Environmental Impact Report / Environmental Impact Statement
for the
San Elijo Lagoon Restoration Project

Final
SCH# 2011111013

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San Elijo Lagoon
RESTORATION
Reviving Your Wetlands

MOFFATT & NICHOL
AECOM

Volume 2 of 4
Appendices A-F

February 2016

Environmental Impact Report/Environmental Impact Statement
for the
San Elijo Lagoon Restoration Project
Volume 2 of 4

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SAMPLING AND ANALYSIS PLAN RESULTS REPORTS

SAN ELIJO LAGOON RESTORATION PROJECT

FINAL

SAMPLING AND ANALYSIS PLAN RESULTS REPORT

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May 2013

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1. INTRODUCTION

This report summarizes results of implementation of the Final Sampling and Analysis Plan (SAP) (Moffatt & Nichol 2011) for the San Elijo Lagoon Restoration Project (herein referred to as SELRP or Project). The Final SAP outlined a sampling approach to determine the physical and chemical compatibility of proposed export materials generated as a by-product of construction of any of the three proposed SELRP alternatives.

This SAP Results Report summarizes the analyses completed to test the compatibility of export materials from the entire SELRP footprint. However, during project development, it was determined that the preferred approach for the construction of Project Alternatives 1B and 2A would entail an Overdredge Pit (OD Pit) feature in the Central Basin, from which all beneficial reuse sediment would be derived. The OD Pit would then be backfilled with export materials generated from elsewhere within the Project footprint. Therefore, the compatibility discussion of export materials generated from construction of the OD Pit feature is emphasized in this report as these materials are what are being proposed for the beneficial reuse options presented.

The proposed OD Pit feature and method of construction would be identical to what was constructed during the Batiquitos lagoon restoration project. The benefit of this approach is that it “mines” materials of highest quality from one location and provides for on-site disposal of unsuitable materials.

1.1 PROJECT SUMMARY

The Project study area is divided into three basins (West, Central, and East) for the purposes of planning and discussion, as shown in Figure 1-1. The basin divisions are set by the North County Transit District (NCTD) railroad and the Interstate 5 (I-5) corridor that traverse the study area.

The SELRP is an effort to restore lagoon functions and values given historic development and constraints placed on it by surrounding activities. The proposed project aims to enhance the tidal prism of the lagoon by modifying existing hydraulic constraints, such as a limited channel network and infrastructure due to Highway 101, the NCTD railroad, and the I-5.

Proposed SELRP alternative and export volumes are presented in this section.

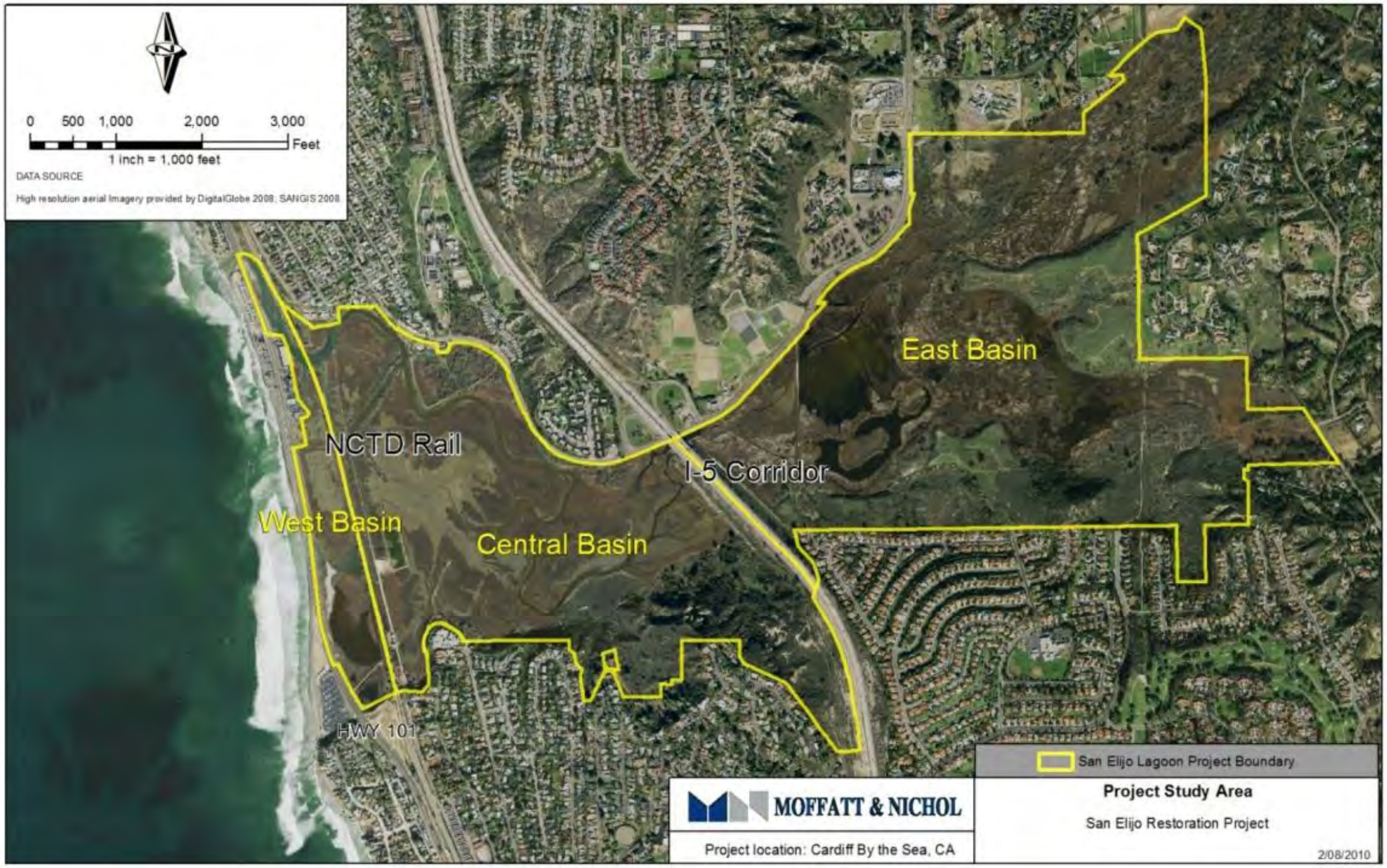

Figure 1-1: San Elijo Lagoon Restoration Project Location

1.1.1 SELRP Conceptual Alternatives

The SELRP is currently within the planning phase, with a total of three conceptual alternatives being evaluated. Major features of these alternatives are generally described below:

- Alternative 1A – Intertidal (minimum changes): Provides minimal physical changes to the site with the exception of enlarging the main feeder channel throughout and redirecting its course just west of I-5. The main tidal channel would be extended farther into the East Basin, and existing constricted channel connections would be cleared and enlarged. The tidal prism of Alternative 1A would be slightly increased compared to existing conditions. The conceptual and grading plans for this alternative are shown in Figure 1-2 and Figure 1-3, respectfully. This alternative yields much less surplus sediment than the Alternatives 1B and 2A. If found to be suitable, the excess sediment is proposed to be disposed of at the designated offshore site (LA-5), as discussed subsequently in this report. Therefore, grading plans for purposes of material re-use and disposal for this option have not been developed to the level of detail as for Alternatives 1B and 2A.
- Original Alternative 1B – Maximum Habitat Diversity (existing inlet location): This alternative has been modified from its original form to reduce impacts to sensitive species. The initial concept design is referred to as original Alternative 1B and the revised concept is referred to as modified Alternative 1B. The main difference between them is elimination of a subtidal basin from original Alternative 1B, and the addition of more low marsh area. For purposes of estimating conservatively large earthwork quantities presented in this SAP report, original Alternative 1B is presented due to the larger quantities of dredging required. Slightly reduced material disposal quantities are required for modified Alternative 1B compared to original Alternative 1B, but these quantities are yet to be calculated due to the evolving nature of modified Alternative 1B. Alternative 1B maintains the current inlet configuration. The conceptual and grading plans for this alternative are shown in Figure 1-4 and Figure 1-5, respectfully. Grading cross-sections of this alternative are shown in Figure 1-6 through Figure 1-8. Major features of Alternative 1B include subtidal habitat area and a large area of intertidal mudflat in the Central Basin, as well as a large subtidal area in the East Basin. Infrastructure improvements are assumed at the NCTD railroad trestle (new bridge and double-tracking), and the bridge under I-5 (assumed to be lengthened). An OD Pit with a capacity of 1.2 million cubic yards is proposed in the Central Basin in this alternative. The location and design of the OD pit is the same for both original and modified Alternative 1B.

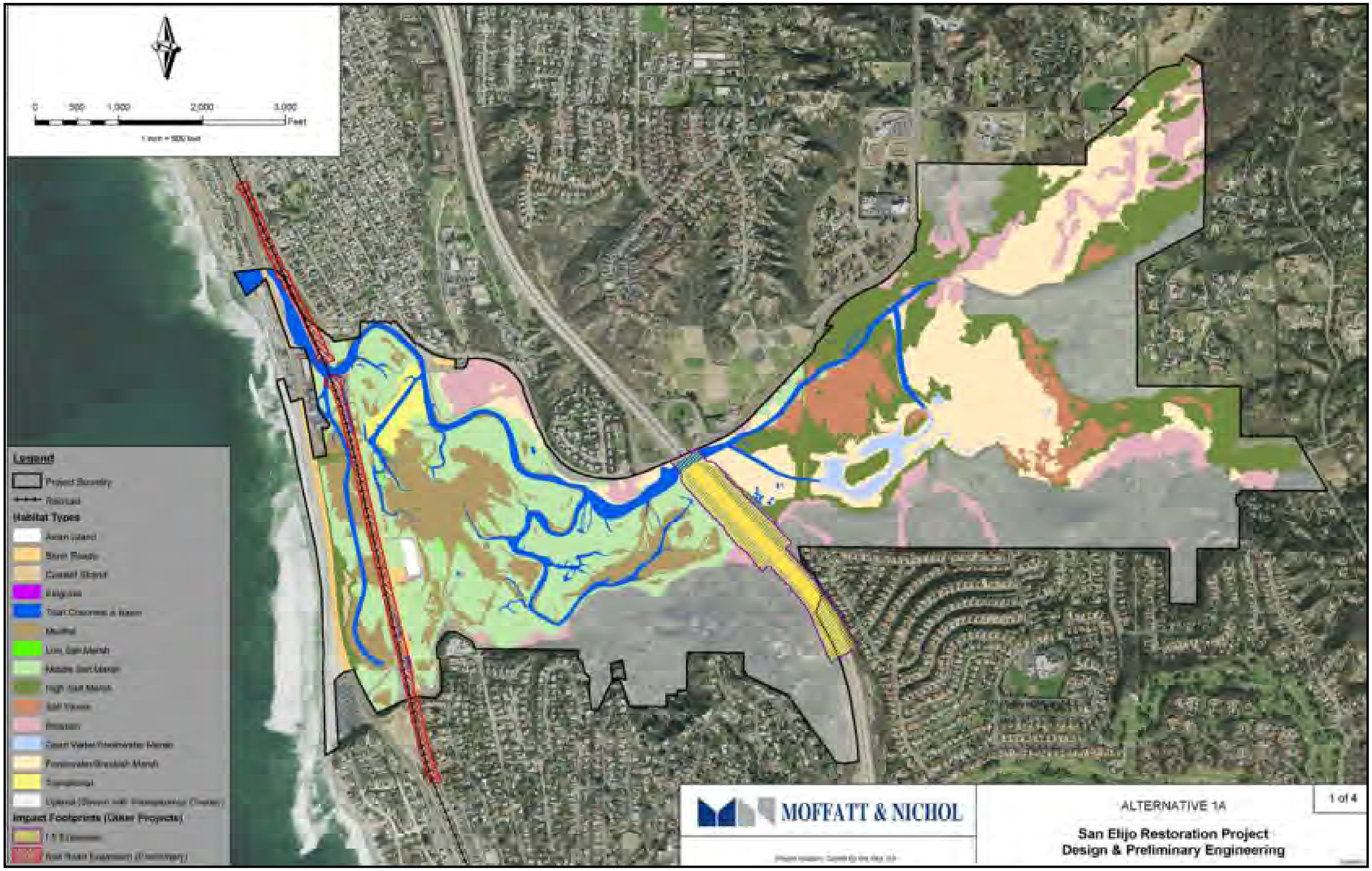

Figure 1-2: Conceptual Plan for Alternative 1A

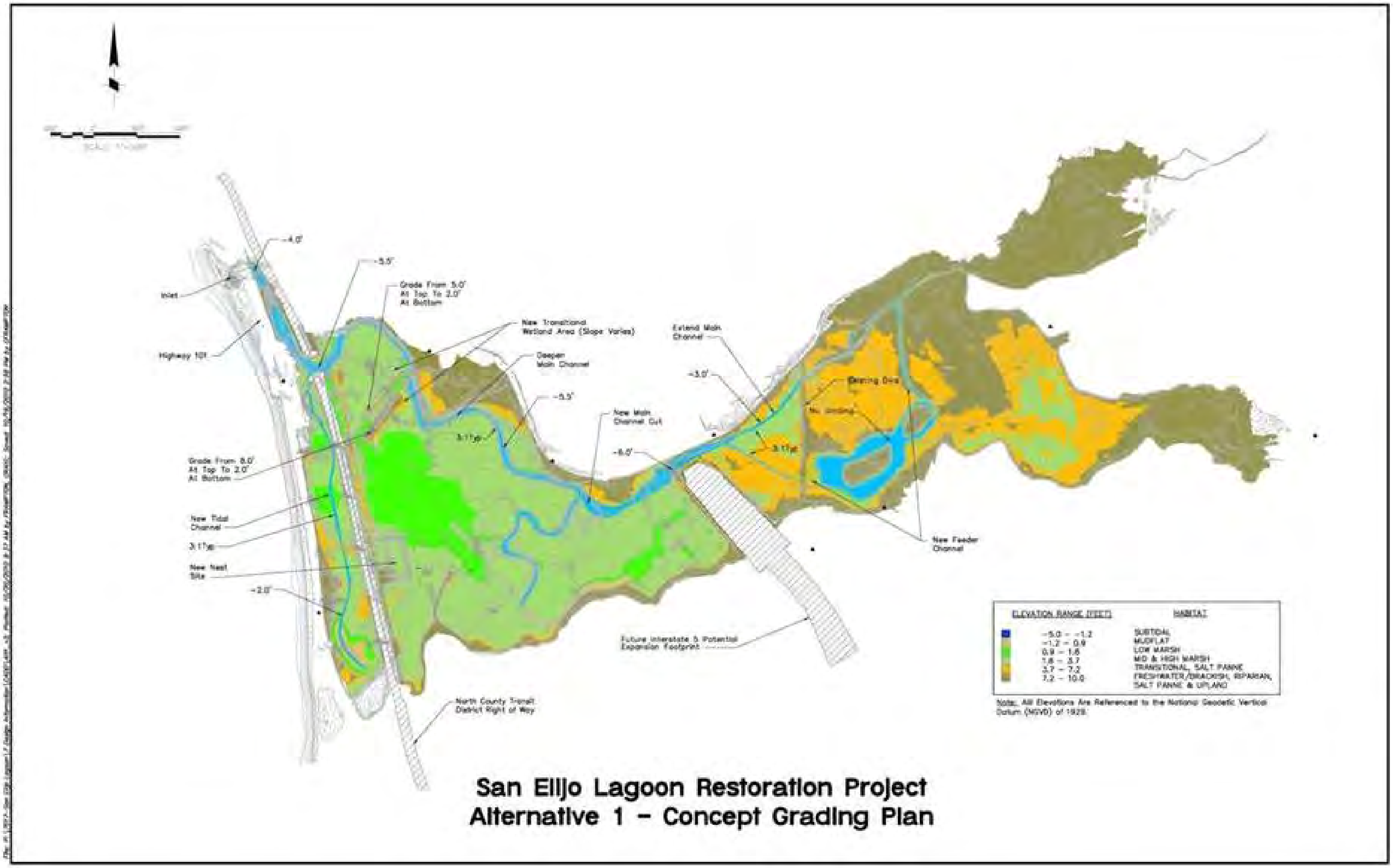

Figure 1-3: SELRP Conceptual Grading Plan for Alternative 1A

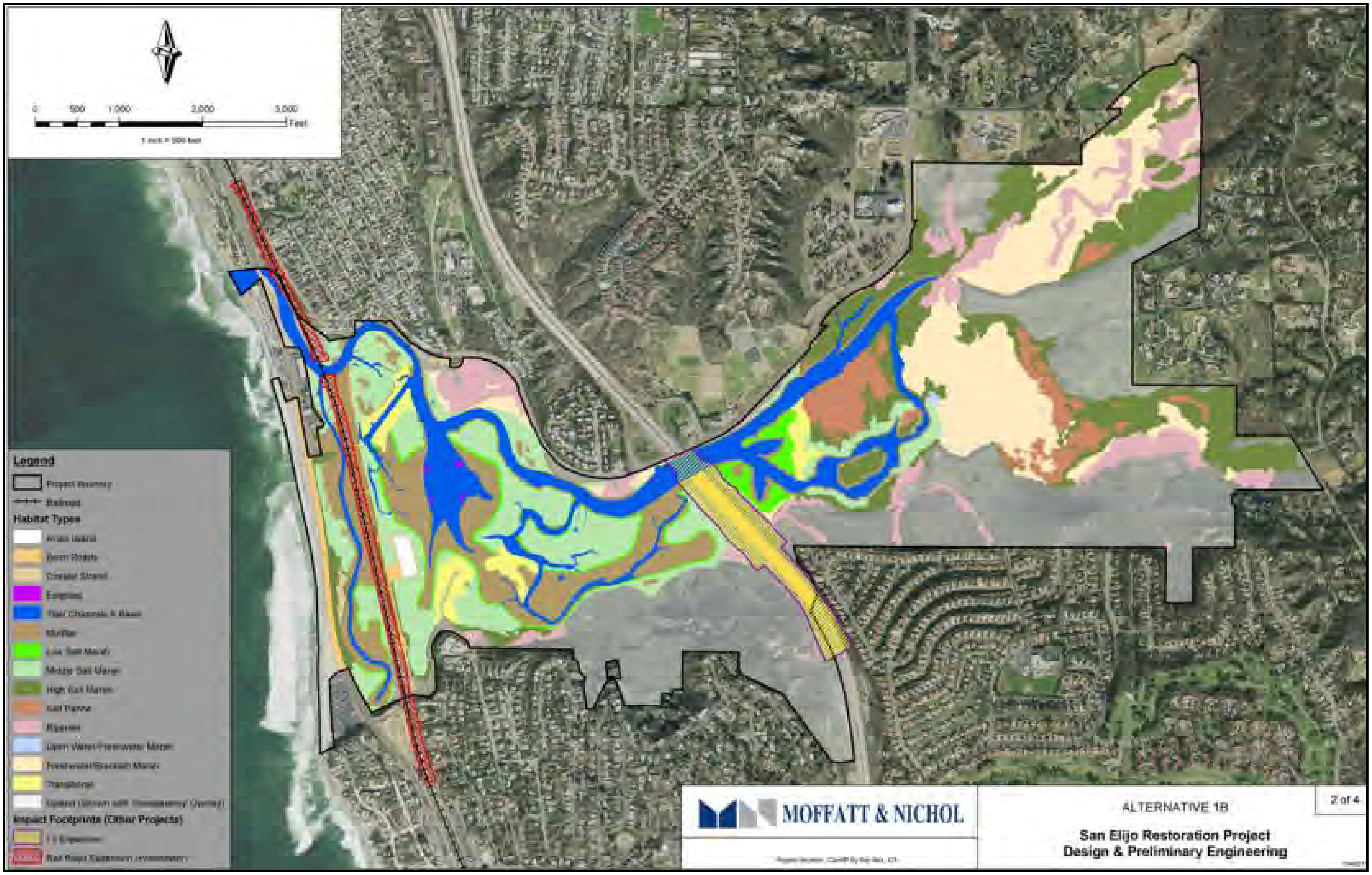

Figure 1-4: SELRP Conceptual Habitat Plan for Original Alternative 1B

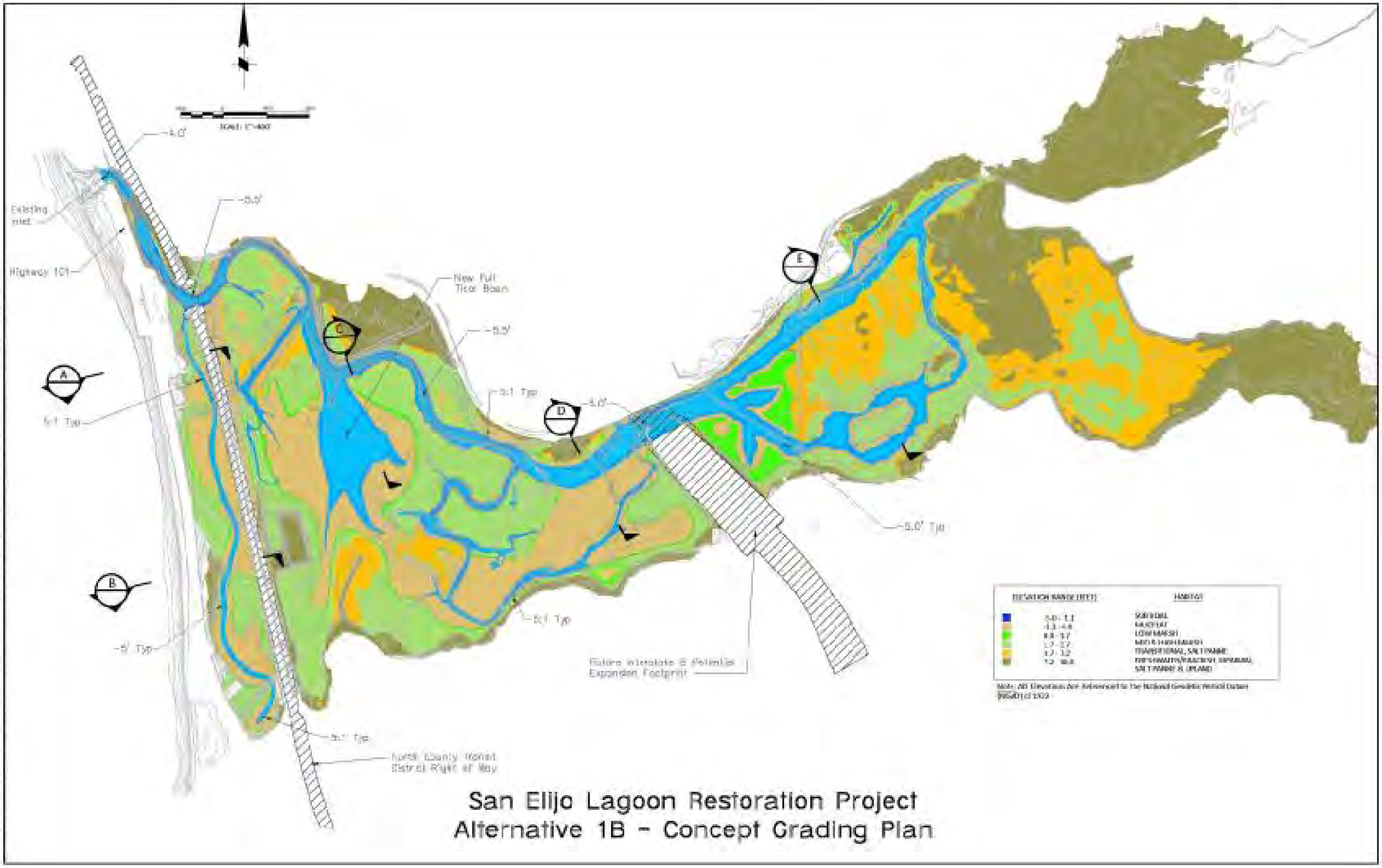

Figure 1-5: SELRP Conceptual Grading Plan for Original Alternative 1B

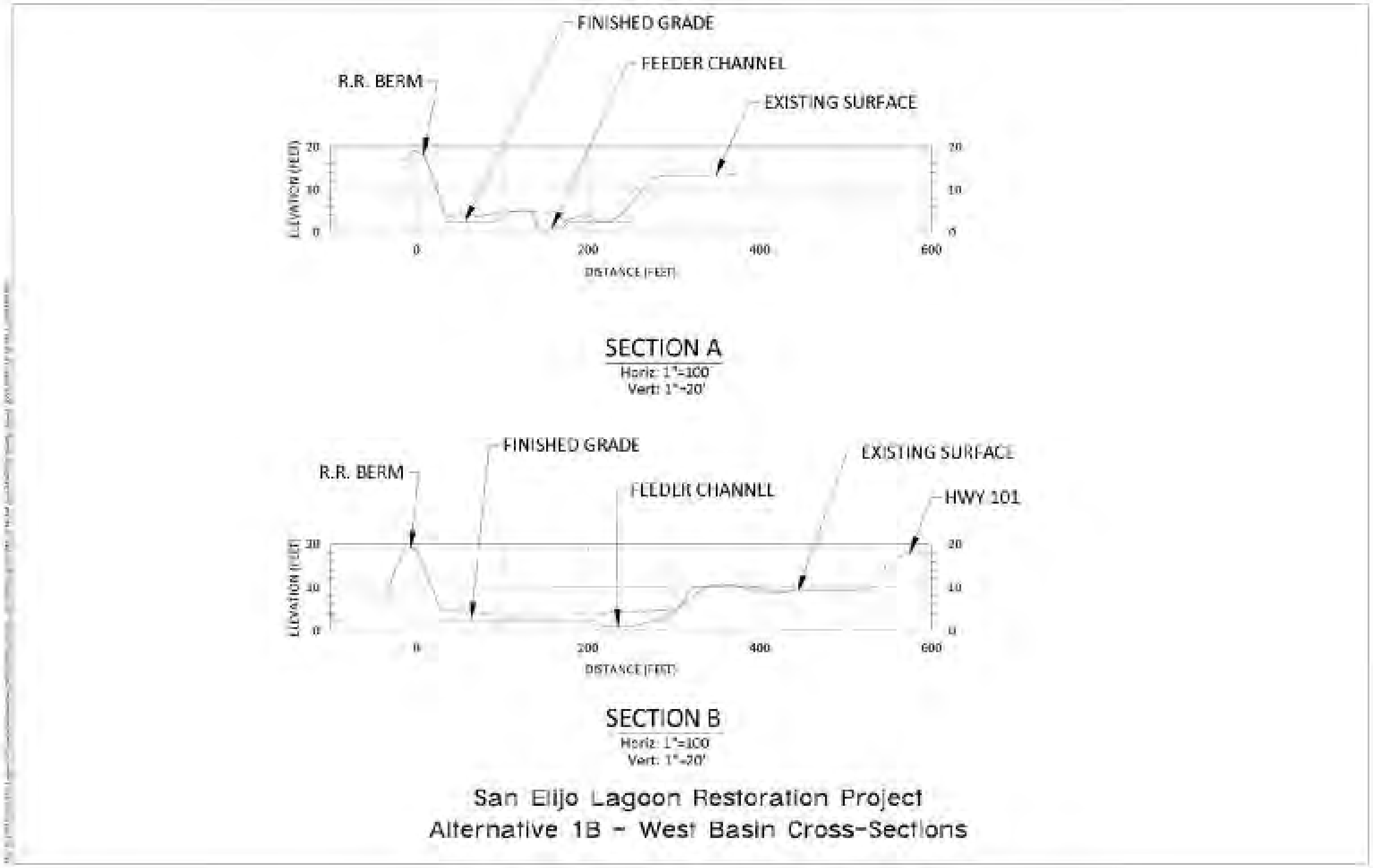

Figure 1-6: SELRP Alternative 1B West Basin Cross-Sections

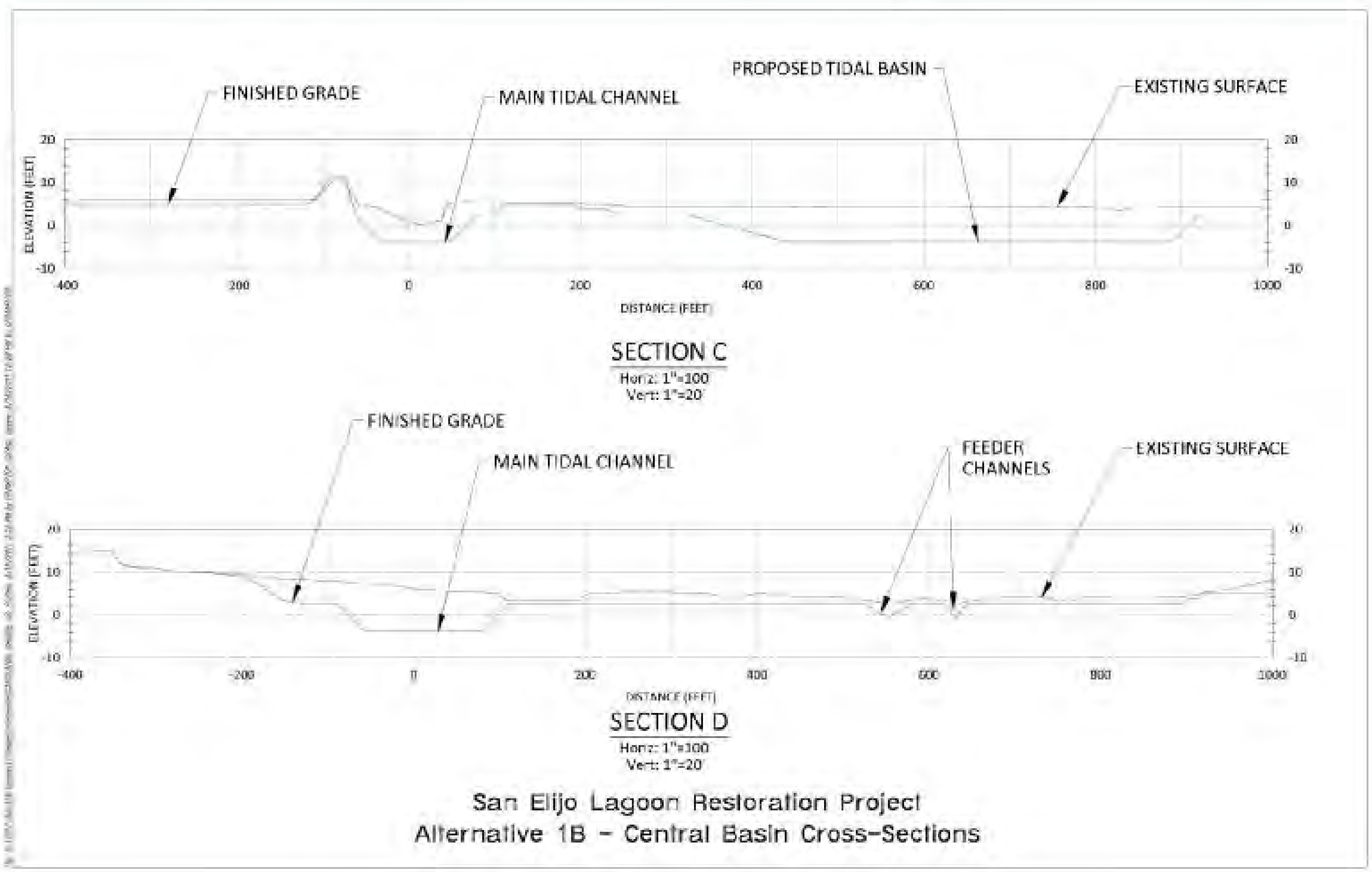

Figure 1-7: SELRP Original Alternative 1B Central Basin Cross-Sections

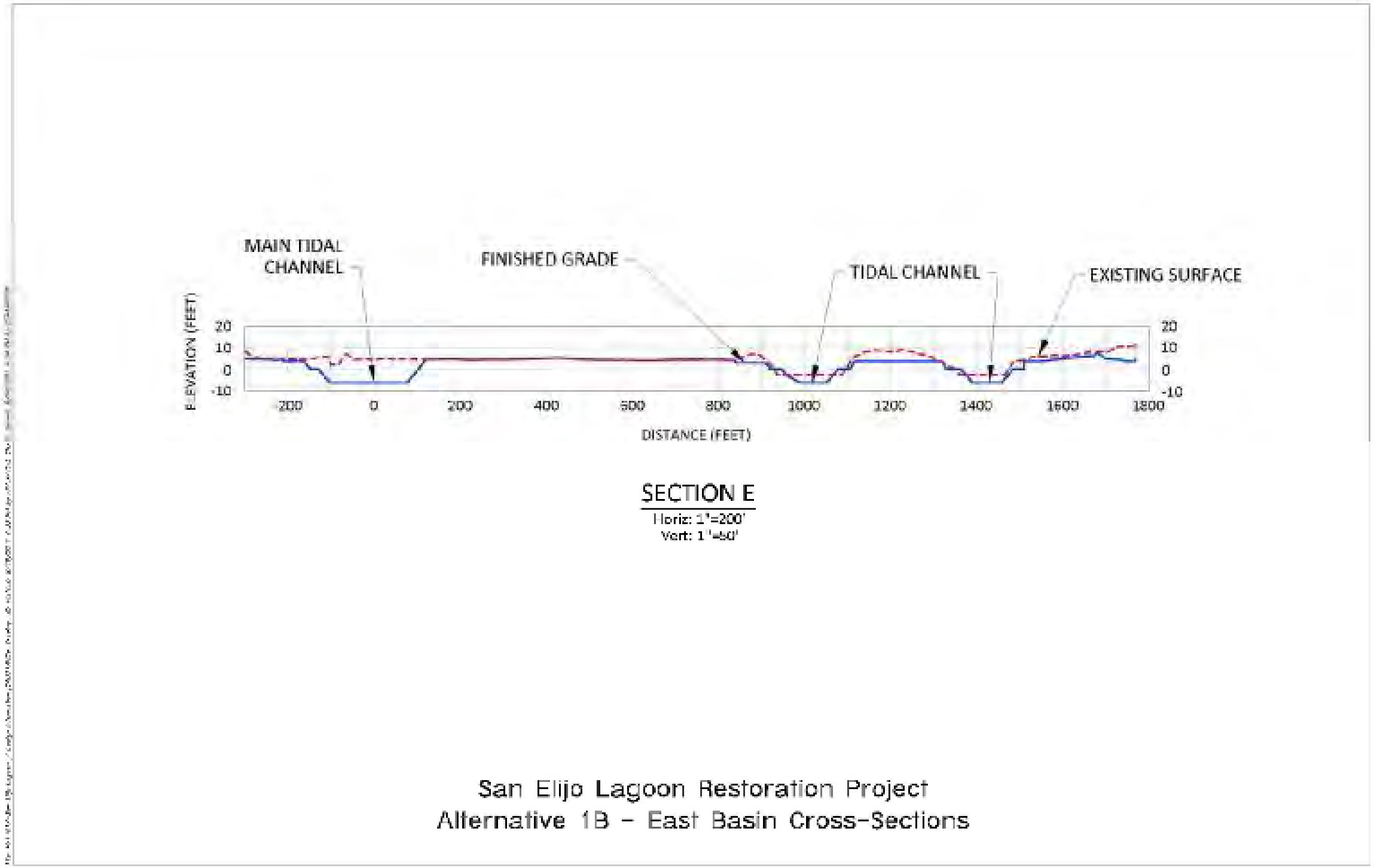

Figure 1-8: SELRP Alternative 1B East Basin Cross-Sections

Alternative 2A – Maximum Habitat Diversity (inlet relocated south): Proposes the greatest amount of change to the Project area, including creation of the greatest subtidal habitat acreage. The conceptual and grading plans for this alternative are shown in Figure 1-9 and Figure 1-10, respectfully. Grading cross-sections of this alternative are shown in Figure 1-11 through Figure 1-13. The major features of Alternative 2A include a new tidal inlet; a subtidal basin extending into the West Basin and a large area of intertidal mudflat in the Central Basin; and a large subtidal habitat area in the East Basin. The design requires a new bridge over Highway 101 at the new inlet location and a new railroad bridge to span the new inlet. Other infrastructure, such as cobble-blocking features at the inlet, are proposed to maintain the inlet in a stable condition. An OD Pit with a capacity of 1.5 million cubic yards is proposed in the Central Basin in this alternative.

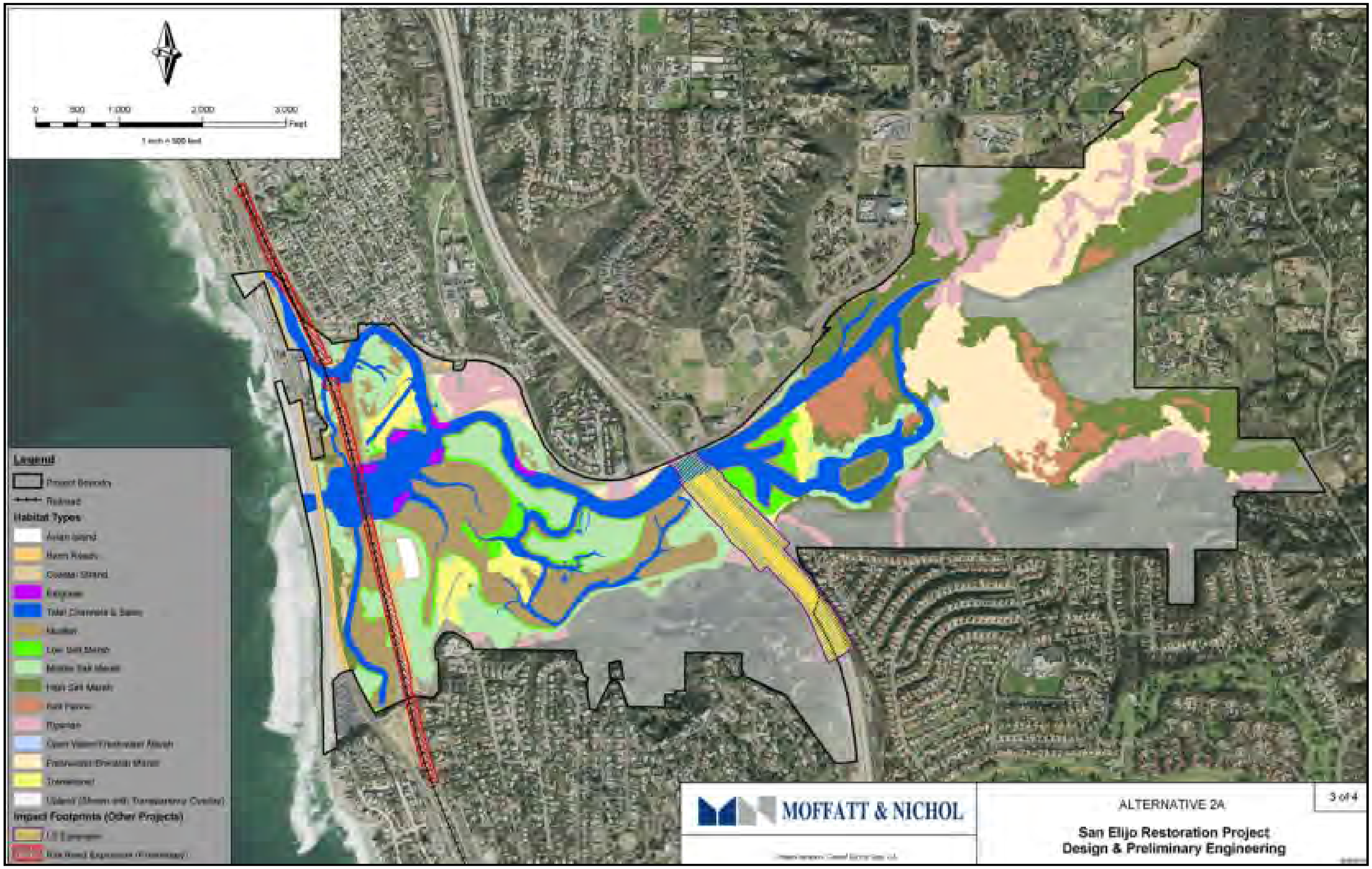

Figure 1-9: SELRP Conceptual Habitat Plan for Alternative 2A

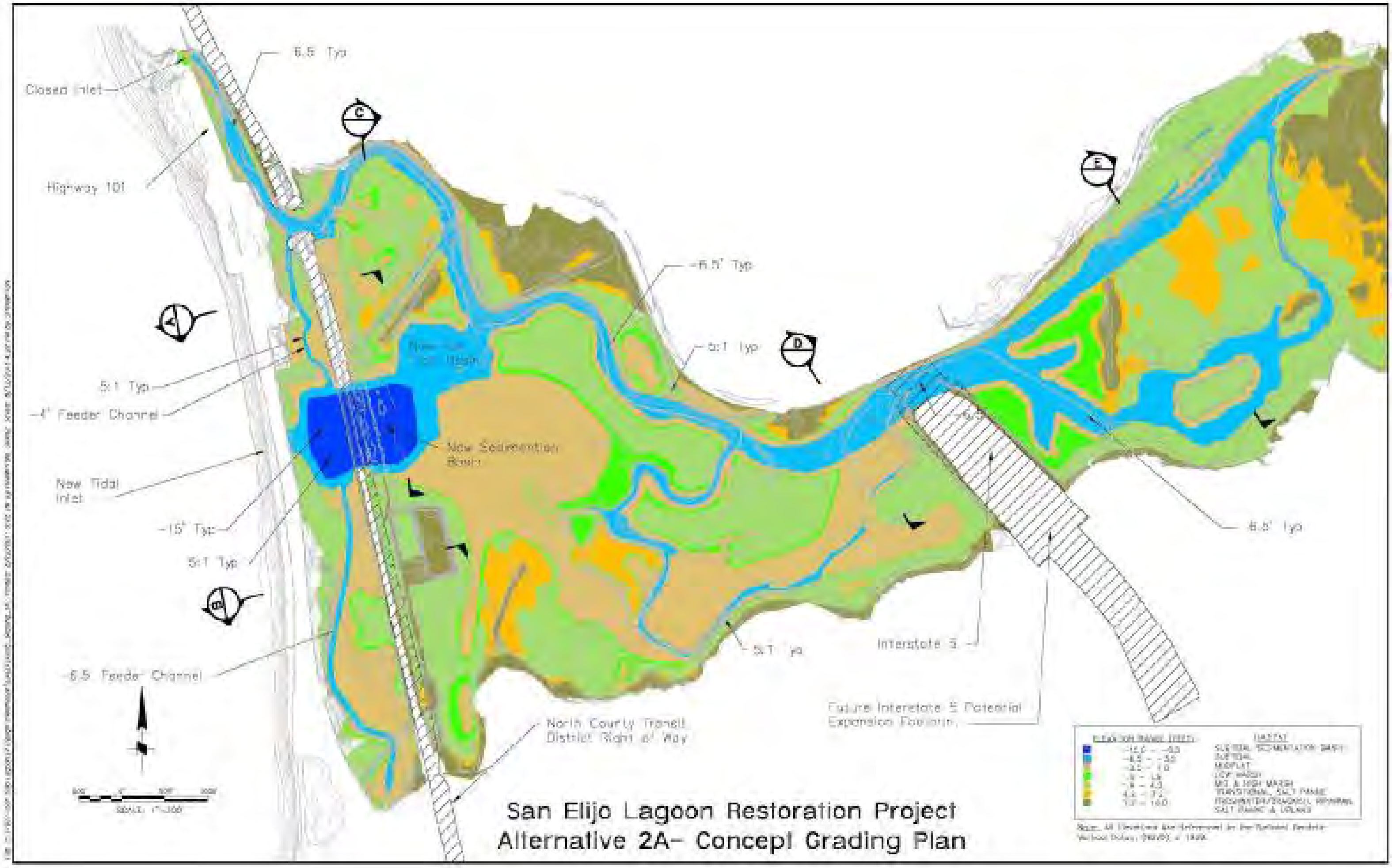

Figure 1-10: SELRP Conceptual Grading Plan for Alternative 2A

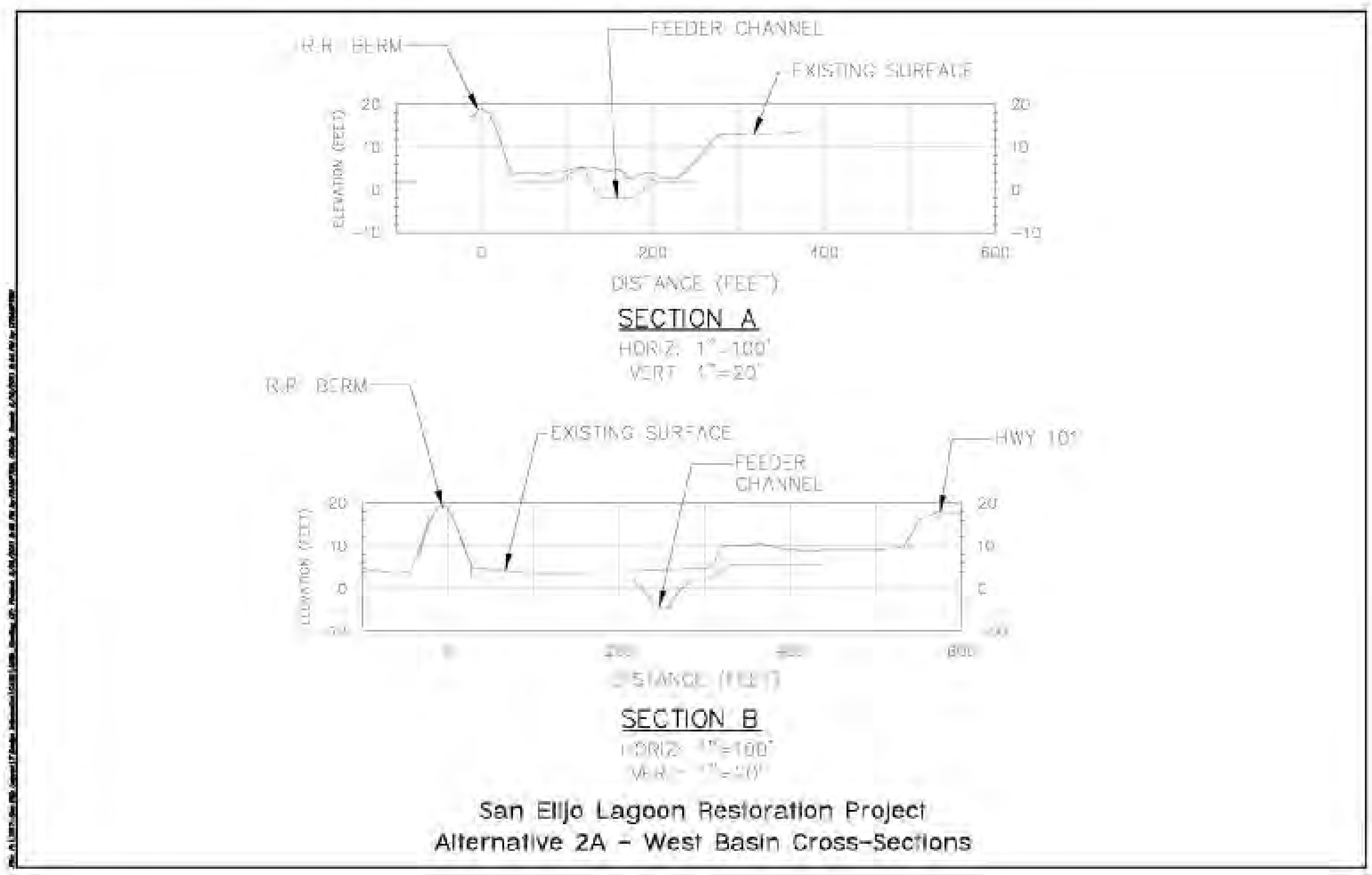

Figure 1-11: SELRP Alternative 2A West Basin Cross-Sections

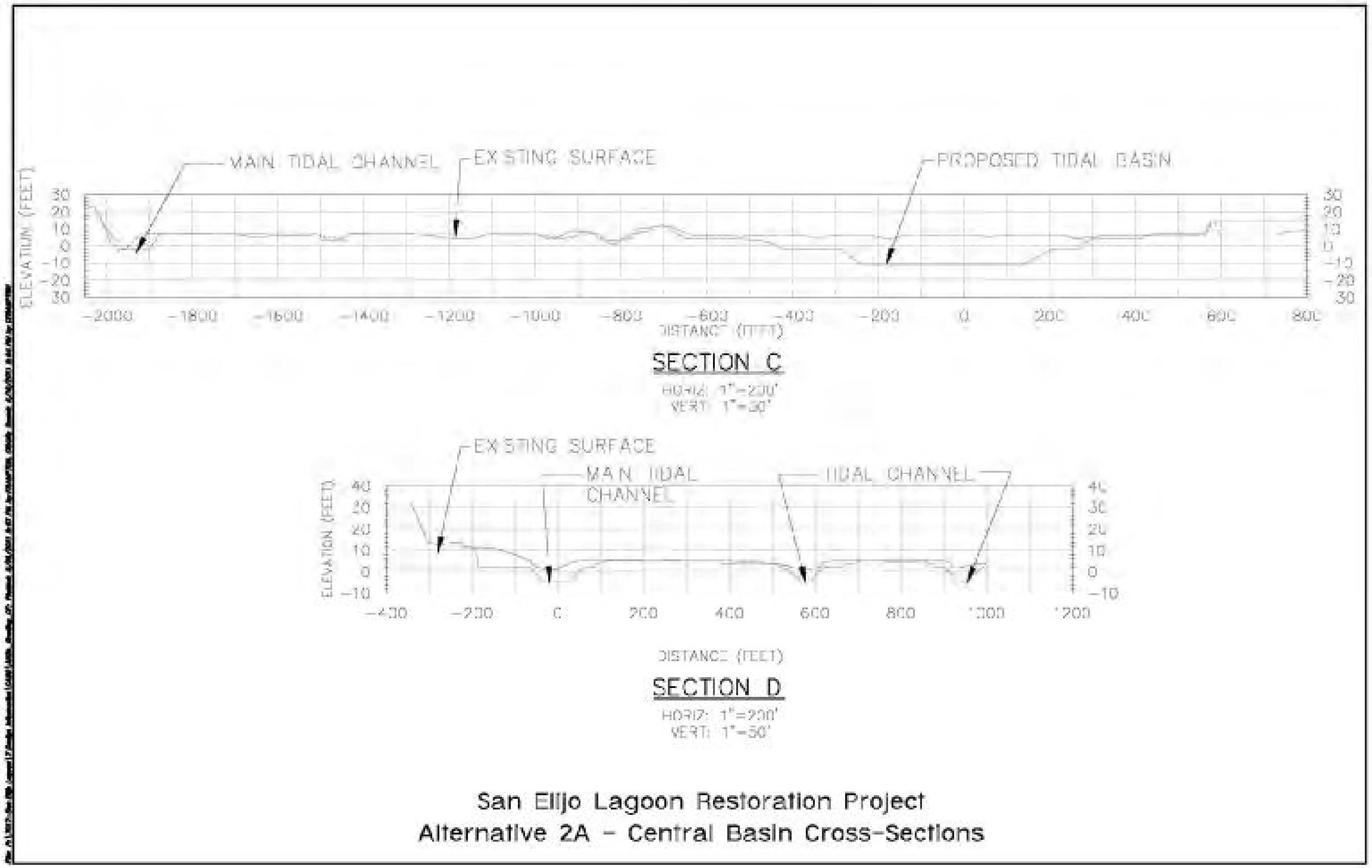

Figure 1-12: SELRP Alternative 2A Central Basin Cross-Sections

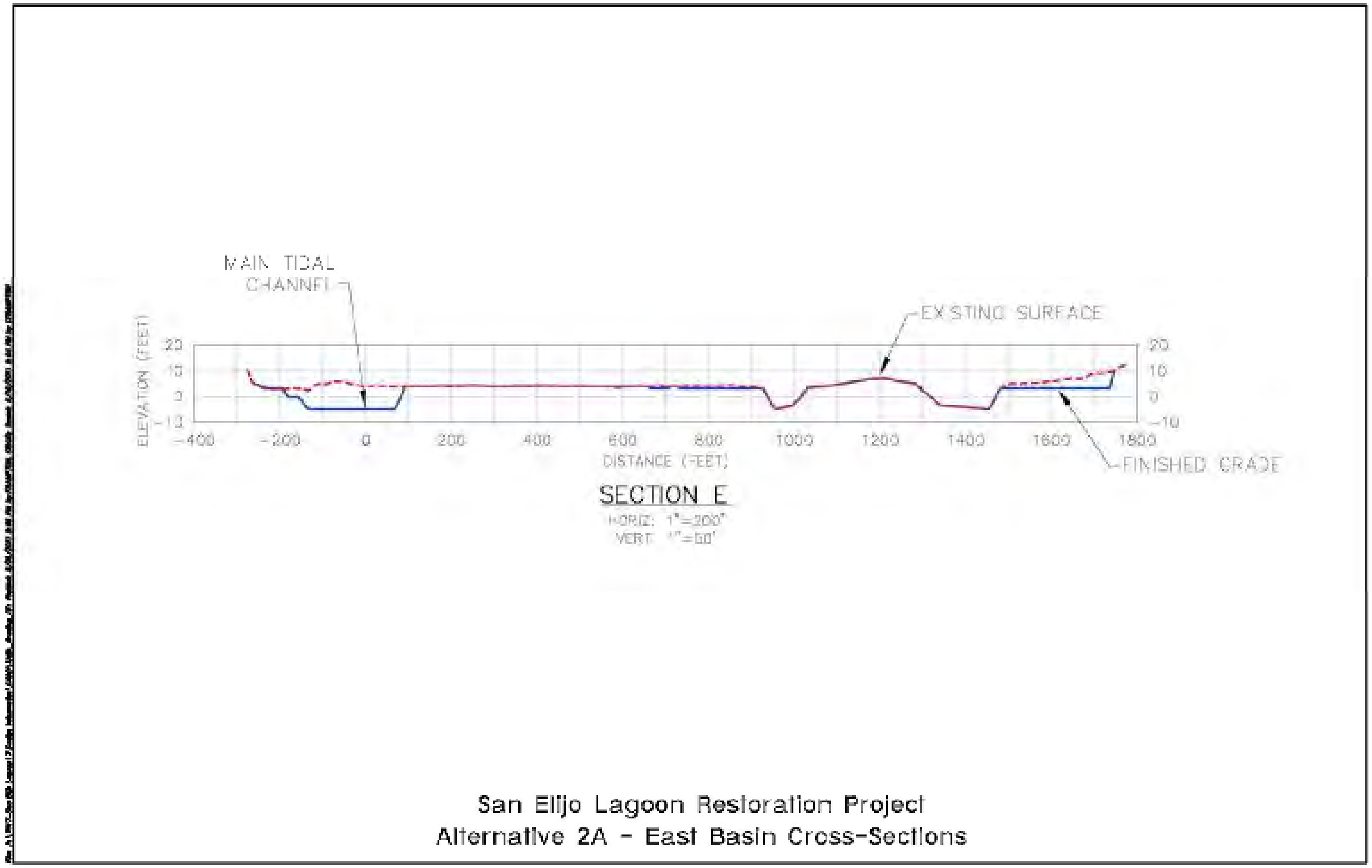

Figure 1-13: SELRP Alternative 2A Sample East Basin Cross-Sections

1.1.2 SELRP Export Summary

Based on stakeholder and resource agency input, Alternatives 1B and 2A are the preferred alternatives. Earthwork budgets from each of the basins, per alternative, are provided in Table 1-1.

