented in habitat patches scattered throughout the oil fields. These areas were not covered in 2010. Tidally-deposited trash is problematic but dealt with through regular clean-up days. Access to the marsh is easy and there are signs of human and dog encroachment into the marsh. A Belding's nest with two hatchlings was discovered in shoregrass, *Monanthochloe littoralis*, in the narrow far western reach of the marsh.

Orange County

Seal Beach National Wildlife Refuge – 326 territories
The Seal Beach NWR was counted on 13 April 2010 by Bill Cullen, Lori de la Cuesta, Kirk Gilligan, Sue Hoffman, Bob Schallman, and Richard Zembal for 18 field-hours. Many of the Belding's were concentrated in the rank pickleweed under muted tidal regime north of Bolsa Avenue (130 pairs), including 12 pairs on the edge of the 3 islands in the north restoration area. There were also concentrations around Nasa and Hog Islands and in the southeast corner of the NWR in the area restored in 1980. A large patch of Belding's habitat has developed just off the NWR east of the southeast corner where culverts have greatly improved tidal access. This is the highest total recorded for the NWR, 11.3% greater than in 2001, the previous high count and makes the Seal Beach subpopulations the second largest in California. This is reflective of successful restoration and ongoing management strategies, which include predator management during the breeding season.

The large-billed Savannah sparrow (*Passerculus sandwichensis rostratus*, a California Species of Special Concern), occurs with the Belding's in some of the wetlands of southern California in winter. Several individuals were observed during a winter high tide count in 2010 but no formal survey was done to estimate total numbers.

Sunset Aquatic Park – 4 territories
This little isolated patch of marsh is adjacent to the Seal Beach NWR and was counted by RZ for one hour on 9 April 2010. It is treated separately herein because it is supposed to be included eventually in a restoration plan for the entire Sunset Aquatic Park. It is a small patch of habitat that is probably dependant upon the adjacent refuge for consistent presence of Belding's.

Bolsa Chica – 280 territories
Bolsa Chica was counted on 24 and 25 February (survey 1) and 30, 31 March and 2 April 2010 (survey 2) by Melissa Booker, Amanda Gonzales, Antonette Gutierrez, Bonnie Peterson and Rachael Woodfield except for Inner and Outer Bolsa which were counted by Peter Knapp and RZ on 2 April and RZ on 31 March and 8 April 2010 for a total of approximately 70 field-hours. The Belding's had been surveyed in Bolsa Chica by the U.S. Fish and Wildlife Service many times since 1986 with a mean count of 175 pairs (1986 – 2006). The 2010 counts were much higher than any previous count and 39% greater than the previous high reported in 2006; this makes Bolsa the fourth largest subpopulation in California. It is interesting that the count was this large following the restoration project which caused the inundation of many acres of former Belding's habitat in August 2006. In summary, the **2010** (2006) totals were: Inner Bolsa had **41** (19) territories; Outer Bolsa had **2** (11) territories; cells 30–42, 63 had **78** (67) territories; cells 50–55, 59, 60, 67 had **27** (17) territories; cells 45-49, 61, 62 had **57** (39) territories; and cells 2-29 (about half this area has been under water since just after the 2006 count) had **75** (48) territories. The highest of the two spring 2010 counts is recorded herein (237 territories in February); the March/April survey totaled 199 territories excluding Inner and Outer Bolsa. In spite of turning a significant acreage of former Belding's habitat into fish habitat, the Belding's appear to be doing well at Bolsa Chica.

Newland Avenue Marsh – 16 territories
This little isolated wetland was surveyed by RZ on 22 March 2010 for 1 field-hour. Between the 2001 and 2006 surveys, there was a 67% reduction in territorial Belding's but they rebounded 167% by 2010. The pickleweed is maintained poorly by seepage from the flood control channel and is very dependant upon rainfall which was above average in 2010. More than half of the wetland is heavily invaded by upland weeds. The wetland is used as a neighborhood playground;

bicycle and dog tracks crisscross the site. A tent was pitched under the one large *Myoporum* tree on the edge of the property and two new, mismatched bicycles were stashed nearby. Public ownership of the wetland is needed along with adequate fencing and monitoring of the habitat for implementation of appropriate management measures.