Table 1-1: Estimated Earthwork Budgets and Total Export Volumes Per Basin

Alternative	Project Feature	Layer	Volume (CY)
1A	West	Upper Layer	50,000
	Central		75,000
	East		35,000
	On-Site Material Re-use	*Man-made Transitional Habitat Areas*	*-10,000*
		Nesting Area Cap (sand)	*-35,000*
	Total Alt. 1A Export		**115,000**
1B	West	Upper Layer	15,500
		Lower Layer	34,500
		Total West Basin Export	*50,000*
	Central	Upper Layer	420,000
		Lower Layer	130,000
		Total Central Basin Export	*550,000*
	East	Upper Layer	260,000
		Lower Layer	440,000
		Total East Basin Export	*700,000*
	On-Site Material Re-use	*Overdredge Pit Cap*	-130,000
		Man-made Transitional Habitat Areas	*-45,000*
		Nesting Area Cap (sand)	*-35,000*
		Total Alt. 1B Export	**1,090,000**
2A	West	Upper Layer	50,000
		Lower Layer	150,000
		Total West Basin Export	*200,000*
	Central	Upper Layer	400,000
		Lower Layer	250,000
		Total Central Basin Export	*650,000*
	East	Upper Layer	260,000
		Lower Layer	440,000*
		Total East Basin Export	*700,000*
	On-Site Material Re-use	*Overdredge Pit Cap*	-130,000
		Man-made Transitional Habitat Areas	*-45,000*
		Nesting Area Cap (sand)	*-35,000*
	Total Alt. 2A Export		**1,340,000**

As shown, SELRP construction is anticipated to generate approximately 115,000 to 1,340,000 cubic yards (cy) of export material, contingent on the alternative selected. The export volumes were separated into upper and lower layers consistent with the sampling approach outlined in the Final SAP. The upper layer consists of variable depth and lagoonal deposits (i.e., silts and clays), while the lower layer is comprised of sandy materials.

All export materials generated from Alternatives 1B and 2A are proposed to be disposed of / backfilled within an OD Pit feature and capped with a coarser, sandier material (Figure 1-14 and Figure 1-15). The OD Pit feature is proposed within the Central Basin and would be scaled to accommodate fill produced from Alternatives 1B and 2A. The conceptual design of this feature would include:

- An approximate 27-acre footprint excavated to a depth of -40 feet (NGVD 29) (approximately 45 feet bgs);
- A flat bottom with maximum side slopes of 2:1 (Horizontal : Vertical); and
- A 3-foot sand cap (approximately 130,000-cubic yards) produced from sandy export materials generated from elsewhere in the lagoon (e.g. West and/or East Basin) during construction.

Three types of beneficial re-use sites are being considered for Project-generated export materials from the OD Pit. These include on-beach placement, nearshore beach placement, and offshore placement/staging, as summarized below:

1. **On-beach Placement:** Placement of material on the beach in the form of a beach berm generally within the template of the San Diego Regional Beach Sand Project (RBSP) II or Sand Compatibility and Opportunistic Use Program (SCOUP). Beaches being considered for on-beach / surf-zone placement are as follows:
    a. Leucadia Beach – RBSP I placement footprint (Figure 1-16).
    b. Moonlight Beach – RBSP I & II and SCOUP placement footprint (Figure 1-17).
    c. Cardiff Beach – expanded from the RBSP I & II placement footprints (Figure 1-18).
    d. Fletcher Cove – RBSP I &II and SCOUP placement footprint (Figure 1-20).
    e. Torrey Pines Beach - RBSP I proposed placement footprint (Figure 1-21).
2. **Nearshore Beach Placement:** This placement option would provide a source of sand to the littoral cell while allowing less-than-optimum materials to be winnowed out of the surf-zone. Cardiff is the only area being considered for nearshore placement (Figure 1-22).

3. **Offshore Staging:** Material is proposed to be placed within the SO-5 and SO-6 borrow area footprints of RBSP I and RBSP II to serve for potential offshore "staging" for future beach nourishment projects. Old and new S0-6 sites are located off of San Elijo Lagoon and have areas of approximately 18 and 37 acres, respectively (Figure 1-22). The total volume capacity of old and new SO-6 together are approximately 400,000 cy. Old and new SO-5 are located offshore of the San Dieguito Lagoon and have an area of approximately 130 acres each (Figure 1-23). The total volume capacity of old and new SO-5 together are approximately 1,300,000 cy.

All suitable, non-toxic material generated during construction of Alternative 1A is proposed to be placed at LA-5 due to the fine-grain nature of these export materials. The site is located approximately 30 miles southwest of the Project site. The site has a bottom radius of 3,000 feet and a surface disposal radius of 1,000 feet (Figure 1-24). Additional Tier III testing (including bioassays) would be required to consider placement of export materials at LA-5.

Four potential disposal options are currently being considered for the Project. The proposed disposal options are as follows:

I. **Alternative 1A Option** – Export of all suitable and non-toxic material from Alternative 1A would be placed in LA-5.
II. **Proximity Option** – Maximizes beneficial re-use opportunities in close proximity to the Project site. Includes previously permitted volumes / sites under RBSP II.
III. **Lowest Cost Option** – Would minimize cost by using offshore disposal sites and the Cardiff on-beach and nearshore sites.
IV. **Low Cost Hybrid Option** – Would use offshore disposal sites, Cardiff onshore and nearshore, and three RBSP sites (Leucadia, Moonlight Beach, and Solana Beach).

The "capacities" of the placement sites being considered under each of the disposal options are shown in Table 1-2. The capacity of each site was defined based on the volume of prior placements, borrow site volume to be backfilled, permitted placement volume under an established project (i.e., RBSP I and II), or the result of supporting coastal studies.

This Final Draft SAP Results Report is being submitted to the U.S. Army Corps of Engineers (USACE), the U.S. Environmental Protection Agency (USEPA), California Coastal Commission, and the Regional Water Quality Control Board (RWQCB) for review and compatibility determination findings.

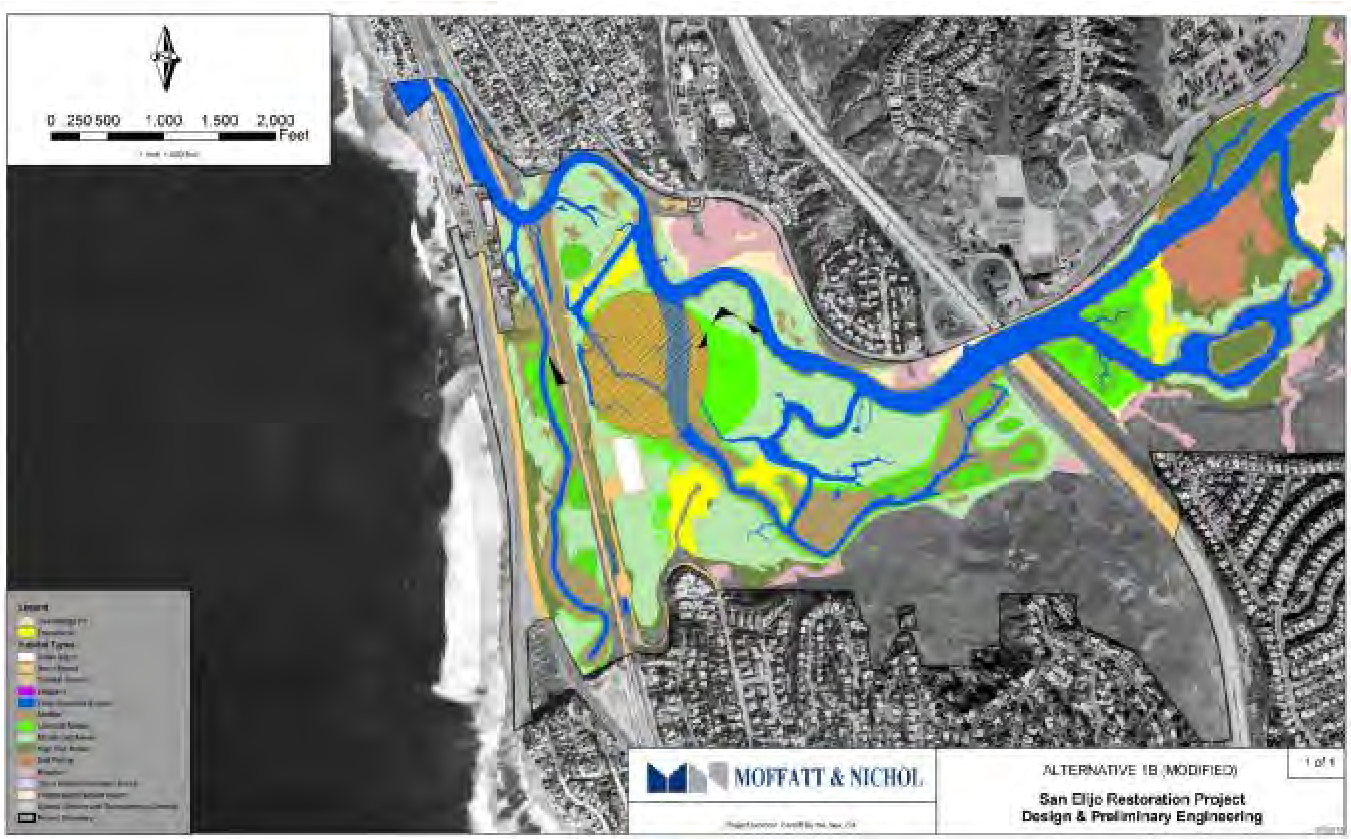

Figure 1-14: SELRP Proposed Overdredge Pit Conceptual Plan View Over Modified Alternative 1B

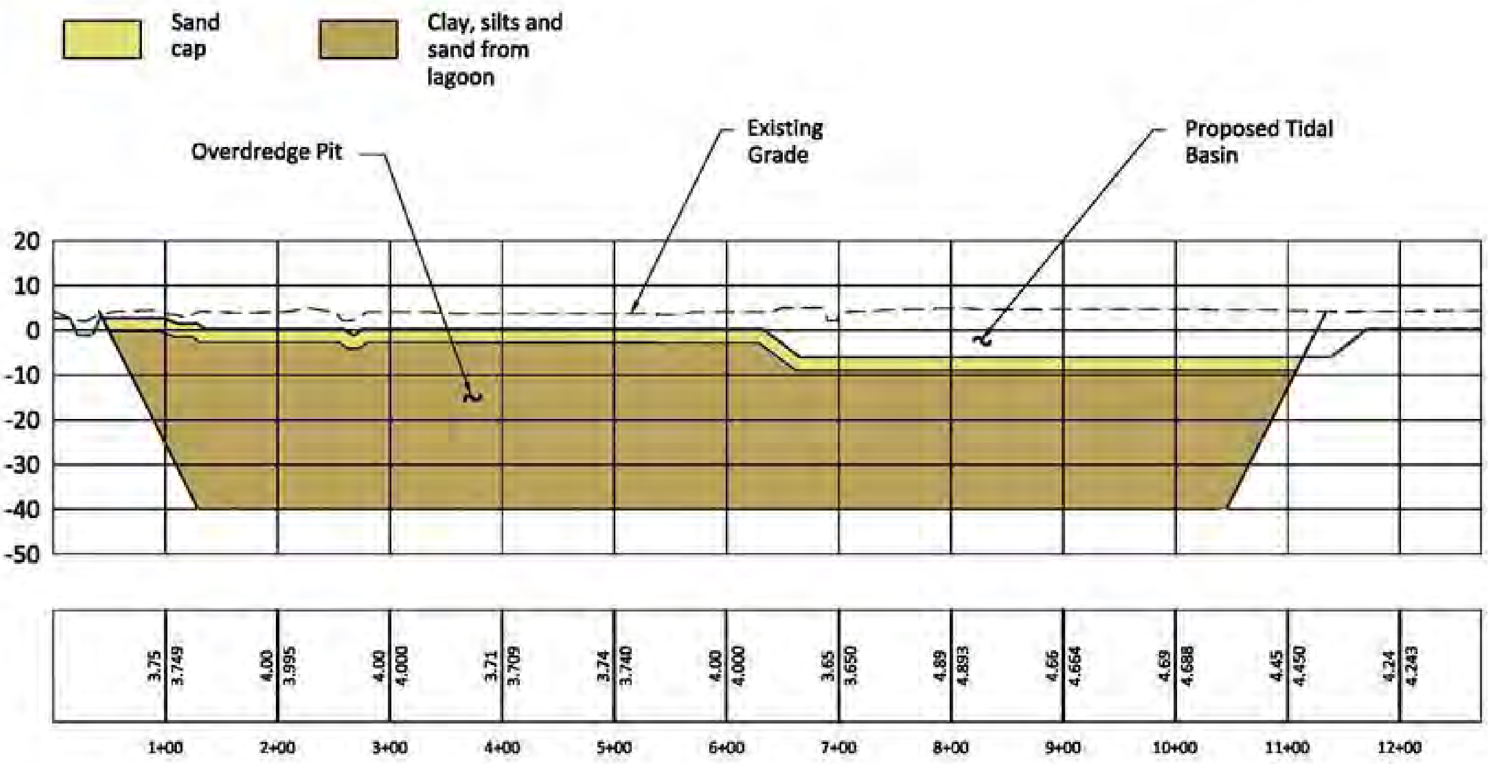

Figure 1-15: SELRP Proposed Overdredge Pit Conceptual Section

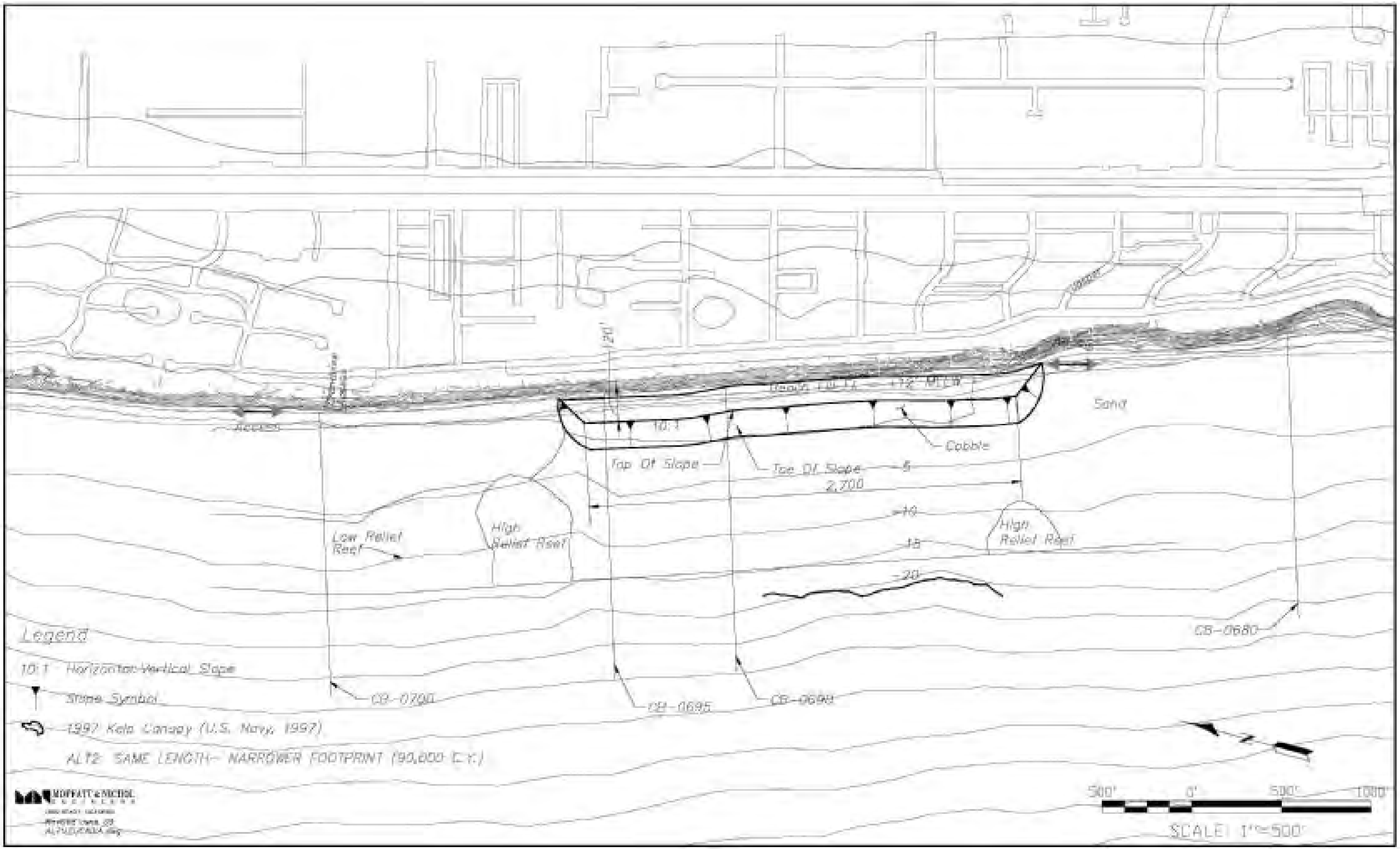

Figure 1-16: Leucadia Beach (City of Encinitas) On-Beach Placement Location (per RBSP I)

Figure 1-17: Moonlight Beach (City of Encinitas) On-Beach Placement Location (per RBSP I, RBSP II & SCOUP)

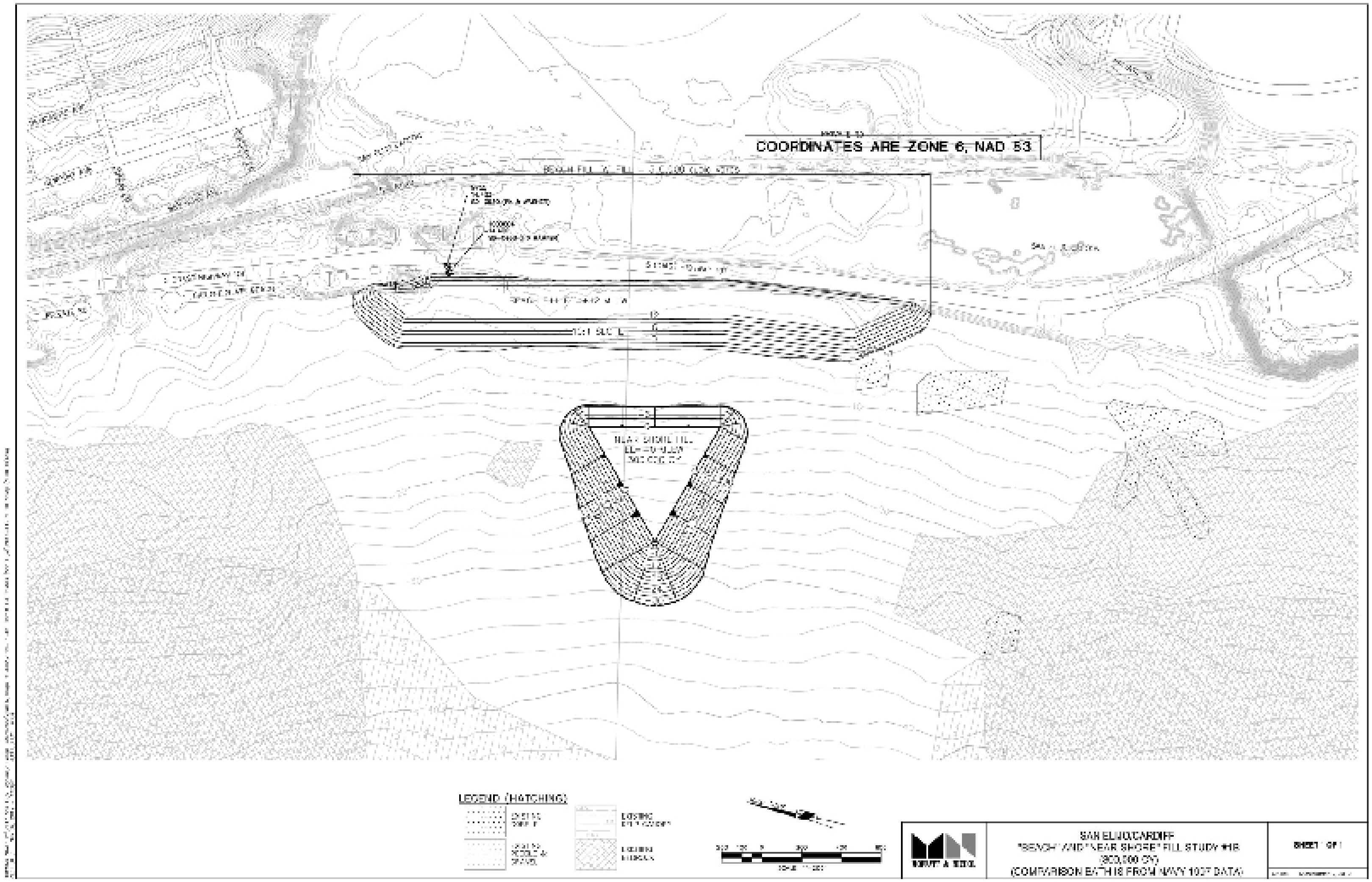

Figure 1-18: Cardiff Beach On-Beach and Nearshore Placement Locations (Alternative 1B)

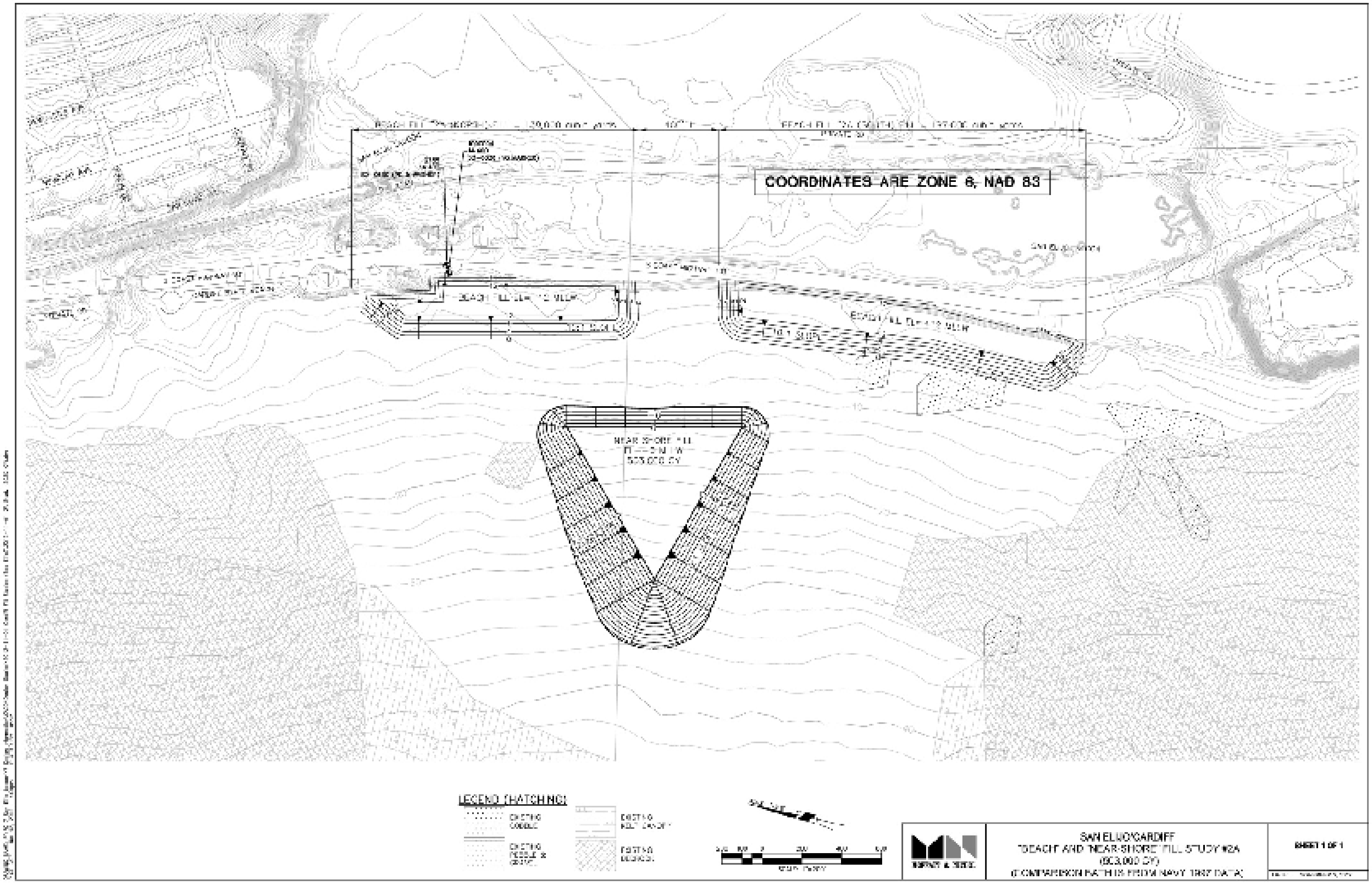

Figure 1-19: Cardiff Beach On-Beach and Nearshore Placement Locations (Alternative 2A)

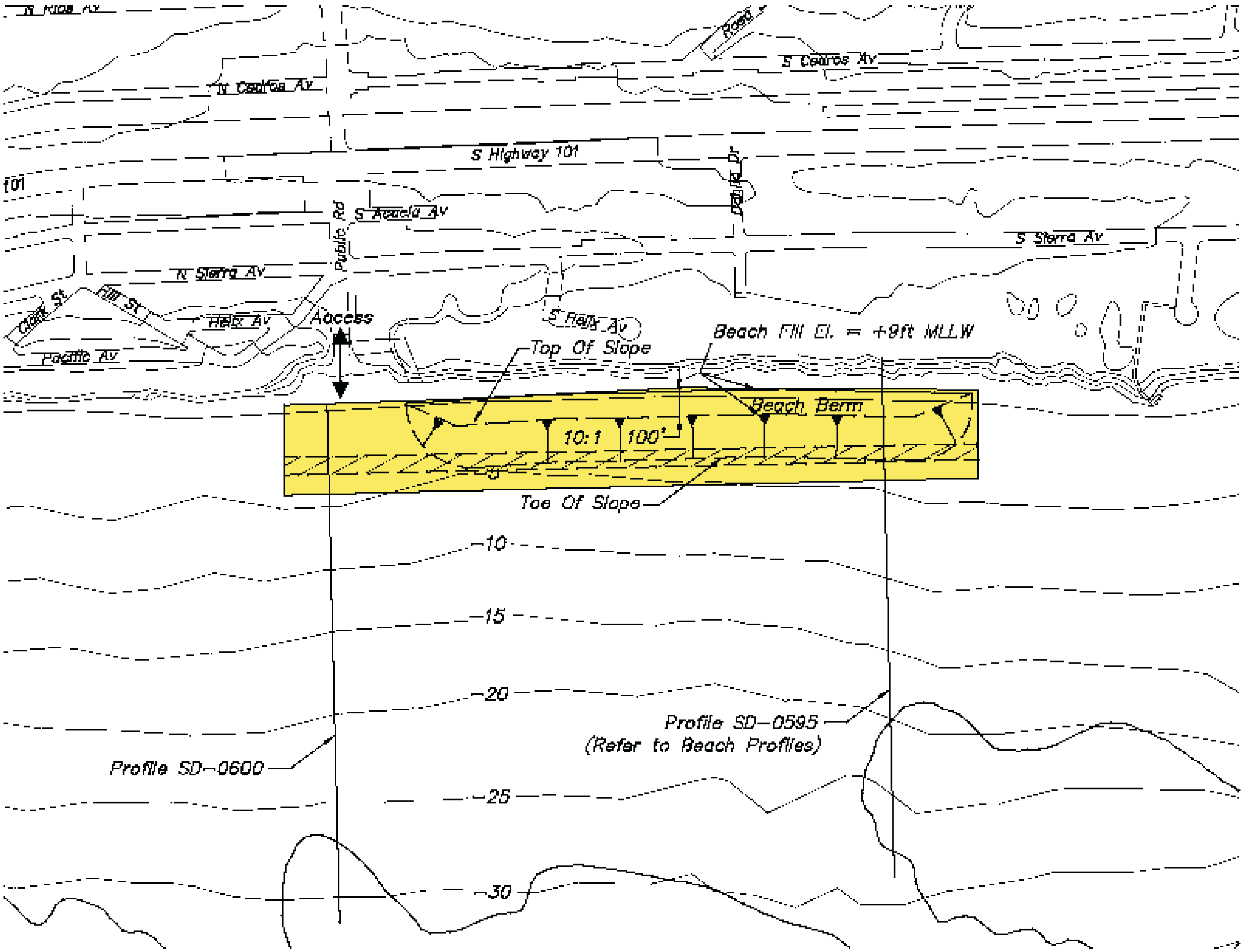

Figure 1-20: Fletcher Cove (City of Solana Beach) On-Beach Placement Location (per RBSP I, RBSP II & SCOUP)

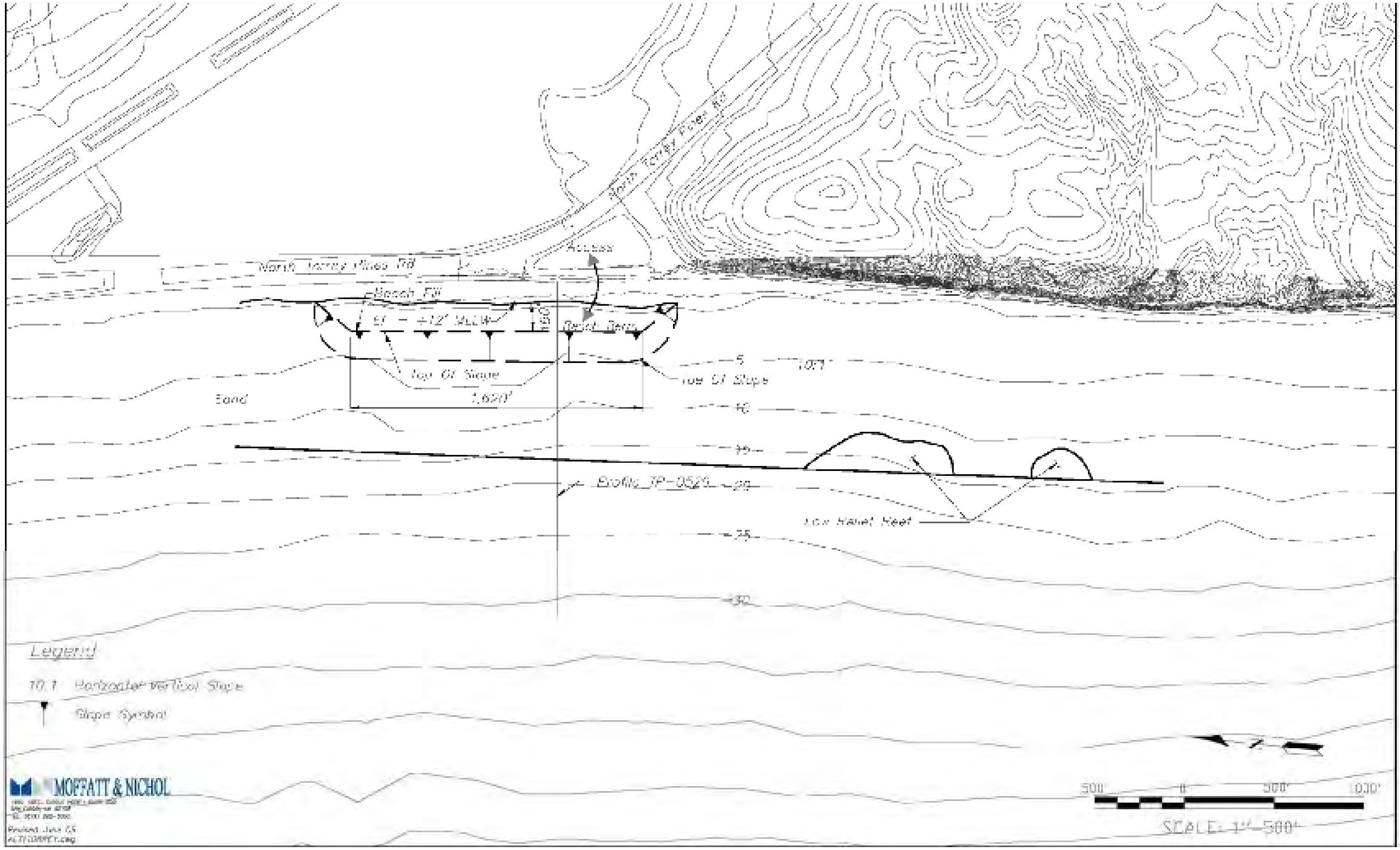

Figure 1-21: Torrey Pines (City of San Diego) On-Beach Placement Location (per RBSP I)

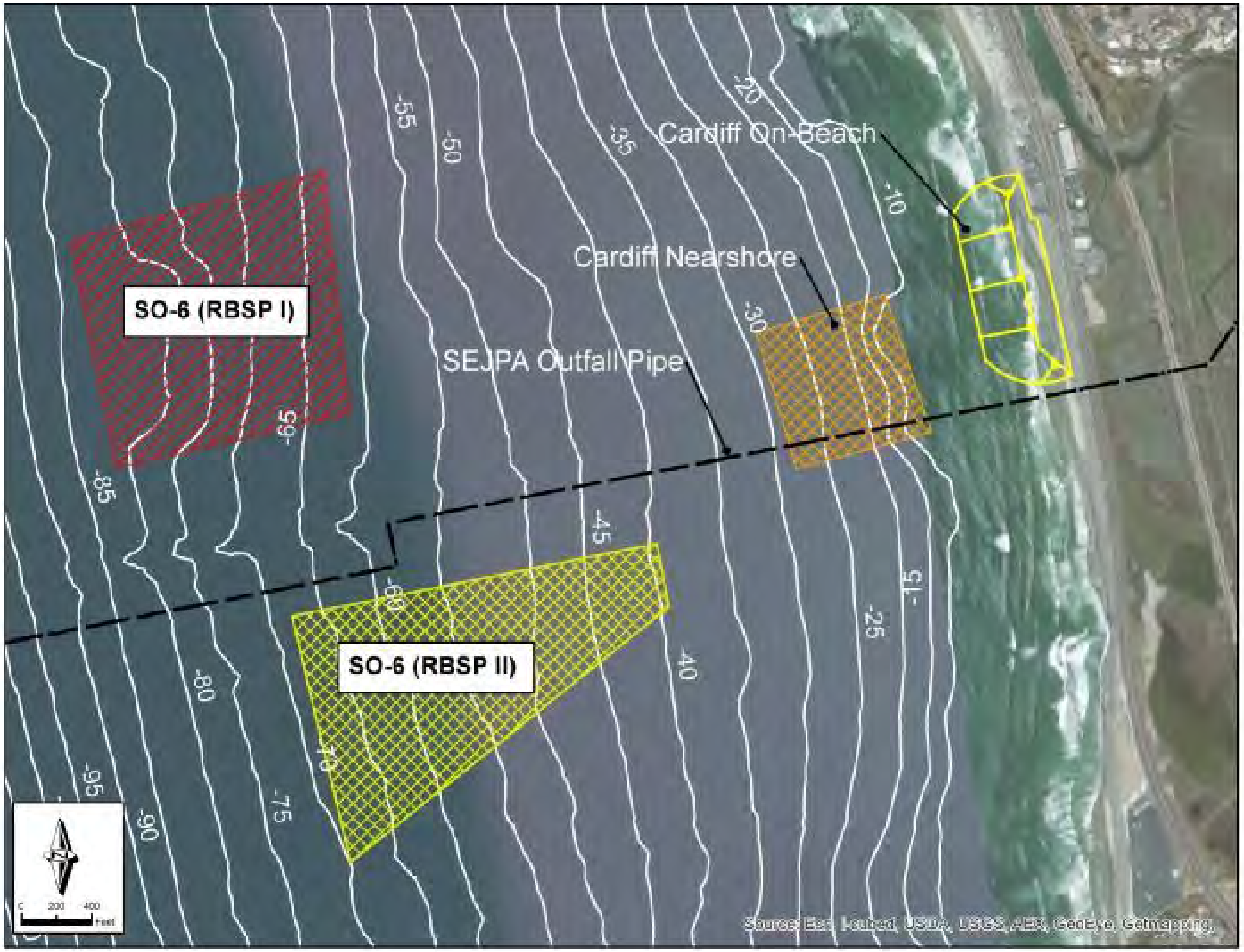

Figure 1-22: Potential Beneficial Re-Use Locations in Cardiff

Figure 1-23: Potential SO-5 Offshore Placement Locations

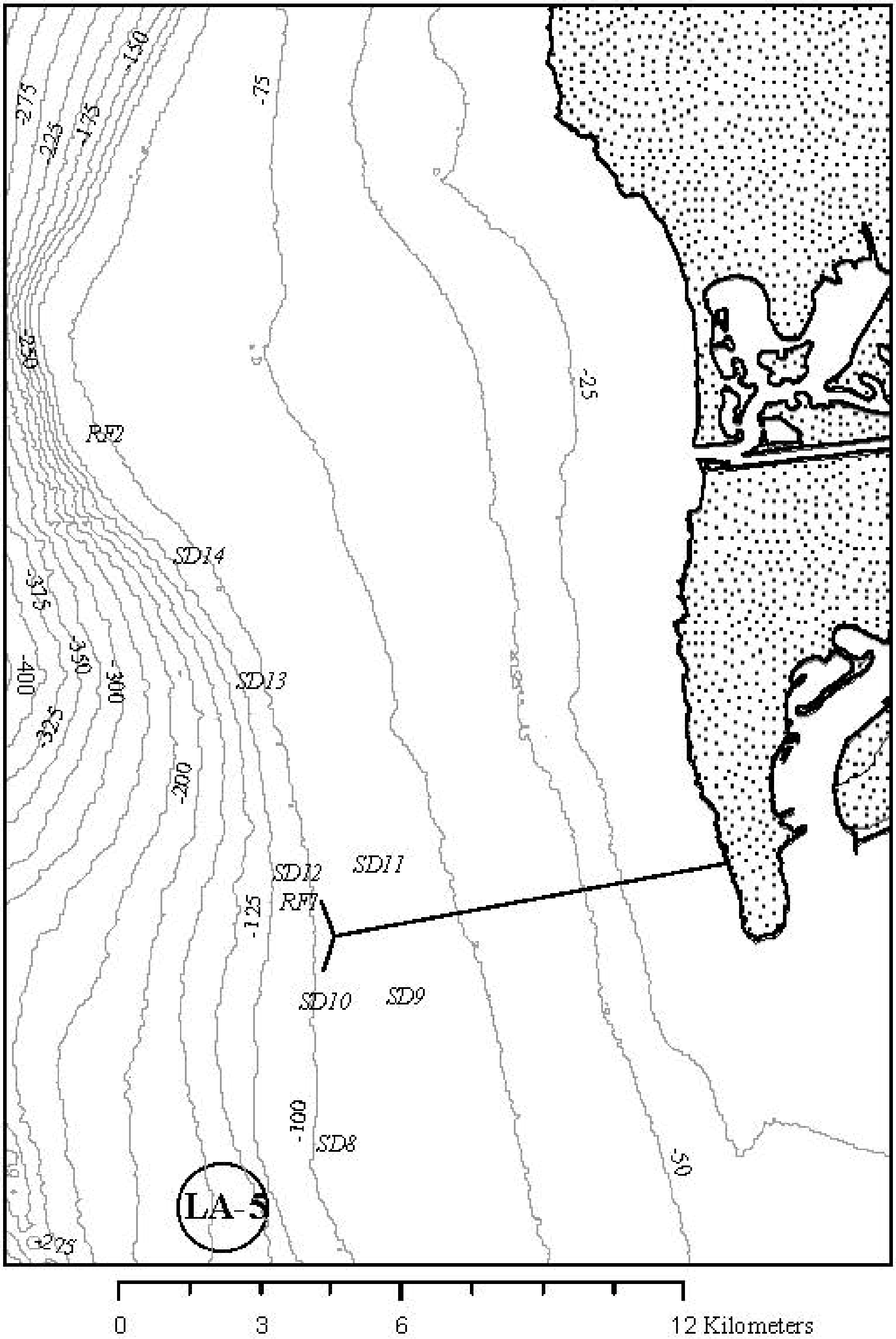

Figure 1-24: LA-5 Ocean Dredged Material Disposal Site - Designated and Managed by the USEPA

Table 1-2: Proposed Beneficial Re-Use Disposal Options for SELRP Export (Placement Quantities)

Potential Placement Locations			Capacity (cy)	Potential Placement Options (Maximum Possible Quantities as a Worst Possible Case Scenario That Exceed Those in Table 1-1)						
				I. Alternative 1A	II. Proximity (Assumes previously permitted volumes/sites)		III. Lowest Cost		IV. Low Cost Hybrid	
				Alt 1A	Alt 1B	Alt 2A	Alt 1B	Alt 2A	Alt 1B	Alt 2A
Offshore Placement Sites		LA-5	750,000 (annually)	160,000	-	-	-	-	-	-
		SO-5/SO-6*	1.32 MCY / 0.4 MCY	-	Alternative site to Cardiff nearshore (300,000 cy)	87,000	600,000	700,000	300,000	300,000
Nearshore (inside littoral zone)		Cardiff	500,000**	-	300,000	500,000	300,000	500,000	300,000	500,000
On-beach Placement Sites	RBSP sites	Cardiff (Expanded)***	300,000	-	300,000	300,000	300,000	300,000	300,000	300,000
		Leucadia	117,000	-	117,000	117,000			117,000	117,000
		Moonlight Beach	105,000	-	105,000	105,000			105,000	105,000
		Solana Beach	146,000	-	146,000	146,000			146,000	146,000
		Torrey Pines	245,000	-	245,000	245,000				
Disposal Option Quantity (cy)				**160,000**	**1,213,000**	**1,500,000**	**1,200,000**	**1,500,000**	**1,268,000**	**1,468,000**

** Capacity is considered volume to fill prior RBSP borrow areas. Includes new and old borrow sites.*

*** Volume was determined based on San Elijo Lagoon Restoration Project Ebb Bar and Flood Shoal Study, Final Report (M&N 2011).*

**** Capacity based on habitat and area constraints of the beach.*

1.2 SITE DESCRIPTION

The San Elijo Lagoon is located in the City of Encinitas, San Diego County, California (Figure 1-25). The lagoon is the terminus of the Escondido Creek and La Orilla Creek watersheds at the Pacific Ocean. The lagoon can be accessed via I-5 or Highway 101 at Manchester Avenue.

The study area is comprised of approximately 960 acres, primarily within the San Elijo Lagoon Ecological Reserve (Reserve), including the lagoon. The Reserve is owned and managed by the San Elijo Lagoon Conservancy (SELC), the California Department of Fish and Game (CDFG), and the County of San Diego Parks and Recreation Department (County Parks).

1.3 ROLES AND RESPONSIBILITIES

Table 1-3 below outlines the SAP team members and tasks for conducting the work.

Table 1-3: Project Team and Responsibilities

Task/Responsibility	San Elijo Lagoon Conservancy	Moffatt & Nichol	Geotechnical Engineer (URS)	Analytical Lab (Calscience)
Overall Project Management	X	X		
Sampling Plan Development	X	X		
Agency Coordination	X	X		
Sampling Site Plan/ Positioning	X	X		
Sediment Sampling			X	
Compositing/Sub-sampling			X	
Grain Size Analysis & QA/QC			X	
Chemical Analysis & QA/QC				X
Final Report	X	X		

Doug Gibson, San Elijo Lagoon Conservancy, 760-436-3944, extension 4
Chris Webb, Moffatt & Nichol, (562) 426-9551
Brian Leslie, Moffatt & Nichol, (619) 220-6050
Derek Rector, URS, (858) 812-9292 and Dave Schug (858) 812-2784
Bob Stearns, Calscience, (714) 895-5494

Figure 1-25: Project Vicinity Map

(Source: EDAW 2009)

2. SITE HISTORY

2.1 POTENTIAL SOURCES OF CONTAMINATION

Due to encroachment by development, San Elijo Lagoon has gradually been constrained and its ecological function compromised. The lagoon has been traversed by Highway 101, the NCTD railroad, and I-5. In addition, development adjacent to the lagoon and upstream within its 77-square-mile watershed has restricted the tidal prism within the lagoon. Such modifications have led to a consistent degradation of water quality in the lagoon and adjacent to the lagoon mouth leading to beach closures and elevated bacteria levels. The chronology of development in San Elijo Lagoon and its respective watershed is shown in Table 2-1.

Table 2-1: San Elijo Lagoon Development Chronology

Year	Event
1887	A narrow-gauge railroad is built across the lagoon constricting the inlet.
1895	Lake Wohlford Dam is built, reducing water flow through Escondido Creek.
1912	Pacific Coast Highway (Highway 101) is constructed.
1925	The present Santa Fe Railroad is built.
1937	Berms and shallow ponds for duck hunting are constructed.
1940	The cities of Encinitas, Escondido, and Solana Beach discharge treated sewage into the lagoon, a practice that continues until 1973.
1965	Interstate 5 is built across the midsection of the lagoon.
1969	Private developers begin housing construction around the lagoon. Erosion and pollution further reduce water quality.
1971	Lake Dixon Dam is built, further reducing water flow into Escondido Creek.

Source: San Elijo Lagoon Conservancy (http://www.sanelijo.org/history.html)

2.2 PREVIOUS SEDIMENT TESTING

A number of prior physical and chemical sediment investigations have been completed within the study area. These prior investigations were conducted by various groups including consultants, academics, and federal and state agencies. These studies were related to activities associated with infrastructure improvements (the San Elijo Joint Powers Authority outfall pipe, I-5 bridge, Highway 101, and the sewer pump station), and planned restoration activities by the SELC and the USACE. Of these studies, the most relevant, in terms of location and depth relative to the SELRP and year, are as follows:

- USACE (2004) – Contact: K.Raabe USACE LA District
- California State University Fullerton (CSUF) (Laton et al. 2002)
- Coastal Environments (2000)
- Phillip Williams and Associates (Goodwin, et al. 1991)
- Foster (1991) (unpublished CSUF 1991)
- State Water Resources Control Board (SWRCB) (1997)

The results of the evaluation of these studies are summarized in the Final SAP document (Moffatt & Nichol 2011) and the Sediment Characterization Study (Moffatt & Nichol 2010).

3. METHODS

Between November 8, 2011 and December 17, 2011, URS performed sampling of the Project site. A supplemental phase of explorations was performed between February 8, 2012 and February 10, 2012. A total of 55 subsurface explorations were performed. A geologic log of each sample location was recorded by a geologist in the field and is included in Attachment A. The logs contain the location name, location (lat./long.), method of drilling or sampling, total depth drilled or sampled, and geologic descriptions of the materials encountered.

Drilling was primarily performed by hollow stem or solid stem methods using a hand-carried tripod drill rig. Where possible, some locations were drilled using an all-terrain drill to collect samples. Samples were also collected by hand driving a 3.5-inch sampler or a standard penetration test sampler into the subsurface. Samples were collected from depths ranging from 0 to 31.5 feet below ground surface (bgs).

Sample collection was performed in samplers that were cleaned in an Alconox bath, rinsed once with clean water, and rinsed a second time with de-ionized water. This cleaning process was done in the field between each sample collection.

For borings located within wet channels, a surface grab was collected from the channel bottom at that location using a small vessel and hand-driven sampler. These samples (labeled “-CH”) were composited with surficial materials of an adjacent auger boring to make-up the “fines” sample at this location. This methodology was used due to the difficulty in reaching target sample depths within the wetted channel. Other sample nomenclature in the following sections is categorized as deep (labeled “-D”), shallow (labeled “-S”), and supplemental boring (labeled “-SB”).

As described in the Final SAP (Moffatt & Nichol 2011), the upper and lower sediment layers were sampled separately for grain size and chemistry. The depth at which the upper and lower layers were delineated was determined by the field geologist. The interface was easily distinguished as the top, organic rich layer, and the sandier sub-surface differed starkly in coloration.

4. RESULTS

Physical and chemical results of the sampling are presented in this section. The results are discussed below by export area (i.e., lagoon basin and OD pit) and by geologic layer (upper and lower). A summary of the number of samples collected per basin and per analysis is provided in Table 4-1.

Table 4-1: SELRP SAP Sampling Summary

Area	Deep Borings*	Shallow Borings	Channel Borings	No. of Samples Tested for Grain Size Distribution	No. of Samples Tested for Chemistry
West Basin	2	4	2	8	4
Central Basin	6	10	10	26	8
East Basin	0	8	6	14	4
Overdredge Pit	4	0	3	7	4
Total	12	22	21	55	20

**Includes supplemental borings.*

Deviations from the Final SAP are as follows:

- <u>Sample locations:</u> Locations were adjusted in the field as necessary based on input from environmental monitors in the field to avoid protected or sensitive species, the relative firmness of the surface, and access constraints of the drilling equipment. The proposed versus actual sample locations are shown in Figure 4-1.
- <u>Lower Layer Sampling Depths:</u> Sampling of the lower layer was not confined to the upper 2 feet, as described in the Final SAP. The lower composite was instead generated from material collected from multiple depths below the fines / sand interface.
- <u>Z-layer or “leave layer” Testing:</u> Leave layer testing was not performed. However, only three locations (WB02-S, OD01A, and OD01) did not encounter native formation.

The chemical testing results report produced by the lab is included in Attachment A to this report.

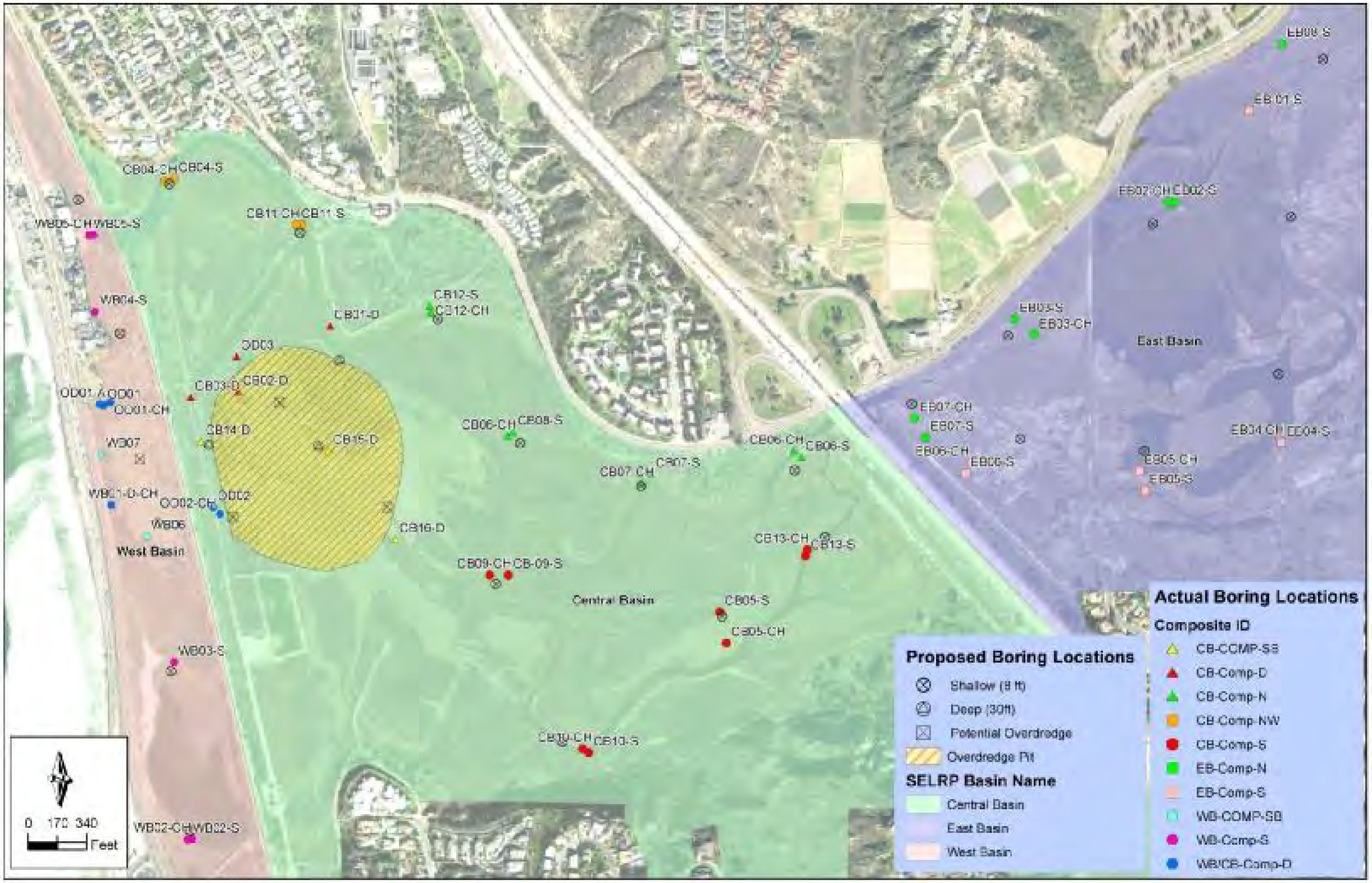

Figure 4-1: Proposed Versus Actual Sample Locations

4.1 RECEIVING BEACH TESTING

4.1.1 Receiving Beach Grain Size Testing Results

Grain size envelopes, which represent the range of sediment grain sizes found within the active littoral area of a given beach, are used as a tool for determining the physical compatibility of source material for beach placement. Creation of these grain size envelopes entails the collection of sediment samples from shore-perpendicular transects at elevations of +12, +6, 0, -6, -12, -18, -24, and -30 feet relative to mean lower low water (MLLW) per SCOUP guidelines (Moffatt & Nichol 2006) and USACE (1989) guidance. The grain size envelopes depict the coarsest and finest grain size curves from the two transects. Grain size is defined in terms of the diameter of particles, with the statistical median (or D_{50}) representing the grain size of the majority of the material. Gradation is also often expressed as the percent of sand in a sample versus the percent of fines, which is the percentage of clays and silts passing the #200 sieve, or less than 0.074 millimeters in diameter. Limited fines content typically exists at the beach due to the energetic environment, and, therefore, a limited percentage of fines is desirable in beach fill material.

Grain size envelopes for each of the receiving beaches considered for placement are shown in Figure 4-2 through Figure 4-6. Grain size data were not available for Leucadia Beach; however, grain size data were provided from an adjacent beach (Batiquitos Beach) located ½ mile to the north that is considered representative. The grain size envelope for Torrey Pines Beach were only collected from the dry beach (i.e. +12, +6 and 0 feet MLLW) elevations; thus, the envelope is “tighter” than average as it does not include the generally finer offshore sediments. Supplemental data for this beach could be obtained during the next phase (final engineering for construction) of the project, if necessary.

The finest sediments found on these receiving beaches was 41.0% fines (Solana Beach nearshore), and the coarsest material was 0.6% fines (Cardiff on-beach). Typically higher percentages of fines naturally exist at the deeper ends of beach profiles (nearshore and offshore), thus, placement options for lagoon material could be more suited to nearshore and offshore areas.

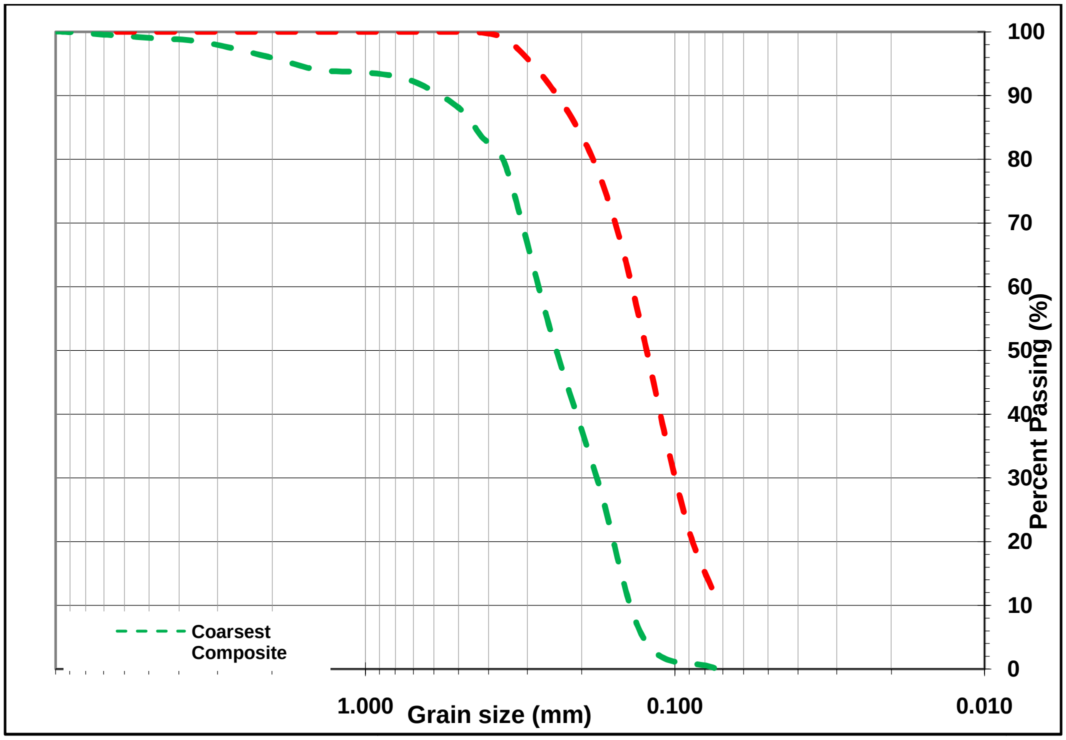

Figure 4-2: Composite Grain Size Envelope for Batiquitos Beach (proxy for Leucadia Beach)

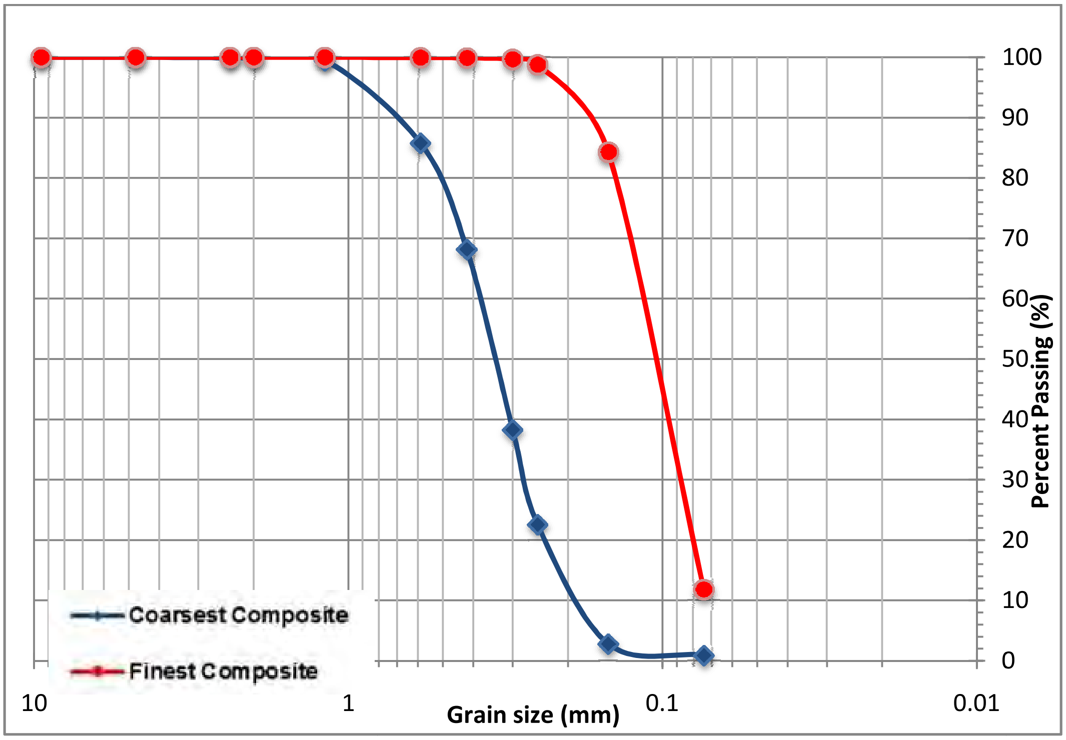

Figure 4-3: Composite Grain Size Envelope for Moonlight Beach

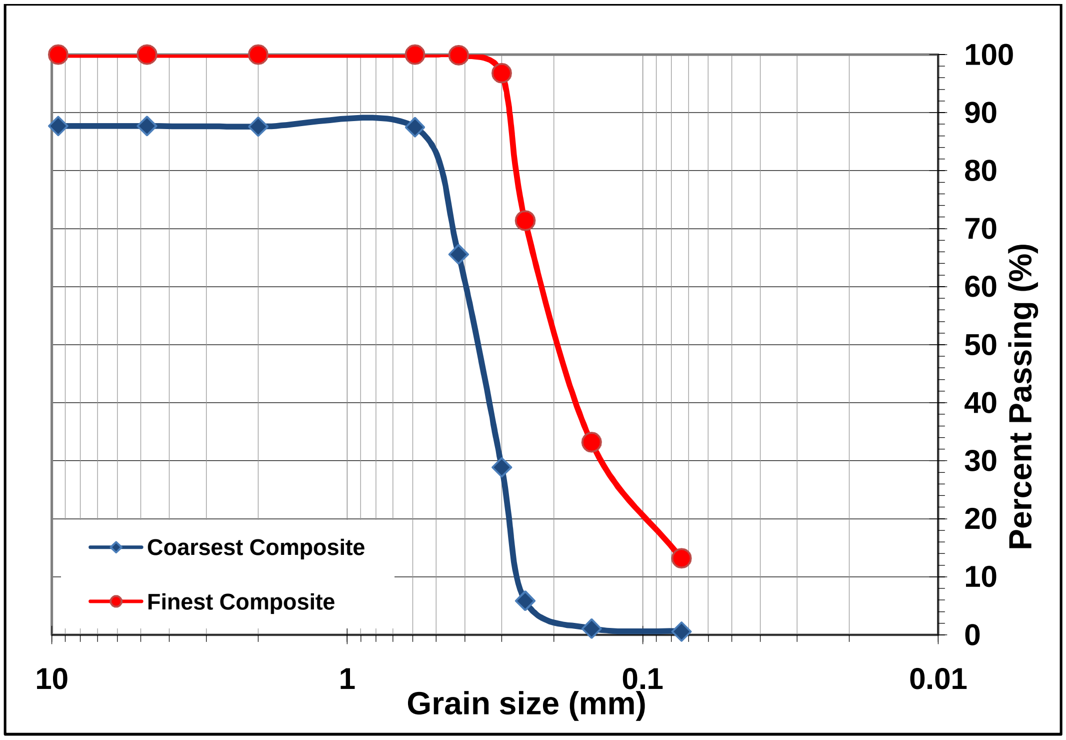

Figure 4-4: Composite Grain Size Envelope for Cardiff State Beach

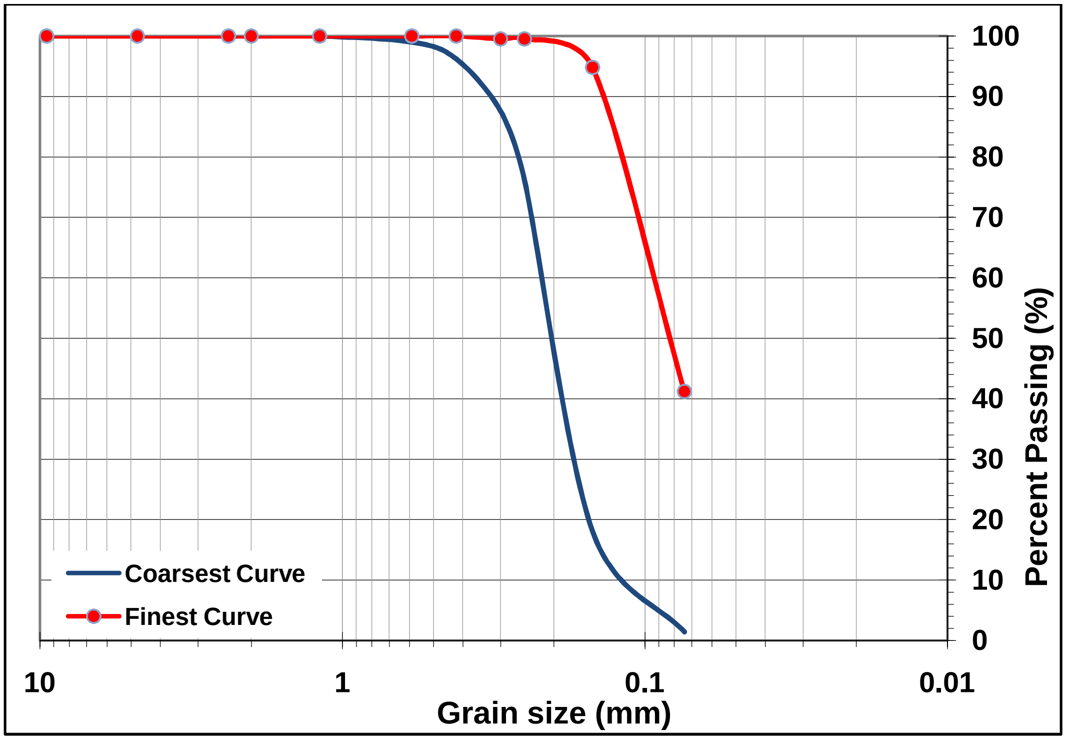

Figure 4-5: Composite Grain Size Envelope for Fletcher Cove

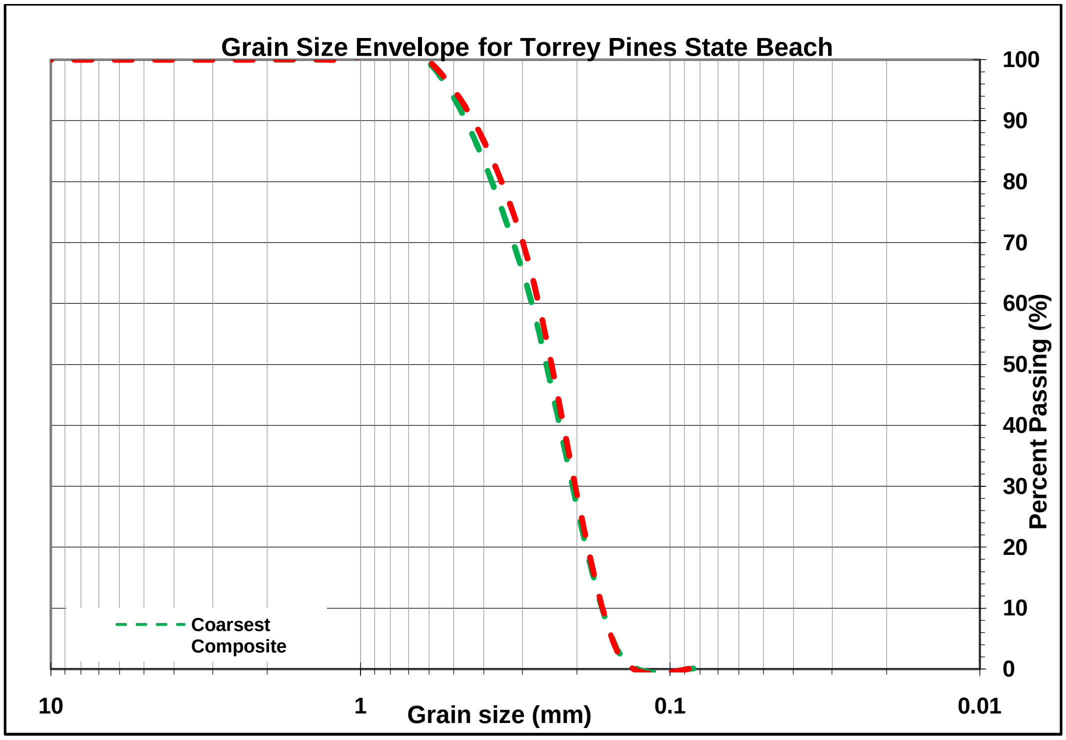

Figure 4-6: **Composite Grain Size Envelope for Torrey Pines Beach (data from +12, +6 and 0 elevations only)**

4.1.2 Receiving Beach Chemistry Results

With the exceptions of Leucadia and Torrey Pines Beach, the majority of the beaches being considered for placement have recently been nourished by the RBSP II Project, which was administered by the San Diego Association of Governments (SANDAG). The RBSP II Project delivered approximately 100,000 cubic yards to each of these beaches and concluded in December 2012. Offshore materials were used to nourish these beaches and these offshore borrow areas were analyzed for beach compatibility through a similar SAP effort.

Sand from borrow site SO-5 was used by SANDAG to nourish the majority of beaches proposed for nourishment in this project. Due to its broad presence on the proposed SELRP placement sites now, that same sand is assumed to represent the material on the proposed receiving beaches for this project. Therefore, the chemical composition of offshore materials from borrow site SO-5 (located offshore of San Dieguito Lagoon) were used to establish the chemical baseline for these SELRP receiving beaches. The approximate volumes of material placed on these receiving beaches during the RBSP II project are provided in Table 4-2.

Table 4-2: RBSP II Receiving Beaches and Placement Volumes

Beach Name	Borrow Area	Approximate RBSP II Beach Nourishment Volume (cy)
Moonlight Beach	SO-5	92,287
Cardiff Beach		88,751
Fletcher Cove		142,430

The results of the chemical analysis of the receiving beaches are provided in Table 4-3. As shown, for constituents where ERL/ERM values exist, results were below these levels. Levels slightly above detection limits were found for metals, phthalate, dioxins/furans, and sediment conventionals.

Table 4-3: RBSP II Chemistry Results Summary for SO-5

Trace Metals	Units	ERL [(a)]	ERM [(b)]	SO-5
Metals				
Arsenic	mg/Kg	8.2	70	1.82
Chromium	mg/Kg	81	370	10.1
Copper	mg/Kg	34	270	9.04
Lead	mg/Kg	46.7	218	1.96
Nickel	mg/Kg	20.9	51.6	3.32
Selenium	mg/Kg	-	-	2.01
Zinc	mg/Kg	150	410	32.1
Phthalates				
Di-n-Butyl Phthalate	µg/Kg	-	-	8.3
Diethyl Phthalate	µg/Kg	-	-	10
Dioxins/Furans				
1,2,3,4,6,7,8-HpCDD	ng/Kg	-	-	0.533
Octachlorodibenzo-p-dioxin (OCDD)	ng/Kg	-	-	3.6
1,2,3,4,6,7,8-HpCDF	ng/Kg	-	-	0.15
Octachlorodibenzofuran (OCDF)	ng/Kg	-	-	0.221
Total Hexa-Dioxins	ng/Kg	-	-	0.173
Total Hepta-Dioxins	ng/Kg	-	-	1.37
Total Penta-Furans	ng/Kg	-	-	0.632
Total Hexa-Furans	ng/Kg	-	-	0.168
Total Hepta-Furans	ng/Kg	-	-	0.15
Total TEQ	ng/Kg	-	-	0.00798
Sediment Conventionals				
Oil & Grease	mg/Kg	-	-	23
TRPH	mg/Kg	-	-	59
Total Volatile Solids	%	-	-	0.82
Total Sulfides	mg/Kg	-	-	1.1
Total Solids	%	-	-	70.8

(a) Effects range low
(b) Effects range medium

No chemistry data exist for Torrey Pines State Beach or Leucadia Beach.

4.2 WEST BASIN

A total of eight borings were collected within the West Basin, not including samples that were collected to characterize the OD Pit, as shown in Figure 4-7. Two of these borings were channel sites used to create the upper layer samples for WB02 and WB05. Sample location details (depth, drilling method, sample ID) are provided in Table 4-4.

Table 4-4: West Basin Sample Summary

Boring/Sample Location ID	Boring Location (Decimal Degrees, WGS84)	Boring Depth (feet, bgs)	Method of Drilling/Collection
WB02-CH	33.00619, 117.27711	1.5	Hand Driven
WB02-S	33.00328, 117.27689	13.5	Hollow Stem Auger
WB03-S	33.00611, 117.27719	13.5	Hollow Stem Auger
WB04-S	33.01171, 117.27875	13.5	Hollow Stem Auger
WB05-CH	33.01293, 117.27879	1.5	Hand Driven
WB05-S	33.01293, 117.27888	12.0	Hollow Stem Auger
WB06-SB	33.00813, 117.27773	28.0	Solid Stem Auger
WB07-SB	33.00943, 117.27860	31.5	Mud Rotary

Figure 4-7: West Basin Sample Locations

4.2.1 Physical Testing

The grain size distribution results for the West Basin are summarized in Table 4-5.

Table 4-5: West Basin Grain Size Distribution Summary

Boring/Sample Location ID	Boring Depth (ft)	Approx. Interface Depth (ft, bgs)	Upper Layer (% Fines)	Lower Layer (% Fines)	Upper Layer (D50, mm)	Lower Layer (D50, mm)
WB02-CH	1.5	>1.5	20.1	ND	0.17	NA
WB02-S	13.5	NA	No Fines Encountered	9.5	No Fines Encountered	0.19
WB03-S	13.5	2	3.4	3.4	0.21	0.27
WB04-S	13.5	1	25.5	7.3	0.14	0.20
WB05-CH	1.5	NA	33.6	ND	0.13	NA
WB05-S	12.0	2		9.4		0.19
WB06-SB	28.0	1	19.5 (WB-COMP-SB)	10.5 (WB-COMP-SB)	0.16	0.18
WB07-SB	31.5	10				
		Average	**20.4%**	**8.0%**	**0.18 mm**	**0.21 mm**

As shown, the average percentage of fines in the upper layer in this basin is 20.4%. The lower layer is coarser, with an average of 8.0% fines. All export materials from the West Basin are proposed to be placed within the Overdredge Pit for all alternatives except Alternative 1A. Therefore, grain size distribution plots of the upper and lower layers of sediments are not shown relative to beach sediments. Additional Tier III sampling would be required to consider placement of export materials from the West, Central, and East Basins at LA-5 as a component of Alternative 1A.

4.2.2 Chemistry Testing

A total of four (two upper and two lower) chemistry samples were collected in the West Basin. The chemistry compositing scheme is shown in Table 4-6.

Table 4-6: West Basin Compositing Scheme

Supplemental Borings	Composite ID
WB02-CH	WB-Comp-South-Upper WB-Comp-South-Lower
WB02-S	
WB03-S	
WB04-S	
WB05-CH	
WB05-S	
WB06	WB-Comp-SB-Upper WB-Comp-SB-Lower
WB07	

The chemistry results are shown in Table 4-7. As shown in the table, all chemistry results are below established effects range-low (ERL) values except for WB-COMP-SB-Upper, which meets the ERL threshold for 4,4'-DDE at 2.2 ug/kg.

Table 4-7: West Basin Chemistry Results

Meets or Exceeds ERL		RSL		CHHSL	NOAA Screening		WB-COMP-South-Lower	WB-COMP-South-Upper	WB-Comp-SB-Upper	WB-Comp-SB-Lower
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
SEDIMENT CONVENTIONALS										
Percent Solids (total)	%								70.2	77.3
Total Organic Carbon	mg/kg dry						6200	1000	7700	2200
TRPH	mg/kg dry						ND	ND	ND	ND
Water Soluble Sulfides	mg/kg dry						ND	ND	ND	ND
Total Sulfides	mg/kg dry						2.7	2.9	18	8.3
Oil & Grease	mg/kg dry						ND	ND	ND	ND
METALS										
Arsenic	mg/kg dry	0.39	22	0.07	8.2	70	1.16	2.41	2.42	2.17
Cadmium	mg/kg dry	1800	70	1.7	1.2	9.6	ND	ND	ND	ND
Chromium	mg/kg dry			100000	81	370	5.33	10.7	11.6	8.04
Copper	mg/kg dry		3100	3000	34	270	2.05	19.5	10.6	5.14
Lead	mg/kg dry		400	150	46.7	218	1.26	12.0	8.9	4.3
Mercury	mg/kg dry		5.6	18	0.15	0.71	ND	ND	ND	ND
Nickel	mg/kg dry			1600	20.9	51.6	1.70	4.34	4.35	2.98
Selenium	mg/kg dry		390	380			ND	ND	0.322	0.186
Silver	mg/kg dry		390	380	1	3.7	ND	ND	ND	ND
Zinc	mg/kg dry		23000	23000	150	410	13.7	40.0	28.8	17.1
ORGANICS - BUTYLTINS										
Dibutyltin	ug/kg dry		18000				ND	ND	ND	ND
Monobutyltin	ug/kg dry						ND	ND	ND	ND
Tetrabutyltin	ug/kg dry						ND	ND	ND	ND
Tributyltin	ug/kg dry		18000				ND	ND	ND	ND
POLYAROMATIC HYDROCARBONS										
1-Methylnaphthalene	mg/kg dry						ND	ND	ND	ND
1-Methylphenanthrene	mg/kg dry						ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	mg/kg dry									
2,6-Dimethylnaphthalene	mg/kg dry						ND	ND	ND	ND
2-Methylnaphthalene	mg/kg dry				70	670	ND	ND	ND	ND
Acenaphthene	mg/kg dry		3400000		16	500	ND	ND	ND	ND
Acenaphthylene	mg/kg dry				44	640	ND	ND	ND	ND
Anthracene	mg/kg dry		17000000		85.3	1100	ND	ND	ND	ND
Benzo(a)anthracene	mg/kg dry	150			261	1600	ND	ND	ND	ND
Benzo(a)pyrene	mg/kg dry	150		38	430	1600	ND	ND	ND	ND
Benzo(b)fluoranthene	mg/kg dry	150					ND	ND	ND	ND
Benzo(e)pyrene	mg/kg dry						ND	ND	ND	ND
Benzo(g,h,i)perylene	mg/kg dry						ND	ND	ND	ND
Benzo(k)fluoranthene	mg/kg dry	1500					ND	ND	ND	ND
Biphenyl	mg/kg dry						ND	ND	ND	ND
Chrysene	mg/kg dry	15000			384	2800	ND	ND	ND	ND
Dibenzo(a,h)anthracene	mg/kg dry	150			63.4	260	ND	ND	ND	ND
Dibenzothiophene	mg/kg dry						ND	ND	ND	ND
Fluoranthene	mg/kg dry		2300000		600	5100	ND	ND	ND	ND

Meets or Exceeds ERL		RSL		CHHSL	NOAA Screening		WB-COMP-South-Lower	WB-COMP-South-Upper	WB-Comp-SB-Upper	WB-Comp-SB-Lower
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
Fluorene	mg/kg dry		2300000		19	540	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	mg/kg dry	150					ND	ND	ND	ND
Naphthalene	mg/kg dry		140000		160	2100	ND	ND	ND	ND
Perylene	mg/kg dry						ND	ND	ND	ND
Phenanthrene	mg/kg dry				240	1500	ND	ND	ND	ND
Pyrene	mg/kg dry		1700000		665	2600	ND	ND	ND	ND
Total Low Weight PAHs	mg/kg dry				552	3160				
Total High Weight PAHs	mg/kg dry				1700	9600				
Total PAHs	mg/kg dry				4022	44792				
ORGANICS - PHTHALATES										
Butyl Benzyl phthalate	mg/kg dry	260000	12000000				0.031	0.022	ND	ND
bis-(2-Ethylhexyl)phthalate	mg/kg dry	350000	1200000				0.077	0.048	ND	0.019
Diethyl phthalate	mg/kg dry		49000000				ND	ND	ND	ND
Dimethyl phthalate	mg/kg dry						0.10	0.13	0.15	0.085
Di-n-butyl phthalate	mg/kg dry		6100000				0.023	0.019	ND	ND
Di-n-octyl phthalate	mg/kg dry						ND	ND	ND	ND
ORGANICS - PHENOLS										
2,4,6-Trichlorophenol	mg/kg dry						ND	ND	ND	ND
2,4-Dichlorophenol	mg/kg dry						ND	ND	ND	ND
2,4-Dimethylphenol	mg/kg dry		1200000				ND	ND	ND	ND
2,4-Dinitrophenol	mg/kg dry						ND	ND	ND	ND
2-Chlorophenol	mg/kg dry						ND	ND	ND	ND
2-Methyl-4,6-dinitrophenol	mg/kg dry						ND	ND	ND	ND
2-Nitrophenol	mg/kg dry						ND	ND	ND	ND
4-Chloro-3-methylphenol	mg/kg dry						ND	ND	ND	ND
4-Nitrophenol	mg/kg dry						ND	ND	ND	ND
Pentachlorophenol	mg/kg dry	3000	1400000	4400			ND	ND	ND	ND
Phenol	mg/kg dry		18000000				ND	ND	ND	ND
CHLORINATED PESTICIDES										
2,4'-DDD	ug/kg dry	2000		2300			ND	ND	ND	ND
2,4'-DDE	ug/kg dry	1400		1600			ND	ND	ND	ND
2,4'-DDT	ug/kg dry	1700	36000	1600			ND	ND	ND	ND
4,4'-DDD	ug/kg dry	2000		2300	2	20	ND	ND	ND	ND
4,4'-DDE	ug/kg dry	1400		1600	2.2	27	ND	ND	2.2	ND
4,4'-DDT	ug/kg dry	1700	36000	1600	1	7	ND	ND	ND	ND
Total DDT	ug/kg dry				1.58	46.1	ND	ND	2.2	ND
Aldrin	ug/kg dry	29	1800	33			ND	ND	ND	ND
BHC-alpha	ug/kg dry						ND	ND	ND	ND
BHC-beta	ug/kg dry						ND	ND	ND	ND
BHC-delta	ug/kg dry						ND	ND	ND	ND
BHC-gamma	ug/kg dry						ND	ND	ND	ND
Chlordane-alpha	ug/kg dry						ND	ND	ND	ND
Chlordane-gamma	ug/kg dry						ND	ND	ND	ND
cis-Nonachlor	ug/kg dry						ND	ND	ND	ND
DCPA (Dacthal)	ug/kg dry				0.02	8	ND	ND	ND	ND

🟧 Meets or Exceeds ERL		RSL		CHHSL	NOAA Screening		WB-COMP-South-Lower	WB-COMP-South-Upper	WB-Comp-SB-Upper	WB-Comp-SB-Lower
🟥 Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
Dicofol	ug/kg dry									
Dieldrin	ug/kg dry	30	3100	35			ND	ND	ND	ND
Endosulfan Sulfate	ug/kg dry		370000				ND	ND	ND	ND
Endosulfan-I	ug/kg dry						ND	ND	ND	ND
Endosulfan-II	ug/kg dry						ND	ND	ND	ND
Endrin	ug/kg dry		18000	21000			ND	ND	ND	ND
Endrin Aldehyde	ug/kg dry						ND	ND	ND	ND
Endrin Ketone	ug/kg dry						ND	ND	ND	ND
Heptachlor	ug/kg dry	110	31000	130			ND	ND	ND	ND
Heptachlor Epoxide	ug/kg dry	53	790				ND	ND	ND	ND
Methoxychlor	ug/kg dry			340000			ND	ND	ND	ND
Mirex	ug/kg dry	27	12000	31			ND	ND	ND	ND
Oxychlordane	ug/kg dry						ND	ND	ND	ND
Perthane	ug/kg dry						ND	ND	ND	ND
Toxaphene	ug/kg dry	440		460			ND	ND	ND	ND
trans-Nonachlor	ug/kg dry						ND	ND	ND	ND
Total Chlordane[2]	ug/kg dry	1600	35000	430	0.5	6	ND	ND	ND	ND
ORGANICS - AROCLORS										
Aroclor 1016	ug/kg dry						ND	ND	ND	ND
Aroclor 1221	ug/kg dry						ND	ND	ND	ND
Aroclor 1232	ug/kg dry						ND	ND	ND	ND
Aroclor 1242	ug/kg dry						ND	ND	ND	ND
Aroclor 1248	ug/kg dry						ND	ND	ND	ND
Aroclor 1254	ug/kg dry						ND	ND	ND	ND
Aroclor 1260	ug/kg dry						ND	ND	ND	ND
Total Aroclor PCBs	ug/kg dry			89	22.7	180	ND	ND	ND	ND
ORGANICS – PCB CONGENERS										
PCB003	ug/kg dry						ND	ND	ND	ND
PCB008	ug/kg dry						ND	ND	ND	ND
PCB018	ug/kg dry						ND	ND	ND	ND
PCB028	ug/kg dry						ND	ND	ND	ND
PCB031	ug/kg dry						ND	ND	ND	ND
PCB033	ug/kg dry						ND	ND	ND	ND
PCB037	ug/kg dry						ND	ND	ND	ND
PCB044	ug/kg dry						ND	ND	ND	ND
PCB049	ug/kg dry						ND	ND	ND	ND
PCB052	ug/kg dry						ND	ND	ND	ND
PCB056+060	ug/kg dry						ND	ND	ND	ND
PCB066	ug/kg dry						ND	ND	ND	ND
PCB070	ug/kg dry						ND	ND	ND	ND
PCB074	ug/kg dry						ND	ND	ND	ND
PCB077	ug/kg dry	34					ND	ND	ND	ND
PCB081	ug/kg dry	34					ND	ND	ND	ND
PCB087	ug/kg dry						ND	ND	ND	ND
PCB095	ug/kg dry						ND	ND	ND	ND

Meets or Exceeds ERL		RSL		CHHSL	NOAA Screening		WB-COMP-South-Lower	WB-COMP-South-Upper	WB-Comp-SB-Upper	WB-Comp-SB-Lower
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
PCB097	ug/kg dry						ND	ND	ND	ND
PCB099	ug/kg dry						ND	ND	ND	ND
PCB101	ug/kg dry						ND	ND	ND	ND
PCB105	ug/kg dry	34					ND	ND	ND	ND
PCB110	ug/kg dry						ND	ND	ND	ND
PCB114	ug/kg dry	0.68					ND	ND	ND	ND
PCB118	ug/kg dry	34					ND	ND	ND	ND
PCB119	ug/kg dry						ND	ND	ND	ND
PCB123	ug/kg dry	34					ND	ND	ND	ND
PCB126	ug/kg dry	0.34					ND	ND	ND	ND
PCB128	ug/kg dry						ND	ND	ND	ND
PCB138	ug/kg dry						ND	ND	ND	ND
PCB141	ug/kg dry						ND	ND	ND	ND
PCB149	ug/kg dry						ND	ND	ND	ND
PCB151	ug/kg dry						ND	ND	ND	ND
PCB153	ug/kg dry						ND	ND	ND	ND
PCB156	ug/kg dry	6.8					ND	ND	ND	ND
PCB157	ug/kg dry	6.8					ND	ND	ND	ND
PCB158	ug/kg dry						ND	ND	ND	ND
PCB167	ug/kg dry	340					ND	ND	ND	ND
PCB168+132	ug/kg dry						ND	ND	ND	ND
PCB169	ug/kg dry	0.34					ND	ND	ND	ND
PCB170	ug/kg dry						ND	ND	ND	ND
PCB174	ug/kg dry						ND	ND	ND	ND
PCB177	ug/kg dry						ND	ND	ND	ND
PCB180	ug/kg dry						ND	ND	ND	ND
PCB183	ug/kg dry						ND	ND	ND	ND
PCB187	ug/kg dry						ND	ND	ND	ND
PCB189	ug/kg dry	34					ND	ND	ND	ND
PCB194	ug/kg dry						ND	ND	ND	ND
PCB195	ug/kg dry						ND	ND	ND	ND
PCB200	ug/kg dry						ND	ND	ND	ND
PCB201	ug/kg dry						ND	ND	ND	ND
PCB203	ug/kg dry						ND	ND	ND	ND
PCB206	ug/kg dry						ND	ND	ND	ND
PCB209	ug/kg dry						ND	ND	ND	ND
Total PCB Congeners	ug/kg dry			89	22.7	180	ND	ND	ND	ND

4.3 CENTRAL BASIN

A total of 26 borings were collected within the Central Basin, excluding samples that were collected to characterize the OD Pit, as shown in Figure 4-8. Although located in the Central Basin, the OD Pit feature is characterized separately in Section 4.4. A total of 10 of these borings were channel sites, which were used to create upper layer samples. Sample location details (depth, drilling method, sample ID) are provided in Table 4-8.

Table 4-8: Central Basin Sample Summary

Boring/Sample Location ID	Boring Location (Decimal Degrees, WGS84)	Boring Depth (feet, bgs)	Method of Drilling/Collection
CB01-D	33.01152, 117.27428	21.5	Hollow Stem Auger
CB02-D	33.01045, 117.27601	15.0	Hollow Stem Auger
CB03-D	33.01036, 117.27692	26.5	Hollow Stem Auger
CB04-CH	33.01381, 117.27745	1.5	Hand Driven
CB04-S	33.01385, 117.27728	13.5	Hollow Stem Auger
CB05-CH	33.00650, 117.26669	1.5	Hand Driven
CB05-S	33.00700, 117.26682	13.5	Hollow Stem Auger
CB06-CH	33.00959, 117.26545	1.5	Hand Driven
CB06-S	33.00949, 117.26530	9.5	Hollow Stem Auger
CB07-CH	33.00905, 117.26833	1.5	Hand Driven
CB07-S	33.00920, 117.26815	9.5	Hollow Stem Auger
CB08-CH	33.00979, 117.27089	1.5	Hand Driven
CB08-S	33.00986, 117.27078	9.5	Hollow Stem Auger
CB09-CH	33.00756, 117.27120	1.5	Hand Driven
CB09-S	33.00756, 117.27085	13.5	Hollow Stem Auger
CB10-CH	33.00479, 117.26941	1.5	Hand Driven
CB10-S	33.00473, 117.26929	9.5	Hollow Stem Auger
CB11-CH	33.01313, 117.27483	1.5	Hand Driven
CB11-S	33.01313, 117.27494	13.5	Hollow Stem Auger
CB12-CH	33.01175, 117.27237	1.5	Hand Driven
CB12-S	33.01182, 117.27240	9.5	Hollow Stem Auger
CB13-CH	33.00801, 117.26517	1.5	Hand Driven
CB13-S	33.00791, 117.26520	9.5	Hollow Stem Auger
CB14-SB	33.00965, 117.27671	30.0	Solid Stem Auger
CB15-SB	33.00952, 117.27428	30.0	Solid Stem Auger
CB16-SB	33.00812, 117.27300	30.0	Solid Stem Auger

Figure 4-8: Boring Locations in the Central Basin

4.3.1 Physical Testing

The grain size distribution results for the Central Basin are summarized in Table 4-9.

Table 4-9: Central Basin Grain Size Distribution Summary

Boring/Sample Location ID	Boring Depth (feet)	Approx. Interface Depth (ft, bgs)	Upper Layer (% Fines)	Lower Layer (% Fines)	Upper Layer ($D_{50, mm}$)	Lower Layer ($D_{50, mm}$)
CB01-D	21.5	10	9.4	7.9	0.13	0.18
CB02-D	15.0	2.5	64.3	7.2	ND	0.18
CB03-D	26.5	5	24.9	8.5	0.13	0.18
CB04-CH	1.5	>1.5	10.3	NA	0.19	NA
CB04-S	13.5	1		11		0.16
CB05-CH	1.5	>1.5	76.8	NA	ND	NA
CB05-S	13.5	2.5		19.9		0.12
CB06-CH	1.5	>1.5	72.6	NA	ND	NA
CB06-S	9.5	1.5		23.7		0.12
CB07-CH	1.5	>1.5	43.5	NA	0.09	NA
CB07-S	9.5	6		17.9		0.12
CB08-CH	1.5	>1.5	36	NA	0.10	NA
CB08-S	9.5	2		12.8		0.16
CB09-CH	1.5	>1.5	81.5	NA	ND	NA
CB09-S	13.5	2		10.2		0.17
CB10-CH	1.5	>1.5	35	NA	0.19	NA
CB10-S	9.5	3		17.5		0.17
CB11-CH	1.5	>1.5	36.4	NA	0.11	NA
CB11-S	13.5	5		19		0.17
CB12-CH	1.5	>1.5	97	NA	ND	NA
CB12-S	9.5	3.5		10.2		0.17
CB13-CH	1.5	>1.5	99	NA	ND	NA
CB13-S	9.5	2		27.8		0.12
CB14-SB	30.0		62.0 (CB-COMP-SB)	14.3 (CB-COMP-SB)	ND	0.19
CB15-SB	30.0					
CB16-SB	30.0					
Average			53.5%	14.9%	0.13 mm	0.16 mm

As shown, the average percentage of fines in the upper layer in this basin is 53.5%. The lower layer is coarser, with an average of 14.9% fines. All export materials from the Central Basin, except for 35,000 cy used for the creation of man-made transitional habitat areas, are proposed to be placed within the Overdredge Pit for all proposed alternatives except Alternative 1A. Therefore, grain size distribution plots of the upper and lower layers of sediments are not shown relative to proposed receiving beach sediments. Additional Tier III sampling would be required to consider placement of export materials from the Central Basin at LA-5 as a component of Alternative 1A.