Huntington Beach Wetlands – 117 territories
The Huntington Beach Wetlands (HBW) were counted on 17, 18, 22, and 23 March and 14 May 2010 by RZ for 14 field-hours. These isolated wetlands used to be subject to highly variable rainfall and limited seepage resulting in unpredictable habitat conditions. All but the Beach Boulevard parcel have been restored to tidal flushing since the last count. This caused concern that the Belding's habitat would be lost to inundation but as of the 2010 count, the high count of 2006 was maintained. The total for Newland Marsh plus HBW was 123 territories in 2006 and 2010. The restored Talbert Marsh, located at the south end of the strip had sufficient marsh vegetation to accommodate Belding's by the 2006 count and was a territory stronger by 2010. In summary, there were: 40 territories (41 in 2006) in the Beach Marsh (fenced parcel adjacent to Beach Boulevard and owned by Caltrans); 26 territories (35 in 2006) in the Magnolia Marsh (patch north of Magnolia Street); 37 territories (38 in 2006) in the Brookhurst Marsh; and 4 territories (3 in 2006) in the Talbert Marsh. Human and pet trespass into these wetlands is significantly less than in former times. The Huntington Beach Wetlands Conservancy owns and manages 118 acres of the remaining 300 acre wetlands and has implemented plans for their restoration by improving tidal access and providing management.

The HBW were imperiled in 2010 by El Nino conditions that resulted in sand deposition that closed off the ocean inlet to the wetlands. Through multiple partnerships proper permits were obtained and the County of Orange re-opened the channel, restoring the lifeline of a coastal marsh, tidal flushing. Although the ocean's influence was cut off from the wetlands for several weeks during the critical nesting season for Belding's, a re-count in Brookhurst Marsh revealed the same number of territorial Belding's in May as had been on territory in March prior to the closure.

Santa Ana River Marsh (Newport Slough) – 29 territories
Santa Ana River Marsh was surveyed on 5 March 2010 by RZ for 3 field-hours. This is a restoration success story for Belding's and this little wetland. Prior to 1996, the only Savannah sparrows detected in the wetland were of the inland, non-endangered race. New tide gates and culverts were installed, transforming the desiccated, isolated wetland into a healthier marsh. Ownership is still under the U.S. Army Corps of Engineers (Corps) and management has mostly been voluntary and organized by the Santa Ana Watershed Association (SAWA) in cooperation with the Corps and other groups. The area is fenced but the fence is often in disrepair, and there are usually holes cut by trespassers. Trash heaps, associated with homeless encampments are often encountered in the thicker shrub cover on the wetland edge. The trash is cleaned up periodically but the trash and homeless issues are ongoing. There is a trailer park and other housing that lines the main tidal channel on the south edge; people boat in the channels and occasionally romp in the marsh. Dogs access the marsh from the housing. A 5-acre island was originally built in 1992 for nesting endangered California least terns, *Sternula antillarum browni* but became a weed field. The fence around it was repaired by the Corps and it was cleared of weeds by SAWA and volunteers in 2008 but no nesting resulted. With the Huntington Beach Wetlands, this property is another piece of what used to be a much larger wetlands system, some 3,000 acres at the mouth of the Santa Ana River.

Loren Hays, first reported a lone singing male on 10 February 2006 at the south end of the Santa Ana River Marsh (connected by the main channel) in a small remnant patch of pickleweed on the north side of Pacific Coast Highway adjacent to Cappy's Restaurant in Newport Beach. In memory of Loren, the patch was checked again in 2010 and again held a singing male.