4.3.2 Chemistry Testing

A total of eight (four upper and four lower) chemistry samples were collected in the Central Basin. The chemistry compositing scheme is shown in Table 4-10.

Table 4-10: Central Basin Compositing Scheme

Boring ID	Composite ID
CB04-CH	CB-Comp-NW-Upper CB-Comp-NW-Lower
CB04-S	
CB11-CH	
CB11-S	
OD03	CB-Comp-D-Upper CB-Comp-D-Lower
CB01-D	
CB02-D	
CB03-D	
CB06-CH	CB-Comp-North-Upper CB-Comp-North-Lower
CB06-S	
CB07-CH	
CB07-S	
CB08-CH	
CB08-S	
CB12-CH	
CB12-S	
CB05-CH	CB-Comp-South-Upper CB-Comp-South-Lower
CB05-S	
CB09-CH	
CB-09-S	
CB10-CH	
CB10-S	
CB13-CH	
CB13-S	

The chemistry results are shown in Table 4-11. As shown, all chemistry results are below established ERL values except for CB-COMP-South-Upper and CB-COMP-NW-Upper. These exceedances are as follows:

- CB-COMP-South-Upper
    - 4,4'-DDE at 6.5 ug/kg (ERL = 2.2 ug/kg)
- CB-COMP-NW-Upper
    - 4,4'-DDD at 2.8 ug/kg (ERL = 2.0 ug/kg)
    - 4,4'-DDE at 3.1 ug/kg (ERL = 2.2 ug/kg)

Table 4-11: Central Basin Chemistry Results

Exceeds ERL	Units	RSL		CHHSL	NOAA Screening		CB-COMP-South-Lower	CB-COMP-South-Upper	CB-COMP-North-Lower	CB-COMP-North-Upper	CB-COMP-NW-Lower	CB-COMP-NW-Upper	CB-Comp-SB-Lower	CB-Comp-SB-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use										
Valid Analyte Name		(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM								
SEDIMENT CONVENTIONALS														
Percent Solids (total)	%												77.7	70.2
Total Organic Carbon	mg/kg dry						1400	8200	1100	13000	6200	6900	1400	6400
TRPH	mg/kg dry						ND	ND	ND	ND	ND	16	ND	ND
Water Soluble Sulfides	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Total Sulfides	mg/kg dry						0.83	27	0.94	140	3.3	14	9.3	11
Oil & Grease	mg/kg dry						ND	ND	ND	ND	ND	28	19	ND
METALS														
Arsenic	mg/kg dry	0.39	22	0.07	8.2	70	2.02	3.74	2.56	5.04	1.66	2.07	1.58	2.51
Cadmium	mg/kg dry	1800	70	1.7	1.2	9.6	0.168	0.413	0.228	0.219	ND	0.178	ND	ND
Chromium	mg/kg dry			100000	81	370	7.83	20.7	7.90	16.9	5.65	11.8	6.76	16.4
Copper	mg/kg dry		3100	3000	34	270	4.35	32.5	3.75	26.7	2.26	21.9	4.89	16.5
Lead	mg/kg dry		400	150	46.7	218	1.21	9.19	1.24	11.0	0.919	6.05	1.67	6.56
Mercury	mg/kg dry		5.6	18	0.15	0.71	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	mg/kg dry			1600	20.9	51.6	2.97	9.32	3.91	8.19	2.04	4.91	2.63	6.45
Selenium	mg/kg dry		390	380			0.316	0.475	0.186	0.347	ND	ND	0.244	0.393
Silver	mg/kg dry		390	380	1	3.7	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	mg/kg dry		23000	23000	150	410	18.2	60.6	21.1	57.1	11.4	41.8	14.9	47.6
ORGANICS - BUTYLTINS														
Dibutyltin	ug/kg dry		18000				ND	ND	ND	ND	ND	ND	ND	ND
Monobutyltin	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Tetrabutyltin	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Tributyltin	ug/kg dry		18000				ND	ND	ND	ND	ND	ND	ND	ND
POLYAROMATIC HYDROCARBONS														
1-Methylnaphthalene	mg/kg dry						ND	0.033	ND	ND	ND	ND	ND	ND
1-Methylphenanthrene	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	mg/kg dry													
2,6-Dimethylnaphthalene	mg/kg dry						ND	0.02	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	mg/kg dry				70	670	ND	0.088	ND	ND	ND	ND	ND	ND
Acenaphthene	mg/kg dry		3400000		16	500	ND	0.015	ND	ND	ND	ND	ND	ND
Acenaphthylene	mg/kg dry				44	640	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	mg/kg dry		17000000		85.3	1100	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	mg/kg dry	150			261	1600	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	mg/kg dry	150		38	430	1600	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	mg/kg dry	150					ND	ND	ND	ND	ND	ND	ND	ND
Benzo(e)pyrene	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	mg/kg dry	1500					ND	ND	ND	ND	ND	ND	ND	ND
Biphenyl	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	mg/kg dry	15000			384	2800	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	mg/kg dry	150			63.4	260	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzothiophene	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	mg/kg dry		2300000		600	5100	ND	ND	ND	ND	ND	ND	ND	ND

Exceeds ERL	Units	RSL		CHHSL	NOAA Screening		CB-COMP-South-Lower	CB-COMP-South-Upper	CB-COMP-North-Lower	CB-COMP-North-Upper	CB-COMP-NW-Lower	CB-COMP-NW-Upper	CB-Comp-SB-Lower	CB-Comp-SB-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use										
Valid Analyte Name		(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM								
Fluorene	mg/kg dry		2300000		19	540	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	mg/kg dry	150					ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	mg/kg dry		140000		160	2100	ND	0.18	ND	ND	ND	ND	ND	ND
Perylene	mg/kg dry						ND	ND	ND	0.05	ND	0.015	ND	ND
Phenanthrene	mg/kg dry				240	1500	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	mg/kg dry		1700000		665	2600	ND	ND	ND	ND	ND	ND	ND	ND
Total Low Weight PAHs	mg/kg dry				552	3160								
Total High Weight PAHs	mg/kg dry				1700	9600								
Total PAHs	mg/kg dry				4022	44792	ND	0.336	ND	ND	ND	0.015	ND	ND
ORGANICS - PHTHALATES														
Butyl Benzyl phthalate	mg/kg dry	260000	12000000				0.014	ND	0.017	0.030	0.025	0.023	ND	0.017
bis-(2-Ethylhexyl)phthalate	mg/kg dry	350000	1200000				0.032	0.040	0.018	0.028	0.059	0.077	0.013	0.031
Diethyl phthalate	mg/kg dry		49000000				ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl phthalate	mg/kg dry						0.24	0.44	0.44	0.47	0.11	0.095	0.062	0.071
Di-n-butyl phthalate	mg/kg dry		6100000				ND	ND	ND	ND	0.020	0.019	ND	ND
Di-n-octyl phthalate	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
ORGANICS - PHENOLS														
2,4,6-Trichlorophenol	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	mg/kg dry		1200000				ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorophenol	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
2-Methyl-4,6-dinitrophenol	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
2-Nitrophenol	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
4-Nitrophenol	mg/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	mg/kg dry	3000	1400000	4400			ND	ND	ND	ND	ND	ND	ND	ND
Phenol	mg/kg dry		18000000				ND	ND	ND	ND	ND	ND	ND	ND
CHLORINATED PESTICIDES														
2,4'-DDD	ug/kg dry	2000		2300			ND	ND	ND	ND	ND	ND	ND	ND
2,4'-DDE	ug/kg dry	1400		1600			ND	1.5	ND	ND	ND	ND	ND	ND
2,4'-DDT	ug/kg dry	1700	36000	1600			ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD	ug/kg dry	2000		2300	2	20	ND	1.5	ND	ND	ND	2.8	ND	ND
4,4'-DDE	ug/kg dry	1400		1600	2.2	27	ND	6.5	ND	ND	ND	3.1	ND	ND
4,4'-DDT	ug/kg dry	1700	36000	1600	1	7	ND	ND	ND	ND	ND	ND	ND	ND
Total DDT	ug/kg dry				1.58	46.1		9.5	ND	ND	ND	5.9	ND	ND
Aldrin	ug/kg dry	29	1800	33			ND	ND	ND	ND	ND	ND	ND	ND
BHC-alpha	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
BHC-beta	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
BHC-delta	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
BHC-gamma	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Chlordane-alpha	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Chlordane-gamma	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
cis-Nonachlor	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
DCPA (Dacthal)	ug/kg dry				0.02	8	ND	ND	ND	ND	ND	ND	ND	ND

Exceeds ERL	Units	RSL		CHHSL	NOAA Screening		CB-COMP-South-Lower	CB-COMP-South-Upper	CB-COMP-North-Lower	CB-COMP-North-Upper	CB-COMP-NW-Lower	CB-COMP-NW-Upper	CB-Comp-SB-Lower	CB-Comp-SB-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use										
Valid Analyte Name		(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM								
Dicofol	ug/kg dry													
Dieldrin	ug/kg dry	30	3100	35			ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate	ug/kg dry		370000				ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan-I	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan-II	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Endrin	ug/kg dry		18000	21000			ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ug/kg dry	110	31000	130			ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ug/kg dry	53	790				ND	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	ug/kg dry			340000			ND	ND	ND	ND	ND	ND	ND	ND
Mirex	ug/kg dry	27	12000	31			ND	ND	ND	ND	ND	ND	ND	ND
Oxychlordane	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Perthane	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Toxaphene	ug/kg dry	440		460			ND	ND	ND	ND	ND	ND	ND	ND
trans-Nonachlor	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Total Chlordane[2]	ug/kg dry	1600	35000	430	0.5	6	ND	ND	ND	ND	ND	ND	ND	ND
ORGANICS - AROCLORS														
Aroclor 1016	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1221	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1232	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1242	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1248	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1254	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1260	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Total Aroclor PCBs	ug/kg dry			89	22.7	180	ND	ND	ND	ND	ND	ND	ND	ND
ORGANICS – PCB CONGENERS														
PCB003	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB008	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB018	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB028	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB031	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB033	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB037	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB044	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB049	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB052	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB056+060	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB066	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB070	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB074	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB077	ug/kg dry	34					ND	ND	ND	ND	ND	ND	ND	ND
PCB081	ug/kg dry	34					ND	ND	ND	ND	ND	ND	ND	ND
PCB087	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB095	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND

Exceeds ERL	Units	RSL		CHHSL	NOAA Screening		CB-COMP-South-Lower	CB-COMP-South-Upper	CB-COMP-North-Lower	CB-COMP-North-Upper	CB-COMP-NW-Lower	CB-COMP-NW-Upper	CB-Comp-SB-Lower	CB-Comp-SB-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use										
Valid Analyte Name		(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM								
PCB097	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB099	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB101	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB105	ug/kg dry	34					ND	ND	ND	ND	ND	ND	ND	ND
PCB110	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB114	ug/kg dry	0.68					ND	ND	ND	ND	ND	ND	ND	ND
PCB118	ug/kg dry	34					ND	ND	ND	ND	ND	ND	ND	ND
PCB119	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB123	ug/kg dry	34					ND	ND	ND	ND	ND	ND	ND	ND
PCB126	ug/kg dry	0.34					ND	ND	ND	ND	ND	ND	ND	ND
PCB128	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB138	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB141	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB149	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB151	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB153	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB156	ug/kg dry	6.8					ND	ND	ND	ND	ND	ND	ND	ND
PCB157	ug/kg dry	6.8					ND	ND	ND	ND	ND	ND	ND	ND
PCB158	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB167	ug/kg dry	340					ND	ND	ND	ND	ND	ND	ND	ND
PCB168+132	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB169	ug/kg dry	0.34					ND	ND	ND	ND	ND	ND	ND	ND
PCB170	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB174	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB177	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB180	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB183	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB187	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB189	ug/kg dry	34					ND	ND	ND	ND	ND	ND	ND	ND
PCB194	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB195	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB200	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB201	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB203	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB206	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
PCB209	ug/kg dry						ND	ND	ND	ND	ND	ND	ND	ND
Total PCB Congeners	ug/kg dry			89	22.7	180	ND	ND	ND	ND	ND	ND	ND	ND

4.4 EAST BASIN

A total of 14 samples were collected within the East Basin, as shown in Figure 4-9. A total of six of these borings were channel sites, which were used to create upper layer samples. Sample location details (depth, drilling method, sample ID) are shown in Table 4-12.

Table 4-12: East Basin Grain Size Distribution Summary

Boring/Sample Location ID	Boring Location (Decimal Degrees, WGS84)	Boring Depth (feet, bgs)	Method of Drilling/Collection
EB01-S	33.01510, 117.25686	13.5	Hollow Stem Auger
EB02-CH	33.01363, 117.25826	1.5	Hand Driven
EB02-S	33.01364, 117.25838	13.5	Hollow Stem Auger
EB03-CH	33.01150, 117.26019	1.5	Hand Driven
EB03-S	33.01173, 117.26128	13.5	Hollow Stem Auger
EB04-CH	33.00982, 117.25621	1.5	Hand Driven
EB04-S	33.00980, 117.25619	13.5	Hollow Stem Auger
EB05-CH	33.00732, 117.25888	1.5	Hand Driven
EB05-S	33.00901, 117.25877	13.5	Hollow Stem Auger
EB06-CH	33.00743, 117.26206	1.5	Hand Driven
EB06-S	33.00926, 117.26218	13.5	Hollow Stem Auger
EB07-CH	33.01013, 117.26316	1.5	Hand Driven
EB07-S	33.00983, 117.26295	13.5	Hollow Stem Auger
EB08-S	33.01618, 117.25625	13.5	Hollow Stem Auger

Figure 4-9: East Basin Sample Locations

4.4.1 Physical Testing

The grain size distribution results for the East Basin are summarized in Table 4-13.

Table 4-13: East Basin Grain Size Distribution Summary

Boring/Sample Location ID	Boring Depth (feet, bgs)	Approx. Interface Depth (ft, bgs)	Upper Layer (% Fines)	Lower Layer (% Fines)	Upper Layer ($D_{50, mm}$)	Lower Layer ($D_{50, mm}$)
EB01-S	13.5	9.5	76.4	40.2	ND	0.09
EB02-CH	1.5	>1.5	89	NA	ND	NA
EB02-S	13.5	9		12.8		0.14
EB03-CH	1.5	>1.5	86.9	NA	ND	NA
EB03-S	13.5	6		14.8		0.17
EB04-CH	1.5	>1.5	83.3	NA	ND	NA
EB04-S	13.5	4		27.5		0.12
EB05-CH	1.5	>1.5	63.3	NA	ND	NA
EB05-S	13.5	4		24.5		0.12
EB06-CH	1.5	>1.5	69.2	NA	ND	NA
EB06-S	13.5	4		28.1		0.12
EB07-CH	1.5	>1.5	83	NA	ND	NA
EB07-S	13.5	6		34.2		0.11
EB08-S	13.5	9.5	77.4	30.6	ND	0.10
		Average	78.6%	26.6%	ND	0.12mm

As shown, the average percentage of fines in the upper layer in this basin is 78.6%. The lower layer is coarser, with an average of 26.6% fines. All export materials from the East Basin, except for 10,000 cy to be used for the creation of a man-made transitional habitat area, are proposed to be placed within the Overdredge Pit for all proposed alternatives except Alternative 1A. Therefore, grain size distribution plots of the upper and lower layers of sediments are not shown relative to proposed receiving beach sediments. Additional Tier III sampling would be required to consider placement of export materials from the East Basin at LA-5 as a component of Alternative 1A.

4.4.2 Chemistry Testing

A total of four (two upper and two lower) chemistry samples were collected in the East Basin. The chemistry compositing scheme is shown in Table 4-14.

Table 4-14: East Basin Compositing Scheme

Boring ID	Composite ID
EB02-CH	EB-Comp-North-Upper EB-Comp-North-Lower
EB02-S	
EB03-CH	
EB03-S	
EB07-CH	
EB07-S	
EB08-S	
EB-01-S	EB-Comp-South-Upper EB-Comp-South-Lower
EB04-CH	
EB04-S	
EB05-CH	
EB05-S	
EB06-CH	
EB06-S	

The chemistry results are shown in Table 4-15. All chemistry results were below established screening levels, except for EB-COMP-North-Upper and EB-COMP-South-Lower, which both exceeded the ERL value for Total Aroclor PCB's. These exceedances are as follows:

- EB-COMP-North-Upper
    - Total Aroclor PCB's at 39 ug/kg (ERL = 22.7 ug/kg)
- EB-COMP-South-Lower
    - Total Aroclor PCB's at 92 ug/kg (ERL = 22.7 ug/kg)

Table 4-15: East Basin Chemistry Results

Exceeds ERL		RSL		CHHSL	NOAA Screening		EB-COMP-North-Lower	EB-COMP-North-Upper	EB-COMP-South-Lower	EB-COMP-South-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
SEDIMENT CONVENTIONALS										
Percent Solids (total)	%									
Total Organic Carbon	mg/kg dry						2800	9800	3700	11000
TRPH	mg/kg dry						69	43	ND	ND
Water Soluble Sulfides	mg/kg dry						ND	ND	ND	ND
Total Sulfides	mg/kg dry						12	13	2.4	1.6
Oil & Grease	mg/kg dry						79	53	ND	ND
METALS										
Arsenic	mg/kg dry	0.39	22	0.07	8.2	70	6.63	4.50	3.75	6.09
Cadmium	mg/kg dry	1800	70	1.7	1.2	9.6	ND	0.192	0.132	0.230
Chromium	mg/kg dry			100000	81	370	10.5	13.8	9.78	19.1
Copper	mg/kg dry		3100	3000	34	270	7.21	21.8	5.11	26.4
Lead	mg/kg dry		400	150	46.7	218	3.54	8.61	1.82	11.0
Mercury	mg/kg dry		5.6	18	0.15	0.71	ND	ND	ND	ND
Nickel	mg/kg dry			1600	20.9	51.6	4.55	8.31	3.68	9.93
Selenium	mg/kg dry		390	380			ND	0.167	0.147	0.422
Silver	mg/kg dry		390	380	1	3.7	ND	ND	ND	ND
Zinc	mg/kg dry		23000	23000	150	410	32.5	59.4	29.9	65.5
ORGANICS - BUTYLTINS										
Dibutyltin	ug/kg dry		18000				ND	ND	ND	ND
Monobutyltin	ug/kg dry						ND	ND	ND	ND
Tetrabutyltin	ug/kg dry						ND	ND	ND	ND
Tributyltin	ug/kg dry		18000				ND	ND	ND	ND
POLYAROMATIC HYDROCARBONS										
1-Methylnaphthalene	mg/kg dry						ND	ND	ND	ND
1-Methylphenanthrene	mg/kg dry						ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	mg/kg dry									
2,6-Dimethylnaphthalene	mg/kg dry						ND	ND	ND	ND
2-Methylnaphthalene	mg/kg dry				70	670	ND	ND	ND	ND
Acenaphthene	mg/kg dry		3400000		16	500	ND	ND	ND	ND
Acenaphthylene	mg/kg dry				44	640	ND	ND	ND	ND
Anthracene	mg/kg dry		17000000		85.3	1100	ND	ND	ND	ND
Benzo(a)anthracene	mg/kg dry	150			261	1600	ND	ND	ND	ND
Benzo(a)pyrene	mg/kg dry	150		38	430	1600	ND	ND	ND	ND
Benzo(b)fluoranthene	mg/kg dry	150					ND	ND	ND	ND
Benzo(e)pyrene	mg/kg dry						ND	ND	ND	ND
Benzo(g,h,i)perylene	mg/kg dry						ND	ND	ND	ND
Benzo(k)fluoranthene	mg/kg dry	1500					ND	ND	ND	ND
Biphenyl	mg/kg dry						ND	ND	ND	ND
Chrysene	mg/kg dry	15000			384	2800	ND	ND	ND	ND
Dibenzo(a,h)anthracene	mg/kg dry	150			63.4	260	ND	ND	ND	ND
Dibenzothiophene	mg/kg dry						ND	ND	ND	ND
Fluoranthene	mg/kg dry		2300000		600	5100	ND	ND	ND	ND

Exceeds ERL		RSL		CHHSL	NOAA Screening		EB-COMP-North-Lower	EB-COMP-North-Upper	EB-COMP-South-Lower	EB-COMP-South-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
Fluorene	mg/kg dry		2300000		19	540	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	mg/kg dry	150					ND	ND	ND	ND
Naphthalene	mg/kg dry		140000		160	2100	ND	ND	ND	ND
Perylene	mg/kg dry						ND	ND	ND	ND
Phenanthrene	mg/kg dry				240	1500	ND	ND	ND	ND
Pyrene	mg/kg dry		1700000		665	2600	ND	ND	ND	ND
Total Low Weight PAHs	mg/kg dry				552	3160				
Total High Weight PAHs	mg/kg dry				1700	9600				
Total PAHs	mg/kg dry				4022	44792	ND	ND	ND	ND
ORGANICS - PHTHALATES										
Butyl Benzyl phthalate	mg/kg dry	260000	12000000				0.04	0.076	0.049	0.15
bis-(2-Ethylhexyl)phthalate	mg/kg dry	350000	1200000				0.049	0.1	0.059	0.21
Diethyl phthalate	mg/kg dry		49000000				ND	0.015	ND	0.016
Dimethyl phthalate	mg/kg dry						0.35	0.42	0.30	0.34
Di-n-butyl phthalate	mg/kg dry		6100000				ND	0.015	0.016	0.021
Di-n-octyl phthalate	mg/kg dry						ND	ND	ND	ND
ORGANICS - PHENOLS										
2,4,6-Trichlorophenol	mg/kg dry						ND	ND	ND	ND
2,4-Dichlorophenol	mg/kg dry						ND	ND	ND	ND
2,4-Dimethylphenol	mg/kg dry		1200000				ND	ND	ND	ND
2,4-Dinitrophenol	mg/kg dry						ND	ND	ND	ND
2-Chlorophenol	mg/kg dry						ND	ND	ND	ND
2-Methyl-4,6-dinitrophenol	mg/kg dry						ND	ND	ND	ND
2-Nitrophenol	mg/kg dry						ND	ND	ND	ND
4-Chloro-3-methylphenol	mg/kg dry						ND	ND	ND	ND
4-Nitrophenol	mg/kg dry						ND	ND	ND	ND
Pentachlorophenol	mg/kg dry	3000	1400000	4400			ND	ND	ND	ND
Phenol	mg/kg dry		18000000				ND	ND	ND	ND
CHLORINATED PESTICIDES										
2,4'-DDD	ug/kg dry	2000		2300			ND	ND	ND	ND
2,4'-DDE	ug/kg dry	1400		1600			ND	ND	ND	ND
2,4'-DDT	ug/kg dry	1700	36000	1600			ND	ND	ND	ND
4,4'-DDD	ug/kg dry	2000		2300	2	20	ND	ND	ND	ND
4,4'-DDE	ug/kg dry	1400		1600	2.2	27	ND	ND	ND	ND
4,4'-DDT	ug/kg dry	1700	36000	1600	1	7	ND	ND	ND	ND
Total DDT	ug/kg dry				1.58	46.1	ND	ND	ND	ND
Aldrin	ug/kg dry	29	1800	33			ND	ND	ND	ND
BHC-alpha	ug/kg dry						ND	ND	ND	ND
BHC-beta	ug/kg dry						ND	ND	ND	ND
BHC-delta	ug/kg dry						ND	ND	ND	ND
BHC-gamma	ug/kg dry						ND	ND	ND	ND
Chlordane-alpha	ug/kg dry						ND	ND	ND	ND
Chlordane-gamma	ug/kg dry						ND	ND	ND	ND
cis-Nonachlor	ug/kg dry						ND	ND	ND	ND
DCPA (Dacthal)	ug/kg dry				0.02	8	ND	ND	ND	ND

Exceeds ERL		RSL		CHHSL	NOAA Screening		EB-COMP-North-Lower	EB-COMP-North-Upper	EB-COMP-South-Lower	EB-COMP-South-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
Dicofol	ug/kg dry									
Dieldrin	ug/kg dry	30	3100	35			ND	ND	ND	ND
Endosulfan Sulfate	ug/kg dry		370000				ND	ND	ND	ND
Endosulfan-I	ug/kg dry						ND	ND	ND	ND
Endosulfan-II	ug/kg dry						ND	ND	ND	ND
Endrin	ug/kg dry		18000	21000			ND	ND	ND	ND
Endrin Aldehyde	ug/kg dry						ND	ND	ND	ND
Endrin Ketone	ug/kg dry						ND	ND	ND	ND
Heptachlor	ug/kg dry	110	31000	130			ND	ND	ND	ND
Heptachlor Epoxide	ug/kg dry	53	790				ND	ND	ND	ND
Methoxychlor	ug/kg dry			340000			ND	ND	ND	ND
Mirex	ug/kg dry	27	12000	31			ND	ND	ND	ND
Oxychlordane	ug/kg dry						ND	ND	ND	ND
Perthane	ug/kg dry						ND	ND	ND	ND
Toxaphene	ug/kg dry	440		460			ND	ND	ND	ND
trans-Nonachlor	ug/kg dry						ND	ND	ND	ND
Total Chlordane[2]	ug/kg dry	1600	35000	430	0.5	6	ND	ND	ND	ND
ORGANICS - AROCLORS										
Aroclor 1016	ug/kg dry						ND	ND	ND	ND
Aroclor 1221	ug/kg dry						ND	ND	ND	ND
Aroclor 1232	ug/kg dry						ND	ND	ND	ND
Aroclor 1242	ug/kg dry						18	39	92	ND
Aroclor 1248	ug/kg dry						ND	ND	ND	ND
Aroclor 1254	ug/kg dry						ND	ND	ND	ND
Aroclor 1260	ug/kg dry						ND	ND	ND	ND
Total Aroclor PCBs	ug/kg dry			89	22.7	180	18	39	92	ND
ORGANICS – PCB CONGENERS										
PCB003	ug/kg dry						ND	ND	ND	ND
PCB008	ug/kg dry						ND	ND	ND	ND
PCB018	ug/kg dry						ND	ND	ND	ND
PCB028	ug/kg dry						ND	ND	ND	ND
PCB031	ug/kg dry						ND	ND	ND	ND
PCB033	ug/kg dry						ND	ND	ND	ND
PCB037	ug/kg dry						ND	ND	ND	ND
PCB044	ug/kg dry						ND	ND	ND	ND
PCB049	ug/kg dry						ND	ND	ND	ND
PCB052	ug/kg dry						ND	ND	ND	ND
PCB056+060	ug/kg dry						ND	ND	ND	ND
PCB066	ug/kg dry						ND	ND	ND	ND
PCB070	ug/kg dry						ND	ND	ND	ND
PCB074	ug/kg dry						ND	ND	ND	ND
PCB077	ug/kg dry	34					ND	ND	ND	ND
PCB081	ug/kg dry	34					ND	ND	ND	ND
PCB087	ug/kg dry						ND	ND	ND	ND
PCB095	ug/kg dry						ND	ND	ND	ND

Exceeds ERL		RSL		CHHSL	NOAA Screening		EB-COMP-North-Lower	EB-COMP-North-Upper	EB-COMP-South-Lower	EB-COMP-South-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
PCB097	ug/kg dry						ND	ND	ND	ND
PCB099	ug/kg dry						ND	ND	ND	ND
PCB101	ug/kg dry						ND	ND	ND	ND
PCB105	ug/kg dry	34					ND	ND	ND	ND
PCB110	ug/kg dry						ND	ND	ND	ND
PCB114	ug/kg dry	0.68					ND	ND	ND	ND
PCB118	ug/kg dry	34					ND	ND	ND	ND
PCB119	ug/kg dry						ND	ND	ND	ND
PCB123	ug/kg dry	34					ND	ND	ND	ND
PCB126	ug/kg dry	0.34					ND	ND	ND	ND
PCB128	ug/kg dry						ND	ND	ND	ND
PCB138	ug/kg dry						ND	ND	ND	ND
PCB141	ug/kg dry						ND	ND	ND	ND
PCB149	ug/kg dry						ND	ND	ND	ND
PCB151	ug/kg dry						ND	ND	ND	ND
PCB153	ug/kg dry						ND	ND	ND	ND
PCB156	ug/kg dry	6.8					ND	ND	ND	ND
PCB157	ug/kg dry	6.8					ND	ND	ND	ND
PCB158	ug/kg dry						ND	ND	ND	ND
PCB167	ug/kg dry	340					ND	ND	ND	ND
PCB168+132	ug/kg dry						ND	ND	ND	ND
PCB169	ug/kg dry	0.34					ND	ND	ND	ND
PCB170	ug/kg dry						ND	ND	ND	ND
PCB174	ug/kg dry						ND	ND	ND	ND
PCB177	ug/kg dry						ND	ND	ND	ND
PCB180	ug/kg dry						ND	ND	ND	ND
PCB183	ug/kg dry						ND	ND	ND	ND
PCB187	ug/kg dry						ND	ND	ND	ND
PCB189	ug/kg dry	34					ND	ND	ND	ND
PCB194	ug/kg dry						ND	ND	ND	ND
PCB195	ug/kg dry						ND	ND	ND	ND
PCB200	ug/kg dry						ND	ND	ND	ND
PCB201	ug/kg dry						ND	ND	ND	ND
PCB203	ug/kg dry						ND	ND	ND	ND
PCB206	ug/kg dry						ND	ND	ND	ND
PCB209	ug/kg dry						ND	ND	ND	ND
Total PCB Congeners	ug/kg dry			89	22.7	180	ND	ND	ND	ND

4.5 OVERDREDGE PIT

A total of seven borings were collected within the vicinity of the originally proposed OD Pit per the Final SAP, as shown in Figure 4-10. A total of three of these borings were channel sites, which were used to create upper layer samples. Boring OD01 was relocated due to the proximity of the site to the San Elijo Joint Powers Authority (JPA) underground outfall pipe. The boring was stopped at a depth of 9 feet bgs when JPA staff notified URS of this underground utility in the field. The boring, at its relocated position was called OD01A. OD Pit boring location details (depth, drilling method, sample ID) are provided in Table 4-16.

Table 4-16: Overdredge Pit Sample Summary

Boring/Sample Location ID	Boring Location (Decimal Degrees, WGS84)	Boring Depth (feet, bgs)	Method of Drilling/Collection
OD01	33.01021, 117.27858	9.0	Hollow Stem Auger
OD01A	33.01023, 117.27864	21.5	Hollow Stem Auger
WB01-D-CH	33.00862, 117.27841	1.5	Hand Driven
OD01-CH	33.10126, 117.27849	1.5	Hand Driven
OD02	33.00560, 117.27647	21.5	Hollow Stem Auger
OD02-CH	33.00849, 117.27634	1.5	Hand Driven
OD03	33.01101, 117.27605	18.0	Hollow Stem Auger

The OD Pit was originally conceptually shown (in the Final SAP) to extend into the West Basin and has been revised to be located entirely within the Central Basin. Both the original (black polyline) and revised (red, dashed polyline) footprints of this feature are shown in Figure 4-10 for reference. The OD Pit was also deepened from -30 to -40 ft NGVD 29 from its original design. Maximum boring depths from this SAP were -30 bgs, which is approximately -27 ft NGVD. This sample depth is considered sufficient to characterize the additional 13-foot depth based on: 1) the homogenous nature of this sedimentary layer and 2) the age of the sediments at this depth being such that they have been removed from anthropogenic sources of contamination.

The original, deep borings locations (per the Final SAP and as shown in Table 4-16) were used to characterize export from the OD Pit in conjunction with a number of deep borings from the Central Basin (presented previously in this section). These additional borings used for characterization include: CB01-D, CB02-D, CB03-D, CB14-D, CB15-D, and CB16-D. The majority of the borings used to characterize the new OD Pit feature are located outside of its proposed footprint. However, these borings are within the immediate vicinity of this feature and are generally considered representative of this export area due to the general homogeneity of the material under the lagoon.

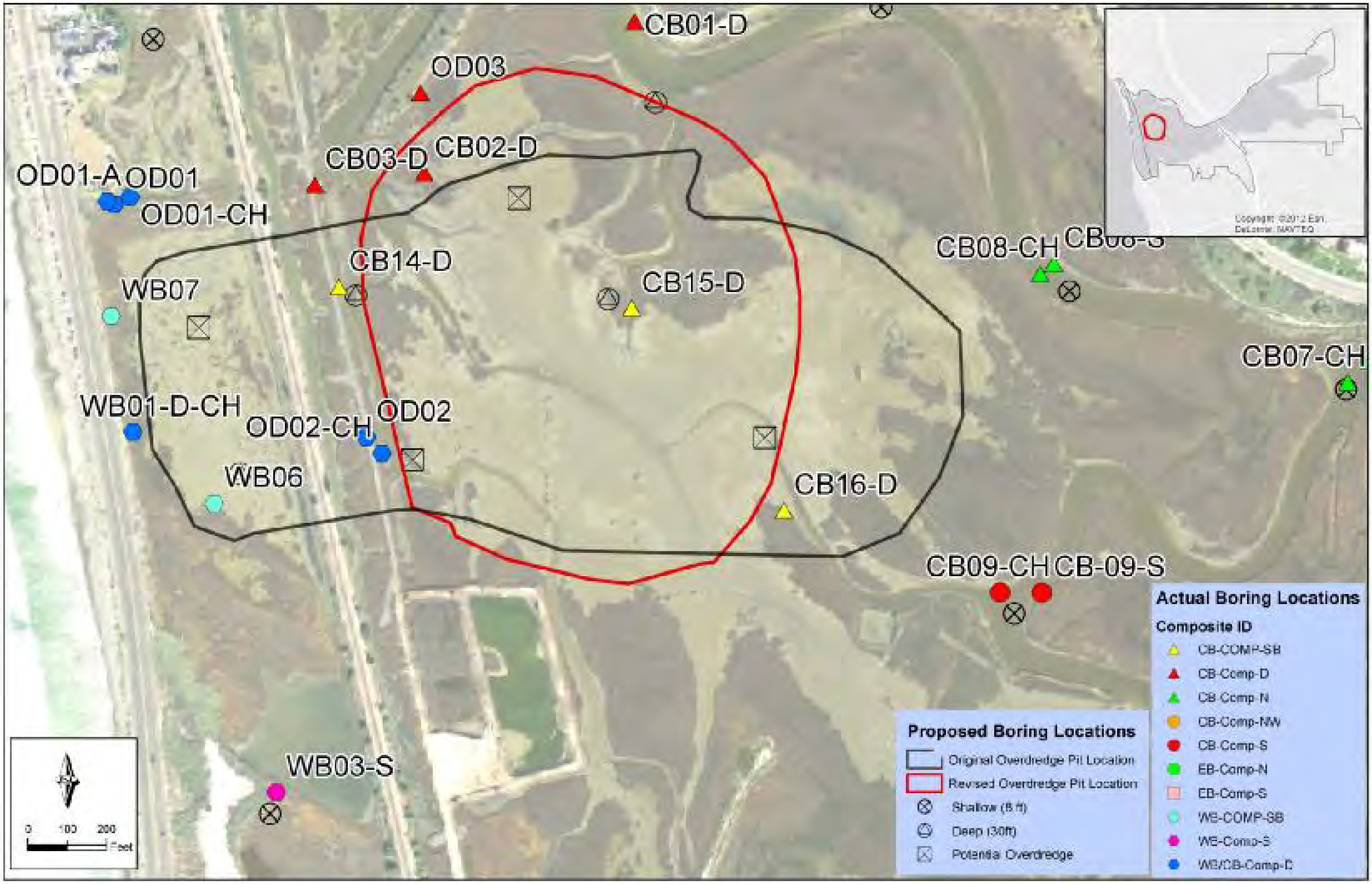

Figure 4-10: Boring Locations in the Overdredge Pit

4.5.1 Physical Testing

The grain size distribution results for the OD Pit are summarized in Table 4-17.

Table 4-17: Overdredge Pit Grain Size Distribution Summary

Boring/Sample Location ID	Boring Depth (feet)	Approx. Interface Depth (ft, bgs)	Upper Layer (% Fines)	Lower Layer (% Fines)	Upper Layer (D_{50})	Lower Layer (D_{50})
OD01	9.0	>9	No Fines Encountered	8.3	No Fines Encountered	0.183
OD01A	21.5	NA	23.2 (OD/WB01)	7.9	0.176	0.212
WB01-D-CH	1.5	>1.5		NA		NA
OD01-CH	1.5	>1.5		NA		NA
OD02	21.5	3	9.9	7	0.221	0.189
OD02-CH	1.5	>1.5		NA		NA
OD03	18.0	1.5	12.9	18.1	0.142	0.127
CB01-D	21.5	10	9.4	7.9	0.134	0.178
CB02-D	15.0	2.5	64.3	7.2	ND	0.177
CB03-D	26.5	5	24.9	8.5	0.126	0.178
CB14-SB	30.0		62.0 (CB-COMP-SB)	14.3 (CB-COMP-SB)	ND	0.187
CB15-SB	30.0					
CB16-SB	30.0					
Average		**4.4**	**29.5**	**9.9**	**0.16**	**0.18**

As shown, the average percentage of fines in the upper layer of the OD Pit is 29.5%. The grain size of the lower layer is coarser, with an average of 9.9% fines. The grain size distribution plots of the upper and lower layers of sediments relative to Leucadia Beach (using Batiquitos Beach curves), Moonlight Beach, Cardiff Beach, Fletcher Cove, and Torrey Pines Beach composite grain size envelope is shown in Figure 4-2 through Figure 4-6, respectively.

The depth of the upper, fine-grained layer is variable throughout the borings collected; however, it is approximately 4.4 feet bgs on average. The upper layer of material represents only a small fraction (approximately 9% or 130,000 cy) of the total amount to be exported from this feature (maximum of between 1.3 and 1.5 MCY for Alternatives 1B and 2A, respectively). Therefore, the upper layer of material would ideally be blended with the lower layer to produce a lower overall percentage of fine grained material from the export. Using a weighted average approach, the approximate percentage of fines from this blended export volume would range from 11.9% to 11.6% fines based on Alternatives 1B and 2A export scenarios, respectively. Supporting information for the weighted average calculation is provided in Table 4-18 below.

Table 4-18: Overdredge Pit Export Gradation - Weighted Average Calculation

Alt. 1B - 1.3 MCY Scenario		
OD Pit Export Area	**Volume (cy)**	**Average % Fines**
Upper Layer	130,000	29.5
Lower Layer	1,170,000	9.9
	Weighted Avg.	**11.9**

Alt. 2A - 1.5 MCY Scenario		
OD Pit Export Area	**Volume (cy)**	**Average % Fines**
Upper Layer	130,000	29.5
Lower Layer	1,3700,00	9.9
	Weighted Avg.	**11.6**

Based on this analysis, blended export from the OD Pit feature is compatible for on-beach, surf-zone, or nearshore beach placement.

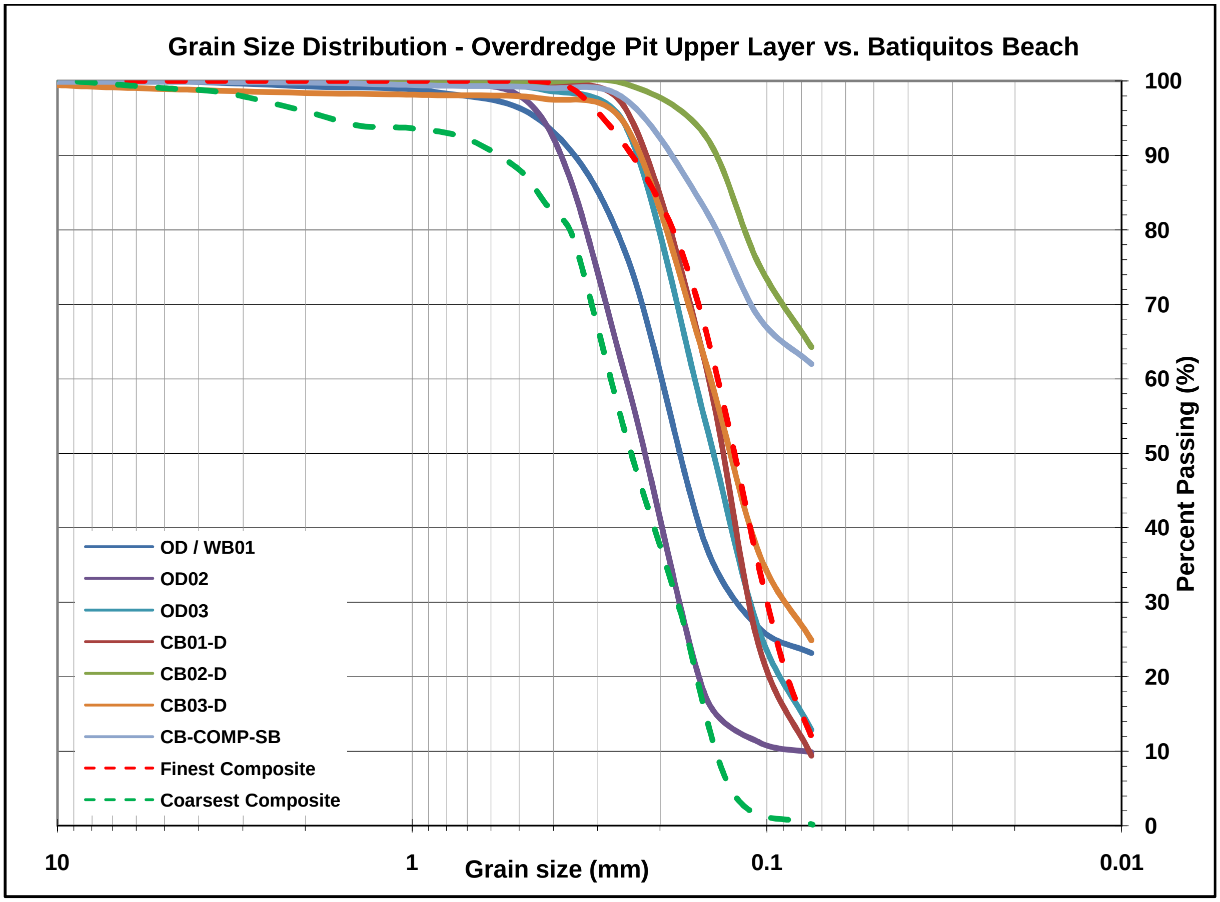

Figure 4-11: Grain Size Distribution of the Overdredge Pit Upper Layer vs. Batiquitos Beach Composite Grain Size Envelope

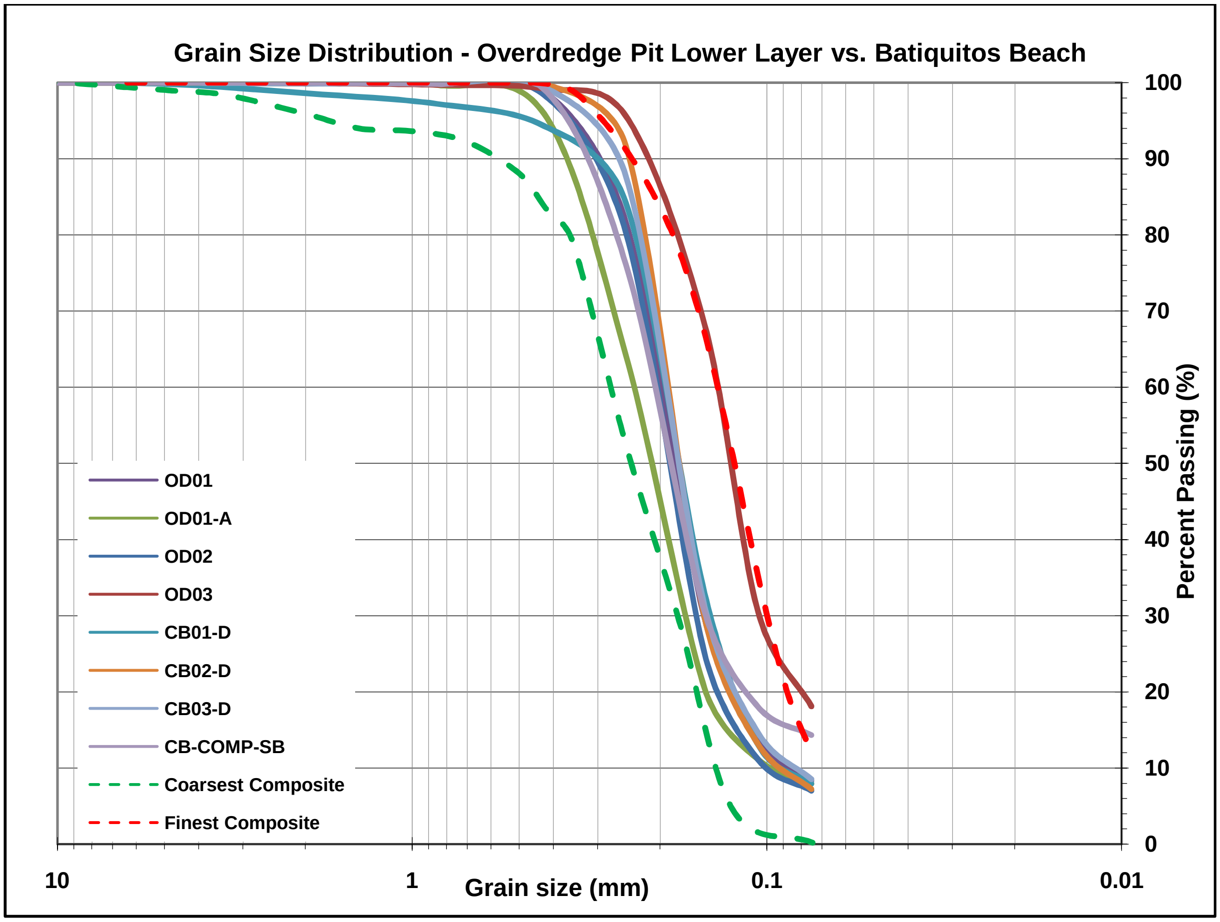

Figure 4-12: Grain Size Distribution of the Overdredge Pit Lower Layer vs. Batiquitos Beach Composite Grain Size Envelope

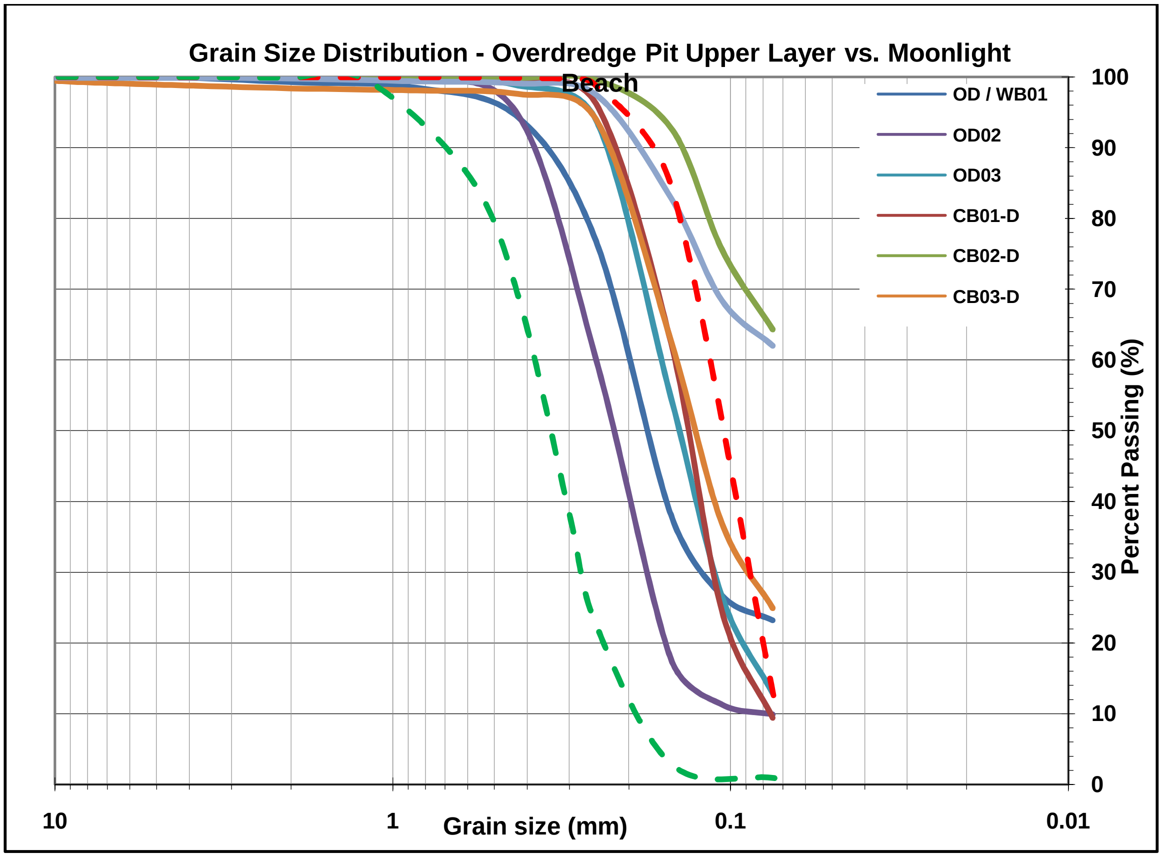

Figure 4-13: Grain Size Distribution of the Overdredge Pit Upper Layer vs. Moonlight Beach Composite Grain Size Envelope

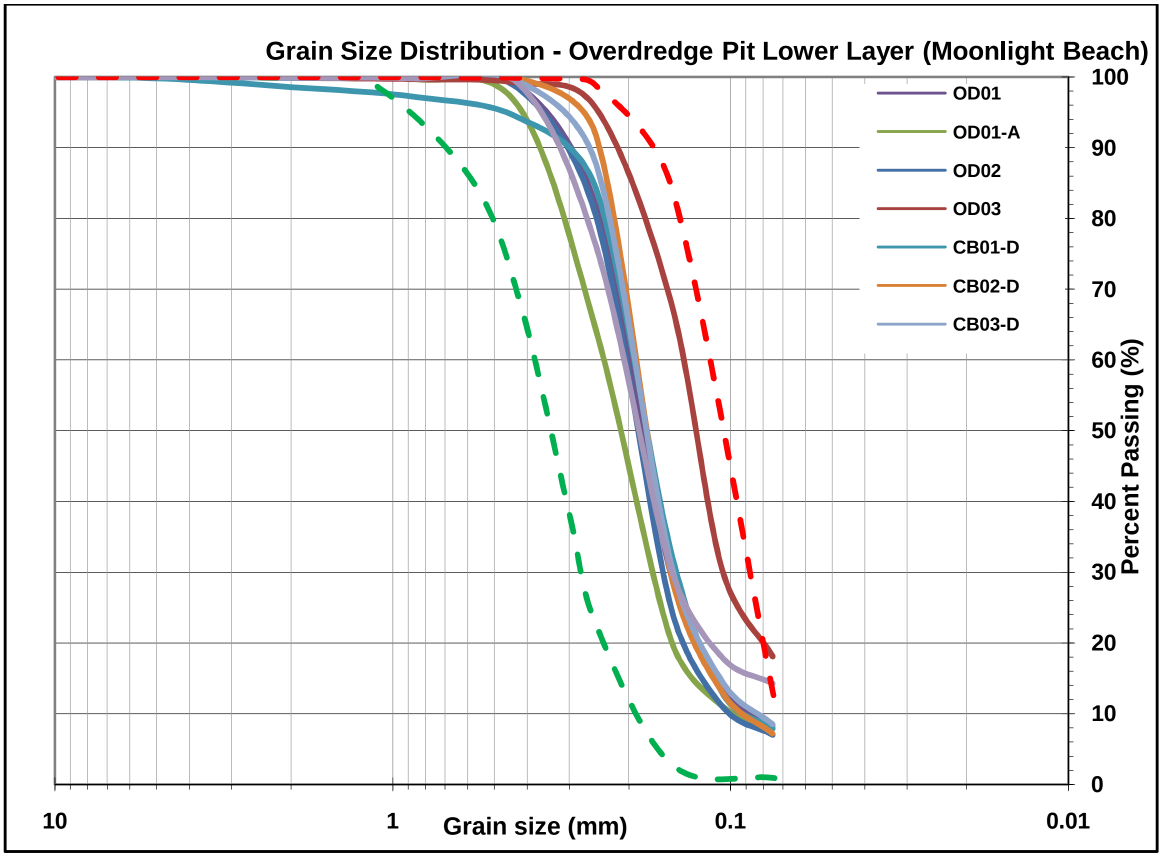

Figure 4-14: Grain Size Distribution of the Overdredge Pit Lower Layer vs. Moonlight Beach Composite Grain Size Envelope

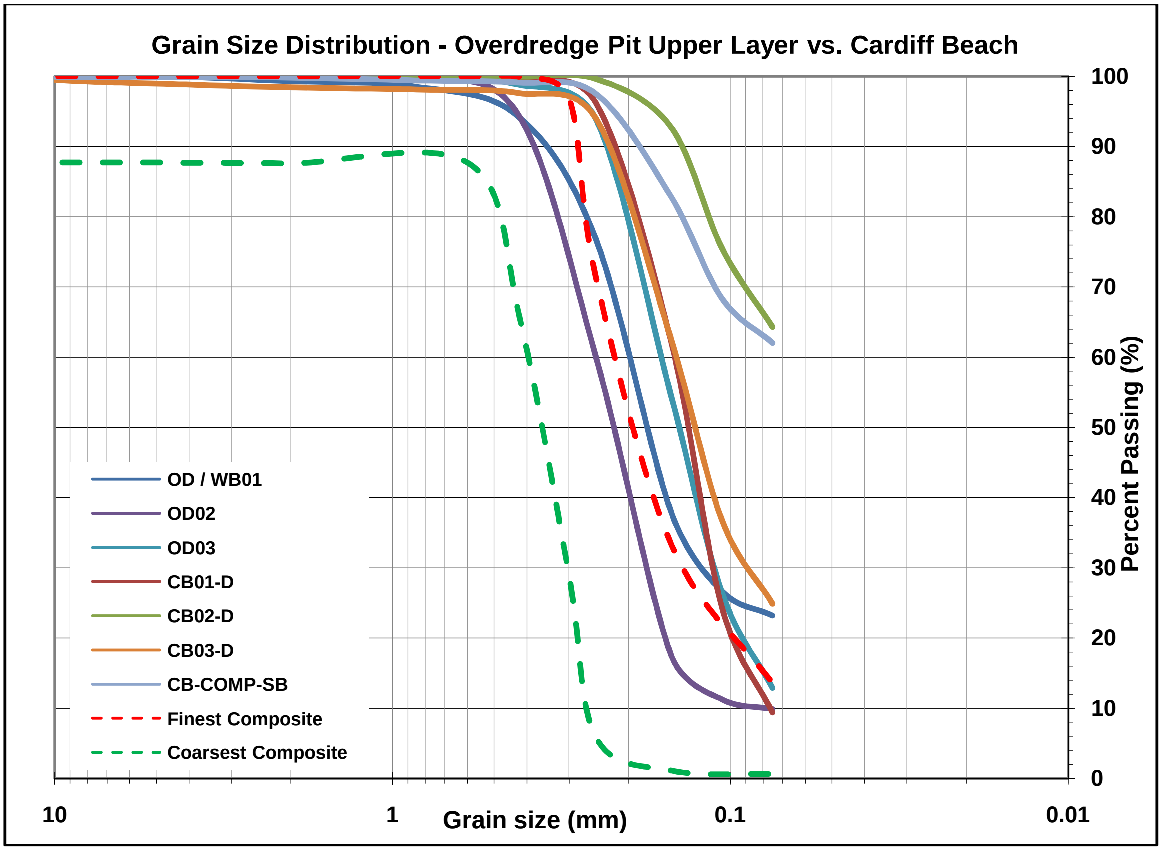

Figure 4-15: Grain Size Distribution of the Overdredge Pit Upper Layer vs. Cardiff Beach Composite Grain Size Envelope

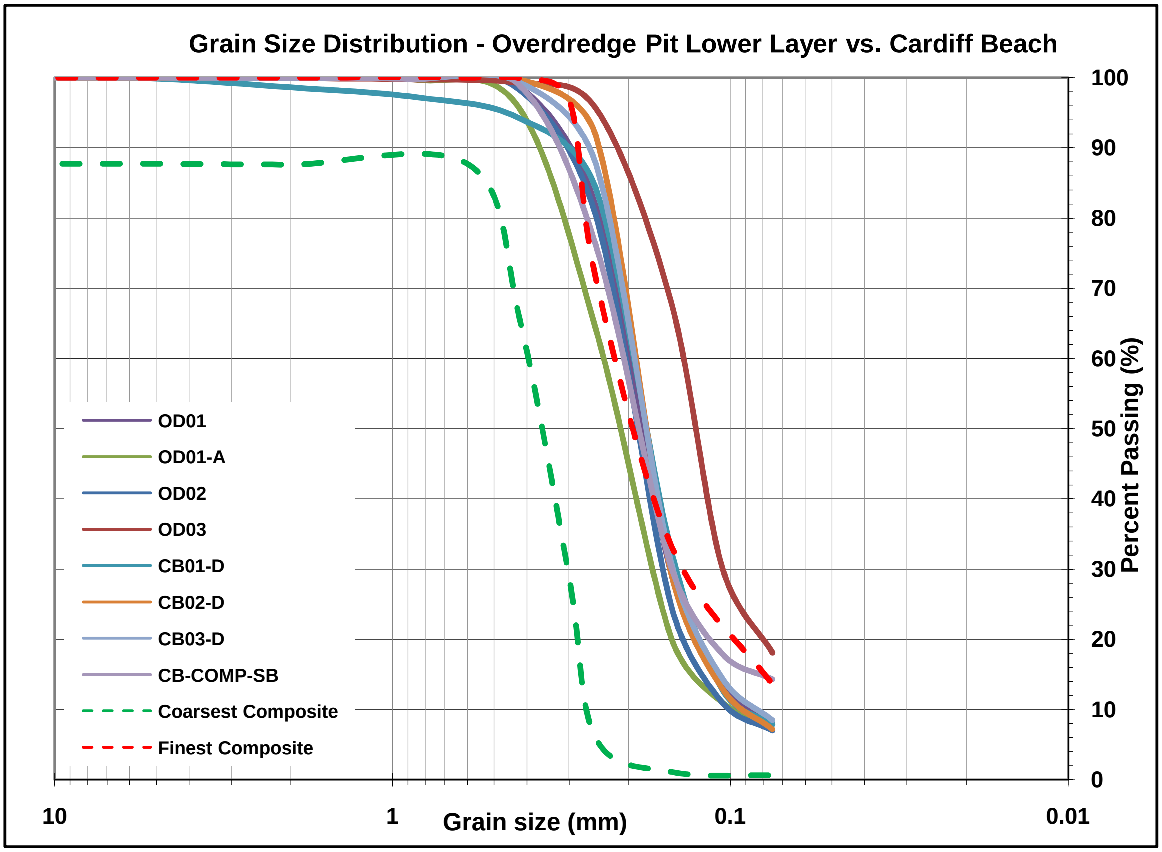

Figure 4-16: Grain Size Distribution of the Overdredge Pit Lower Layer vs. Cardiff Beach Composite Grain Size Envelope

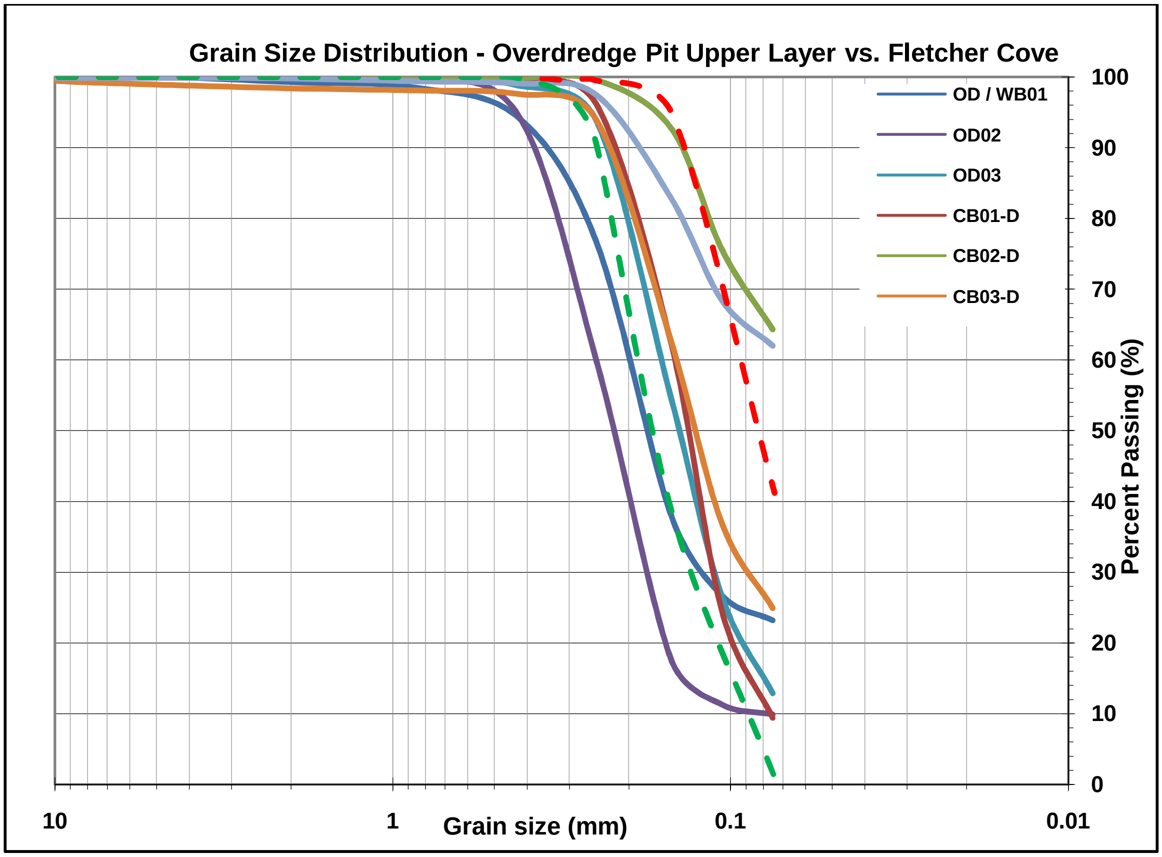

Figure 4-17: Grain Size Distribution of the Overdredge Pit Upper Layer vs. Fletcher Cove Composite Grain Size Envelope

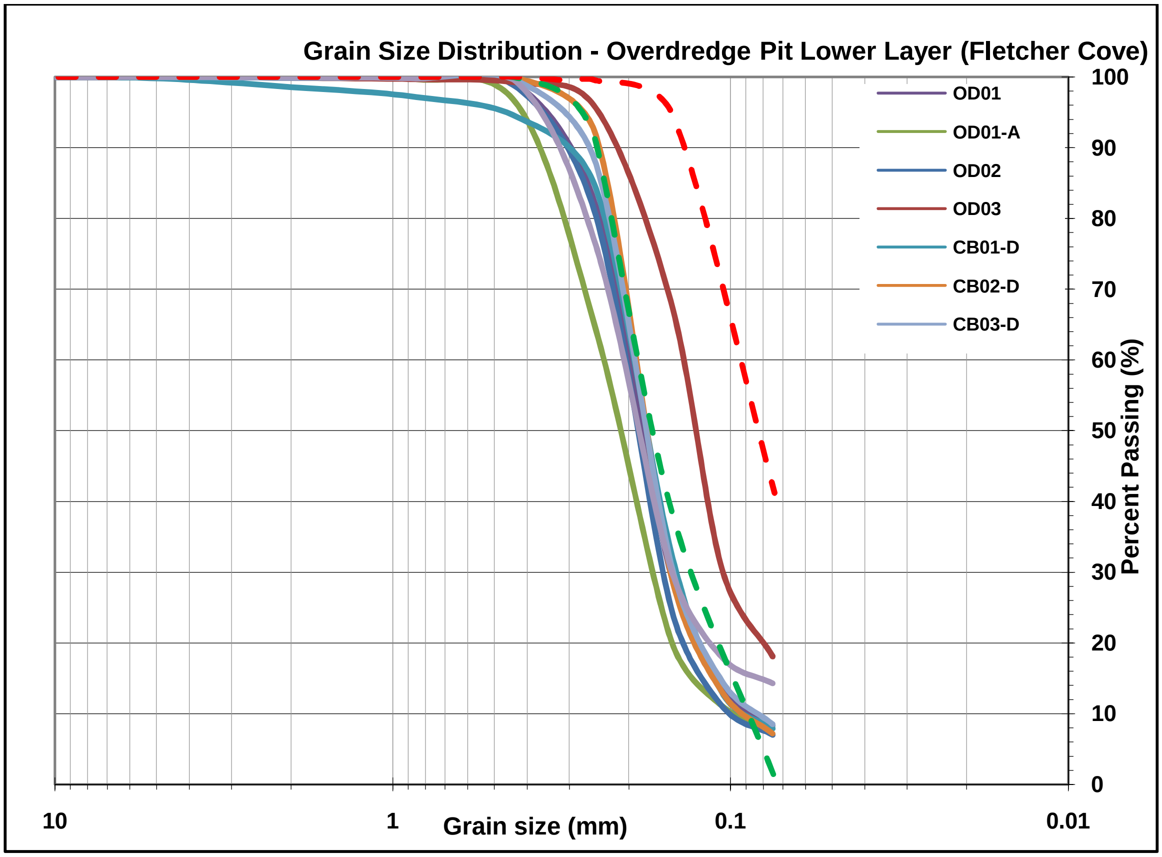

Figure 4-18: Grain Size Distribution of the Overdredge Pit Lower Layer vs. Fletcher Cove Composite Grain Size Envelope

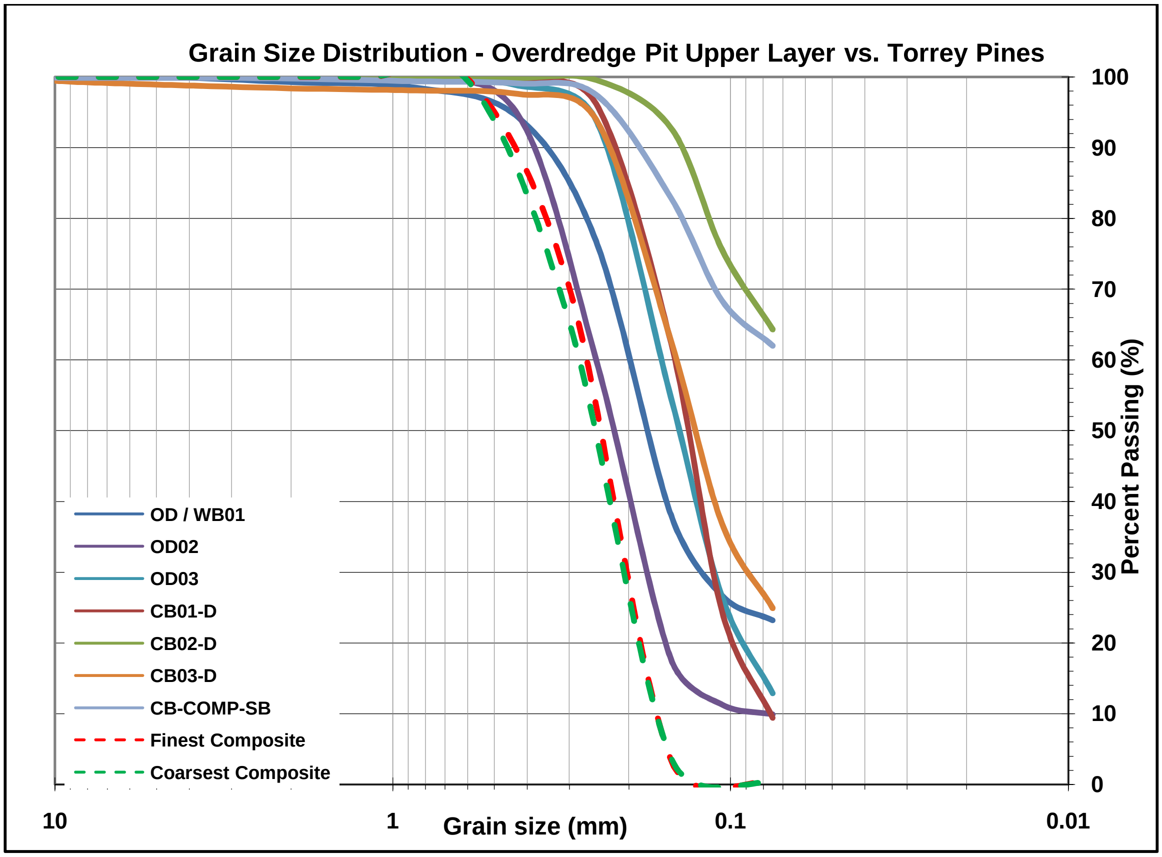

Figure 4-19: Grain Size Distribution of the Overdredge Pit Upper Layer vs. Torrey Pines Composite Grain Size Envelope

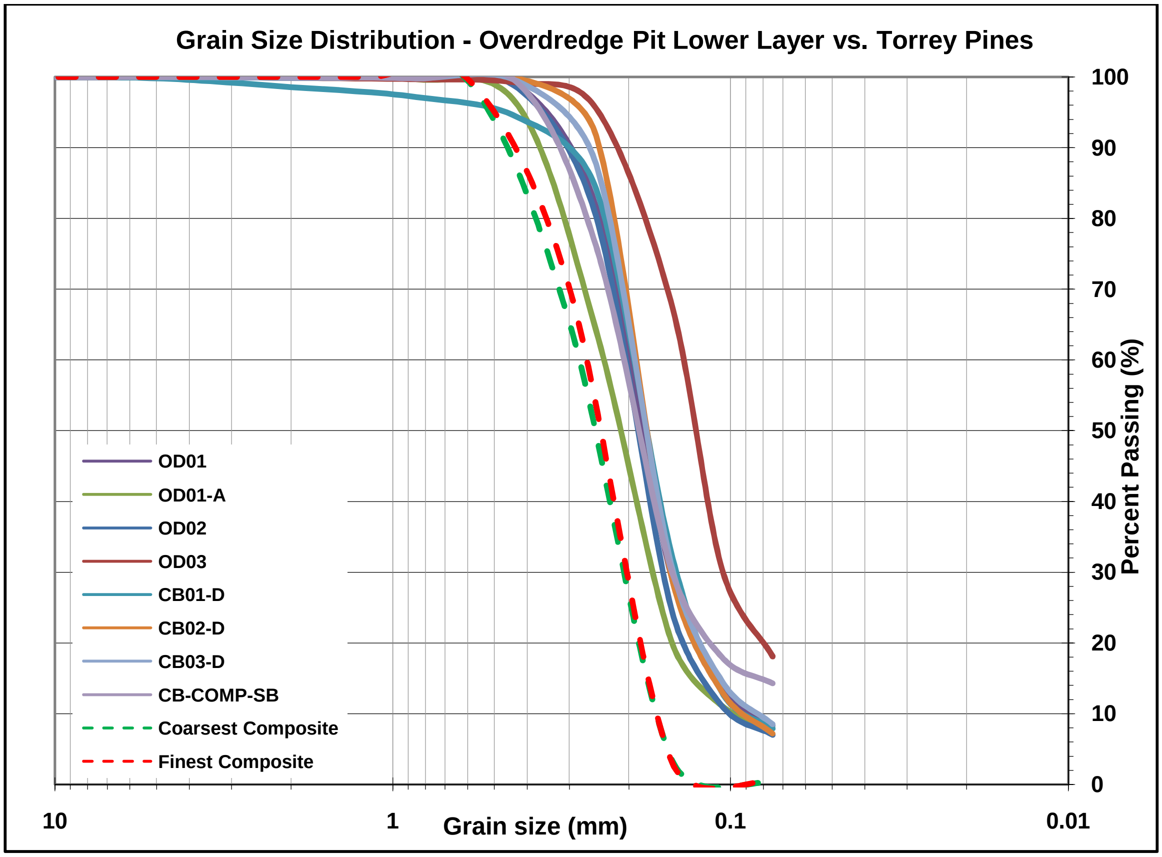

Figure 4-20: Grain Size Distribution of the Overdredge Pit Lower Layer vs. Torrey Pines Composite Grain Size Envelope

4.5.2 Chemistry Testing

A total of four (two upper and two lower) chemistry samples were proposed to be collected in the OD Pit in the Final SAP. The chemistry compositing scheme is shown in Table 4-19.

Table 4-19: Overdredge Pit Compositing Scheme

Boring ID	Composite ID
OD01	WB/CB-Comp-D-Upper WB/CB-Comp-D-Lower
OD01-A	
OD01-CH	
OD02	
OD02-CH	
WB01-D-CH	
OD03	CB-Comp-D-Upper CB-Comp-D-Lower
CB01-D	
CB02-D	
CB03-D	

The chemistry results are shown in Table 4-20. As shown, all chemistry results are below established ERL values except for CB-COMP-D-Upper and WB/CB-COMP-D-Upper. These exceedances are as follows:

- CB-COMP-D-Upper
    - Total PCB Congeners = 264.6 ug/kg (ERL = 180 ug/kg)
- WB/CB-COMP-D-Upper
    - 4,4’-DDD = 3.9 ug/kg (ERL = 2 ug/kg)
    - 4,4’-DDE = 5.7 ug/kg (ERL = 2.2 ug/kg)
    - 4,4’-DDT = 12.6 ug/kg (ERM: = 7 ug/kg)

Based on coordination with the USEPA, CB-COMP-D-Upper and the four samples that comprised this composite sample (i.e. OD03-Upper, CB03-D-Upper, CB02-D-Upper, and CB01-D-Upper) were analyzed for PCB congeners by Calscience on February 9, 2012. Lab results found non-detects for PCB congeners in all five of these samples. The case narrative from Calscience stated that the cause of the originally elevated concentration of PCB congeners in CB-COMP-D-Upper could not be determined. The lab results and report from this archive sampling are included within Attachment A.

Other borings that were used to characterize the OD Pit export materials for chemistry include CB-COMP-SB, CB-COMP-D, and WB/CB COMP-D. These samples were all found to be below established screening levels, as discussed in Section 4.3.2 .

Table 4-20: Overdredge Pit Chemistry Results

Exceeds ERL		RSL		CHHSL	NOAA Screening		CB-COMP-D-Lower	CB-COMP-D-Upper	WB/CB-COMP-D-Lower	WB/CB-COMP-D-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
SEDIMENT CONVENTIONALS										
Percent Solids (total)	%									
Total Organic Carbon	mg/kg dry						1000	4200	1100	8500
TRPH	mg/kg dry						ND	ND	ND	ND
Water Soluble Sulfides	mg/kg dry						ND	ND	ND	ND
Total Sulfides	mg/kg dry						3.0	1.1	0.27	2.3
Oil & Grease	mg/kg dry						ND	ND	ND	ND
METALS										
Arsenic	mg/kg dry	0.39	22	0.07	8.2	70	1.30	2.54	1.73	2.77
Cadmium	mg/kg dry	1800	70	1.7	1.2	9.6	ND	ND	ND	0.167
Chromium	mg/kg dry			100000	81	370	4.22	11.8	4.69	9.45
Copper	mg/kg dry		3100	3000	34	270	3.19	8.90	1.90	14.0
Lead	mg/kg dry		400	150	46.7	218	0.818	3.24	0.682	10.2
Mercury	mg/kg dry		5.6	18	0.15	0.71	ND	ND	ND	ND
Nickel	mg/kg dry			1600	20.9	51.6	1.59	5.03	1.86	4.18
Selenium	mg/kg dry		390	380			ND	ND	ND	0.233
Silver	mg/kg dry		390	380	1	3.7	ND	ND	ND	ND
Zinc	mg/kg dry		23000	23000	150	410	12.5	29.8	7.94	29.7
ORGANICS - BUTYLTINS										
Dibutyltin	ug/kg dry		18000				ND	ND	ND	ND
Monobutyltin	ug/kg dry						ND	ND	ND	ND
Tetrabutyltin	ug/kg dry						ND	ND	ND	ND
Tributyltin	ug/kg dry		18000				ND	ND	ND	ND
POLYAROMATIC HYDROCARBONS										
1-Methylnaphthalene	mg/kg dry						ND	ND	ND	ND
1-Methylphenanthrene	mg/kg dry						ND	ND	ND	ND
2,3,5-Trimethylnaphthalene	mg/kg dry									
2,6-Dimethylnaphthalene	mg/kg dry						ND	ND	ND	ND
2-Methylnaphthalene	mg/kg dry				70	670	ND	ND	ND	ND
Acenaphthene	mg/kg dry		3400000		16	500	ND	ND	ND	ND
Acenaphthylene	mg/kg dry				44	640	ND	ND	ND	ND
Anthracene	mg/kg dry		17000000		85.3	1100	ND	ND	ND	ND
Benzo(a)anthracene	mg/kg dry	150			261	1600	ND	ND	ND	ND
Benzo(a)pyrene	mg/kg dry	150		38	430	1600	ND	ND	ND	ND
Benzo(b)fluoranthene	mg/kg dry	150					ND	ND	ND	ND
Benzo(e)pyrene	mg/kg dry						ND	ND	ND	ND
Benzo(g,h,i)perylene	mg/kg dry						ND	ND	ND	ND
Benzo(k)fluoranthene	mg/kg dry	1500					ND	ND	ND	ND
Biphenyl	mg/kg dry						ND	ND	ND	ND
Chrysene	mg/kg dry	15000			384	2800	ND	ND	ND	ND
Dibenzo(a,h)anthracene	mg/kg dry	150			63.4	260	ND	ND	ND	ND
Dibenzothiophene	mg/kg dry						ND	ND	ND	ND
Fluoranthene	mg/kg dry		2300000		600	5100	ND	ND	ND	ND

Exceeds ERL		RSL		CHHSL	NOAA Screening		CB-COMP-D-Lower	CB-COMP-D-Upper	WB/CB-COMP-D-Lower	WB/CB-COMP-D-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
Fluorene	mg/kg dry		2300000		19	540	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	mg/kg dry	150					ND	ND	ND	ND
Naphthalene	mg/kg dry		140000		160	2100	ND	ND	ND	ND
Perylene	mg/kg dry						ND	ND	ND	ND
Phenanthrene	mg/kg dry				240	1500	ND	ND	ND	ND
Pyrene	mg/kg dry		1700000		665	2600	ND	ND	ND	ND
Total Low Weight PAHs	mg/kg dry				552	3160				
Total High Weight PAHs	mg/kg dry				1700	9600				
Total PAHs	mg/kg dry				4022	44792	ND	ND	ND	ND
ORGANICS - PHTHALATES										
Butyl Benzyl phthalate	mg/kg dry	260000	12000000				0.027	0.036	ND	0.021
bis-(2-Ethylhexyl)phthalate	mg/kg dry	350000	1200000				0.048	0.081	0.019	0.054
Diethyl phthalate	mg/kg dry		49000000				ND	ND	ND	ND
Dimethyl phthalate	mg/kg dry						ND	ND	ND	ND
Di-n-butyl phthalate	mg/kg dry		6100000				ND	ND	ND	ND
Di-n-octyl phthalate	mg/kg dry						ND	ND	ND	ND
ORGANICS - PHENOLS										
2,4,6-Trichlorophenol	mg/kg dry						ND	ND	ND	ND
2,4-Dichlorophenol	mg/kg dry						ND	ND	ND	ND
2,4-Dimethylphenol	mg/kg dry		1200000				ND	ND	ND	ND
2,4-Dinitrophenol	mg/kg dry						ND	ND	ND	ND
2-Chlorophenol	mg/kg dry						ND	ND	ND	ND
2-Methyl-4,6-dinitrophenol	mg/kg dry						ND	ND	ND	ND
2-Nitrophenol	mg/kg dry						ND	ND	ND	ND
4-Chloro-3-methylphenol	mg/kg dry						ND	ND	ND	ND
4-Nitrophenol	mg/kg dry						ND	ND	ND	ND
Pentachlorophenol	mg/kg dry	3000	1400000	4400			ND	ND	ND	ND
Phenol	mg/kg dry		18000000				ND	ND	ND	ND
CHLORINATED PESTICIDES										
2,4'-DDD	ug/kg dry	2000		2300			ND	ND	ND	3
2,4'-DDE	ug/kg dry	1400		1600			ND	ND	ND	ND
2,4'-DDT	ug/kg dry	1700	36000	1600			ND	ND	ND	ND
4,4'-DDD	ug/kg dry	2000		2300	2	20	ND	ND	ND	3.9
4,4'-DDE	ug/kg dry	1400		1600	2.2	27	ND	ND	ND	5.7
4,4'-DDT	ug/kg dry	1700	36000	1600	1	7	ND	ND	ND	12.6
Total DDT	ug/kg dry				1.58	46.1	ND	ND	ND	22.2
Aldrin	ug/kg dry	29	1800	33			ND	ND	ND	ND
BHC-alpha	ug/kg dry						ND	ND	ND	ND
BHC-beta	ug/kg dry						ND	ND	ND	ND
BHC-delta	ug/kg dry						ND	ND	ND	ND
BHC-gamma	ug/kg dry						ND	ND	ND	ND
Chlordane-alpha	ug/kg dry						ND	ND	ND	ND
Chlordane-gamma	ug/kg dry						ND	ND	ND	ND
cis-Nonachlor	ug/kg dry						ND	ND	ND	ND
DCPA (Dacthal)	ug/kg dry				0.02	8	ND	ND	ND	ND

Exceeds ERL		RSL		CHHSL	NOAA Screening		CB-COMP-D-Lower	CB-COMP-D-Upper	WB/CB-COMP-D-Lower	WB/CB-COMP-D-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
Dicofol	ug/kg dry									
Dieldrin	ug/kg dry	30	3100	35			ND	ND	ND	ND
Endosulfan Sulfate	ug/kg dry		370000				ND	ND	ND	ND
Endosulfan-I	ug/kg dry						ND	ND	ND	ND
Endosulfan-II	ug/kg dry						ND	ND	ND	ND
Endrin	ug/kg dry		18000	21000			ND	ND	ND	ND
Endrin Aldehyde	ug/kg dry						ND	ND	ND	ND
Endrin Ketone	ug/kg dry						ND	ND	ND	ND
Heptachlor	ug/kg dry	110	31000	130			ND	ND	ND	ND
Heptachlor Epoxide	ug/kg dry	53	790				ND	ND	ND	ND
Methoxychlor	ug/kg dry			340000			ND	ND	ND	ND
Mirex	ug/kg dry	27	12000	31			ND	ND	ND	ND
Oxychlordane	ug/kg dry						ND	ND	ND	ND
Perthane	ug/kg dry						ND	ND	ND	ND
Toxaphene	ug/kg dry	440		460			ND	ND	ND	ND
trans-Nonachlor	ug/kg dry						ND	ND	ND	ND
Total Chlordane[2]	ug/kg dry	1600	35000	430	0.5	6	ND	ND	ND	ND
ORGANICS - AROCLORS										
Aroclor 1016	ug/kg dry						ND	ND	ND	ND
Aroclor 1221	ug/kg dry						ND	ND	ND	ND
Aroclor 1232	ug/kg dry						ND	ND	ND	ND
Aroclor 1242	ug/kg dry						ND	ND	ND	ND
Aroclor 1248	ug/kg dry						ND	ND	ND	ND
Aroclor 1254	ug/kg dry						ND	ND	ND	ND
Aroclor 1260	ug/kg dry						ND	ND	ND	ND
Total Aroclor PCBs	ug/kg dry			89	22.7	180	ND	ND	ND	ND
ORGANICS – PCB CONGENERS										
PCB003	ug/kg dry						ND	ND	ND	ND
PCB008	ug/kg dry						0.73	16	ND	ND
PCB018	ug/kg dry						2	34	ND	ND
PCB028	ug/kg dry						1.5	24	ND	ND
PCB031	ug/kg dry						1.5	28	ND	ND
PCB033	ug/kg dry						1.3	23	ND	ND
PCB037	ug/kg dry						ND	8.3	ND	ND
PCB044	ug/kg dry						1.2	19	ND	ND
PCB049	ug/kg dry						ND	9.7	ND	ND
PCB052	ug/kg dry						0.99	15	ND	ND
PCB056+060	ug/kg dry						ND	14	ND	ND
PCB066	ug/kg dry						1.0	15	ND	ND
PCB070	ug/kg dry						1.1	18	ND	ND
PCB074	ug/kg dry						ND	8.5	ND	ND
PCB077	ug/kg dry	34					ND	1.8	ND	ND
PCB081	ug/kg dry	34					ND	ND	ND	ND
PCB087	ug/kg dry						ND	2.4	ND	ND
PCB095	ug/kg dry						ND	4.5	ND	ND

Exceeds ERL		RSL		CHHSL	NOAA Screening		CB-COMP-D-Lower	CB-COMP-D-Upper	WB/CB-COMP-D-Lower	WB/CB-COMP-D-Upper
Exceeds ERM		Carcinogenic	Noncancer	Residential Land Use						
Valid Analyte Name	Units	(mg/kg)	(mg/kg)	(mg/kg)	Salt ERL	Salt ERM				
PCB097	ug/kg dry						ND	2.8	ND	ND
PCB099	ug/kg dry						ND	2.7	ND	ND
PCB101	ug/kg dry						ND	5.5	ND	ND
PCB105	ug/kg dry	34					ND	2.8	ND	ND
PCB110	ug/kg dry						ND	4.7	ND	ND
PCB114	ug/kg dry	0.68					ND	ND	ND	ND
PCB118	ug/kg dry	34					ND	4.1	ND	ND
PCB119	ug/kg dry						ND	ND	ND	ND
PCB123	ug/kg dry	34					ND	ND	ND	ND
PCB126	ug/kg dry	0.34					ND	ND	ND	ND
PCB128	ug/kg dry						ND	ND	ND	ND
PCB138	ug/kg dry						ND	ND	ND	ND
PCB141	ug/kg dry						ND	ND	ND	ND
PCB149	ug/kg dry						ND	ND	ND	ND
PCB151	ug/kg dry						ND	ND	ND	ND
PCB153	ug/kg dry						ND	0.77	ND	ND
PCB156	ug/kg dry	6.8					ND	ND	ND	ND
PCB157	ug/kg dry	6.8					ND	ND	ND	ND
PCB158	ug/kg dry						ND	ND	ND	ND
PCB167	ug/kg dry	340					ND	ND	ND	ND
PCB168+132	ug/kg dry						ND	ND	ND	ND
PCB169	ug/kg dry	0.34					ND	ND	ND	ND
PCB170	ug/kg dry						ND	ND	ND	ND
PCB174	ug/kg dry						ND	ND	ND	ND
PCB177	ug/kg dry						ND	ND	ND	ND
PCB180	ug/kg dry						ND	ND	ND	ND
PCB183	ug/kg dry						ND	ND	ND	ND
PCB187	ug/kg dry						ND	ND	ND	ND
PCB189	ug/kg dry	34					ND	ND	ND	ND
PCB194	ug/kg dry						ND	ND	ND	ND
PCB195	ug/kg dry						ND	ND	ND	ND
PCB200	ug/kg dry						ND	ND	ND	ND
PCB201	ug/kg dry						ND	ND	ND	ND
PCB203	ug/kg dry						ND	ND	ND	ND
PCB206	ug/kg dry						ND	ND	ND	ND
PCB209	ug/kg dry						ND	ND	ND	ND
Total PCB Congeners	ug/kg dry			89	22.7	180	11.32	264.57*	ND	ND

* Analysis was conducted of CB-COMP-D-Upper and the four associated archive samples for PCB congeners. Results found all five samples were found to be non-detect. See Attachment B, Calscience Case Narrative 11-12-0898.

5. CONCLUSIONS AND RECOMMENDATIONS

This SAP Results Report presents a summary of the analyses of the compatibility of export materials from the entire SELRP footprint. However, during project development it was determined that the preferred approach for the construction of SELRP Alternatives 1B or 2A would entail a OD Pit feature in the Central Basin, from which all beneficial reuse sediment would be derived. After excavation of these materials, the OD Pit would then be backfilled with materials generated from elsewhere within the Project footprint and capped with a 3-foot layer of sandy material. Therefore, the compatibility discussion of export materials generated from construction of the OD Pit feature is the focus of this report, as these materials represent the beneficial reuse component of the project.

Similar to other portions of the lagoon, the OD Pit area consists of a thin layer of fine-grained material (~29% fines) that overlays a thick, relatively homogenous layer of sandy materials (~10% fines). The upper layer of material represents only a small fraction (approximately 9% or 130,000 cy) of the total amount to be exported from this feature. This material is proposed to be dredged together with the lower layer of material during construction (resulting in a blending effect) to reduce the overall percentage of fines within this export volume. Using a weighted average approach, the percentage of fines for the maximum total volume of export from the OD Pit (1.5 MCY) would be 12% fines. Evaluation of this material compared to the proposed receiving beaches' grain size envelopes finds that the material would be compatible for on-beach or nearshore placement options, as well as offshore in existing borrow sites used by SANDAG.

Chemical analysis of the OD Pit found the upper layer to contain some low levels of DDD, DDE, and DDT. Based on initial correspondence with the USEPA, these results were not found to trigger a concern for the beneficial reuse options being considered. Furthermore, the position of the OD pit was slightly shifted to avoid sensitive habitat, and these samples were located outside of the existing OD pit footprint and within the old OD Pit footprint within the West Basin. These materials would, therefore, be avoided with the new OD Pit footprint. An initially elevated level of PCB Congeners was found within a composite sample that included a boring from the northern portion of the OD Pit footprint. Re-sampling of the archive and the original composite sample found non-detect in all samples for PCB congeners. Therefore, the originally elevated level is assumed to be due to lab error and this area is believed to be free of PCB contamination. Export materials from the OD Pit appear to be chemically compatible for all beneficial reuse options proposed (i.e. on-beach, nearshore, or offshore staging).

6. REFERENCES

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Moffatt & Nichol. 2006. Final Sand Compatibility and Opportunistic Use Program Plan. Prepared for SANDAG and the Coastal Sediment Management Workgroup, February 2006.

______. 2010. San Elijo Lagoon Restoration Project, Sediment Characterization Study, Draft Report. February 2010.

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U.S. Environmental Protection Agency (USEPA) and U. S. Army Corps of Engineers (USACE). 1998. *Inland Testing Manual (ITM), Evaluation of Dredged Material Proposed for Discharge in Waters of the U. S. - Testing Manual.* EPA reference 823-B-98-004, USACE Office of Water, February 1998.

U.S. Army Corps of Engineers. 1989. *Requirements for Sampling, Testing and Data Analysis of Dredged Material.* Unpublished dated report appended to the June 1989 San Gabriel River to Newport Beach, Beach Replenishment at Surfside-Sunset Beach, Geotechnical Report, US Army Engineer District Los Angeles, Los Angeles, CA.

ATTACHMENT A:
URS REPORT WITH APPENDIES A – C
(Under Separate Cover)

Attachment A is provided within this EIR/EIS as Appendix M, Geotechnical Data Report

ATTACHMENT B:
PCB EXCEEDANCE ANALYSIS

(Under Separate Cover)

Calscience Environmental Laboratories, Inc.

Supplemental Report 1

CALSCIENCE

WORK ORDER NUMBER: 11-12-0898

The difference is service

Analytical Report For

Client: URS Corporation

Client Project Name: San Elijo Lagoon / 27661119.10000

Attention: David Schug
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Vikas Patel

Approved for release on 02/15/2012 by:
Vikas Patel
Project Manager

ResultLink ▸

Email your PM ▸

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Client Project Name: San Elijo Lagoon / 27661119.10000
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CASE NARRATIVE

Calscience Work Order No.: 11-12-0898

Data Summary

URS-requested that Calscience do a quality control (QC) check on the raw data for PCB Congeners (EPA 8270C SIM) on sample *CB-Comp-D-Upper*. A thorough review of the instrument logs, the sample IDs on the bottles and the raw data did not reveal anything unusual.

The sample extracts were reanalyzed as an additional check; original reported results were confirmed.

The sample was re-extracted and re-analyzed.

This laboratory report was re-issued to reflect this conclusion of our investigation. The cause of the elevated concentration that was reported originally reported could not be determined.

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Analytical Report

URS Corporation		Date Received:	12/13/11
4225 Executive Square, Suite 1600		Work Order No:	11-12-0898
La Jolla, CA 92037-1487		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PCB Congeners
		Units:	ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-D-Upper	**11-12-0898-1-C**	**12/12/11 14:40**	**Sediment**	**GC/MS HHH**	**02/09/12**	**02/10/12 18:28**	**120209L09**

Comment(s): -Sample extracted outside recommended holding time.

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.68	1		PCB126	ND	0.68	1	
PCB008	ND	0.68	1		PCB128	ND	0.68	1	
PCB018	ND	0.68	1		PCB132	ND	0.68	1	
PCB028	ND	0.68	1		PCB138/158	ND	1.4	1	
PCB031	ND	0.68	1		PCB141	ND	0.68	1	
PCB033	ND	0.68	1		PCB149	ND	0.68	1	
PCB037	ND	0.68	1		PCB151	ND	0.68	1	
PCB044	ND	0.68	1		PCB153	ND	0.68	1	
PCB049	ND	0.68	1		PCB156	ND	0.68	1	
PCB052	ND	0.68	1		PCB157	ND	0.68	1	
PCB056	ND	0.68	1		PCB167	ND	0.68	1	
PCB060	ND	0.68	1		PCB168	ND	0.68	1	
PCB066	ND	0.68	1		PCB169	ND	0.68	1	
PCB070	ND	0.68	1		PCB170	ND	0.68	1	
PCB074	ND	0.68	1		PCB174	ND	0.68	1	
PCB077	ND	0.68	1		PCB177	ND	0.68	1	
PCB081	ND	0.68	1		PCB180	ND	0.68	1	
PCB087	ND	0.68	1		PCB183	ND	0.68	1	
PCB095	ND	0.68	1		PCB184	ND	0.68	1	
PCB097	ND	0.68	1		PCB187	ND	0.68	1	
PCB099	ND	0.68	1		PCB189	ND	0.68	1	
PCB101	ND	0.68	1		PCB194	ND	0.68	1	
PCB105	ND	0.68	1		PCB195	ND	0.68	1	
PCB110	ND	0.68	1		PCB200	ND	0.68	1	
PCB114	ND	0.68	1		PCB201	ND	0.68	1	
PCB118	ND	0.68	1		PCB203	ND	0.68	1	
PCB119	ND	0.68	1		PCB206	ND	0.68	1	
PCB123	ND	0.68	1		PCB209	ND	0.68	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	57	50-125		p-Terphenyl-d14	81	50-125	

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Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 12/13/11
Work Order No: 11-12-0898
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-341-39**	**N/A**	**Solid**	**GC/MS HHH**	**02/09/12**	**02/10/12 21:09**	**120209L09**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.50	1		PCB126	ND	0.50	1	
PCB008	ND	0.50	1		PCB128	ND	0.50	1	
PCB018	ND	0.50	1		PCB132	ND	0.50	1	
PCB028	ND	0.50	1		PCB138/158	ND	1.0	1	
PCB031	ND	0.50	1		PCB141	ND	0.50	1	
PCB033	ND	0.50	1		PCB149	ND	0.50	1	
PCB037	ND	0.50	1		PCB151	ND	0.50	1	
PCB044	ND	0.50	1		PCB153	ND	0.50	1	
PCB049	ND	0.50	1		PCB156	ND	0.50	1	
PCB052	ND	0.50	1		PCB157	ND	0.50	1	
PCB056	ND	0.50	1		PCB167	ND	0.50	1	
PCB060	ND	0.50	1		PCB168	ND	0.50	1	
PCB066	ND	0.50	1		PCB169	ND	0.50	1	
PCB070	ND	0.50	1		PCB170	ND	0.50	1	
PCB074	ND	0.50	1		PCB174	ND	0.50	1	
PCB077	ND	0.50	1		PCB177	ND	0.50	1	
PCB081	ND	0.50	1		PCB180	ND	0.50	1	
PCB087	ND	0.50	1		PCB183	ND	0.50	1	
PCB095	ND	0.50	1		PCB184	ND	0.50	1	
PCB097	ND	0.50	1		PCB187	ND	0.50	1	
PCB099	ND	0.50	1		PCB189	ND	0.50	1	
PCB101	ND	0.50	1		PCB194	ND	0.50	1	
PCB105	ND	0.50	1		PCB195	ND	0.50	1	
PCB110	ND	0.50	1		PCB200	ND	0.50	1	
PCB114	ND	0.50	1		PCB201	ND	0.50	1	
PCB118	ND	0.50	1		PCB203	ND	0.50	1	
PCB119	ND	0.50	1		PCB206	ND	0.50	1	
PCB123	ND	0.50	1		PCB209	ND	0.50	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	57	50-125		p-Terphenyl-d14	61	50-125	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 11-12-0898
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-341-29	**Solid**	**GC/MS HHH**	**12/15/11**	**12/20/11**	**111215L16**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
PCB018	25.00	102	97	50-125	38-138	5	0-30	
PCB028	25.00	105	99	50-125	38-138	6	0-30	
PCB044	25.00	102	97	50-125	38-138	5	0-30	
PCB052	25.00	98	94	50-125	38-138	4	0-30	
PCB066	25.00	100	99	50-125	38-138	2	0-30	
PCB077	25.00	97	96	50-125	38-138	2	0-30	
PCB101	25.00	100	98	50-125	38-138	2	0-30	
PCB105	25.00	96	95	50-125	38-138	1	0-30	
PCB118	25.00	104	103	50-125	38-138	1	0-30	
PCB126	25.00	88	88	50-125	38-138	1	0-30	
PCB128	25.00	93	93	50-125	38-138	1	0-30	
PCB153	25.00	94	93	50-125	38-138	1	0-30	
PCB170	25.00	103	94	50-125	38-138	10	0-30	
PCB180	25.00	94	94	50-125	38-138	0	0-30	
PCB187	25.00	93	94	50-125	38-138	1	0-30	
PCB206	25.00	104	99	50-125	38-138	5	0-30	

Total number of LCS compounds : 16
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

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RPD - Relative Percent Difference , CL - Control Limit

Glossary of Terms and Qualifiers

Work Order Number: 11-12-0898

Qualifier	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
ME	LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
MPN - Most Probable Number

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Calscience Environmental Laboratories, Inc.