Upper Newport Bay Ecological Reserve – 268 pairs
Upper Newport Bay Ecological Reserve was surveyed on 1-5, 17, 20, 29 March and 16, 19, 20, 23 April 2010 for 29 field-hours by RZ. Most of the birds (177 territories) were observed in the high marsh on the northwest side of the Bay above the breached salt dike and below the Muth Center toward Jamboree Road (132 territories) and directly across the main channel from there (45 territories). The high marsh associated with the three islands and adjacent shore in the lower bay held a total of 65 territories. The largest expanse of Belding's habitat is located between the old salt dike and Jamboree Road. Most of the high marsh habitat along the edges of the bay is too narrow and heavily influenced by fresh water habitats to support many Belding's. The high marsh edge is bordered by uplands and freshwater marsh with abundant song sparrows and other birds that out-compete Belding's for use of the habitat. The 2010 count was 155% higher than the 2006 count and 6.3% higher than the next highest count taken in 1996. This subpopulation ranked as the fifth largest in California in 2010.

Issues at Upper Newport Bay include human and pet trespass into the marsh and a lack of predator monitoring and management. However, there were surveys of Belding's, light-footed clapper rails (*Rallus longirostris levipes*) and California least terns in 2010. Invasive plants are periodically identified and removed by agency personnel and volunteers. Land management planning is underway including invasive plant control and restoration components. Dredging occurred in the bay in late 1998, again in 2006, and ongoing in 2008 - 2010. This project, when completed, should result in removal of accumulated sediments and creation of additional channels that will benefit salt marsh species. The dredged basins are expected to refill with sediment over 20 years (weather-dependant) at which time dredging will again be necessary. The long-term benefits were deemed by the oversight agencies to outweigh the short-term impacts of noise, mechanical disturbance, and habitat destruction which proceeded unabated throughout the 2008, 2009, and 2010 nesting seasons.

San Diego County

Aliso Creek Marsh – 0 territories
In 1984, there were 11 territories in this remnant salt marsh that sits in a sump behind the beach, sustained by seepage. Since then, military vehicles and personnel have moved through the marsh often enough to destroy or critically disturb most of it. The bit of pickleweed marsh that remains is disturbed too regularly to support breeding Belding's as observed by Zembal on 5 May 2006.

Santa Margarita River Lagoon – 100 territories
The Santa Margarita River Marsh was surveyed on 18 May 2010 by RZ over approximately 3 field-hours from the edge of the freeway; the count is only an estimate due to issues of access onto Camp Pendleton. The saltpan habitat and pickleweed behind the beach are being sustained by seepage and rainfall. The mouth of the river has been mostly closed to the ocean since 1987. This has led to the periodic submergence and destruction of what used to be lush Belding's habitat along the river edge. This wide swath is now brown and dead but used to sustain as many as 72% of the Belding's at the river mouth. The Belding's still occupy pickleweed clumps on the saltpan and along the hind dune, and are concentrated in the remnant pickleweed along the lagoon nearest the hind dune channel, but they are not sustaining their former numbers. River mouth closure is accompanied by wide swings in environmental and habitat conditions. There have been years when most of the pickleweed and substrate were too wet for successful nesting by

Belding's and other years when it was far too dry. As a result, in 2006 (a year with late rains), the Belding's suffered a 29% population reduction.

The river mouth once sustained far more productive estuarine conditions for a wide variety of wildlife, birds and fishes in particular. It is now a shallow lagoon that is being allowed to gradually fill with sediment. Approximately 30 % of the formerly most viable habitat is now covered in upland weeds. The former density of Belding's in this habitat was not exceeded anywhere in its range.

Buena Vista Lagoon – 0 territories
Buena Vista Lagoon was surveyed on 20 April 2010 by RZ for a total of 4 field-hours. The formerly occupied salt marsh vegetation forms a narrow veneer along high spots bordering the dominant cattails and bulrushes on the islands and in the north-east corner of the inner lagoon. The freshwater marsh and song sparrows have encroached enough into the pickleweed bands to preclude Belding's. The fenced patch adjacent to Highway 78 that contained one territory in 1986, and two in 2006 was too soggy for Belding's nesting in 2010. Elsewhere in the central lagoon between the freeway and Pacific Coast Highway there is an edge of robust pickleweed along much of the brackish marsh but the habitat is too narrow and disturbed by fishermen and other visitors to support breeding Belding's. The highest potential for restoration is on the islands and in the north-east quarter of the inner lagoon. Important habitat enhancement could be achieved with continued control of invasive plants, containment of reeds, and the cleanup of trash and homeless encampments therein. However, the pendulum has swung from salt toward brackish marsh to the detriment of the Belding's in Buena Vista.