☐ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

CHAIN OF CUSTODY RECORD

Date 12/12/11

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WO # / LAB USE ONLY ☐ **11-12-0898**

LABORATORY CLIENT: URS Corporation

ADDRESS: 4225 Executive Square Suite 1600

CITY La Jolla STATE CA ZIP 92037

TEL: 619.888.0487 E-MAIL: David.Schug@urs.com / Derek.Rector@URS.com

CLIENT PROJECT NAME / NUMBER: San Elijo Lagoon / 27661119.10000

P.O. NO.:

PROJECT CONTACT: Derek Rector / David Schug

SAMPLER(S): (PRINT) Derek Rector

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☒ STANDARD

☐ COELT EDF

GLOBAL ID

LOG CODE

SPECIAL INSTRUCTIONS:
Please begin ASAP - samples represent composites of older samples from ~6 days ago.

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	TPH (g) or GRO	TPH (d) or DRO or (C6-C36) or (C6-C44)	TPH ( )	BTEX / MTBE (8260) or ( )	VOCs (8260)	Oxygenates (8260)	En Core / Terra Core Prep (5035)	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PNAs (8310) or (8270)	T22 Metals (6010/747X)	Cr(VI) [7196 or 7199 or 218.6]	Air - VOCs (TO-14A) or (TO-15)	Air - TPH (g) [TO-3]	San Elijo Lagoon - Vikas	Patel is the Calscience Pm.	
1	CB-Comp-D-upper	12/12/11	2:40 DR	Soil	4																			X		
2	CB-Comp-D-Lower	12/12/11	2:55	Soil	4																			X		
3	WB/CB-Comp-D-Upper	12/12/11	3:10	Soil	4																			X		
4	WB/CB-Comp-D-Lower	12/12/11	3:20	Soil	4																			X		

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Derek Rector	CEL	12/13/11	0920

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision

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Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12- 0 8 9 ~~9~~ 8 12/13/11 PS

SAMPLE RECEIPT FORM

Cooler 1 **of** 1

CLIENT: URS CORP

DATE: 12/13/11

TEMPERATURE: Thermometer ID: SC3 (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 3 . 2 °C - 0.3 °C (CF) = 2 . 9 °C ☐ Blank ☑ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _______).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter

Initial: PS

CUSTODY SEALS INTACT:

☐ Cooler	☐ ________	☐ No (Not Intact)	☑ Not Present	☐ N/A	**Initial:** PS
☐ Sample	☐ ________	☐ No (Not Intact)	☑ Not Present		**Initial:** PS

SAMPLE CONDITION:

	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours	☐	☐	☑
Proper preservation noted on COC or sample container	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☑16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐________

Water: ☐VOA ☐VOA**h** ☐VOA**na**$_2$ ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na**$_2$ ☐1AGB**s**

☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na**$_2$ ☐________ ☐________ ☐________

Air: ☐Tedlar® ☐Summa® **Other:** ☐______ **Trip Blank Lot#:**________ **Labeled/Checked by:** PS

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** DL

Preservative: **h:** HCL **n:** HNO_3 **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** DC

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Calscience Environmental Laboratories, Inc.

CALSCIENCE

WORK ORDER NUMBER: 12-02-0032

The difference is service

Analytical Report For

Client: URS Corporation

Client Project Name: San Elijo Lagoon / 27661119.10000

Attention: Derek Rector
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Vikas Patel

Approved for release on 02/14/2012 by:
Vikas Patel
Project Manager

ResultLink ▸

Email your PM ▸

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety. Note that the Chain-of-Custody Record and Sample Receipt Form are integral parts of this report.

Contents

Client Project Name: San Elijo Lagoon / 27661119.10000
Work Order Number: 12-02-0032

Client: URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487
Attn: Derek Rector

Work Order: 12-02-0032
Project name: San Elijo Lagoon / 27661119.10000
Received: 02/01/12 14:10

DETECTIONS SUMMARY

Client Sample ID Analyte	Result	Qualifiers	Reporting Limit	Units	Method	Extraction
OD03-UPPER						
Solids, Total	**75.1**		0.100	%	SM 2540 B	N/A
CB03-D-UPPER						
Solids, Total	**82.2**		0.100	%	SM 2540 B	N/A
CB02-D-UPPER						
Solids, Total	**65.7**		0.100	%	SM 2540 B	N/A
CB01-D-UPPER						
Solids, Total	**69.9**		0.100	%	SM 2540 B	N/A

Subcontracted analyses, if any, are not included in this summary.

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*MDL is shown.

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/01/12
Work Order No: 12-02-0032
Preparation: N/A
Method: SM 2540 B

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
OD03-UPPER	**12-02-0032-1-A**	**02/01/12 11:00**	**Solid**	**N/A**	**02/13/12**	**02/13/12 19:00**	**C0213TSB2**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	75.1	0.100	1		%

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB03-D-UPPER	**12-02-0032-2-A**	**02/01/12 11:00**	**Solid**	**N/A**	**02/13/12**	**02/13/12 19:00**	**C0213TSB2**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	82.2	0.100	1		%

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB02-D-UPPER	**12-02-0032-3-A**	**02/01/12 11:00**	**Solid**	**N/A**	**02/13/12**	**02/13/12 19:00**	**C0213TSB2**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	65.7	0.100	1		%

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB01-D-UPPER	**12-02-0032-4-A**	**02/01/12 11:00**	**Solid**	**N/A**	**02/13/12**	**02/13/12 19:00**	**C0213TSB2**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	69.9	0.100	1		%

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-05-019-1,837**	**N/A**	**Solid**	**N/A**	**02/13/12**	**02/13/12 19:00**	**C0213TSB2**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	ND	0.100	1		%

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/01/12
Work Order No: 12-02-0032
Preparation: EPA 3545
Method: EPA 8082
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
OD03-UPPER	**12-02-0032-1-A**	**02/01/12 11:00**	**Solid**	**GC 58**	**02/03/12**	**02/07/12 18:06**	**120203L07**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	13	1		Aroclor-1248	ND	13	1	
Aroclor-1221	ND	13	1		Aroclor-1254	ND	13	1	
Aroclor-1232	ND	13	1		Aroclor-1260	ND	13	1	
Aroclor-1242	ND	13	1		Aroclor-1262	ND	13	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	97	50-130			Decachlorobiphenyl	93	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB03-D-UPPER	**12-02-0032-2-A**	**02/01/12 11:00**	**Solid**	**GC 58**	**02/03/12**	**02/07/12 18:24**	**120203L07**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	12	1		Aroclor-1248	ND	12	1	
Aroclor-1221	ND	12	1		Aroclor-1254	ND	12	1	
Aroclor-1232	ND	12	1		Aroclor-1260	ND	12	1	
Aroclor-1242	ND	12	1		Aroclor-1262	ND	12	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	77	50-130			Decachlorobiphenyl	83	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB02-D-UPPER	**12-02-0032-3-A**	**02/01/12 11:00**	**Solid**	**GC 58**	**02/03/12**	**02/07/12 18:42**	**120203L07**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	15	1		Aroclor-1248	ND	15	1	
Aroclor-1221	ND	15	1		Aroclor-1254	ND	15	1	
Aroclor-1232	ND	15	1		Aroclor-1260	ND	15	1	
Aroclor-1242	ND	15	1		Aroclor-1262	ND	15	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	91	50-130			Decachlorobiphenyl	96	50-130		

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Calscience
Environmental
Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/01/12
Work Order No: 12-02-0032
Preparation: EPA 3545
Method: EPA 8082
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB01-D-UPPER	**12-02-0032-4-A**	**02/01/12 11:00**	**Solid**	**GC 58**	**02/03/12**	**02/07/12 19:00**	**120203L07**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	14	1		Aroclor-1248	ND	14	1	
Aroclor-1221	ND	14	1		Aroclor-1254	ND	14	1	
Aroclor-1232	ND	14	1		Aroclor-1260	ND	14	1	
Aroclor-1242	ND	14	1		Aroclor-1262	ND	14	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	76	50-130		Decachlorobiphenyl	76	50-130	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-565-215**	**N/A**	**Solid**	**GC 58**	**02/03/12**	**02/07/12 16:54**	**120203L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	10	1		Aroclor-1248	ND	10	1	
Aroclor-1221	ND	10	1		Aroclor-1254	ND	10	1	
Aroclor-1232	ND	10	1		Aroclor-1260	ND	10	1	
Aroclor-1242	ND	10	1		Aroclor-1262	ND	10	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	82	50-130		Decachlorobiphenyl	90	50-130	

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/01/12
Work Order No: 12-02-0032
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
OD03-UPPER	**12-02-0032-1-A**	**02/01/12 11:00**	**Solid**	**GC/MS HHH**	**02/03/12**	**02/07/12 17:46**	**120203L09**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.67	1		PCB126	ND	0.67	1	
PCB008	ND	0.67	1		PCB128	ND	0.67	1	
PCB018	ND	0.67	1		PCB132	ND	0.67	1	
PCB028	ND	0.67	1		PCB138/158	ND	1.3	1	
PCB031	ND	0.67	1		PCB141	ND	0.67	1	
PCB033	ND	0.67	1		PCB149	ND	0.67	1	
PCB037	ND	0.67	1		PCB151	ND	0.67	1	
PCB044	ND	0.67	1		PCB153	ND	0.67	1	
PCB049	ND	0.67	1		PCB156	ND	0.67	1	
PCB052	ND	0.67	1		PCB157	ND	0.67	1	
PCB056	ND	0.67	1		PCB167	ND	0.67	1	
PCB060	ND	0.67	1		PCB168	ND	0.67	1	
PCB066	ND	0.67	1		PCB169	ND	0.67	1	
PCB070	ND	0.67	1		PCB170	ND	0.67	1	
PCB074	ND	0.67	1		PCB174	ND	0.67	1	
PCB077	ND	0.67	1		PCB177	ND	0.67	1	
PCB081	ND	0.67	1		PCB180	ND	0.67	1	
PCB087	ND	0.67	1		PCB183	ND	0.67	1	
PCB095	ND	0.67	1		PCB184	ND	0.67	1	
PCB097	ND	0.67	1		PCB187	ND	0.67	1	
PCB099	ND	0.67	1		PCB189	ND	0.67	1	
PCB101	ND	0.67	1		PCB194	ND	0.67	1	
PCB105	ND	0.67	1		PCB195	ND	0.67	1	
PCB110	ND	0.67	1		PCB200	ND	0.67	1	
PCB114	ND	0.67	1		PCB201	ND	0.67	1	
PCB118	ND	0.67	1		PCB203	ND	0.67	1	
PCB119	ND	0.67	1		PCB206	ND	0.67	1	
PCB123	ND	0.67	1		PCB209	ND	0.67	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	78	50-125		p-Terphenyl-d14	105	50-125	

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/01/12
Work Order No: 12-02-0032
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB03-D-UPPER	**12-02-0032-2-A**	**02/01/12 11:00**	**Solid**	**GC/MS HHH**	**02/03/12**	**02/07/12 18:12**	**120203L09**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.61	1		PCB126	ND	0.61	1	
PCB008	ND	0.61	1		PCB128	ND	0.61	1	
PCB018	ND	0.61	1		PCB132	ND	0.61	1	
PCB028	ND	0.61	1		PCB138/158	ND	1.2	1	
PCB031	ND	0.61	1		PCB141	ND	0.61	1	
PCB033	ND	0.61	1		PCB149	ND	0.61	1	
PCB037	ND	0.61	1		PCB151	ND	0.61	1	
PCB044	ND	0.61	1		PCB153	ND	0.61	1	
PCB049	ND	0.61	1		PCB156	ND	0.61	1	
PCB052	ND	0.61	1		PCB157	ND	0.61	1	
PCB056	ND	0.61	1		PCB167	ND	0.61	1	
PCB060	ND	0.61	1		PCB168	ND	0.61	1	
PCB066	ND	0.61	1		PCB169	ND	0.61	1	
PCB070	ND	0.61	1		PCB170	ND	0.61	1	
PCB074	ND	0.61	1		PCB174	ND	0.61	1	
PCB077	ND	0.61	1		PCB177	ND	0.61	1	
PCB081	ND	0.61	1		PCB180	ND	0.61	1	
PCB087	ND	0.61	1		PCB183	ND	0.61	1	
PCB095	ND	0.61	1		PCB184	ND	0.61	1	
PCB097	ND	0.61	1		PCB187	ND	0.61	1	
PCB099	ND	0.61	1		PCB189	ND	0.61	1	
PCB101	ND	0.61	1		PCB194	ND	0.61	1	
PCB105	ND	0.61	1		PCB195	ND	0.61	1	
PCB110	ND	0.61	1		PCB200	ND	0.61	1	
PCB114	ND	0.61	1		PCB201	ND	0.61	1	
PCB118	ND	0.61	1		PCB203	ND	0.61	1	
PCB119	ND	0.61	1		PCB206	ND	0.61	1	
PCB123	ND	0.61	1		PCB209	ND	0.61	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	109	50-125		p-Terphenyl-d14	123	50-125	

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Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/01/12
Work Order No: 12-02-0032
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB02-D-UPPER	**12-02-0032-3-A**	**02/01/12 11:00**	**Solid**	**GC/MS HHH**	**02/03/12**	**02/07/12 18:39**	**120203L09**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.76	1		PCB126	ND	0.76	1	
PCB008	ND	0.76	1		PCB128	ND	0.76	1	
PCB018	ND	0.76	1		PCB132	ND	0.76	1	
PCB028	ND	0.76	1		PCB138/158	ND	1.5	1	
PCB031	ND	0.76	1		PCB141	ND	0.76	1	
PCB033	ND	0.76	1		PCB149	ND	0.76	1	
PCB037	ND	0.76	1		PCB151	ND	0.76	1	
PCB044	ND	0.76	1		PCB153	ND	0.76	1	
PCB049	ND	0.76	1		PCB156	ND	0.76	1	
PCB052	ND	0.76	1		PCB157	ND	0.76	1	
PCB056	ND	0.76	1		PCB167	ND	0.76	1	
PCB060	ND	0.76	1		PCB168	ND	0.76	1	
PCB066	ND	0.76	1		PCB169	ND	0.76	1	
PCB070	ND	0.76	1		PCB170	ND	0.76	1	
PCB074	ND	0.76	1		PCB174	ND	0.76	1	
PCB077	ND	0.76	1		PCB177	ND	0.76	1	
PCB081	ND	0.76	1		PCB180	ND	0.76	1	
PCB087	ND	0.76	1		PCB183	ND	0.76	1	
PCB095	ND	0.76	1		PCB184	ND	0.76	1	
PCB097	ND	0.76	1		PCB187	ND	0.76	1	
PCB099	ND	0.76	1		PCB189	ND	0.76	1	
PCB101	ND	0.76	1		PCB194	ND	0.76	1	
PCB105	ND	0.76	1		PCB195	ND	0.76	1	
PCB110	ND	0.76	1		PCB200	ND	0.76	1	
PCB114	ND	0.76	1		PCB201	ND	0.76	1	
PCB118	ND	0.76	1		PCB203	ND	0.76	1	
PCB119	ND	0.76	1		PCB206	ND	0.76	1	
PCB123	ND	0.76	1		PCB209	ND	0.76	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	123	50-125		p-Terphenyl-d14	98	50-125	

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/01/12
Work Order No: 12-02-0032
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB01-D-UPPER	**12-02-0032-4-A**	**02/01/12 11:00**	**Solid**	**GC/MS HHH**	**02/03/12**	**02/07/12 19:06**	**120203L09**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.72	1		PCB126	ND	0.72	1	
PCB008	ND	0.72	1		PCB128	ND	0.72	1	
PCB018	ND	0.72	1		PCB132	ND	0.72	1	
PCB028	ND	0.72	1		PCB138/158	ND	1.4	1	
PCB031	ND	0.72	1		PCB141	ND	0.72	1	
PCB033	ND	0.72	1		PCB149	ND	0.72	1	
PCB037	ND	0.72	1		PCB151	ND	0.72	1	
PCB044	ND	0.72	1		PCB153	ND	0.72	1	
PCB049	ND	0.72	1		PCB156	ND	0.72	1	
PCB052	ND	0.72	1		PCB157	ND	0.72	1	
PCB056	ND	0.72	1		PCB167	ND	0.72	1	
PCB060	ND	0.72	1		PCB168	ND	0.72	1	
PCB066	ND	0.72	1		PCB169	ND	0.72	1	
PCB070	ND	0.72	1		PCB170	ND	0.72	1	
PCB074	ND	0.72	1		PCB174	ND	0.72	1	
PCB077	ND	0.72	1		PCB177	ND	0.72	1	
PCB081	ND	0.72	1		PCB180	ND	0.72	1	
PCB087	ND	0.72	1		PCB183	ND	0.72	1	
PCB095	ND	0.72	1		PCB184	ND	0.72	1	
PCB097	ND	0.72	1		PCB187	ND	0.72	1	
PCB099	ND	0.72	1		PCB189	ND	0.72	1	
PCB101	ND	0.72	1		PCB194	ND	0.72	1	
PCB105	ND	0.72	1		PCB195	ND	0.72	1	
PCB110	ND	0.72	1		PCB200	ND	0.72	1	
PCB114	ND	0.72	1		PCB201	ND	0.72	1	
PCB118	ND	0.72	1		PCB203	ND	0.72	1	
PCB119	ND	0.72	1		PCB206	ND	0.72	1	
PCB123	ND	0.72	1		PCB209	ND	0.72	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	85	50-125		p-Terphenyl-d14	113	50-125	

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Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/01/12
Work Order No:	12-02-0032
Preparation:	EPA 3545
Method:	EPA 8270C SIM PCB Congeners
Units:	ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-341-38**	**N/A**	**Solid**	**GC/MS HHH**	**02/03/12**	**02/08/12 02:16**	**120203L09**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.50	1		PCB126	ND	0.50	1	
PCB008	ND	0.50	1		PCB128	ND	0.50	1	
PCB018	ND	0.50	1		PCB132	ND	0.50	1	
PCB028	ND	0.50	1		PCB138/158	ND	1.0	1	
PCB031	ND	0.50	1		PCB141	ND	0.50	1	
PCB033	ND	0.50	1		PCB149	ND	0.50	1	
PCB037	ND	0.50	1		PCB151	ND	0.50	1	
PCB044	ND	0.50	1		PCB153	ND	0.50	1	
PCB049	ND	0.50	1		PCB156	ND	0.50	1	
PCB052	ND	0.50	1		PCB157	ND	0.50	1	
PCB056	ND	0.50	1		PCB167	ND	0.50	1	
PCB060	ND	0.50	1		PCB168	ND	0.50	1	
PCB066	ND	0.50	1		PCB169	ND	0.50	1	
PCB070	ND	0.50	1		PCB170	ND	0.50	1	
PCB074	ND	0.50	1		PCB174	ND	0.50	1	
PCB077	ND	0.50	1		PCB177	ND	0.50	1	
PCB081	ND	0.50	1		PCB180	ND	0.50	1	
PCB087	ND	0.50	1		PCB183	ND	0.50	1	
PCB095	ND	0.50	1		PCB184	ND	0.50	1	
PCB097	ND	0.50	1		PCB187	ND	0.50	1	
PCB099	ND	0.50	1		PCB189	ND	0.50	1	
PCB101	ND	0.50	1		PCB194	ND	0.50	1	
PCB105	ND	0.50	1		PCB195	ND	0.50	1	
PCB110	ND	0.50	1		PCB200	ND	0.50	1	
PCB114	ND	0.50	1		PCB201	ND	0.50	1	
PCB118	ND	0.50	1		PCB203	ND	0.50	1	
PCB119	ND	0.50	1		PCB206	ND	0.50	1	
PCB123	ND	0.50	1		PCB209	ND	0.50	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	65	50-125		p-Terphenyl-d14	65	50-125	

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Quality Control - Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/01/12
Work Order No:	12-02-0032
Preparation:	N/A
Method:	SM 2540 B

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared:	Date Analyzed:	Duplicate Batch Number
OD03-UPPER	**Solid**	**N/A**	**02/13/12**	**02/13/12**	**C0213TSD2**

Parameter	Sample Conc	DUP Conc	RPD	RPD CL	Qualifiers
Solids, Total	75.1	75.3	0	0-10	

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/01/12
Work Order No: 12-02-0032
Preparation: EPA 3545
Method: EPA 8082

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CB03-D-UPPER	**Solid**	**GC 58**	**02/03/12**	**02/07/12**	**120203S07**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aroclor-1016	20.00	76	86	50-135	12	0-25	
Aroclor-1260	20.00	75	86	50-135	14	0-25	

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/01/12
Work Order No: 12-02-0032
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
12-02-0075-1	**Sediment**	**GC/MS HHH**	**02/03/12**	**02/08/12**	**120203S09**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
PCB018	25.00	77	80	50-125	4	0-30	
PCB028	25.00	82	83	50-125	0	0-30	
PCB044	25.00	82	81	50-125	1	0-30	
PCB052	25.00	82	83	50-125	1	0-30	
PCB066	25.00	82	85	50-125	4	0-30	
PCB077	25.00	77	82	50-125	7	0-30	
PCB101	25.00	75	76	50-125	0	0-30	
PCB105	25.00	79	77	50-125	3	0-30	
PCB118	25.00	79	78	50-125	1	0-30	
PCB126	25.00	79	78	50-125	1	0-30	
PCB128	25.00	75	73	50-125	2	0-30	
PCB153	25.00	81	79	50-125	2	0-30	
PCB170	25.00	60	61	50-125	2	0-30	
PCB180	25.00	83	84	50-125	1	0-30	
PCB187	25.00	81	79	50-125	2	0-30	
PCB206	25.00	74	73	50-125	0	0-30	

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	N/A
Work Order No:	12-02-0032
Preparation:	EPA 3545
Method:	EPA 8082

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-565-215	**Solid**	**GC 58**	**02/03/12**	**02/07/12**	**120203L07**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aroclor-1016	20.00	99	90	50-135	10	0-25	
Aroclor-1260	20.00	92	113	50-135	20	0-25	

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0032
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-341-38	**Solid**	**GC/MS HHH**	**02/03/12**	**02/07/12**	**120203L09**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
PCB018	25.00	93	93	50-125	38-138	1	0-30	
PCB028	25.00	97	97	50-125	38-138	0	0-30	
PCB044	25.00	94	94	50-125	38-138	0	0-30	
PCB052	25.00	91	90	50-125	38-138	1	0-30	
PCB066	25.00	98	97	50-125	38-138	1	0-30	
PCB077	25.00	98	96	50-125	38-138	2	0-30	
PCB101	25.00	97	95	50-125	38-138	1	0-30	
PCB105	25.00	97	95	50-125	38-138	2	0-30	
PCB118	25.00	100	99	50-125	38-138	1	0-30	
PCB126	25.00	92	90	50-125	38-138	2	0-30	
PCB128	25.00	81	80	50-125	38-138	1	0-30	
PCB153	25.00	94	93	50-125	38-138	2	0-30	
PCB170	25.00	82	82	50-125	38-138	0	0-30	
PCB180	25.00	98	96	50-125	38-138	2	0-30	
PCB187	25.00	94	93	50-125	38-138	2	0-30	
PCB206	25.00	89	90	50-125	38-138	0	0-30	

Total number of LCS compounds : 16
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Glossary of Terms and Qualifiers

Work Order Number: 12-02-0032

Qualifier	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
ME	LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
MPN - Most Probable Number

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Calscience Environmental Laboratories, Inc.

☐ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

CHAIN OF CUSTODY RECORD

Date 2/1/12

Page 1 of 1

LABORATORY CLIENT: URS

ADDRESS: 2020 E. FIRST St., SUITE 400

CITY SANTA ANA STATE CA ZIP 92705

TEL: 714 648 2861 E-MAIL: thomas.o'meara@urs.com

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ STANDARD

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
☐ RWQCB REPORTING FORMS ☐ COELT EDF ☐

SPECIAL INSTRUCTIONS:

CLIENT PROJECT NAME / NUMBER: 27661119

P.O. NO.:

LAB USE ONLY 12-02-0032

PROJECT CONTACT: DEREK RECTOR

SAMPLER(S): (PRINT) Tom O'MEARA

COELT LOG CODE ☐☐☐☐

COOLER RECEIPT
TEMP= °C

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	FIELD POINT NAME (FOR COELT EDF)	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (g)	TPH (d) or (C6-C36) or (C6-C44)	TPH ( )	BTEX / MTBE (8260B) or ( )	VOCs (8260B)	Oxygenates (8260B)	Encore Prep (5035)	SVOCs (8270C)	Pesticides (8081A)	PCBs (8082)	PNAs (8310) or (8270C)	T22 Metals (6010B/747X)	Cr(VI) [7196A or 7199 or 218.6]	VOCs (TO-14A) or (TO-15)	TPH (g) [TO-3]+	ASK VIK		
1	OD03-UPPER		2/1/12	11:00	S	1																✓		
2	CB03-D-UPPER		2/1/12	11:00	S	1																✓		
3	CB02-D-UPPER		2/1/12	11:00	S	1																✓		
4	CB01-D-UPPER		2/1/12	11:00	S	1																✓		

Relinquished by: (Signature) Tom O'Meara	Received by: (Signature/Affiliation) CEL	Date: 2/1/12	Time: 12:40
Relinquished by: (Signature)	Received by: (Signature/Affiliation) CEL	Date: 2/1/12	Time: 14:10
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

05/01/07 Revision

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Change Order

From: Vikas Patel
Sent: Wednesday, February 01, 2012 4:03 PM
To: Change Order
Cc: 'Noel Cruise'
Subject: FW: ***COC!!!***

Please login all four samples for *EPA 8082 PCBs, Aroclors SEDIMENT and EPA 8270C SIM PCB Congeners Super, Sediment on 5 day TAT from today. Same test codes as 11-12-0898.

Vik Patel
Project Manager
Calscience Environmental Laboratories, Inc.
714-895-5494 x211

From: noreply@calscience.com [mailto:noreply@calscience.com]
Sent: Wednesday, February 01, 2012 3:57 PM
To: Vikas Patel; Noel Cruise
Subject: ***COC!!!***

PLEASE SEE ATTACHMENT...

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Calscience Environmental Laboratories, Inc.

WORK ORDER #: 12-02-☐0 ☐0 ☐3 ☐2

SAMPLE RECEIPT FORM

Cooler 1 **of** 1

CLIENT: URS

DATE: 02/ 1 /12

TEMPERATURE: **Thermometer ID: SC3 (Criteria: 0.0 °C – 6.0 °C, not frozen)**

Temperature 2 . 8 °C - 0.3 °C (CF) = 2 . 5 °C ☑ **Blank** ☐ **Sample**

☐ Sample(s) outside temperature criteria (PM/APM contacted by: ________).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☑ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter **Initial:** DEE

CUSTODY SEALS INTACT:

☐ Cooler	☐ ____________	☐ No (Not Intact)	☑ Not Present	☐ N/A	**Initial:** DEE
☐ Sample	☐ ____________	☐ No (Not Intact)	☑ Not Present		**Initial:** D.L

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples..................	☑	☐	☐
COC document(s) received complete..	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC..	☑	☐	☐
Sample container label(s) consistent with COC..................................	☑	☐	☐
Sample container(s) intact and good condition...................................	☑	☐	☐
Proper containers and sufficient volume for analyses requested...............	☑	☐	☐
Analyses received within holding time...	☑	☐	☐
pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours...	☐	☐	☑
Proper preservation noted on COC or sample container........................	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace..................................	☐	☐	☑
Tedlar bag(s) free of condensation..	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☑8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_________

Water: ☐VOA ☐VOAh ☐VOA**na₂** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na₂** ☐1AGB**s** ☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB ☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na₂** ☐_______ ☐_________ ☐________

Air: ☐Tedlar® ☐Summa® **Other:** ☐______ **Trip Blank Lot#:**________ **Labeled/Checked by:** DL

Container: C: Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** YL

Preservative: h: HCL **n:** HNO_3 **na₂:**$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** YL

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Calscience Environmental Laboratories, Inc.

CALSCIENCE

WORK ORDER NUMBER: 12-02-0901

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: URS Corporation

Client Project Name: San Elijo Lagoon / 27661119.10000

Attention: David Schug
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Vikas Patel

Approved for release on 03/6/2012 by:
Vikas Patel
Project Manager

ResultLink ▸

Email your PM ▸

ACCREDITED IN ACCORDANCE WITH nelac

Contents

Client Project Name: San Elijo Lagoon / 27661119.10000
Work Order Number: 12-02-0901

Client: URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487
Attn: David Schug

Work Order: 12-02-0901
Project Name: San Elijo Lagoon / 27661119.10000
Received: 02/14/12 19:15

DETECTIONS SUMMARY

Client Sample ID

Analyte	Result	Qualifiers	Reporting Limit	Units	Method	Extraction
CB-Comp-SB-Upper						
Arsenic	**2.51**		0.142	mg/kg	EPA 6020	EPA 3050B
Chromium	**16.4**		0.142	mg/kg	EPA 6020	EPA 3050B
Copper	**16.5**		0.142	mg/kg	EPA 6020	EPA 3050B
Lead	**6.56**		0.142	mg/kg	EPA 6020	EPA 3050B
Nickel	**6.45**		0.142	mg/kg	EPA 6020	EPA 3050B
Selenium	**0.393**		0.142	mg/kg	EPA 6020	EPA 3050B
Zinc	**47.6**		1.42	mg/kg	EPA 6020	EPA 3050B
Sulfide, Total	**11**		0.43	mg/kg	EPA 376.2M	N/A
Carbon, Total Organic	**6400**		710	mg/kg	EPA 9060A	N/A
Solids, Volatile	**10**		0.14	%	EPA 160.4M	N/A
Solids, Total	**70.2**		0.100	%	SM 2540 B	N/A
Bis(2-Ethylhexyl) Phthalate	**0.031**		0.014	mg/kg	EPA 8270C SIM	EPA 3545
Butyl Benzyl Phthalate	**0.017**		0.014	mg/kg	EPA 8270C SIM	EPA 3545
Dimethyl Phthalate	**0.071**		0.014	mg/kg	EPA 8270C SIM	EPA 3545
CB-Comp-SB-Lower						
Arsenic	**1.58**		0.129	mg/kg	EPA 6020	EPA 3050B
Chromium	**6.76**		0.129	mg/kg	EPA 6020	EPA 3050B
Copper	**4.89**		0.129	mg/kg	EPA 6020	EPA 3050B
Lead	**1.67**		0.129	mg/kg	EPA 6020	EPA 3050B
Nickel	**2.63**		0.129	mg/kg	EPA 6020	EPA 3050B
Selenium	**0.244**		0.129	mg/kg	EPA 6020	EPA 3050B
Zinc	**14.9**		1.29	mg/kg	EPA 6020	EPA 3050B
Sulfide, Total	**9.3**		0.39	mg/kg	EPA 376.2M	N/A
Carbon, Total Organic	**1400**		640	mg/kg	EPA 9060A	N/A
Solids, Volatile	**0.82**		0.13	%	EPA 160.4M	N/A
Solids, Total	**77.7**		0.100	%	SM 2540 B	N/A
Oil and Grease	**19**		13	mg/kg	EPA 413.2M	Extraction
Bis(2-Ethylhexyl) Phthalate	**0.013**		0.013	mg/kg	EPA 8270C SIM	EPA 3545
Dimethyl Phthalate	**0.062**		0.013	mg/kg	EPA 8270C SIM	EPA 3545

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*MDL is shown.

Client: URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487
Attn: David Schug

Work Order: 12-02-0901
Project Name: San Elijo Lagoon / 27661119.10000
Received: 02/14/12 19:15

DETECTIONS SUMMARY

Client Sample ID

Analyte	Result	Qualifiers	Reporting Limit	Units	Method	Extraction
WB-Comp-SB-Upper						
Arsenic	**2.42**		0.142	mg/kg	EPA 6020	EPA 3050B
Chromium	**11.6**		0.142	mg/kg	EPA 6020	EPA 3050B
Copper	**10.6**		0.142	mg/kg	EPA 6020	EPA 3050B
Lead	**8.90**		0.142	mg/kg	EPA 6020	EPA 3050B
Nickel	**4.35**		0.142	mg/kg	EPA 6020	EPA 3050B
Selenium	**0.322**		0.142	mg/kg	EPA 6020	EPA 3050B
Zinc	**28.8**		1.42	mg/kg	EPA 6020	EPA 3050B
Sulfide, Total	**18**		0.71	mg/kg	EPA 376.2M	N/A
Carbon, Total Organic	**7700**		710	mg/kg	EPA 9060A	N/A
Solids, Volatile	**7.8**		0.14	%	EPA 160.4M	N/A
Solids, Total	**70.2**		0.100	%	SM 2540 B	N/A
4,4'-DDE	**2.2**		1.4	ug/kg	EPA 8081A	EPA 3545
Dimethyl Phthalate	**0.15**		0.014	mg/kg	EPA 8270C SIM	EPA 3545
WB-Comp-SB-Lower						
Arsenic	**2.17**		0.129	mg/kg	EPA 6020	EPA 3050B
Chromium	**8.04**		0.129	mg/kg	EPA 6020	EPA 3050B
Copper	**5.14**		0.129	mg/kg	EPA 6020	EPA 3050B
Lead	**4.30**		0.129	mg/kg	EPA 6020	EPA 3050B
Nickel	**2.98**		0.129	mg/kg	EPA 6020	EPA 3050B
Selenium	**0.186**		0.129	mg/kg	EPA 6020	EPA 3050B
Zinc	**17.1**		1.29	mg/kg	EPA 6020	EPA 3050B
Sulfide, Total	**8.3**		0.26	mg/kg	EPA 376.2M	N/A
Carbon, Total Organic	**2200**		650	mg/kg	EPA 9060A	N/A
Solids, Volatile	**0.89**		0.13	%	EPA 160.4M	N/A
Solids, Total	**77.3**		0.100	%	SM 2540 B	N/A
Bis(2-Ethylhexyl) Phthalate	**0.019**		0.013	mg/kg	EPA 8270C SIM	EPA 3545
Dimethyl Phthalate	**0.085**		0.013	mg/kg	EPA 8270C SIM	EPA 3545

Subcontracted analyses, if any, are not included in this summary.

*MDL is shown.

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Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	N/A
Method:	EPA 376.2M

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-D**	**02/14/12 10:00**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 12:30**	**C0218SB2**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Sulfide, Total	11	0.43	3		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-D**	**02/14/12 10:10**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 12:30**	**C0218SB2**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Sulfide, Total	9.3	0.39	3		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-D**	**02/14/12 10:20**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 12:30**	**C0218SB2**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Sulfide, Total	18	0.71	5		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-D**	**02/14/12 10:30**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 12:30**	**C0218SB2**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Sulfide, Total	8.3	0.26	2		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-10-035-35**	**N/A**	**Solid**	**N/A**	**02/18/12**	**02/18/12 12:30**	**C0218SB2**

Parameter	Result	RL	DF	Qual	Units
Sulfide, Total	ND	0.10	1		mg/kg

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URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: N/A
Method: EPA 376.2M

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-A**	**02/14/12 10:00**	**Sediment**	**N/A**	**02/15/12**	**02/15/12 09:50**	**C0215DSB2**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Sulfide, Dissolved	ND	0.14	1		mg/kg

CB-Comp-SB-Lower	**12-02-0901-2-A**	**02/14/12 10:10**	**Sediment**	**N/A**	**02/15/12**	**02/15/12 09:50**	**C0215DSB2**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Sulfide, Dissolved	ND	0.13	1		mg/kg

WB-Comp-SB-Upper	**12-02-0901-3-A**	**02/14/12 10:20**	**Sediment**	**N/A**	**02/15/12**	**02/15/12 09:50**	**C0215DSB2**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Sulfide, Dissolved	ND	0.14	1		mg/kg

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WB-Comp-SB-Lower	**12-02-0901-4-A**	**02/14/12 10:30**	**Sediment**	**N/A**	**02/15/12**	**02/15/12 09:50**	**C0215DSB2**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Sulfide, Dissolved	ND	0.13	1		mg/kg

Method Blank	**099-14-095-30**	**N/A**	**Solid**	**N/A**	**02/15/12**	**02/15/12 09:50**	**C0215DSB2**

Parameter	Result	RL	DF	Qual	Units
Sulfide, Dissolved	ND	0.10	1		mg/kg

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	N/A
Method:	EPA 9060A

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-B**	**02/14/12 10:00**	**Sediment**	**TOC 5**	**02/16/12**	**02/17/12 12:58**	**C0216TOCL1**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Carbon, Total Organic	6400	710	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-C**	**02/14/12 10:10**	**Sediment**	**TOC 5**	**02/16/12**	**02/17/12 12:58**	**C0216TOCL1**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Carbon, Total Organic	1400	640	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-B**	**02/14/12 10:20**	**Sediment**	**TOC 5**	**02/16/12**	**02/17/12 12:58**	**C0216TOCL1**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Carbon, Total Organic	7700	710	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-C**	**02/14/12 10:30**	**Sediment**	**TOC 5**	**02/16/12**	**02/17/12 12:58**	**C0216TOCL1**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Carbon, Total Organic	2200	650	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-06-013-688**	**N/A**	**Solid**	**TOC 5**	**02/16/12**	**02/17/12 12:58**	**C0216TOCL1**

Parameter	Result	RL	DF	Qual	Units
Carbon, Total Organic	ND	500	1		mg/kg

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Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: N/A
Method: EPA 160.4M

Project: San Elijo Lagoon / 27661119.10000 Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-A**	**02/14/12 10:00**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 18:00**	**C0218VSB1**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Solids, Volatile	10	0.14	1		%

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-A**	**02/14/12 10:10**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 18:00**	**C0218VSB1**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Solids, Volatile	0.82	0.13	1		%

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-A**	**02/14/12 10:20**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 18:00**	**C0218VSB1**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Solids, Volatile	7.8	0.14	1		%

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-A**	**02/14/12 10:30**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 18:00**	**C0218VSB1**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Solids, Volatile	0.89	0.13	1		%

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-05-020-1,006**	**N/A**	**Solid**	**N/A**	**02/18/12**	**02/18/12 18:00**	**C0218VSB1**

Parameter	Result	RL	DF	Qual	Units
Solids, Volatile	ND	0.10	1		%

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: N/A
Method: SM 2540 B

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-A**	**02/14/12 10:00**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 14:00**	**C0218TSB1**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	70.2	0.100	1		%

CB-Comp-SB-Lower	**12-02-0901-2-A**	**02/14/12 10:10**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 14:00**	**C0218TSB1**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	77.7	0.100	1		%

WB-Comp-SB-Upper	**12-02-0901-3-A**	**02/14/12 10:20**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 14:00**	**C0218TSB1**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	70.2	0.100	1		%

WB-Comp-SB-Lower	**12-02-0901-4-A**	**02/14/12 10:30**	**Sediment**	**N/A**	**02/18/12**	**02/18/12 14:00**	**C0218TSB1**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	77.3	0.100	1		%

Method Blank	**099-05-019-1,851**	**N/A**	**Solid**	**N/A**	**02/18/12**	**02/18/12 14:00**	**C0218TSB1**

Parameter	Result	RL	DF	Qual	Units
Solids, Total	ND	0.100	1		%

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Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: Extraction
Method: EPA 413.2M

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-B**	**02/14/12 10:00**	**Sediment**	**IR 2**	**02/20/12**	**02/20/12 13:45**	**120220L03**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Oil and Grease	ND	14	1		mg/kg

CB-Comp-SB-Lower	**12-02-0901-2-B**	**02/14/12 10:10**	**Sediment**	**IR 2**	**02/20/12**	**02/20/12 13:45**	**120220L03**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Oil and Grease	19	13	1		mg/kg

WB-Comp-SB-Upper	**12-02-0901-3-B**	**02/14/12 10:20**	**Sediment**	**IR 2**	**02/20/12**	**02/20/12 13:45**	**120220L03**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Oil and Grease	ND	14	1		mg/kg

WB-Comp-SB-Lower	**12-02-0901-4-C**	**02/14/12 10:30**	**Sediment**	**IR 2**	**02/20/12**	**02/20/12 13:45**	**120220L03**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Oil and Grease	ND	13	1		mg/kg

Method Blank	**099-07-019-114**	**N/A**	**Solid**	**IR 2**	**02/20/12**	**02/20/12 13:45**	**120220L03**

Parameter	Result	RL	DF	Qual	Units
Oil and Grease	ND	10	1		mg/kg

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	Extraction
Method:	EPA 418.1M

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-B**	**02/14/12 10:00**	**Sediment**	**IR 2**	**02/20/12**	**02/20/12 16:20**	**120220L04**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
TRPH	ND	14	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-B**	**02/14/12 10:10**	**Sediment**	**IR 2**	**02/20/12**	**02/20/12 16:20**	**120220L04**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
TRPH	ND	13	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-B**	**02/14/12 10:20**	**Sediment**	**IR 2**	**02/20/12**	**02/20/12 16:20**	**120220L04**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
TRPH	ND	14	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-C**	**02/14/12 10:30**	**Sediment**	**IR 2**	**02/20/12**	**02/20/12 16:20**	**120220L04**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
TRPH	ND	13	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-07-015-1,828**	**N/A**	**Solid**	**IR 2**	**02/20/12**	**02/20/12 16:20**	**120220L04**

Parameter	Result	RL	DF	Qual	Units
TRPH	ND	10	1		mg/kg

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

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Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3540C
Method: EPA 8270D (M)/TQ/EI
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-C**	**02/14/12 10:00**	**Sediment**	**GCTQ 2**	**02/17/12**	**02/22/12 19:53**	**120217L02**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Allethrin	ND	0.71	1		Fluvalinate	ND	0.71	1	
Bifenthrin	ND	0.71	1		Permethrin (cis/trans)	ND	1.4	1	
Cyfluthrin	ND	0.71	1		Phenothrin	ND	0.71	1	
Cypermethrin	ND	0.71	1		Resmethrin/Bioresmethrin	ND	0.71	1	
Deltamethrin/Tralomethrin	ND	0.71	1		Tetramethrin	ND	0.71	1	
Fenpropathrin	ND	0.71	1		lambda-Cyhalothrin	ND	0.71	1	
Fenvalerate/Esfenvalerate	ND	0.71	1						

Surrogates:	REC (%)	Control Limits	Qual
trans-Permethrin(C13)	103	25-200	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-C**	**02/14/12 10:10**	**Sediment**	**GCTQ 2**	**02/17/12**	**02/22/12 20:29**	**120217L02**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Allethrin	ND	0.64	1		Fluvalinate	ND	0.64	1	
Bifenthrin	ND	0.64	1		Permethrin (cis/trans)	ND	1.3	1	
Cyfluthrin	ND	0.64	1		Phenothrin	ND	0.64	1	
Cypermethrin	ND	0.64	1		Resmethrin/Bioresmethrin	ND	0.64	1	
Deltamethrin/Tralomethrin	ND	0.64	1		Tetramethrin	ND	0.64	1	
Fenpropathrin	ND	0.64	1		lambda-Cyhalothrin	ND	0.64	1	
Fenvalerate/Esfenvalerate	ND	0.64	1						

Surrogates:	REC (%)	Control Limits	Qual
trans-Permethrin(C13)	109	25-200	

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-C**	**02/14/12 10:20**	**Sediment**	**GCTQ 2**	**02/17/12**	**02/22/12 21:06**	**120217L02**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Allethrin	ND	0.71	1		Fluvalinate	ND	0.71	1	
Bifenthrin	ND	0.71	1		Permethrin (cis/trans)	ND	1.4	1	
Cyfluthrin	ND	0.71	1		Phenothrin	ND	0.71	1	
Cypermethrin	ND	0.71	1		Resmethrin/Bioresmethrin	ND	0.71	1	
Deltamethrin/Tralomethrin	ND	0.71	1		Tetramethrin	ND	0.71	1	
Fenpropathrin	ND	0.71	1		lambda-Cyhalothrin	ND	0.71	1	
Fenvalerate/Esfenvalerate	ND	0.71	1						

Surrogates:	REC (%)	Control Limits	Qual
trans-Permethrin(C13)	114	25-200	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3540C
Method: EPA 8270D (M)/TQ/EI
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-C**	**02/14/12 10:30**	**Sediment**	**GCTQ 2**	**02/17/12**	**02/22/12 21:43**	**120217L02**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Allethrin	ND	0.65	1		Fluvalinate	ND	0.65	1	
Bifenthrin	ND	0.65	1		Permethrin (cis/trans)	ND	1.3	1	
Cyfluthrin	ND	0.65	1		Phenothrin	ND	0.65	1	
Cypermethrin	ND	0.65	1		Resmethrin/Bioresmethrin	ND	0.65	1	
Deltamethrin/Tralomethrin	ND	0.65	1		Tetramethrin	ND	0.65	1	
Fenpropathrin	ND	0.65	1		lambda-Cyhalothrin	ND	0.65	1	
Fenvalerate/Esfenvalerate	ND	0.65	1						

Surrogates:	REC (%)	Control Limits	Qual
trans-Permethrin(C13)	115	25-200	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-403-13**	**N/A**	**Sediment**	**GCTQ 2**	**02/17/12**	**02/22/12 17:27**	**120217L02**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Allethrin	ND	0.50	1		Fluvalinate	ND	0.50	1	
Bifenthrin	ND	0.50	1		Permethrin (cis/trans)	ND	1.0	1	
Cyfluthrin	ND	0.50	1		Phenothrin	ND	0.50	1	
Cypermethrin	ND	0.50	1		Resmethrin/Bioresmethrin	ND	0.50	1	
Deltamethrin/Tralomethrin	ND	0.50	1		Tetramethrin	ND	0.50	1	
Fenpropathrin	ND	0.50	1		lambda-Cyhalothrin	ND	0.50	1	
Fenvalerate/Esfenvalerate	ND	0.50	1						

Surrogates:	REC (%)	Control Limits	Qual
trans-Permethrin(C13)	98	25-200	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8081A
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-A**	**02/14/12 10:00**	**Sediment**	**GC 44**	**02/17/12**	**02/22/12 16:17**	**120217L09**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
4,4'-Dichlorobenzophenone	ND	36	1		Endosulfan I	ND	1.4	1	
Aldrin	ND	1.4	1		Endosulfan II	ND	1.4	1	
Alpha-BHC	ND	1.4	1		Endosulfan Sulfate	ND	1.4	1	
Beta-BHC	ND	1.4	1		Endrin	ND	1.4	1	
Delta-BHC	ND	1.4	1		Endrin Aldehyde	ND	1.4	1	
Gamma-BHC	ND	1.4	1		Endrin Ketone	ND	1.4	1	
Chlordane	ND	14	1		Heptachlor	ND	1.4	1	
Dieldrin	ND	1.4	1		Heptachlor Epoxide	ND	1.4	1	
Trans-nonachlor	ND	1.4	1		Methoxychlor	ND	1.4	1	
2,4'-DDD	ND	1.4	1		Toxaphene	ND	28	1	
2,4'-DDE	ND	1.4	1		Alpha Chlordane	ND	1.4	1	
2,4'-DDT	ND	1.4	1		Gamma Chlordane	ND	1.4	1	
4,4'-DDD	ND	1.4	1		Cis-nonachlor	ND	1.4	1	
4,4'-DDE	ND	1.4	1		Mirex	ND	7.1	1	
4,4'-DDT	ND	1.4	1		Oxychlordane	ND	1.4	1	
Surrogates:	REC (%)	Control Limits	Qual		Surrogates:	REC (%)	Control Limits	Qual	
2,4,5,6-Tetrachloro-m-Xylene	90	50-130			Decachlorobiphenyl	85	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-A**	**02/14/12 10:10**	**Sediment**	**GC 44**	**02/17/12**	**02/22/12 16:31**	**120217L09**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
4,4'-Dichlorobenzophenone	ND	32	1		Endosulfan I	ND	1.3	1	
Aldrin	ND	1.3	1		Endosulfan II	ND	1.3	1	
Alpha-BHC	ND	1.3	1		Endosulfan Sulfate	ND	1.3	1	
Beta-BHC	ND	1.3	1		Endrin	ND	1.3	1	
Delta-BHC	ND	1.3	1		Endrin Aldehyde	ND	1.3	1	
Gamma-BHC	ND	1.3	1		Endrin Ketone	ND	1.3	1	
Chlordane	ND	13	1		Heptachlor	ND	1.3	1	
Dieldrin	ND	1.3	1		Heptachlor Epoxide	ND	1.3	1	
Trans-nonachlor	ND	1.3	1		Methoxychlor	ND	1.3	1	
2,4'-DDD	ND	1.3	1		Toxaphene	ND	26	1	
2,4'-DDE	ND	1.3	1		Alpha Chlordane	ND	1.3	1	
2,4'-DDT	ND	1.3	1		Gamma Chlordane	ND	1.3	1	
4,4'-DDD	ND	1.3	1		Cis-nonachlor	ND	1.3	1	
4,4'-DDE	ND	1.3	1		Mirex	ND	6.4	1	
4,4'-DDT	ND	1.3	1		Oxychlordane	ND	1.3	1	
Surrogates:	REC (%)	Control Limits	Qual		Surrogates:	REC (%)	Control Limits	Qual	
2,4,5,6-Tetrachloro-m-Xylene	96	50-130			Decachlorobiphenyl	96	50-130		