Agua Hedionda Lagoon – 18 territories
Agua Hedionda was surveyed by John Konecny and RZ on 20 and 30 April 2010 for 11 field-hours. All of the territorial Belding's were detected on the inland edges of the inner lagoon. The habitat and Belding's were concentrated in a sparse higher *Salicornia* belt wedged between encroaching fresh water marsh habitat along the inland drainages and the more tidal marsh, a few hundred meters inland of the lagoon. The survey revealed 25% fewer territories than in 2006.

Regular dredging keeps this lagoon open to the ocean giving it a very high potential for restoration of salt marsh habitat. However, tidal access, although consistent, appears to be heavily muted probably due to the narrowness of the maintained ocean entrance and tidal access under the freeway.   Human trespass, off-road bicycles, and dogs off-leash are regular and continuing problems although Caltrans recently installed formidable fencing on the north edge that will be a challenge for trespassers. The Department of Fish and Game successfully eradicated *Caulerpa* (killer algae) which threatened aquatic life and habitats and has installed low fencing on the south side of the wetland which is helping to a degree. There are still migrant farm worker encampments on the south side; some of these folks were claming adjacent to Belding's habitat during one survey visit. The Department is working on control of the salt marsh invasive plant, Algerian Sea-lavender, *Limonium ramosissimum*, but much of the former Belding's habitat is *Limonium* turf with sparse emergent pickleweed and inadequate nest cover for Belding's.

Batiquitos Lagoon – 44 territories
Batiquitos Lagoon was surveyed by Sue Hoffman and RZ on 18 February; 20, 27 March and 24 April 2010 for 27 field-hours. Seventy-seven percent of all territories were in the eastern 20% of the inland lagoon. With the restoration and management of the lagoon toward a fully tidal system, pickleweed expanded into previously brackish marsh areas and the Belding's nearly doubled between 1996 and 2001. Then in 2006 there was a 44% reduction followed by a slight increase of 19% in 2010. Most of the lagoon has a pickleweed belt that is too narrow and

influenced by uplands or freshwater marsh to adequately accommodate Belding's. Where the pickleweed belt is amply wide on the eastern edge of the lagoon, most of the habitat had standing water under it and the pickleweed-dominated upper marsh is reverting to brackish marsh, fed by increased urban run-off. There also was good upper marsh habitat historically located adjacent to Pacific Coast Highway that was dredged as part of the restoration project to increase fisheries habitat, or has eroded due to tidal action.

San Elijo Lagoon – 72 territories
San Elijo Lagoon was counted by Sue Hoffman, John Konecny, and RZ on 20 and 27 March and 24 April 2010 for approximately 31 field-hours. This is a 47% reduction from the 2006 count and attests to the negative effects of closure of the ocean inlet. The re-establishment of constant tidal influence and estuarine conditions for more than 7 years prior to the 2006 survey resulted in the highest count on record for San Elijo during the previous survey. The excavators were at work re-opening the estuary as we conducted the final piece of the 2010 survey in April, perhaps in time for late nesting in previously inundated habitat. The habitat and Belding's were most abundant in the central lagoon although much of the habitat was inundated in all three lagoons.

San Dieguito Lagoon – 43 territories
San Dieguito Lagoon was surveyed by Robert James on 7 and 8 April 2010 for 6.5 field-hours. The number of observed territories was about a 26% decrease from 2006; however, the number was about the same as in the four surveys prior to that year. Twenty-seven Belding's (about 63%) were detected in the main area of the marsh, mostly along the western and southern edges. Thirteen territories were found in habitat patches inland of the I-5 freeway. Freeway iceplant, *Carpobrotus edulis*, and other invasive species (such as pampas grass, *Cortaderia jubata*) frequently occur along the marsh fringe. A major habitat restoration is underway by Southern California Edison and other agencies, but the *Salicornia* has not yet developed to support more Belding's. If the lagoon remains tidal, habitat conditions should greatly improve over time for Belding's.

Los Penasquitos Lagoon – 101 territories
Los Penasquitos Lagoon was surveyed by Sue Hoffman, John Konecny, and RZ on 27 March and 30 April 2010 for 13 field-hours. The count total represents a 50% reduction from the high count in 2006. Belding's were most abundant on the inland side of the railroad track toward the south end; most all other habitat was under water. The ocean inlet was being mechanically re-opened during the later count.

Los Penasquitos Lagoon is still largely a lagoon and subject to dramatic fluctuations in drying and ponding although efforts are currently being made to keep the inlet open; the number of Belding's documented in 2006 was a testament to some past success with that. Late rains still flood the inland pickleweed marsh and preclude nesting in some areas particularly when the mouth is closed and there is nowhere for the water to drain. The southernmost marsh is gradually becoming more brackish. If it is ever possible to establish a consistent hydrologic regime in Los Penasquitos, it would be of great benefit to Belding's and other wildlife.

Mission Bay

Kendall-Frost Reserve – 10 territories
The University of California's Kendall-Frost Reserve was surveyed by Jeff Gicklehorn, Isabel Kay, John Konecny, and RZ, mostly on 13 March and 29 April 2010 over 17 field-hours. This is a 52% reduction from the number of territories detected in 2006. Belding's have usually been concentrated around the high salt flat on the inland edge of the marsh near Campland on the north

side of the Reserve; there were only 4 territories there in 2010. The rest were on berms near the trailer, below the apartments, and separating the main marsh from the restoration area.

The Kendall-Frost Reserve is extremely isolated from supporting habitats or corridors resulting in an abundance of small and medium-sized predators. Native top carnivores can no longer regularly access this little wetland and so their natural regulation of smaller predators is not happening. Cat tracks were observed all over the saltpan associated with the best of the Belding's habitat in the Reserve. An effective barrier to animals that have been relocated or rehabilitated and released on the marsh edge, abandoned or allowed to roam "free" by owners would help protect the Belding's and other wildlife of this little wetland. To be effective, this would require new fencing, enforcement of prohibition of animal dumping, and predator management to protect nesting listed species.

San Diego Flood Control Channel – 15 territories
The Flood Control Channel was counted by John Konecny and RZ on 6 and 29 April 2010 over 14 field-hours. This is one territory fewer than was documented in 2010. Salt marsh vegetation again dominates the flats west of Interstate 5 but the dominant plant is *Jaumea carnosa*, pickleweed stands are few and small, and cordgrass (*Spartina foliosa*) maintains dominance in the western third of the marsh. *Salicornia* lush enough to support Belding's nests is limited to the south fringe of the channel, a few high spots, and amongst the dunes at the far west end near Dog Beach (7 territories). In many potential habitat patches, there are territorial song sparrows present, but not Belding's.

Prior to 1980, the vegetated flats were dominated by pickleweed (Zedler 1982). Following heavy rainfall and prolonged releases of fresh water from El Capitan Reservoir, cattails almost totally replaced the pickleweed for a brief period. The pickleweed has not recovered to its former extent. Since then, when the freshwater marsh periodically invades and then recedes, the *Jaumea* prevails in the subsequent salt marsh phase. The periodic disturbance and brackish conditions have apparently favored *Jaumea* and cordgrass over pickleweed.

A previously unknown population of the endangered salt marsh bird's beak, *Cordylanthus maritimus maritimus*, was discovered on a dune trail out from the parking lot at Dog Beach. Unfortunately, the stand of several hundred plants is threatened by encroaching, non-native Algerian Sea-lavender, *Limonium ramosissimum* which is forming a thick mat in the midst of the colony, crowding out the salt marsh bird's beak. A restoration project will be attempted.

FAA (Beacon) Island – 1 territory
FAA Island was counted by Jennifer Jackson on 9 June 2010, incidental to monitoring of the island for nesting California least terns. Management of the island for least terns includes vegetation control. Care is usually taken to avoid the veneer of vegetation around the edge of the island for the Belding's sake but in 2006, vegetation was much reduced and the Belding's were gone. A lone male was observed singing in 2010, which is now considered unusual.