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Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8081A
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-A**	**02/14/12 10:20**	**Sediment**	**GC 44**	**02/17/12**	**02/22/12 16:46**	**120217L09**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
4,4'-Dichlorobenzophenone	ND	36	1		Endosulfan I	ND	1.4	1	
Aldrin	ND	1.4	1		Endosulfan II	ND	1.4	1	
Alpha-BHC	ND	1.4	1		Endosulfan Sulfate	ND	1.4	1	
Beta-BHC	ND	1.4	1		Endrin	ND	1.4	1	
Delta-BHC	ND	1.4	1		Endrin Aldehyde	ND	1.4	1	
Gamma-BHC	ND	1.4	1		Endrin Ketone	ND	1.4	1	
Chlordane	ND	14	1		Heptachlor	ND	1.4	1	
Dieldrin	ND	1.4	1		Heptachlor Epoxide	ND	1.4	1	
Trans-nonachlor	ND	1.4	1		Methoxychlor	ND	1.4	1	
2,4'-DDD	ND	1.4	1		Toxaphene	ND	28	1	
2,4'-DDE	ND	1.4	1		Alpha Chlordane	ND	1.4	1	
2,4'-DDT	ND	1.4	1		Gamma Chlordane	ND	1.4	1	
4,4'-DDD	ND	1.4	1		Cis-nonachlor	ND	1.4	1	
4,4'-DDE	2.2	1.4	1		Mirex	ND	7.1	1	
4,4'-DDT	ND	1.4	1		Oxychlordane	ND	1.4	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	88	50-130		Decachlorobiphenyl	93	50-130	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-A**	**02/14/12 10:30**	**Sediment**	**GC 44**	**02/17/12**	**02/22/12 17:00**	**120217L09**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
4,4'-Dichlorobenzophenone	ND	32	1		Endosulfan I	ND	1.3	1	
Aldrin	ND	1.3	1		Endosulfan II	ND	1.3	1	
Alpha-BHC	ND	1.3	1		Endosulfan Sulfate	ND	1.3	1	
Beta-BHC	ND	1.3	1		Endrin	ND	1.3	1	
Delta-BHC	ND	1.3	1		Endrin Aldehyde	ND	1.3	1	
Gamma-BHC	ND	1.3	1		Endrin Ketone	ND	1.3	1	
Chlordane	ND	13	1		Heptachlor	ND	1.3	1	
Dieldrin	ND	1.3	1		Heptachlor Epoxide	ND	1.3	1	
Trans-nonachlor	ND	1.3	1		Methoxychlor	ND	1.3	1	
2,4'-DDD	ND	1.3	1		Toxaphene	ND	26	1	
2,4'-DDE	ND	1.3	1		Alpha Chlordane	ND	1.3	1	
2,4'-DDT	ND	1.3	1		Gamma Chlordane	ND	1.3	1	
4,4'-DDD	ND	1.3	1		Cis-nonachlor	ND	1.3	1	
4,4'-DDE	ND	1.3	1		Mirex	ND	6.5	1	
4,4'-DDT	ND	1.3	1		Oxychlordane	ND	1.3	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	102	50-130		Decachlorobiphenyl	104	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

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Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	02/14/12
4225 Executive Square, Suite 1600		Work Order No:	12-02-0901
La Jolla, CA 92037-1487		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-858-126**	**N/A**	**Solid**	**GC 44**	**02/17/12**	**02/22/12 13:09**	**120217L09**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
4,4'-Dichlorobenzophenone	ND	25	1		Total DDTs	ND	1.0	1	
Endosulfan II	ND	1.0	1		Aldrin	ND	1.0	1	
Total Chlordane	ND	1.0	1		Endosulfan Sulfate	ND	1.0	1	
Alpha-BHC	ND	1.0	1		Endrin	ND	1.0	1	
Beta-BHC	ND	1.0	1		Endrin Aldehyde	ND	1.0	1	
Delta-BHC	ND	1.0	1		Endrin Ketone	ND	1.0	1	
Gamma-BHC	ND	1.0	1		Heptachlor	ND	1.0	1	
Chlordane	ND	10	1		Heptachlor Epoxide	ND	1.0	1	
Dieldrin	ND	1.0	1		Methoxychlor	ND	1.0	1	
Trans-nonachlor	ND	1.0	1		Toxaphene	ND	20	1	
2,4'-DDD	ND	1.0	1		Alpha Chlordane	ND	1.0	1	
2,4'-DDE	ND	1.0	1		Gamma Chlordane	ND	1.0	1	
2,4'-DDT	ND	1.0	1		Cis-nonachlor	ND	1.0	1	
4,4'-DDD	ND	1.0	1		Mirex	ND	5.0	1	
4,4'-DDE	ND	1.0	1		Oxychlordane	ND	1.0	1	
4,4'-DDT	ND	1.0	1		Endosulfan I	ND	1.0	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	106	50-130		Decachlorobiphenyl	104	50-130	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	02/14/12
4225 Executive Square, Suite 1600		Work Order No:	12-02-0901
La Jolla, CA 92037-1487		Preparation:	EPA 3545
		Method:	EPA 8082
		Units:	ug/kg

Project: San Elijo Lagoon / 27661119.10000 | Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-A**	**02/14/12 10:00**	**Sediment**	**GC 58**	**02/17/12**	**02/22/12 13:17**	**120217L10**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	14	1		Aroclor-1248	ND	14	1	
Aroclor-1221	ND	14	1		Aroclor-1254	ND	14	1	
Aroclor-1232	ND	14	1		Aroclor-1260	ND	14	1	
Aroclor-1242	ND	14	1		Aroclor-1262	ND	14	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	81	50-130			Decachlorobiphenyl	86	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-A**	**02/14/12 10:10**	**Sediment**	**GC 58**	**02/17/12**	**02/22/12 13:35**	**120217L10**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	13	1		Aroclor-1248	ND	13	1	
Aroclor-1221	ND	13	1		Aroclor-1254	ND	13	1	
Aroclor-1232	ND	13	1		Aroclor-1260	ND	13	1	
Aroclor-1242	ND	13	1		Aroclor-1262	ND	13	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	86	50-130			Decachlorobiphenyl	93	50-130		

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-A**	**02/14/12 10:20**	**Sediment**	**GC 58**	**02/17/12**	**02/22/12 13:53**	**120217L10**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	14	1		Aroclor-1248	ND	14	1	
Aroclor-1221	ND	14	1		Aroclor-1254	ND	14	1	
Aroclor-1232	ND	14	1		Aroclor-1260	ND	14	1	
Aroclor-1242	ND	14	1		Aroclor-1262	ND	14	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	83	50-130			Decachlorobiphenyl	91	50-130		

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	EPA 3545
Method:	EPA 8082
Units:	ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-A**	**02/14/12 10:30**	**Sediment**	**GC 58**	**02/17/12**	**02/22/12 14:11**	**120217L10**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	13	1		Aroclor-1248	ND	13	1	
Aroclor-1221	ND	13	1		Aroclor-1254	ND	13	1	
Aroclor-1232	ND	13	1		Aroclor-1260	ND	13	1	
Aroclor-1242	ND	13	1		Aroclor-1262	ND	13	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	95	50-130		Decachlorobiphenyl	105	50-130	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-565-216**	**N/A**	**Solid**	**GC 58**	**02/17/12**	**02/22/12 12:23**	**120217L10**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	10	1		Aroclor-1248	ND	10	1	
Aroclor-1221	ND	10	1		Aroclor-1254	ND	10	1	
Aroclor-1232	ND	10	1		Aroclor-1260	ND	10	1	
Aroclor-1242	ND	10	1		Aroclor-1262	ND	10	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	87	50-130		Decachlorobiphenyl	91	50-130	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	02/14/12
4225 Executive Square, Suite 1600		Work Order No:	12-02-0901
La Jolla, CA 92037-1487		Preparation:	EPA 3545
		Method:	EPA 8270C SIM
		Units:	mg/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-A**	**02/14/12 10:00**	**Sediment**	**GC/MS MM**	**02/17/12**	**02/21/12 19:28**	**120217L08**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
2,6-Dimethylnaphthalene	ND	0.014	1		Benzo (k) Fluoranthene	ND	0.014	1	
Perylene	ND	0.014	1		Bis(2-Ethylhexyl) Phthalate	0.031	0.014	1	
Biphenyl	ND	0.014	1		Butyl Benzyl Phthalate	0.017	0.014	1	
Benzo (e) Pyrene	ND	0.014	1		Chrysene	ND	0.014	1	
1-Methylnaphthalene	ND	0.014	1		Di-n-Butyl Phthalate	ND	0.014	1	
2,4,5-Trichlorophenol	ND	0.014	1		Di-n-Octyl Phthalate	ND	0.014	1	
2,4,6-Trichlorophenol	ND	0.014	1		Dibenz (a,h) Anthracene	ND	0.014	1	
2,4-Dichlorophenol	ND	0.014	1		Diethyl Phthalate	ND	0.014	1	
2,4-Dimethylphenol	ND	0.014	1		Dimethyl Phthalate	0.071	0.014	1	
2,4-Dinitrophenol	ND	0.71	1		Fluoranthene	ND	0.014	1	
2-Chlorophenol	ND	0.014	1		Fluorene	ND	0.014	1	
2-Methylnaphthalene	ND	0.014	1		Indeno (1,2,3-c,d) Pyrene	ND	0.014	1	
2-Methylphenol	ND	0.014	1		Naphthalene	ND	0.014	1	
2-Nitrophenol	ND	0.014	1		Pentachlorophenol	ND	0.71	1	
3/4-Methylphenol	ND	0.014	1		Phenanthrene	ND	0.014	1	
4,6-Dinitro-2-Methylphenol	ND	0.71	1		Phenol	ND	0.014	1	
4-Chloro-3-Methylphenol	ND	0.014	1		Pyrene	ND	0.014	1	
4-Nitrophenol	ND	0.71	1		1,6,7-Trimethylnaphthalene	ND	0.014	1	
Acenaphthene	ND	0.014	1		2,3,4,6-Tetrachlorophenol	ND	0.014	1	
Acenaphthylene	ND	0.014	1		2,6-Dichlorophenol	ND	0.014	1	
Anthracene	ND	0.014	1		Benzoic Acid	ND	0.14	1	
Benzo (a) Anthracene	ND	0.014	1		1-Methylphenanthrene	ND	0.014	1	
Benzo (a) Pyrene	ND	0.014	1		DCPA	ND	0.014	1	
Benzo (b) Fluoranthene	ND	0.014	1		Dibenzothiophene	ND	0.014	1	
Benzo (g,h,i) Perylene	ND	0.014	1		Perthane	ND	0.014	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,6-Tribromophenol	70	32-143		2-Fluorobiphenyl	64	14-146	
2-Fluorophenol	67	15-138		Nitrobenzene-d5	61	18-162	
p-Terphenyl-d14	63	34-148		Phenol-d6	60	17-141	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	EPA 3545
Method:	EPA 8270C SIM
Units:	mg/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-A**	**02/14/12 10:10**	**Sediment**	**GC/MS MM**	**02/17/12**	**02/21/12 20:45**	**120217L08**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
2,6-Dimethylnaphthalene	ND	0.013	1		Benzo (k) Fluoranthene	ND	0.013	1	
Biphenyl	ND	0.013	1		Bis(2-Ethylhexyl) Phthalate	0.013	0.013	1	
Perylene	ND	0.013	1		Butyl Benzyl Phthalate	ND	0.013	1	
Benzo (e) Pyrene	ND	0.013	1		Chrysene	ND	0.013	1	
1-Methylnaphthalene	ND	0.013	1		Di-n-Butyl Phthalate	ND	0.013	1	
2,4,5-Trichlorophenol	ND	0.013	1		Di-n-Octyl Phthalate	ND	0.013	1	
2,4,6-Trichlorophenol	ND	0.013	1		Dibenz (a,h) Anthracene	ND	0.013	1	
2,4-Dichlorophenol	ND	0.013	1		Diethyl Phthalate	ND	0.013	1	
2,4-Dimethylphenol	ND	0.013	1		Dimethyl Phthalate	0.062	0.013	1	
2,4-Dinitrophenol	ND	0.64	1		Fluoranthene	ND	0.013	1	
2-Chlorophenol	ND	0.013	1		Fluorene	ND	0.013	1	
2-Methylnaphthalene	ND	0.013	1		Indeno (1,2,3-c,d) Pyrene	ND	0.013	1	
2-Methylphenol	ND	0.013	1		Naphthalene	ND	0.013	1	
2-Nitrophenol	ND	0.013	1		Pentachlorophenol	ND	0.64	1	
3/4-Methylphenol	ND	0.013	1		Phenanthrene	ND	0.013	1	
4,6-Dinitro-2-Methylphenol	ND	0.64	1		Phenol	ND	0.013	1	
4-Chloro-3-Methylphenol	ND	0.013	1		Pyrene	ND	0.013	1	
4-Nitrophenol	ND	0.64	1		1,6,7-Trimethylnaphthalene	ND	0.013	1	
Acenaphthene	ND	0.013	1		2,3,4,6-Tetrachlorophenol	ND	0.013	1	
Acenaphthylene	ND	0.013	1		2,6-Dichlorophenol	ND	0.013	1	
Anthracene	ND	0.013	1		1-Methylphenanthrene	ND	0.013	1	
Benzo (a) Anthracene	ND	0.013	1		Benzoic Acid	ND	0.13	1	
Benzo (a) Pyrene	ND	0.013	1		DCPA	ND	0.013	1	
Benzo (b) Fluoranthene	ND	0.013	1		Dibenzothiophene	ND	0.013	1	
Benzo (g,h,i) Perylene	ND	0.013	1		Perthane	ND	0.013	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,6-Tribromophenol	67	32-143		2-Fluorobiphenyl	62	14-146	
2-Fluorophenol	61	15-138		Nitrobenzene-d5	56	18-162	
p-Terphenyl-d14	60	34-148		Phenol-d6	56	17-141	

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Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	EPA 3545
Method:	EPA 8270C SIM
Units:	mg/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-A**	**02/14/12 10:20**	**Sediment**	**GC/MS MM**	**02/17/12**	**02/21/12 21:11**	**120217L08**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
2,6-Dimethylnaphthalene	ND	0.014	1		Benzo (k) Fluoranthene	ND	0.014	1	
Benzo (e) Pyrene	ND	0.014	1		Bis(2-Ethylhexyl) Phthalate	ND	0.014	1	
Perylene	ND	0.014	1		Butyl Benzyl Phthalate	ND	0.014	1	
Biphenyl	ND	0.014	1		Chrysene	ND	0.014	1	
1-Methylnaphthalene	ND	0.014	1		Di-n-Butyl Phthalate	ND	0.014	1	
2,4,5-Trichlorophenol	ND	0.014	1		Di-n-Octyl Phthalate	ND	0.014	1	
2,4,6-Trichlorophenol	ND	0.014	1		Dibenz (a,h) Anthracene	ND	0.014	1	
2,4-Dichlorophenol	ND	0.014	1		Diethyl Phthalate	ND	0.014	1	
2,4-Dimethylphenol	ND	0.014	1		Dimethyl Phthalate	0.15	0.014	1	
2,4-Dinitrophenol	ND	0.71	1		Fluoranthene	ND	0.014	1	
2-Chlorophenol	ND	0.014	1		Fluorene	ND	0.014	1	
2-Methylnaphthalene	ND	0.014	1		Indeno (1,2,3-c,d) Pyrene	ND	0.014	1	
2-Methylphenol	ND	0.014	1		Naphthalene	ND	0.014	1	
2-Nitrophenol	ND	0.014	1		Pentachlorophenol	ND	0.71	1	
3/4-Methylphenol	ND	0.014	1		Phenanthrene	ND	0.014	1	
4,6-Dinitro-2-Methylphenol	ND	0.71	1		Phenol	ND	0.014	1	
4-Chloro-3-Methylphenol	ND	0.014	1		Pyrene	ND	0.014	1	
4-Nitrophenol	ND	0.71	1		1,6,7-Trimethylnaphthalene	ND	0.014	1	
Acenaphthene	ND	0.014	1		2,3,4,6-Tetrachlorophenol	ND	0.014	1	
Acenaphthylene	ND	0.014	1		2,6-Dichlorophenol	ND	0.014	1	
Anthracene	ND	0.014	1		1-Methylphenanthrene	ND	0.014	1	
Benzo (a) Anthracene	ND	0.014	1		Benzoic Acid	ND	0.14	1	
Benzo (a) Pyrene	ND	0.014	1		DCPA	ND	0.014	1	
Benzo (b) Fluoranthene	ND	0.014	1		Dibenzothiophene	ND	0.014	1	
Benzo (g,h,i) Perylene	ND	0.014	1		Perthane	ND	0.014	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,6-Tribromophenol	71	32-143		2-Fluorobiphenyl	62	14-146	
2-Fluorophenol	66	15-138		Nitrobenzene-d5	61	18-162	
p-Terphenyl-d14	65	34-148		Phenol-d6	56	17-141	

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Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8270C SIM
Units: mg/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-A**	**02/14/12 10:30**	**Sediment**	**GC/MS MM**	**02/17/12**	**02/21/12 21:37**	**120217L08**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
2,6-Dimethylnaphthalene	ND	0.013	1		Benzo (k) Fluoranthene	ND	0.013	1	
Benzo (e) Pyrene	ND	0.013	1		Bis(2-Ethylhexyl) Phthalate	0.019	0.013	1	
Perylene	ND	0.013	1		Butyl Benzyl Phthalate	ND	0.013	1	
Biphenyl	ND	0.013	1		Chrysene	ND	0.013	1	
1-Methylnaphthalene	ND	0.013	1		Di-n-Butyl Phthalate	ND	0.013	1	
2,4,5-Trichlorophenol	ND	0.013	1		Di-n-Octyl Phthalate	ND	0.013	1	
2,4,6-Trichlorophenol	ND	0.013	1		Dibenz (a,h) Anthracene	ND	0.013	1	
2,4-Dichlorophenol	ND	0.013	1		Diethyl Phthalate	ND	0.013	1	
2,4-Dimethylphenol	ND	0.013	1		Dimethyl Phthalate	0.085	0.013	1	
2,4-Dinitrophenol	ND	0.65	1		Fluoranthene	ND	0.013	1	
2-Chlorophenol	ND	0.013	1		Fluorene	ND	0.013	1	
2-Methylnaphthalene	ND	0.013	1		Indeno (1,2,3-c,d) Pyrene	ND	0.013	1	
2-Methylphenol	ND	0.013	1		Naphthalene	ND	0.013	1	
2-Nitrophenol	ND	0.013	1		Pentachlorophenol	ND	0.65	1	
3/4-Methylphenol	ND	0.013	1		Phenanthrene	ND	0.013	1	
4,6-Dinitro-2-Methylphenol	ND	0.65	1		Phenol	ND	0.013	1	
4-Chloro-3-Methylphenol	ND	0.013	1		Pyrene	ND	0.013	1	
4-Nitrophenol	ND	0.65	1		1,6,7-Trimethylnaphthalene	ND	0.013	1	
Acenaphthene	ND	0.013	1		2,3,4,6-Tetrachlorophenol	ND	0.013	1	
Acenaphthylene	ND	0.013	1		2,6-Dichlorophenol	ND	0.013	1	
Anthracene	ND	0.013	1		1-Methylphenanthrene	ND	0.013	1	
Benzo (a) Anthracene	ND	0.013	1		Benzoic Acid	ND	0.13	1	
Benzo (a) Pyrene	ND	0.013	1		DCPA	ND	0.013	1	
Benzo (b) Fluoranthene	ND	0.013	1		Dibenzothiophene	ND	0.013	1	
Benzo (g,h,i) Perylene	ND	0.013	1		Perthane	ND	0.013	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,6-Tribromophenol	74	32-143		2-Fluorobiphenyl	67	14-146	
2-Fluorophenol	72	15-138		Nitrobenzene-d5	65	18-162	
p-Terphenyl-d14	68	34-148		Phenol-d6	63	17-141	

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Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	EPA 3545
Method:	EPA 8270C SIM
Units:	mg/kg

Project: San Elijo Lagoon / 27661119.10000

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-413-361**	**N/A**	**Solid**	**GC/MS MM**	**02/17/12**	**02/21/12 19:03**	**120217L08**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzo (e) Pyrene	ND	0.010	1		Benzo (k) Fluoranthene	ND	0.010	1	
Perylene	ND	0.010	1		Bis(2-Ethylhexyl) Phthalate	ND	0.010	1	
Biphenyl	ND	0.010	1		Butyl Benzyl Phthalate	ND	0.010	1	
2,6-Dimethylnaphthalene	ND	0.010	1		Chrysene	ND	0.010	1	
1-Methylnaphthalene	ND	0.010	1		Di-n-Butyl Phthalate	ND	0.010	1	
2,4,5-Trichlorophenol	ND	0.010	1		Di-n-Octyl Phthalate	ND	0.010	1	
2,4,6-Trichlorophenol	ND	0.010	1		Dibenz (a,h) Anthracene	ND	0.010	1	
2,4-Dichlorophenol	ND	0.010	1		Diethyl Phthalate	ND	0.010	1	
2,4-Dimethylphenol	ND	0.010	1		Dimethyl Phthalate	ND	0.010	1	
2,4-Dinitrophenol	ND	0.50	1		Fluoranthene	ND	0.010	1	
2-Chlorophenol	ND	0.010	1		Fluorene	ND	0.010	1	
2-Methylnaphthalene	ND	0.010	1		Indeno (1,2,3-c,d) Pyrene	ND	0.010	1	
2-Methylphenol	ND	0.010	1		Naphthalene	ND	0.010	1	
2-Nitrophenol	ND	0.010	1		Pentachlorophenol	ND	0.50	1	
3/4-Methylphenol	ND	0.010	1		Phenanthrene	ND	0.010	1	
4,6-Dinitro-2-Methylphenol	ND	0.50	1		Phenol	ND	0.010	1	
4-Chloro-3-Methylphenol	ND	0.010	1		Pyrene	ND	0.010	1	
4-Nitrophenol	ND	0.50	1		1,6,7-Trimethylnaphthalene	ND	0.010	1	
Acenaphthene	ND	0.010	1		2,3,4,6-Tetrachlorophenol	ND	0.010	1	
Acenaphthylene	ND	0.010	1		2,6-Dichlorophenol	ND	0.010	1	
Anthracene	ND	0.010	1		1-Methylphenanthrene	ND	0.010	1	
Benzo (a) Anthracene	ND	0.010	1		Benzoic Acid	ND	0.10	1	
Benzo (a) Pyrene	ND	0.010	1		DCPA	ND	0.010	1	
Benzo (b) Fluoranthene	ND	0.010	1		Dibenzothiophene	ND	0.010	1	
Benzo (g,h,i) Perylene	ND	0.010	1		Perthane	ND	0.010	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,6-Tribromophenol	60	32-143		2-Fluorobiphenyl	64	14-146	
2-Fluorophenol	66	15-138		Nitrobenzene-d5	63	18-162	
p-Terphenyl-d14	63	34-148		Phenol-d6	60	17-141	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-A**	**02/14/12 10:00**	**Sediment**	**GC/MS HHH**	**02/17/12**	**02/24/12 13:18**	**120217L07**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.71	1		PCB126	ND	0.71	1	
PCB008	ND	0.71	1		PCB128	ND	0.71	1	
PCB018	ND	0.71	1		PCB132	ND	0.71	1	
PCB028	ND	0.71	1		PCB138/158	ND	1.4	1	
PCB031	ND	0.71	1		PCB141	ND	0.71	1	
PCB033	ND	0.71	1		PCB149	ND	0.71	1	
PCB037	ND	0.71	1		PCB151	ND	0.71	1	
PCB044	ND	0.71	1		PCB153	ND	0.71	1	
PCB049	ND	0.71	1		PCB156	ND	0.71	1	
PCB052	ND	0.71	1		PCB157	ND	0.71	1	
PCB056	ND	0.71	1		PCB167	ND	0.71	1	
PCB060	ND	0.71	1		PCB168	ND	0.71	1	
PCB066	ND	0.71	1		PCB169	ND	0.71	1	
PCB070	ND	0.71	1		PCB170	ND	0.71	1	
PCB074	ND	0.71	1		PCB174	ND	0.71	1	
PCB077	ND	0.71	1		PCB177	ND	0.71	1	
PCB081	ND	0.71	1		PCB180	ND	0.71	1	
PCB087	ND	0.71	1		PCB183	ND	0.71	1	
PCB095	ND	0.71	1		PCB184	ND	0.71	1	
PCB097	ND	0.71	1		PCB187	ND	0.71	1	
PCB099	ND	0.71	1		PCB189	ND	0.71	1	
PCB101	ND	0.71	1		PCB194	ND	0.71	1	
PCB105	ND	0.71	1		PCB195	ND	0.71	1	
PCB110	ND	0.71	1		PCB200	ND	0.71	1	
PCB114	ND	0.71	1		PCB201	ND	0.71	1	
PCB118	ND	0.71	1		PCB203	ND	0.71	1	
PCB119	ND	0.71	1		PCB206	ND	0.71	1	
PCB123	ND	0.71	1		PCB209	ND	0.71	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	69	50-125		p-Terphenyl-d14	89	50-125	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	02/14/12
4225 Executive Square, Suite 1600		Work Order No:	12-02-0901
La Jolla, CA 92037-1487		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PCB Congeners
		Units:	ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-A**	**02/14/12 10:10**	**Sediment**	**GC/MS HHH**	**02/17/12**	**02/24/12 13:45**	**120217L07**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.64	1		PCB126	ND	0.64	1	
PCB008	ND	0.64	1		PCB128	ND	0.64	1	
PCB018	ND	0.64	1		PCB132	ND	0.64	1	
PCB028	ND	0.64	1		PCB138/158	ND	1.3	1	
PCB031	ND	0.64	1		PCB141	ND	0.64	1	
PCB033	ND	0.64	1		PCB149	ND	0.64	1	
PCB037	ND	0.64	1		PCB151	ND	0.64	1	
PCB044	ND	0.64	1		PCB153	ND	0.64	1	
PCB049	ND	0.64	1		PCB156	ND	0.64	1	
PCB052	ND	0.64	1		PCB157	ND	0.64	1	
PCB056	ND	0.64	1		PCB167	ND	0.64	1	
PCB060	ND	0.64	1		PCB168	ND	0.64	1	
PCB066	ND	0.64	1		PCB169	ND	0.64	1	
PCB070	ND	0.64	1		PCB170	ND	0.64	1	
PCB074	ND	0.64	1		PCB174	ND	0.64	1	
PCB077	ND	0.64	1		PCB177	ND	0.64	1	
PCB081	ND	0.64	1		PCB180	ND	0.64	1	
PCB087	ND	0.64	1		PCB183	ND	0.64	1	
PCB095	ND	0.64	1		PCB184	ND	0.64	1	
PCB097	ND	0.64	1		PCB187	ND	0.64	1	
PCB099	ND	0.64	1		PCB189	ND	0.64	1	
PCB101	ND	0.64	1		PCB194	ND	0.64	1	
PCB105	ND	0.64	1		PCB195	ND	0.64	1	
PCB110	ND	0.64	1		PCB200	ND	0.64	1	
PCB114	ND	0.64	1		PCB201	ND	0.64	1	
PCB118	ND	0.64	1		PCB203	ND	0.64	1	
PCB119	ND	0.64	1		PCB206	ND	0.64	1	
PCB123	ND	0.64	1		PCB209	ND	0.64	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	72	50-125		p-Terphenyl-d14	118	50-125	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-A**	**02/14/12 10:20**	**Sediment**	**GC/MS HHH**	**02/17/12**	**02/24/12 14:12**	**120217L07**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.71	1		PCB126	ND	0.71	1	
PCB008	ND	0.71	1		PCB128	ND	0.71	1	
PCB018	ND	0.71	1		PCB132	ND	0.71	1	
PCB028	ND	0.71	1		PCB138/158	ND	1.4	1	
PCB031	ND	0.71	1		PCB141	ND	0.71	1	
PCB033	ND	0.71	1		PCB149	ND	0.71	1	
PCB037	ND	0.71	1		PCB151	ND	0.71	1	
PCB044	ND	0.71	1		PCB153	ND	0.71	1	
PCB049	ND	0.71	1		PCB156	ND	0.71	1	
PCB052	ND	0.71	1		PCB157	ND	0.71	1	
PCB056	ND	0.71	1		PCB167	ND	0.71	1	
PCB060	ND	0.71	1		PCB168	ND	0.71	1	
PCB066	ND	0.71	1		PCB169	ND	0.71	1	
PCB070	ND	0.71	1		PCB170	ND	0.71	1	
PCB074	ND	0.71	1		PCB174	ND	0.71	1	
PCB077	ND	0.71	1		PCB177	ND	0.71	1	
PCB081	ND	0.71	1		PCB180	ND	0.71	1	
PCB087	ND	0.71	1		PCB183	ND	0.71	1	
PCB095	ND	0.71	1		PCB184	ND	0.71	1	
PCB097	ND	0.71	1		PCB187	ND	0.71	1	
PCB099	ND	0.71	1		PCB189	ND	0.71	1	
PCB101	ND	0.71	1		PCB194	ND	0.71	1	
PCB105	ND	0.71	1		PCB195	ND	0.71	1	
PCB110	ND	0.71	1		PCB200	ND	0.71	1	
PCB114	ND	0.71	1		PCB201	ND	0.71	1	
PCB118	ND	0.71	1		PCB203	ND	0.71	1	
PCB119	ND	0.71	1		PCB206	ND	0.71	1	
PCB123	ND	0.71	1		PCB209	ND	0.71	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	85	50-125		p-Terphenyl-d14	109	50-125	

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Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	02/14/12
4225 Executive Square, Suite 1600		Work Order No:	12-02-0901
La Jolla, CA 92037-1487		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PCB Congeners
		Units:	ug/kg

Project: San Elijo Lagoon / 27661119.10000

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-A**	**02/14/12 10:30**	**Sediment**	**GC/MS HHH**	**02/17/12**	**02/24/12 14:39**	**120217L07**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.65	1		PCB126	ND	0.65	1	
PCB008	ND	0.65	1		PCB128	ND	0.65	1	
PCB018	ND	0.65	1		PCB132	ND	0.65	1	
PCB028	ND	0.65	1		PCB138/158	ND	1.3	1	
PCB031	ND	0.65	1		PCB141	ND	0.65	1	
PCB033	ND	0.65	1		PCB149	ND	0.65	1	
PCB037	ND	0.65	1		PCB151	ND	0.65	1	
PCB044	ND	0.65	1		PCB153	ND	0.65	1	
PCB049	ND	0.65	1		PCB156	ND	0.65	1	
PCB052	ND	0.65	1		PCB157	ND	0.65	1	
PCB056	ND	0.65	1		PCB167	ND	0.65	1	
PCB060	ND	0.65	1		PCB168	ND	0.65	1	
PCB066	ND	0.65	1		PCB169	ND	0.65	1	
PCB070	ND	0.65	1		PCB170	ND	0.65	1	
PCB074	ND	0.65	1		PCB174	ND	0.65	1	
PCB077	ND	0.65	1		PCB177	ND	0.65	1	
PCB081	ND	0.65	1		PCB180	ND	0.65	1	
PCB087	ND	0.65	1		PCB183	ND	0.65	1	
PCB095	ND	0.65	1		PCB184	ND	0.65	1	
PCB097	ND	0.65	1		PCB187	ND	0.65	1	
PCB099	ND	0.65	1		PCB189	ND	0.65	1	
PCB101	ND	0.65	1		PCB194	ND	0.65	1	
PCB105	ND	0.65	1		PCB195	ND	0.65	1	
PCB110	ND	0.65	1		PCB200	ND	0.65	1	
PCB114	ND	0.65	1		PCB201	ND	0.65	1	
PCB118	ND	0.65	1		PCB203	ND	0.65	1	
PCB119	ND	0.65	1		PCB206	ND	0.65	1	
PCB123	ND	0.65	1		PCB209	ND	0.65	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2-Fluorobiphenyl	76	50-125		p-Terphenyl-d14	97	50-125	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners
Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-341-40**	**N/A**	**Solid**	**GC/MS HHH**	**02/17/12**	**02/24/12 12:50**	**120217L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
PCB003	ND	0.50	1		PCB126	ND	0.50	1	
PCB008	ND	0.50	1		PCB128	ND	0.50	1	
PCB018	ND	0.50	1		PCB132	ND	0.50	1	
PCB028	ND	0.50	1		PCB138/158	ND	1.0	1	
PCB031	ND	0.50	1		PCB141	ND	0.50	1	
PCB033	ND	0.50	1		PCB149	ND	0.50	1	
PCB037	ND	0.50	1		PCB151	ND	0.50	1	
PCB044	ND	0.50	1		PCB153	ND	0.50	1	
PCB049	ND	0.50	1		PCB156	ND	0.50	1	
PCB052	ND	0.50	1		PCB157	ND	0.50	1	
PCB056	ND	0.50	1		PCB167	ND	0.50	1	
PCB060	ND	0.50	1		PCB168	ND	0.50	1	
PCB066	ND	0.50	1		PCB169	ND	0.50	1	
PCB070	ND	0.50	1		PCB170	ND	0.50	1	
PCB074	ND	0.50	1		PCB174	ND	0.50	1	
PCB077	ND	0.50	1		PCB177	ND	0.50	1	
PCB081	ND	0.50	1		PCB180	ND	0.50	1	
PCB087	ND	0.50	1		PCB183	ND	0.50	1	
PCB095	ND	0.50	1		PCB184	ND	0.50	1	
PCB097	ND	0.50	1		PCB187	ND	0.50	1	
PCB099	ND	0.50	1		PCB189	ND	0.50	1	
PCB101	ND	0.50	1		PCB194	ND	0.50	1	
PCB105	ND	0.50	1		PCB195	ND	0.50	1	
PCB110	ND	0.50	1		PCB200	ND	0.50	1	
PCB114	ND	0.50	1		PCB201	ND	0.50	1	
PCB118	ND	0.50	1		PCB203	ND	0.50	1	
PCB119	ND	0.50	1		PCB206	ND	0.50	1	
PCB123	ND	0.50	1		PCB209	ND	0.50	1	
Surrogates:	REC (%)	Control Limits	Qual		Surrogates:	REC (%)	Control Limits	Qual	
2-Fluorobiphenyl	64	50-125			p-Terphenyl-d14	75	50-125		

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience
Environmental
Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	EPA 3550B
Method:	Organotins by Krone et al.
Units:	ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-A**	**02/14/12 10:00**	**Sediment**	**GC/MS JJJ**	**02/17/12**	**02/20/12 20:28**	**120217L11**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	4.3	1		Tetrabutyltin	ND	4.3	1	
Monobutyltin	ND	4.3	1		Tributyltin	ND	4.3	1	

Surrogates:	REC (%)	Control Limits	Qual
Tripentyltin	93	50-130	

CB-Comp-SB-Lower	**12-02-0901-2-A**	**02/14/12 10:10**	**Sediment**	**GC/MS JJJ**	**02/17/12**	**02/20/12 20:59**	**120217L11**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.9	1		Tetrabutyltin	ND	3.9	1	
Monobutyltin	ND	3.9	1		Tributyltin	ND	3.9	1	

Surrogates:	REC (%)	Control Limits	Qual
Tripentyltin	96	50-130	

WB-Comp-SB-Upper	**12-02-0901-3-A**	**02/14/12 10:20**	**Sediment**	**GC/MS JJJ**	**02/17/12**	**02/20/12 21:29**	**120217L11**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	4.3	1		Tetrabutyltin	ND	4.3	1	
Monobutyltin	ND	4.3	1		Tributyltin	ND	4.3	1	

Surrogates:	REC (%)	Control Limits	Qual
Tripentyltin	92	50-130	

WB-Comp-SB-Lower	**12-02-0901-4-A**	**02/14/12 10:30**	**Sediment**	**GC/MS JJJ**	**02/17/12**	**02/20/12 22:00**	**120217L11**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.9	1		Tetrabutyltin	ND	3.9	1	
Monobutyltin	ND	3.9	1		Tributyltin	ND	3.9	1	

Surrogates:	REC (%)	Control Limits	Qual
Tripentyltin	81	50-130	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation	Date Received: 02/14/12
4225 Executive Square, Suite 1600	Work Order No: 12-02-0901
La Jolla, CA 92037-1487	Preparation: EPA 3550B
	Method: Organotins by Krone et al.
	Units: ug/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-07-016-913**	**N/A**	**Solid**	**GC/MS JJJ**	**02/17/12**	**02/21/12 11:50**	**120217L11**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.0	1		Tetrabutyltin	ND	3.0	1	
Monobutyltin	ND	3.0	1		Tributyltin	ND	3.0	1	

Surrogates:	REC (%)	Control Limits	Qual
Tripentyltin	90	50-130	

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-B**	**02/14/12 10:00**	**Sediment**	**ICP/MS 04**	**02/16/12**	**02/23/12 10:39**	**120216L01E**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Arsenic	2.51	0.142	1		Nickel	6.45	0.142	1	
Cadmium	ND	0.142	1		Selenium	0.393	0.142	1	
Chromium	16.4	0.142	1		Silver	ND	0.142	1	
Copper	16.5	0.142	1		Zinc	47.6	1.42	1	
Lead	6.56	0.142	1						

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-B**	**02/14/12 10:10**	**Sediment**	**ICP/MS 04**	**02/16/12**	**02/23/12 10:42**	**120216L01E**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Arsenic	1.58	0.129	1		Nickel	2.63	0.129	1	
Cadmium	ND	0.129	1		Selenium	0.244	0.129	1	
Chromium	6.76	0.129	1		Silver	ND	0.129	1	
Copper	4.89	0.129	1		Zinc	14.9	1.29	1	
Lead	1.67	0.129	1						

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-B**	**02/14/12 10:20**	**Sediment**	**ICP/MS 04**	**02/16/12**	**02/23/12 10:45**	**120216L01E**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Arsenic	2.42	0.142	1		Nickel	4.35	0.142	1	
Cadmium	ND	0.142	1		Selenium	0.322	0.142	1	
Chromium	11.6	0.142	1		Silver	ND	0.142	1	
Copper	10.6	0.142	1		Zinc	28.8	1.42	1	
Lead	8.90	0.142	1						

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-C**	**02/14/12 10:30**	**Sediment**	**ICP/MS 04**	**02/16/12**	**02/23/12 10:48**	**120216L01E**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Arsenic	2.17	0.129	1		Nickel	2.98	0.129	1	
Cadmium	ND	0.129	1		Selenium	0.186	0.129	1	
Chromium	8.04	0.129	1		Silver	ND	0.129	1	
Copper	5.14	0.129	1		Zinc	17.1	1.29	1	
Lead	4.30	0.129	1						

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Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**096-10-002-2,188**	**N/A**	**Solid**	**ICP/MS 04**	**02/16/12**	**02/23/12 10:15**	**120216L01E**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Arsenic	ND	0.100	1		Nickel	ND	0.100	1	
Cadmium	ND	0.100	1		Selenium	ND	0.100	1	
Chromium	ND	0.100	1		Silver	ND	0.100	1	
Copper	ND	0.100	1		Zinc	ND	1.00	1	
Lead	ND	0.100	1						

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RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Analytical Report

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 7471A Total
Method: EPA 7471A

Project: San Elijo Lagoon / 27661119.10000

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Upper	**12-02-0901-1-B**	**02/14/12 10:00**	**Sediment**	**Mercury**	**02/16/12**	**02/16/12 13:50**	**120216L01E**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Mercury	ND	0.0285	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CB-Comp-SB-Lower	**12-02-0901-2-B**	**02/14/12 10:10**	**Sediment**	**Mercury**	**02/16/12**	**02/16/12 13:53**	**120216L01E**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Mercury	ND	0.0258	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Upper	**12-02-0901-3-B**	**02/14/12 10:20**	**Sediment**	**Mercury**	**02/16/12**	**02/16/12 13:55**	**120216L01E**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Mercury	ND	0.0285	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
WB-Comp-SB-Lower	**12-02-0901-4-C**	**02/14/12 10:30**	**Sediment**	**Mercury**	**02/16/12**	**02/16/12 13:57**	**120216L01E**

-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units
Mercury	ND	0.0259	1		mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-452-271**	**N/A**	**Solid**	**Mercury**	**02/16/12**	**02/16/12 13:21**	**120216L01E**

Parameter	Result	RL	DF	Qual	Units
Mercury	ND	0.0200	1		mg/kg

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	EPA 3050B
Method:	EPA 6020

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CB-Comp-SB-Lower	**Sediment**	**ICP/MS 04**	**02/16/12**	**02/23/12**	**120216S01**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Arsenic	25.00	106	108	80-120	2	0-20	
Cadmium	25.00	102	101	80-120	1	0-20	
Chromium	25.00	102	107	80-120	4	0-20	
Copper	25.00	105	107	80-120	2	0-20	
Lead	25.00	102	104	80-120	1	0-20	
Nickel	25.00	107	110	80-120	2	0-20	
Selenium	25.00	105	106	80-120	1	0-20	
Silver	12.50	103	106	80-120	2	0-20	
Zinc	25.00	109	114	80-120	3	0-20	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	N/A
Method:	EPA 9060A

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
12-02-1071-2	**Sediment**	**TOC 5**	**02/16/12**	**02/16/12**	**C0216TOCS1**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Carbon, Total Organic	30000	94	95	75-125	1	0-25	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: N/A
Method: EPA 376.2M

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared:	Date Analyzed:	Duplicate Batch Number
WB-Comp-SB-Lower	**Sediment**	**N/A**	**02/18/12**	**02/18/12**	**C0218SD2**

Parameter	Sample Conc	DUP Conc	RPD	RPD CL	Qualifiers
Sulfide, Total	6.4	6.2	3	0-25	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: N/A
Method: EPA 376.2M

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared:	Date Analyzed:	Duplicate Batch Number
WB-Comp-SB-Lower	**Sediment**	**N/A**	**02/15/12**	**02/15/12**	**C0215DSD2**

Parameter	Sample Conc	DUP Conc	RPD	RPD CL	Qualifiers
Sulfide, Dissolved	ND	ND	NA	0-25	

RPD - Relative Percent Difference , CL - Control Limit

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Quality Control - Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: N/A
Method: SM 2540 B

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared:	Date Analyzed:	Duplicate Batch Number
WB-Comp-SB-Lower	**Sediment**	**N/A**	**02/18/12**	**02/18/12**	**C0218TSD1**

Parameter	Sample Conc	DUP Conc	RPD	RPD CL	Qualifiers
Solids, Total	77.3	78.3	1	0-10	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: N/A
Method: EPA 160.4M

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared:	Date Analyzed:	Duplicate Batch Number
WB-Comp-SB-Lower	**Sediment**	**N/A**	**02/18/12**	**02/18/12**	**C0218VSD1**

Parameter	Sample Conc	DUP Conc	RPD	RPD CL	Qualifiers
Solids, Volatile	0.69	0.59	16	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	Extraction
Method:	EPA 413.2M

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CB-Comp-SB-Lower	**Sediment**	**IR 2**	**02/20/12**	**02/20/12**	**120220S03**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Oil and Grease	100.0	84	84	55-135	0	0-30	

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RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: Extraction
Method: EPA 418.1M

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CB-Comp-SB-Lower	**Sediment**	**IR 2**	**02/20/12**	**02/20/12**	**120220S04**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
TRPH	100.0	94	94	55-135	0	0-30	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	EPA 3540C
Method:	EPA 8270D (M)/TQ/EI

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CB-Comp-SB-Lower	**Sediment**	**GCTQ 2**	**02/17/12**	**02/22/12**	**120217S02**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Allethrin	1.000	240	227	25-200	6	0-25	
Bifenthrin	5.000	68	68	25-200	0	0-25	
Cyfluthrin	5.000	81	90	25-200	10	0-25	
Cypermethrin	5.000	84	92	25-200	8	0-25	
Deltamethrin/Tralomethrin	5.000	56	62	25-200	9	0-25	
Fenpropathrin	1.000	463	478	25-200	3	0-25	
Fenvalerate/Esfenvalerate	5.000	78	85	25-200	9	0-25	
Fluvalinate	5.000	61	63	25-200	4	0-25	
Permethrin (cis/trans)	20.00	51	52	25-200	3	0-25	
Phenothrin	5.000	128	131	25-200	2	0-25	
Resmethrin/Bioresmethrin	5.000	74	70	25-200	5	0-25	
Tetramethrin	1.000	556	579	25-200	4	0-25	
lambda-Cyhalothrin	5.000	56	60	25-200	6	0-25	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	02/14/12
Work Order No:	12-02-0901
Preparation:	EPA 7471A Total
Method:	EPA 7471A

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
12-02-0827-2	**Solid**	**Mercury**	**02/16/12**	**02/16/12**	**120216S01**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	0.8350	103	101	80-120	2	0-16	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3550B
Method: Organotins by Krone et al.