San Diego Bay

Paradise Marsh – 18 territories
Paradise Creek Marsh was counted by RZ on 5 May 2010 for 2 field-hours. This is two territories down from 2006 and includes 6 territories in the "Connector Marsh" that were not occupied in 2006. The Belding's are doing well compared to the low counts of 1996 and 2001. Salt marsh bird's beak has also abundantly colonized the Connector Marsh. The pickleweed is not extensive but there are several high spots covered in lush upper marsh vegetation along the edge

of the main tidal channel and on the little islands in the Connector Marsh. However, this little wetland is very narrow and heavily impacted by the noise of Interstate 5. The freeway is loud enough to mask cues from predators. Raccoon and coyote tracks were abundant. There were abundant signs of people and dogs in the marsh and along its edge, which is a regularly traveled trail. Several homeless people were encountered during the survey route and there were encampments with mounds of trash and fire pits. The palms, acacias, and *Myoporum* along the abandoned railroad tracks should be removed as part of the Fish and Wildlife Service's management of the NWR.

Sweetwater Marsh National Wildlife Refuge – 208 territories
The Sweetwater Marsh was surveyed by RZ mostly on 5 and 26 May 2010 for 9 field-hours. Belding's were territorial along the larger creek and channel margins and particularly abundant in the extensive high marsh on the inland third of the wetland where salt marsh daisies (*Lasthenia glabrata coulteri*) still abound in the spring. The count was 75% higher than in 2006, comprising the highest survey total for the Sweetwater NWR, and ranking it the sixth largest subpopulation in California for 2010. The NWR is a high marsh with extensive suitable habitat for Belding's. Trespass and feral animal problems are dealt with on a regular basis by the NWR staff and the wetland inhabitants have benefited. Trash is still a problem because very large chunks of old hulls and other such bulky objects wash up into the marsh from wind lap and tidal action. Some of these objects are so large that they do great damage to the marsh but are extremely difficult to remove. Three nests with eggs were encountered; one was built of and under *Frankenia*.

"F" Street Marsh – 6 territories
"F" Street Marsh was surveyed by RZ on 26 May 2010 for 1 field-hour. This little wetland is separated from Sweetwater Marsh by a few hundred meters of uplands and a road. It is still romped through occasionally by people and pets but not so much as in the past. Tidal access is through a culvert which is kept functional, maintaining some tidal flushing. This marsh should be connected with the Sweetwater by excavating out the uplands between them. It is now too small and isolated to offer the resident Belding's much security.

Western Salt Company Dikes/Otay River Mouth – 169 territories
The marsh veneer along the Western Salt Company Dikes and Otay River (saltworks) in south San Diego Bay was surveyed by Brian Collins on 5, 7, and 10 May 2010 for 10 field-hours. The survey total represents a 141% increase over the 2006 count, places the saltworks as the seventh largest subpopulation in 2010, and hopefully attests to improving conditions there. The Belding's were concentrated along the outer Otay River Channel and in a thick patch of *Salicornia* on the northeast extreme of the saltworks. This later site is along a small creek that runs south from the channel out of the San Diego Gas & Electric facility. The habitat along the outer edge of the saltworks has supported numerous territories in the past but the habitat was very sparse with isolated *Salicornia* and shrubby weeds scattered widely. The occupied habitat has always been a narrow belt with very marginal marsh vegetation. However, the NWR plan for the saltworks as part of the South San Diego Bay NWR should result in increased marsh vegetation and Belding's habitat over time.

South Bay Marine Reserve – 12 territories
The Marine Reserve was surveyed by Sue Hoffman and RZ on 6 April 2010 for 3 field-hours. Belding's were only territorial in the southern portion of the wetland; the northern half is covered in sparse *Salicornia* that is too frequently inundated to support Belding's. This area has a very high restoration potential but it is in dire need of management and security from the encroachment of humans and their pets. The Reserve should greatly benefit from adjacent restoration activities on the NWR.

Tijuana Slough National Wildlife Refuge – 317 territories
The Tijuana Marsh was surveyed by Sue Hoffman and RZ on 6 April and 18 May 2010 for 21 field-hours. This is 16% higher than in 2006, 5% higher than the next largest count in 1991, and ranked Tijuana Slough NWR subpopulation as third largest in California in 2010. There were 109 Belding's territories in the Oneonta Lagoon section north of the river and 208 territories to the south of the river.

Tijuana Marsh has become a center for wetland research, restoration, and limited management activity. Some of these efforts are focused upon sedimentation and contaminants, which are issues of major concern for the endangered species of the wetland. Tracking sediment accrual, removing sediment bottlenecks, and ensuring that the river mouth remains open and the tidal prism remains nearly full, should be a very high priority. A repeat of the ecological disaster of 1984 when the river mouth closed and estuarine function ceased must be avoided. It is equally important to continue working with Mexico to curtail other water quality issues in the Tijuana River.

RECOMMENDATIONS

It is important to monitor the abundance and distribution of the Belding's on a regular basis. The status of this little pickleweed endemic is one of the better indicators of the conditions and health of the occupied wetlands. The state-wide survey has been conducted every 5 years since 1986. It is recommended that this be continued hereafter except that we changed this count which should have been conducted in 2011 to 2010. This will make it easier for the aging count participants to anticipate the following counts in 2015, 2020, etc.

Recognizing the disproportionate destruction of high marsh habitat, the infrequently inundated upper zone should be focused upon and planned for disproportionately in marsh restoration plans. This would help compensate for some of the historic loses of Belding's habitat, require the least grading of all the marsh zones, and provide areas for marsh vegetation to spread when sea level rises. When ample upper marsh is not part of a restoration project and tidal amplitude is broadly increased, Belding's will decline in the short term in that wetland and perhaps require a decade to recover since it can take that long for adequate cover to develop. Some populations might never recover if the higher marsh acreage is scant. Uplands adjacent to tidal marshes will become increasing important in the future as sea level rise is increasingly manifest. Adjacent uplands and viable connections with larger open spaces are important components for ecologically functional wetlands. Modern day restoration projects still involve huge, expensive dredging operations, some of which may be counter-productive.

Where the encroachment of freshwater marsh is not desirable, managers should consider cutting small tidal creeks through the upper marsh to establish better drainage and tidal access. If done properly, this would benefit several wetland birds including the Belding's and the endangered light-footed clapper rail. Cutting small tidal creeks would also be beneficial through extreme high marsh, isolated upper marsh, and salt pan in several wetlands including Upper Newport Bay, the Santa Margarita River, and Agua Hedionda. The new creeks would provide additional tidal access, habitat vigor, and foraging opportunities for Belding's.

Millions of people make southern California their home and most of them clamor for recreational opportunities and other enjoyments provided by open space. Thousands of these people live on the edges of our wetlands, impacting them in many ways. Many of these people would gladly be part of a solution for the issues reported in "The Marshes" herein and the other problems confronting our wetlands and wetland wildlife. Vesting the public in their neighborhood wetland is something that numerous “friends” groups have already begun in an excellent way. However, most of them do not have the training or expertise available to them to prioritize and implement sound adaptive management strategies. The wildlife agencies should focus on filling that gap, where it exists, and in coordinating a range-wide strategy for the management of the Belding’s.

It is also imperative that funding be allocated for the implementation of that management strategy. There are numerous projects that could be implemented to benefit Belding’s immediately except for the lack of funding. Weeding is a primary example of activity that is labor intensive but could be conducted by “Friends” or contractors, if funded. For example, a significant amount of former nesting habitat at Agua Hedionda has been rendered unsuitable for Belding’s, having been invaded by Algerian sea-lavender. Caught early, the magnitude of problems like this would be far less severe. Department of Fish and Game South Coast Region staff are currently coordinating with the Pesticide Investigation Unit on the use of herbicide treatments that are showing promising results for the eradication of Algerian sea-lavender.

Lastly, it is widely recognized that the full value of a tidal system is realized only when tidal exchange is maintained. There are many wetlands within the range of the Belding’s whose functions are periodically compromised by closure of their ocean inlets. Managers and responsible agencies must establish systems, the required standing permits, and funding for the emergency work needed to re-open lagoons as needed. Furthermore, re-opening should be timed to accommodate Belding’s breeding.

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