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
12-02-0837-3	**Sediment**	**GC/MS JJJ**	**02/17/12**	**02/20/12**	**120217S11**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Tetrabutyltin	100.0	121	113	50-130	7	0-20	
Tributyltin	100.0	106	97	50-130	9	0-20	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8082

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CB-Comp-SB-Upper	**Sediment**	**GC 58**	**02/17/12**	**02/22/12**	**120217S10**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aroclor-1016	20.00	76	78	50-135	3	0-25	
Aroclor-1260	20.00	79	78	50-135	1	0-25	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8270C SIM

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CB-Comp-SB-Upper	**Sediment**	**GC/MS MM**	**02/17/12**	**02/21/12**	**120217S08**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
2,4,6-Trichlorophenol	1.000	68	69	40-160	1	0-20	
2,4-Dichlorophenol	1.000	68	69	40-160	1	0-20	
2-Methylphenol	1.000	58	55	40-160	6	0-20	
2-Nitrophenol	1.000	61	61	40-160	0	0-20	
4-Chloro-3-Methylphenol	1.000	65	65	40-160	0	0-20	
Acenaphthene	1.000	64	65	40-106	1	0-20	
Benzo (a) Pyrene	1.000	65	66	17-163	1	0-20	
Chrysene	1.000	61	62	17-168	2	0-20	
Di-n-Butyl Phthalate	1.000	67	67	40-160	0	0-20	
Dimethyl Phthalate	1.000	69	68	40-160	1	0-20	
Fluoranthene	1.000	65	66	26-137	1	0-20	
Fluorene	1.000	69	69	59-121	0	0-20	
Naphthalene	1.000	63	63	21-133	1	0-20	
Phenanthrene	1.000	65	65	54-120	1	0-20	
Phenol	1.000	56	55	40-160	2	0-20	
Pyrene	1.000	60	61	6-156	1	0-46	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation		Date Received:	02/14/12
4225 Executive Square, Suite 1600		Work Order No:	12-02-0901
La Jolla, CA 92037-1487		Preparation:	EPA 3545
		Method:	EPA 8081A

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
12-02-0837-3	**Sediment**	**GC 44**	**02/17/12**	**02/23/12**	**120217S09**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aldrin	5.000	79	80	50-135	0	0-25	
Alpha-BHC	5.000	102	85	50-135	18	0-25	
Beta-BHC	5.000	115	109	50-135	5	0-25	
Delta-BHC	5.000	112	122	50-135	9	0-25	
Gamma-BHC	5.000	86	88	50-135	3	0-25	
Dieldrin	5.000	87	86	50-135	1	0-25	
4,4'-DDD	5.000	95	94	50-135	1	0-25	
4,4'-DDE	5.000	103	105	50-135	1	0-25	
4,4'-DDT	5.000	93	91	50-135	2	0-25	
Endosulfan I	5.000	80	80	50-135	0	0-25	
Endosulfan II	5.000	86	85	50-135	2	0-25	
Endosulfan Sulfate	5.000	92	91	50-135	1	0-25	
Endrin	5.000	90	91	50-135	1	0-25	
Endrin Aldehyde	5.000	10	15	50-135	38	0-25	3,4
Endrin Ketone	5.000	98	96	50-135	2	0-25	
Heptachlor	5.000	82	83	50-135	2	0-25	
Heptachlor Epoxide	5.000	86	87	50-135	1	0-25	
Methoxychlor	5.000	88	85	50-135	3	0-25	
Alpha Chlordane	5.000	89	89	50-135	1	0-25	
Gamma Chlordane	5.000	84	84	50-135	0	0-25	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Spike/Spike Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: 02/14/12
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners

Project San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CB-Comp-SB-Upper	**Sediment**	**GC/MS HHH**	**02/17/12**	**02/24/12**	**120217S07**

Parameter	SPIKE ADDED	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
PCB018	25.00	79	78	50-125	1	0-30	
PCB028	25.00	84	84	50-125	0	0-30	
PCB044	25.00	82	81	50-125	0	0-30	
PCB052	25.00	79	78	50-125	0	0-30	
PCB066	25.00	86	85	50-125	1	0-30	
PCB077	25.00	87	87	50-125	1	0-30	
PCB101	25.00	86	85	50-125	1	0-30	
PCB105	25.00	87	87	50-125	0	0-30	
PCB118	25.00	92	92	50-125	0	0-30	
PCB126	25.00	84	84	50-125	1	0-30	
PCB128	25.00	81	81	50-125	1	0-30	
PCB153	25.00	87	87	50-125	0	0-30	
PCB170	25.00	70	69	50-125	2	0-30	
PCB180	25.00	94	93	50-125	1	0-30	
PCB187	25.00	90	90	50-125	0	0-30	
PCB206	25.00	80	79	50-125	1	0-30	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0901
Preparation: EPA 3050B
Method: EPA 6020

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
096-10-002-2,188	**Solid**	**ICP/MS 04**	**02/16/12**	**02/23/12**	**120216L01E**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Arsenic	25.00	96	101	80-120	5	0-20	
Cadmium	25.00	94	96	80-120	2	0-20	
Chromium	25.00	96	100	80-120	4	0-20	
Copper	25.00	101	104	80-120	2	0-20	
Lead	25.00	94	98	80-120	4	0-20	
Nickel	25.00	100	103	80-120	3	0-20	
Selenium	25.00	95	99	80-120	4	0-20	
Silver	12.50	81	83	80-120	3	0-20	
Zinc	25.00	100	103	80-120	3	0-20	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0901
Preparation: N/A
Method: EPA 9060A

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-06-013-688	**Solid**	**TOC 5**	**02/16/12**	**02/17/12**	**C0216TOCL1**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Carbon, Total Organic	6000	101	99	80-120	2	0-20	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Laboratory Control Sample

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0901
Preparation: Extraction
Method: EPA 413.2M

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-07-019-114	**Solid**	**IR 2**	**02/20/12**	**NONE**	**120220L03**

Parameter	Conc Added	Conc Recovered	LCS %Rec	%Rec CL	Qualifiers
Oil and Grease	100.0	23.90	24	70-130	X

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - Laboratory Control Sample

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received:	N/A
Work Order No:	12-02-0901
Preparation:	Extraction
Method:	EPA 418.1M

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-07-015-1,828	**Solid**	**IR 2**	**02/20/12**	**NONE**	**120220L04**

Parameter	Conc Added	Conc Recovered	LCS %Rec	%Rec CL	Qualifiers
TRPH	100.0	95.77	96	70-130	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0901
Preparation: EPA 3540C
Method: EPA 8270D (M)/TQ/EI

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-403-13	**Sediment**	**GCTQ 2**	**02/17/12**	**02/22/12**	**120217L02**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Allethrin	1.000	340	342	25-200	0-229	1	0-30	
Bifenthrin	5.000	90	91	25-200	0-229	1	0-30	
Cyfluthrin	5.000	73	75	25-200	0-229	4	0-30	
Cypermethrin	5.000	72	74	25-200	0-229	3	0-30	
Deltamethrin/Tralomethrin	5.000	45	48	25-200	0-229	6	0-30	
Fenpropathrin	1.000	535	558	25-200	0-229	4	0-30	
Fenvalerate/Esfenvalerate	5.000	62	65	25-200	0-229	4	0-30	
Fluvalinate	5.000	60	64	25-200	0-229	6	0-30	
Permethrin (cis/trans)	20.00	49	51	25-200	0-229	4	0-30	
Phenothrin	5.000	145	149	25-200	0-229	3	0-30	
Resmethrin/Bioresmethrin	5.000	97	100	25-200	0-229	3	0-30	
Tetramethrin	1.000	610	632	25-200	0-229	4	0-30	
lambda-Cyhalothrin	5.000	62	63	25-200	0-229	2	0-30	

Total number of LCS compounds : 13
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0901
Preparation: EPA 7471A Total
Method: EPA 7471A

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-452-271	**Solid**	**Mercury**	**02/16/12**	**02/16/12**	**120216L01E**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	0.8350	100	100	82-124	0	0-16	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0901
Preparation: EPA 3550B
Method: Organotins by Krone et al.

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-07-016-913	**Solid**	**GC/MS JJJ**	**02/17/12**	**02/20/12**	**120217L11**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Tetrabutyltin	100.0	114	115	50-130	1	0-20	
Tributyltin	100.0	91	91	50-130	0	0-20	

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8082

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-565-216	**Solid**	**GC 58**	**02/17/12**	**02/22/12**	**120217L10**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aroclor-1016	20.00	84	69	50-135	20	0-25	
Aroclor-1260	20.00	82	67	50-135	20	0-25	

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RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

URS Corporation		Date Received:	N/A
4225 Executive Square, Suite 1600		Work Order No:	12-02-0901
La Jolla, CA 92037-1487		Preparation:	EPA 3545
		Method:	EPA 8270C SIM

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-413-361	**Solid**	**GC/MS MM**	**02/17/12**	**02/21/12**	**120217L08**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
2,4,6-Trichlorophenol	1.000	68	65	40-160	20-180	3	0-20	
2,4-Dichlorophenol	1.000	73	70	40-160	20-180	4	0-20	
2-Methylphenol	1.000	64	63	40-160	20-180	1	0-20	
2-Nitrophenol	1.000	48	46	40-160	20-180	4	0-20	
4-Chloro-3-Methylphenol	1.000	71	71	40-160	20-180	1	0-20	
Acenaphthene	1.000	69	70	48-108	38-118	1	0-11	
Benzo (a) Pyrene	1.000	74	74	17-163	0-187	1	0-20	
Chrysene	1.000	65	67	17-168	0-193	3	0-20	
Di-n-Butyl Phthalate	1.000	70	71	40-160	20-180	2	0-20	
Dimethyl Phthalate	1.000	75	74	40-160	20-180	1	0-20	
Fluoranthene	1.000	69	69	26-137	8-156	0	0-20	
Fluorene	1.000	73	73	59-121	49-131	0	0-20	
Naphthalene	1.000	69	68	21-133	2-152	1	0-20	
Phenanthrene	1.000	67	68	54-120	43-131	1	0-20	
Phenol	1.000	58	57	40-160	20-180	2	0-20	
Pyrene	1.000	62	63	28-106	15-119	2	0-16	

Total number of LCS compounds : 16

Total number of ME compounds : 0

Total number of ME compounds allowed : 1

LCS ME CL validation result : Pass

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RPD - Relative Percent Difference , CL - Control Limit

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8081A

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-858-126	**Solid**	**GC 44**	**02/17/12**	**02/22/12**	**120217L09**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Aldrin	5.000	79	90	50-135	36-149	13	0-25	
Alpha-BHC	5.000	82	96	50-135	36-149	16	0-25	
Beta-BHC	5.000	84	97	50-135	36-149	14	0-25	
Delta-BHC	5.000	82	98	50-135	36-149	18	0-25	
Gamma-BHC	5.000	85	99	50-135	36-149	15	0-25	
Dieldrin	5.000	81	96	50-135	36-149	16	0-25	
4,4'-DDD	5.000	81	94	50-135	36-149	15	0-25	
4,4'-DDE	5.000	87	100	50-135	36-149	14	0-25	
4,4'-DDT	5.000	85	99	50-135	36-149	15	0-25	
Endosulfan I	5.000	78	93	50-135	36-149	17	0-25	
Endosulfan II	5.000	81	95	50-135	36-149	16	0-25	
Endosulfan Sulfate	5.000	80	93	50-135	36-149	15	0-25	
Endrin	5.000	78	93	50-135	36-149	17	0-25	
Endrin Aldehyde	5.000	81	95	50-135	36-149	15	0-25	
Endrin Ketone	5.000	89	102	50-135	36-149	14	0-25	
Heptachlor	5.000	84	97	50-135	36-149	14	0-25	
Heptachlor Epoxide	5.000	78	89	50-135	36-149	13	0-25	
Methoxychlor	5.000	85	98	50-135	36-149	14	0-25	
Alpha Chlordane	5.000	82	96	50-135	36-149	15	0-25	
Gamma Chlordane	5.000	82	95	50-135	36-149	15	0-25	

Total number of LCS compounds : 20
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Quality Control - LCS/LCS Duplicate

URS Corporation
4225 Executive Square, Suite 1600
La Jolla, CA 92037-1487

Date Received: N/A
Work Order No: 12-02-0901
Preparation: EPA 3545
Method: EPA 8270C SIM PCB Congeners

Project: San Elijo Lagoon / 27661119.10000

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-341-40	**Solid**	**GC/MS HHH**	**02/17/12**	**02/23/12**	**120217L07**

Parameter	SPIKE ADDED	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
PCB018	25.00	110	109	50-125	38-138	1	0-30	
PCB028	25.00	113	113	50-125	38-138	0	0-30	
PCB044	25.00	112	112	50-125	38-138	1	0-30	
PCB052	25.00	108	107	50-125	38-138	1	0-30	
PCB066	25.00	116	115	50-125	38-138	1	0-30	
PCB077	25.00	104	106	50-125	38-138	2	0-30	
PCB101	25.00	117	116	50-125	38-138	1	0-30	
PCB105	25.00	118	118	50-125	38-138	0	0-30	
PCB118	25.00	119	119	50-125	38-138	0	0-30	
PCB126	25.00	111	110	50-125	38-138	1	0-30	
PCB128	25.00	109	107	50-125	38-138	2	0-30	
PCB153	25.00	117	117	50-125	38-138	0	0-30	
PCB170	25.00	105	105	50-125	38-138	0	0-30	
PCB180	25.00	124	124	50-125	38-138	0	0-30	
PCB187	25.00	120	120	50-125	38-138	0	0-30	
PCB206	25.00	118	120	50-125	38-138	1	0-30	

Total number of LCS compounds : 16
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

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RPD - Relative Percent Difference , CL - Control Limit

Glossary of Terms and Qualifiers

Work Order Number: 12-02-0901

Qualifier	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
ME	LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
MPN - Most Probable Number

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Calscience Environmental Laboratories, Inc.

☐ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

WO # / LAB USE ONLY **12-02-0901**

CHAIN OF CUSTODY RECORD

Date 2/14/12

Page ______ of ______

LABORATORY CLIENT: URS Corporation

ADDRESS: 4225 Executive Square Suite 1600

CITY La Jolla STATE CA ZIP 92037

TEL: 858 812 9292 E-MAIL: derek.rector@URS.com, david.schug@URS.com

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☒ STANDARD

☐ COELT EDF GLOBAL ID LOG CODE

SPECIAL INSTRUCTIONS:

CLIENT PROJECT NAME / NUMBER: SEL / 27661119.10000

P.O. NO.:

PROJECT CONTACT: Derek Rector / David Schug

SAMPLER(S): (PRINT) Derek Rector

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	TPH (g) or GRO	TPH (d) or DRO or (C6-C36) or (C6-C44)	TPH ( )	BTEX / MTBE (8260) or ( )	VOCs (8260)	Oxygenates (8260)	En Core / Terra Core Prep (5035)	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PNAs (8310) or (8270)	T22 Metals (6010/747X)	Cr(VI) [7196 or 7199 or 218.6]	Air - VOCs (TO-14A) or (TO-15)	Air - TPH (g) [TO-3]	SEL full suite of tests	See Vik Patel for	Instructions
1	CB-Comp-SB-Upper	2/14/12	10:00	Soil	4																			X		
2	CB-Comp-SB-Lower	↓	10:10	↓	4																			X		
3	WB-Comp-SB-Upper	↓	10:20	↓	4																			X		
4	WB-Comp-SB-Lower	↓	10:30	↓	4																			X		

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
	CEL	2/14/12	1249
	CEL	2/14/12	1915

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision

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APPENDIX B

NOP AND SPECIAL PUBLIC NOTICE/ NOI AND COMMENT LETTERS

County of San Diego

DEPARTMENT OF PARKS AND RECREATION

BRIAN ALBRIGHT
DIRECTOR

Administrative Office: (858) 694-3030
Fax: (858) 495-5841
Reservations: (858) 565-3600

www.sdparks.org

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT

Public Review Period: November 7, 2011 through December 18, 2011

NOTICE IS HEREBY GIVEN that the County of San Diego, Department of Parks and Recreation (County) will be the Lead Agency and will prepare an Environmental Impact Report (EIR) in accordance with the California Environmental Quality Act (CEQA) for the San Elijo Lagoon Restoration Project (SELRP or project). The County is seeking public agency, interest group, and citizen input on the scope and content of the environmental information to be included in the EIR/Environmental Impact Statement (EIS). Because the SELRP is a cooperative effort between the County and the U.S. Army Corps of Engineers (Corps), the project will require the preparation of a joint National Environmental Policy Act (NEPA)/CEQA EIS/EIR. A separate Notice of Intent to prepare an EIS for this project will be sent out by the Corps.

The SELRP is a restoration project to enhance and restore the biological function and values of the San Elijo Lagoon. The study area covers approximately 961 acres. The project will require approval by the Corps, as well as other federal, state, and local resource agencies and jurisdictions. The project is located within the City of Encinitas, in San Diego County.

A Notice of Preparation document, which contains a more thorough project description, a regional location map, and a study area map, along with a description of the probable environmental effects of the project, is attached and can be reviewed at http://www.sanelijo.org/restoration or http://www.sdcounty.ca.gov/parks/public_review.html. Comments on the Notice of Preparation document must be in writing and must reference the project name; they may be sent to the following email or address:

Ms. Megan Hamilton
megan.hamilton@sdcounty.ca.gov
County of San Diego Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego CA 92123

PARKS AND
RECREATION
COUNTY OF SAN DIEGO

Comments on this Notice of Preparation document must be received no later than December 18, 2011. For additional information, please contact **Megan Hamilton** via email or at (858) 966-1377. Public scoping meetings will also be held **at the locations and times listed below.** The meetings will provide a public forum for information dissemination; identification of issues; presenting the scope of review; and questions on the SELRP, EIS/EIR, and the overall process.

1. **Carlsbad: November 15, 2011 at 1:00 P.M.**
   U.S. Fish & Wildlife Service, Conference Room 1
   6010 Hidden Valley Road, Suite 101
   Carlsbad, California 92011

2. **Encinitas: November 29, 2011 at 6:00 P. M.**
   City of Encinitas Community Center
   1140 Oakcrest Park Drive
   Encinitas, CA 92024

3. **Solana Beach: December 1, 2011 at 6:00 P.M.**
   Holiday Inn Express Meeting Room
   621 South Highway 101
   Solana Beach, CA 92075

County of San Diego

DEPARTMENT OF PARKS AND RECREATION

BRIAN ALBRIGHT
DIRECTOR

Administrative Office: (858) 694-3030
Fax: (858) 495-5841
Reservations: (858) 565-3600

www.sdparks.org

NOTICE OF PREPARATION DOCUMENTATION

DATE: November 7, 2011

PROJECT NAME: San Elijo Lagoon Restoration Project (SELRP)

PROJECT APPLICANT: San Elijo Lagoon Conservancy

PROJECT LOCATION:

The proposed project is within the San Elijo Lagoon Ecological Reserve located at the southern boundary of the City of Encinitas adjacent to Solana Beach (Figure 1). The project study area is composed of approximately 961 acres, which has been separated into four basins or areas (East Basin, Central Basin, West Basin, and coastal area), as depicted in Figure 2.

PROJECT DESCRIPTION:

The overall goal of the San Elijo Lagoon Restoration Project (SELRP or project) is:

1. To protect, restore, and then maintain, via adaptive management, the San Elijo Lagoon ecosystem and adjacent uplands
2. To perpetuate native flora and fauna characteristics of southern California.
3. To restore, then maintain estuarine and brackish marsh hydrology
4. To avoid and minimize impacts to recreational opportunities within and adjacent to the SEL
5. To improve water quality.

The San Elijo Lagoon Ecological Reserve serves as habitat for sensitive, threatened, and endangered plants, and resident and migratory wildlife, as well as provides recreational opportunities to the public. However, due to encroachment by development, the San Elijo Lagoon has gradually been constrained and its ecological function compromised. Development adjacent to the lagoon and within its watershed has restricted the tidal prism within the lagoon, and led to consistent degradation of water quality, leading to elevated bacteria levels and beach closures. Lagoon habitat is transitioning from mudflats to mid-marsh habitat, with the expansion of key vegetation that will continue to contribute to saltmarsh and riparian habitat within the lagoon, further restricting the tidal prism. The proposed project is an effort to restore lagoon function and values through dredging or excavation, channel clearing, repositioning of the lagoon inlet, or other hydrologic modifications.

The County of San Diego Department of Parks and Recreation (County), in coordination with the U.S. Army Corps of Engineers (Corps) and other stakeholders, is working to address the restoration of the San Elijo Lagoon. Three alternatives are anticipated to be carried forward for evaluation in the restoration plan and the Environmental Impact Statement/Environmental Impact Report (EIS/EIR), plus a No Project/No Action Alternative:

- Alternative 1A – Intertidal Alternative (Existing Inlet)
- Alternative 1B –Habitat Diversity Alternative (Existing Inlet)
- Alternative 2A –Habitat Diversity Alternative (Inlet Relocated)

These alternatives will undergo evaluation in the EIS/EIR before a final alternative is selected for construction. Under these alternatives, a number of actions could take place, including dredging or excavation to improve tidal circulation, channel clearing, repositioning of the lagoon inlet, or other hydrologic modifications. The project may be constructed in phases, if necessary, to maintain adequate habitat for sensitive lagoon species. Adaptive management strategies to maintain these restoration efforts are also included as part of the project. Excess sediment could be discharged on the beach or in the nearshore zone west of the lagoon if it is identified as suitable beach sand material. There are common design features that could be implemented as elements of each of the alternatives, such as micro-grading, facilitating the conveyance of seasonal freshwater flows through the system to the existing inlet, retention of avian nesting areas, and the inclusion of transitional upland areas. Brief descriptions of the SELRP alternatives are provided below.

Alternative 1A – Intertidal Alternative

Alternative 1A emphasizes enhancement of existing tidal channels and creation of new tidal channels to provide increased tidal flows in the three existing lagoon basins. This alternative would use the existing tidal inlet, create a north-south-trending tidal channel in the West Basin, enlarge the channel linking the Central Basin and East Basin beneath Interstate 5 (I-5), and enhance existing tidal channels in the East Basin. The inlet/undercrossing at U.S. Highway 101 would remain in the current location. No other infrastructure improvements would be made at the North County Transit District (NCTD) railroad trestle or at I-5. Because minimal changes are proposed as part of Alternative 1A, existing habitat areas would essentially remain intact. The tidal prism of Alternative 1A would be slightly increased compared to existing conditions.

Alternative 1B –Habitat Diversity (Existing Inlet)

Alternative 1B would increase the lagoon tidal prism and create a greater diversity of habitats compared to Alternative 1A. Alternative 1B would include the creation of a subtidal basin in the Central Basin, deepening and widening of tidal channels to the north and east of this tidal basin to provide additional tidal influence, and creation of an extensive network of tidal channels in the East Basin. The existing tidal inlet would remain the source of seawater, and the main tidal channel would be extended throughout the lagoon. The existing U.S. Highway 101 bridge would be replaced in place as part of this project. No infrastructure improvements are assumed at the NCTD railroad trestle, but the channel under I-5 is assumed to be widened as part of the California Department of Transportation (Caltrans) I-5 North Coast Corridor Project. Thus, the tidal connection between the Central and East Basins would be widened and deepened, and the tidal prism of Alternative 1B would be substantially increased compared to Alternative 1A. Nontidal habitat areas would still exist in the East Basin. Several areas of transitional habitat above tidal elevations would be located in the western portion of the Central Basin.

Alternative 2A –Habitat Diversity (Relocated Inlet)

Alternative 2A would increase tidal influence within San Elijo Lagoon compared to Alternatives 1A and 1B by relocating the lagoon inlet to the middle of the West Basin. The new inlet would be protected by short cobble blocking structures. In addition, a new subtidal basin would be created just landward of the new inlet in the West and Central Basins. Tidal channels extending north and east of the basin would also be enlarged, as well as the channel under I-5 connecting the East and Central Basins. The main tidal channel would extend throughout the lagoon and be redirected just west of I-5, then extend into the East Basin. Infrastructure improvements are assumed to be completed by others at the NCTD railroad trestle, including the portion of the railroad directly parallel to the new inlet and the channel under I-5, which is assumed to be widened by Caltrans as part of the North Coast Corridor Project. A new bridge along U.S. Highway 101 would be constructed as part of the SELRP. This bridge would span the new lagoon inlet location, and would tie into the existing roadway. Excavation in the lagoon would result in onshore or nearshore placement of suitable beach sand material near the relocated inlet mouth. Nontidal habitat areas would remain in the East Basin. Transitional habitat areas above tidal elevations would be included in the Central and East Basins.

PROBABLE ENVIRONMENTAL EFFECTS:

An initial study was not prepared for this project. Based on the County's preliminary analyses of the project, the following environmental issues will be examined in the EIS/EIR: Geology, Coastal Processes, Hydrology, Water and Aquatic Sediment Quality, Biological Resources (Aquatic and Terrestrial), Cultural and Paleontological Resources, Land Use, Recreation, Socioeconomics, Visual Resources, Traffic, Air Quality, Noise, Hazardous Materials, Mineral Resources, Public Services and Utilities, and Cumulative.

PUBLIC SCOPING MEETING: Consistent with Section 21083.9 of the California Environmental Quality Act (CEQA) Statues, three public scoping meetings will be held to solicit comments on the EIR:

1. **Carlsbad: November 15, 2011 at 1:00 P.M.**
   U.S. Fish & Wildlife Service, Conference Room 1
   6010 Hidden Valley Road, Suite 101
   Carlsbad, California 92011

2. **Encinitas: November 29, 2011 at 6:00 P. M.**
   City of Encinitas Community Center
   1140 Oakcrest Park Drive
   Encinitas, CA 92024

3. **Solana Beach: December 1, 2011 at 6:00 P.M.**
Holiday Inn Express Meeting Room
621 South Highway 101
Solana Beach, CA 92075

Attachments:

Figure 1: Regional Map
Figure 2: San Elijo Lagoon Restoration Project Study Area and Land Ownership

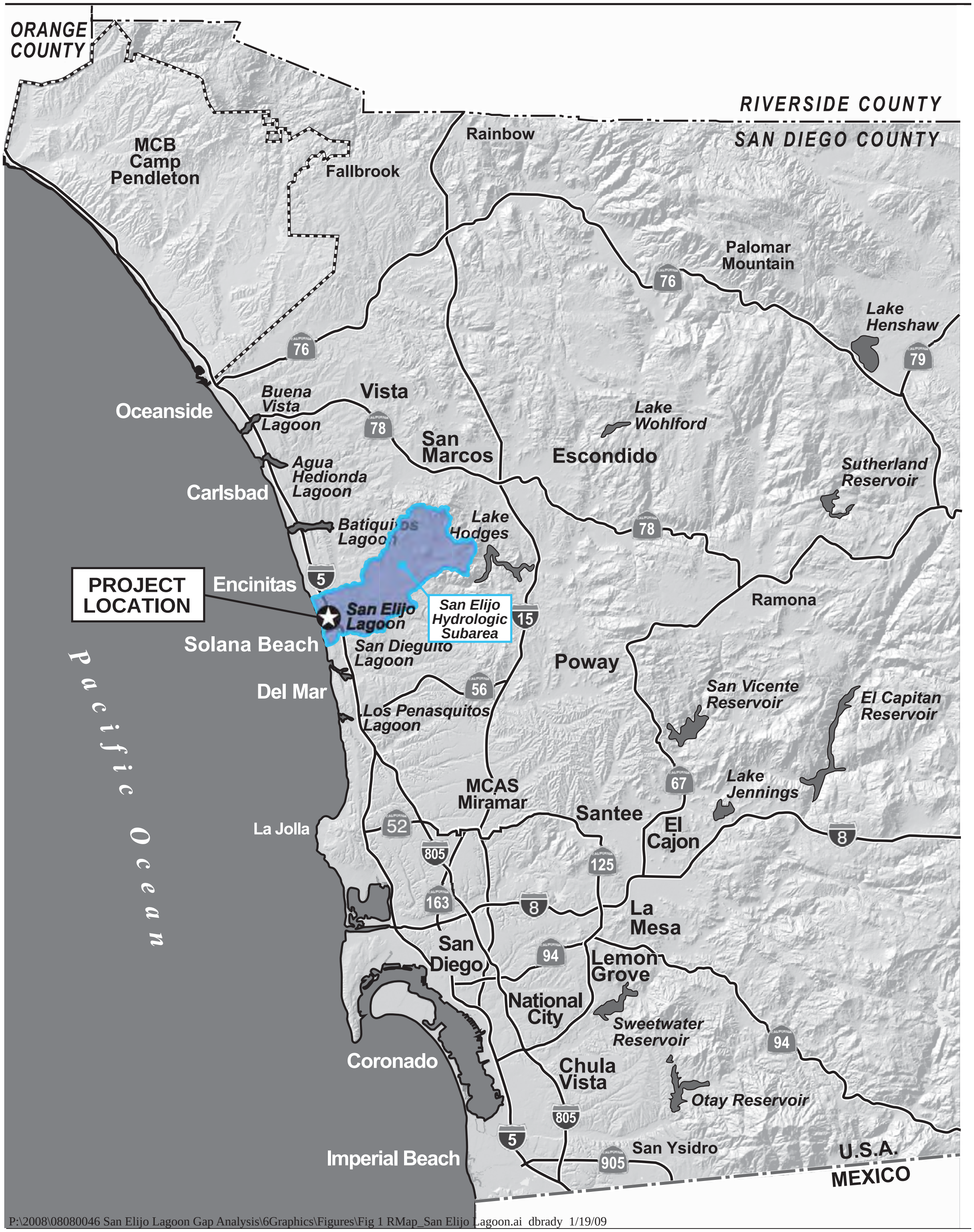
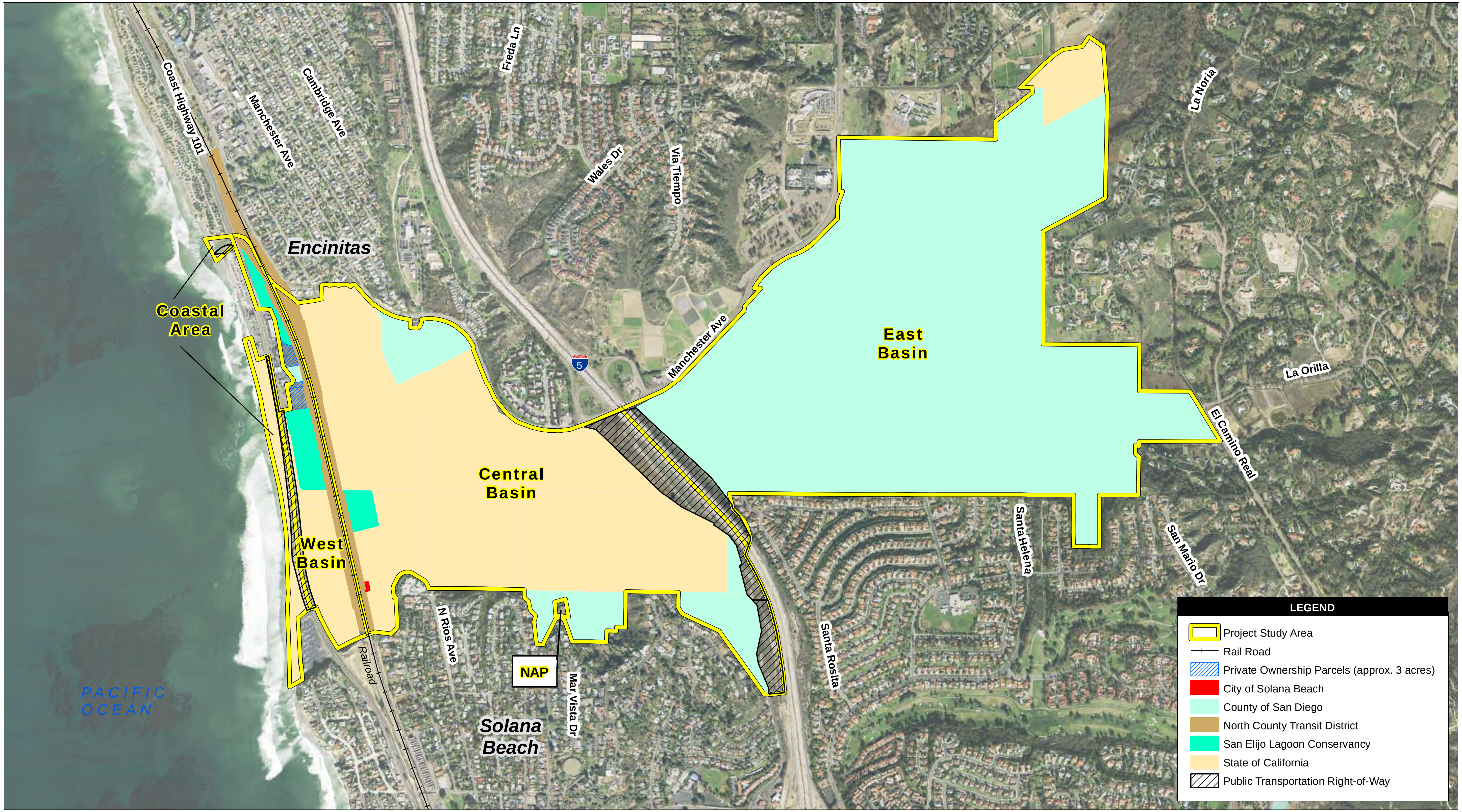


Figure 1
Regional Map



Source: DigitalGlobe 2008; SanGIS 2008; SANDAG 2008

Figure 2
San Elijo Lagoon Restoration Project
Study Area and Land Ownership

DEPARTMENT OF DEFENSE UNITED STATES OF AMERICA

SPECIAL PUBLIC NOTICE

NOTICE OF INTENT TO PREPARE A DRAFT ENVIRONMENTAL IMPACT STATEMENT/ ENVIRONMENT IMPACT REPORT (DEIS/DEIR)

LOS ANGELES DISTRICT

Public Notice/Application No.: CESPL-2009-00575-MLM
Project: San Elijo Lagoon Restoration Project, City of Encinitas, San Diego County, California
Comment Period: November 7, 2011 through December 18, 2011
Corps Project Manager: Michelle Lee Mattson; (760) 602-4835; Michelle.L.Mattson@usace.army.mil
County Project Manager: Megan Hamilton; (858) 966-1377; Megan.Hamilton@sdcounty.ca.gov

---

Applicant	**Contact**
Doug Gibson	Doug Gibson
San Elijo Lagoon Conservancy	San Elijo Lagoon Conservancy
P.O. Box 230634	P.O. Box 230634
Encinitas, California 92023-0634	Encinitas, California 92023-0634

Location

San Elijo Lagoon is located in the city of Encinitas, San Diego County, California. The lagoon is the terminus of the Escondido Creek and La Orilla Creek watersheds at the Pacific Ocean [latitude: 33deg 0min 32.3sec (N), longitude: 117deg 15min 41.0sec (W)].

Activity

The United States (U.S.) Army Corps of Engineers (Corps), in conjunction with the County of San Diego Department of Parks and Recreation (County Parks), is preparing a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the proposed San Elijo Lagoon Restoration Project (SELRP). The SELRP is an effort to restore estuarine functions and services to the greatest extent practicable in light of permanent constraints. The SELRP would improve tidal influence by modifying and maintaining the existing inlet of the lagoon or by constructing a new, permanently open lagoon inlet. Habitat diversity and other wetland functions and services would also be improved by modifying existing tidal channels, grading new tidal channels, and/or by grading areas specified by a range of tide elevations. The basic project purpose of the proposed SELRP is to restore tidal wetlands; this is a water dependent activity. The overall project purpose of the SELRP is to enhance and restore the physical and biological functions and services of the lagoon by increasing the tidal prism to support a diverse range of habitat types.

Three restoration alternatives and the No Project/No Action alternative are being evaluated in the EIR/EIS. The study area boundaries for the SELRP are generally defined to include publicly owned parcels where restoration activities could occur. The study area encompasses approximately 960 acres within and adjacent to the Reserve, but final project size may vary, depending on the outcome of the alternatives analysis. All the restoration alternatives are designed to counteract the conversion trend to freshwater habitats and restore a range of estuarine habitat types. Therefore, increasing tidal influence is the primary action being evaluated to restore ecological functions and services. Two alternatives retain the existing tidal inlet and one constructs a new inlet further south. In addition, alternatives are being evaluated to determine if project phasing is necessary to maintain adequate habitat for sensitive aquatic species, including light footed clapper rail (*Rallus longirostris levipes*) and potentially western snowy plovers (*Charadrius alexandrines nivosus*) and California least terns (*Sterna antillarum browni*).

Restoration alternatives evaluate varying degrees of dredging and filling portions of the three basins (West, Central, and East Basin) to restore or create a diversity of estuarine habitat types. Excess sediment from dredging could be discharged on the adjacent beach or in the nearshore zone west of the lagoon, if it is identified as suitable beach sand material. Maintenance and adaptive management strategies are also being evaluated by alternative.

Through the EIS/EIR process, an Agency Preferred Alternative will be identified and a Restoration Plan will be developed. The Restoration Plan will be consistent with the goals and objectives listed above and will fit within the overall management strategies identified in the *San Elijo Lagoon Enhancement Plan* (County Parks 1996) and the *San Elijo Lagoon Action Plan* (San Elijo Lagoon Conservancy 1998).

Implementing the Agency Preferred Alternative would require a Department of the Army permit pursuant to Section 404 of the Clean Water Act. To be authorized by the Corps, the Agency Preferred Alternative must also comply with the Section 404(b)(1) Guidelines (40 Code of Federal Regulations [CFR] Part 230) and may not be contrary to the public interest. Should the project receive a permit, it is anticipated that construction of the SELRP would begin in fall 2014.

Interested parties are hereby provided notice of intent to prepare a DEIS/DEIR as a basis for a potential future Permit Application for the SELRP. Parties interested in obtaining additional information about the SELRP can also visit http://www.sanelijo.org/restoration. Interested parties are invited to participate in public scoping meetings to provide their views on the project.

A series of public scoping meetings will be held on the following dates and locations:

1. **Carlsbad: November 15, 2011 at 1:00 P.M.**
U.S. Fish & Wildlife Service, Conference Room 1
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

2. Encinitas: November 29, 2011 at 6:00 P. M.
City of Encinitas Community Center
1140 Oakcrest Park Drive
Encinitas, CA 92024

3. Solana Beach: December 1, 2011 at 6:00 P.M.
Holiday Inn Express Meeting Room
621 South Highway 101
Solana Beach, CA 92075

Written comments should reference the "San Elijo Lagoon Restoration Project, CESPL-2009-00575-MLM" and may be addressed to:

U.S. Army Corps of Engineers,
Los Angeles District, Regulatory Division
Carlsbad Field Office
Attn: Michelle Lee Mattson
6010 Hidden Valley Road, Suite 105
Carlsbad, CA 92011
Michelle.L.Mattson@usace.army.mil
(760) 602-4835

County of San Diego
Department of Parks and Recreation
Attn: Megan Hamilton
5500 Overland Avenue, Suite 410
San Diego CA 92123
Megan.Hamilton@sdcounty.ca.gov
(858) 966-1377

Parties interested in being added to the Corps' electronic mail notification list can register at: www.spl.usace.army.mil/regulatory/register.html. This list will be used in the future to notify the public about scheduled hearings and availability of future public notices.

Federal Action:
The development of the SELRP Draft EIS/EIR and associated technical studies are being completed to determine the Agency Preferred Alternative, which would improve and/or restore wetland functions and services within the San Elijo Lagoon. Given the complexity of the alternatives analysis and range of potentially significant issues, the appropriate environmental document was determined by the Corps and County Parks to be a combined EIS/EIR, respectively. The Corps and the County Parks have agreed to jointly prepare the EIS/EIR to optimize efficiency and avoid duplication. The EIS/EIR is intended to be sufficient in scope to address federal, state, and local requirements for environmental analysis and permitting.

Federal agencies coordinating in the development of the EIS include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and Environmental Protection Agency (EPA).

The following federal permits and consultations are expected:

- Corps CWA Section 404 Permit
- USFWS Section 7 Consultation
- National Historic Preservation Act Section 106 consultation
- U.S. Coast Guard Navigation Permit (new inlet only)

The Corps prepared and published a Notice of Intent (NOI) to prepare a DEIS/DEIR for the proposed Project in the Federal Register (**November 7, 2011**).

State Action:

County Parks and the San Elijo Lagoon Conservancy propose to restore estuarine functions and services of the San Elijo Lagoon. County Parks will jointly lead preparation of the EIS/EIR with the Corps. Pursuant to the California Environmental Quality Act (CEQA), County Parks will serve as Lead Agency for the preparation of the EIR for its consideration and development approvals within its jurisdiction. The primary purpose of this Draft EIS/EIR is to evaluate potential significant environmental effects of each restoration alternative. Also, County Parks would use this EIR to support permit applications and other actions required to implement the Agency Preferred Alternative.

County Parks has prepared a Notice of Preparation (NOP), in accordance with the County of San Diego Guidelines for the Implementation of the California Environmental Quality Act (CEQA) (1970, Article 1), State CEQA Guidelines (Title 14, California Code of Regulations), and the California Public Resources Code (Section 21000, et seq.).

State agencies coordinating in the development of the EIR include Department of Fish and Game (CDFG), California Coastal Commission (CCC), San Diego Regional Water Quality Control Board (SDRWQCB), State Water Resources Control Board, California Department of Transportation (Caltrans), and San Diego Association of Governments (SANDAG).

The following state permits and consultations are expected:

- SDRWQCB CWA Section 401 Water Quality Certification
- CDFG Section 1600 Streambed Alteration Agreement
- CCC Development Permit
- Air quality permits
- State Lands Commission Lease
- State Department of Parks and Recreation Encroachment Permit

Potential Environmental Issues:

A number of potential environmental issues will be addressed in the EIS/EIR for each alternative. Additional issues may be identified during the scoping process, but issues initially identified as potentially significant or that are believed to be of local concern are as follows:

- Geology and Soils: permanent impacts through the removal of sediment accumulated in the lagoon and on-going impacts resulting from as-needed maintenance activities.

- Coastal Processes: temporary impacts during construction, permanent impacts depending on tidal inlet location, and on-going impacts resulting from as needed maintenance activities.
- Hydrology: temporary impacts during construction, permanent changes in water circulation, and on-going impacts resulting from as-needed maintenance of the tidal inlet and/or interior dredging.
- Water & Aquatic Sediment Quality: impacts during construction, including turbidity, and potential impacts resulting from as-needed maintenance activities.
- Aquatic & Terrestrial Biological Resources: temporary and permanent impacts to existing species.
- Cultural & Paleontological Resources: impacts to archaeological resources, human remains, and sacred sites.
- Land Use: temporary or permanent impacts to beach use depending on inlet location.
- Recreation: temporary impacts to existing trail use during construction and potential on-going impacts resulting from as-needed maintenance activities.
- Visual Resources: temporary impacts during construction and permanent impacts associated with changes in vegetation communities and regular tidal flooding.
- Transportation and Traffic: impacts during construction and potential on-going impacts resulting from as-needed maintenance activities.
- Air Quality/Greenhouse Gas Emissions: impacts during construction and on-going impacts resulting from as-needed maintenance activities.
- Noise: impacts during construction and on-going impacts resulting from dredging or other construction equipment during as-needed maintenance activities.
- Hazards and Hazardous Materials: impacts during construction and on-going impacts resulting from as-needed maintenance activities.
- Public Services and Utilities: impacts during construction and on-going impacts resulting from as-needed maintenance activities.

Availability of the DEIS/DEIR:

The Draft EIS/EIR is expected to be published and circulated by fall 2012, and public meetings will be held after its publication.

Proposed Activity for Which an EIS is Required:

Basic Project Purpose: The basic project purpose of the proposed SELRP is to restore tidal wetlands; this is a water dependent activity.

Overall Project Purpose: The overall project purpose of the SELRP is to enhance and restore the physical and biological functions and services of the lagoon by increasing the tidal prism to support a diverse range of habitat types.

The overarching goal of the SELRP is to protect, restore, and then maintain, via adaptive management the San Elijo Lagoon ecosystem and the adjacent uplands to support a diversity of estuarine and brackish marsh habitats and associated native species of southern California. This goal can be further refined into three categories of objectives:

1. **Physical restoration of lagoon estuarine hydrologic functions;**

2. **Biological restoration of lagoon estuarine habitats; and**
3. **Management and maintenance of the lagoon to ensure long-term viability of the restoration efforts.**

Additional Project Information:

NEPA and CEQA require preparation of an EIS and EIR for actions that could significantly affect the environment. Actions subject to NEPA and CEQA requirements include projects sponsored by a governmental agency and the approval of projects over which the governmental agency has discretionary authority. The purpose of the Draft EIS/EIR is to evaluate the potential impacts of the restoration alternatives and to determine the Agency Preferred Project that minimizes adverse effects and maximizes beneficial effects. The Corps will serve as the federal Lead Agency in accordance with NEPA, and County Parks will serve as the state Lead Agency under CEQA.

Baseline Information:

The lagoon provides habitat for resident and migratory species, some of which are sensitive or listed as federally-threatened or endangered under the Endangered Species Act (ESA). However, due to encroachment by development, restricted tidal influence, and the increase of freshwater from the watershed, the San Elijo Lagoon has gradually degraded over time lowering biodiversity. Tidal influence has been restricted by infrastructure and development at the inlet of the lagoon. The Pacific Coast Highway (PCH), the North County Transit District (NCTD) railroad, and Interstate 5 (I-5) all traverse the lagoon and further modify tidal and freshwater circulation patterns and increased sediment accumulation from the watershed. Freshwater input has increased as a result of residential and commercial land uses in the 77-square-mile hydrologic watershed. Because of these hydrologic changes, lagoon habitat is rapidly transitioning from mudflats to mid-marsh habitat through the rapid expansion of cordgrass (*Spartina* spp.) and pickleweed (*Sarcoconia pacifica*) and the East Basin supports large areas of freshwater marsh vegetated primarily by cattails (*Typha* spp.). The changes have also decreased the quality of water in the lagoon causing elevated bacteria levels and increased the occurrences of beach closures during high flow events.

Mechanical breaching of the ocean inlet is routinely performed to maintain tidal flushing within the lagoon, but benefits are only temporarily realized due to the physical and hydrological changes previously mentioned. If no action is taken to restore the lagoon, functions and services will continue to degrade, further reducing the diversity of estuarine habitats and biodiversity in flora and fauna, and increasing freshwater wetland and riparian habitats. Sensitive flora and fauna currently dependent on the estuarine conditions will continue to be adversely affected.

Project Description:

Three restoration alternatives and the No Project/No Action alternative are being evaluated in the EIR/EIS. All the restoration alternatives are designed to counteract the conversion trend to freshwater habitats and restore a range of estuarine habitat types. Therefore, increasing tidal influence is the primary action being evaluated to restore ecological functions and services. Since 1996, various interested parties have devised restoration concepts and considered alternative configurations of infrastructure that traverse the lagoon. Through an intensive process, four conceptual alternatives have been identified to be carried forward for engineering refinement and environmental evaluation:

- Alternative 1A – Intertidal Alternative (existing inlet)

- Alternative 1B – Habitat Diversity Alternative (existing inlet)
- Alternative 2A – Habitat Diversity Alternative (inlet relocated south)
- No Project/No Action

There are common design features that would be implemented in each alternative, such as micro-grading and the use of short cobble-blocking structures at the inlet. Restoration alternatives evaluate varying degrees of dredging and filling portions of the three basins (West, Central, and East Basin) to restore or create a diversity of estuarine habitat types. Excess sediment from dredging could be discharged on the adjacent beach or in the nearshore zone west of the lagoon, if it is identified as suitable beach sand material. Maintenance and adaptive management strategies are also being evaluated for each alternative (i.e. new inlet channel maintenance would differ from the existing inlet channel maintenance). The range and characteristics of the alternatives addressed in the EIS/EIR will be more fully developed based on input from the scoping process and specialized hydrological and biological technical studies that are underway.

Proposed Mitigation:

Mitigation measures will be developed during the EIS/EIR and regulatory agency permitting processes. They will be available for public review and comment when the DEIS/DEIR is published and circulated by fall 2012, during subsequent public meetings, and as part of the Public Notice process when an application is received to implement the Agency Preferred Project under Section 404 of the Clean Water Act.

Proposed Special Conditions:

The Corps will require standard special conditions related to work (dredging) and structural development in and over navigable waters of the U.S., as well as standard conditions to protect cultural resources, water quality, and federally endangered or threatened species. Special conditions may also include financial assurances, monitoring performance standards, and annual reporting. Detailed permit conditions will be developed as part of the Final EIS/EIR, the Section 404(b)(1) Alternatives Analysis.

For additional information please call Michelle Lee Mattson at (760) 602-4835 or via e-mail at Michelle.L.Mattson@usace.army.mil. This public notice is issued by the Chief, Regulatory Division.

U.S. Department of Homeland Security
FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA. 94607-4052

FEMA

November 15, 2011

Michelle L. Mattson, Project Manager
U. S. Army Corps of Engineers
Los Angeles District, Regulatory Division
Carlsbad Field Office
6010 Hidden Valley Road, Suite 105
Carlsbad, California 92011

Dear Ms. Mattson:

This is in response to your request for comments on Public Notice Number CESPL-2009-00575-MLM for the San Elijo Lagoon Restoration Project (Gen2) in Encinitas, San Diego County, California.

Please review the current effective countywide Flood Insurance Rate Maps (FIRMs) for the County of San Diego (Community Number 060284) and City of Encinitas (Community Number 060726), Maps revised September 29, 2006. Please note that the City of Encinitas, San Diego County, California is a participant in the National Flood Insurance Program (NFIP). The minimum, basic NFIP floodplain management building requirements are described in Vol. 44 Code of Federal Regulations (44 CFR), Sections 59 through 65.

A summary of these NFIP floodplain management building requirements are as follows:

- All buildings constructed within a riverine floodplain, (i.e., Flood Zones A, AO, AH, AE, and A1 through A30 as delineated on the FIRM), must be elevated so that the lowest floor is at or above the Base Flood Elevation level in accordance with the effective Flood Insurance Rate Map.

- If the area of construction is located within a Regulatory Floodway as delineated on the FIRM, any ***development*** must not increase base flood elevation levels. **The term *development* means any man-made change to improved or unimproved real estate, including but not limited to buildings, other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, and storage of equipment or materials.** A hydrologic and hydraulic analysis must be performed *prior* to the start of development, and must demonstrate that the development would not cause any rise in base flood levels. No rise is permitted within regulatory floodways.

- All buildings constructed within a coastal high hazard area, (any of the "V" Flood Zones as delineated on the FIRM), must be elevated on pilings and columns, so that the lowest horizontal structural member, (excluding the pilings and columns), is elevated to or above the base flood elevation level. In addition, the posts and pilings foundation and the structure attached thereto, is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components.

- Upon completion of any development that changes existing Special Flood Hazard Areas, the NFIP directs all participating communities to submit the appropriate hydrologic and hydraulic data to FEMA for a FIRM revision. In accordance with 44 CFR, Section 65.3, as soon as practicable, but not later than six months after such data becomes available, a community shall notify FEMA of the changes by submitting technical data for a flood map revision. To obtain copies of FEMA's Flood Map Revision Application Packages, please refer to the FEMA website at http://www.fema.gov/business/nfip/forms.shtm.

Please Note:

Many NFIP participating communities have adopted floodplain management building requirements which are more restrictive than the minimum federal standards described in 44 CFR. Please contact the local community's floodplain manager for more information on local floodplain management building requirements. The Encinitas floodplain manager can be reached by calling Larry Watt, City Engineer, at (760) 633-2770. The San Diego County floodplain manager can be reached by calling Cid Tesoro, Flood Control District Manager, at (858) 694-3672.

If you have any questions or concerns, please do not hesitate to call Robert Durrin of the Mitigation staff at (510) 627-7057.

Sincerely,

Gregor Blackburn, CFM, Branch Chief
Floodplain Management and Insurance Branch

cc:
Larry Watt, City Engineer, City of Encinitas
Cid Tesoro, Flood Control District Manager, San Diego County
Megan Hamilton, Department of Parks and Recreation, San Diego County
Garret Tam Sing/Salomon Miranda, State of California, Department of Water Resources,
Southern Region Office
Robert Durrin, Floodplanner, CFM, DHS/FEMA Region IX
Alessandro Amaglio, Environmental Officer, DHS/FEMA Region IX

State of California -The Natural Resources Agency **EDMUND G. BROWN, JR**, *Governor*
DEPARTMENT OF FISH AND GAME **CHARLTON H. BONHAM,** *Director*
South Coast Region
3883 Ruffin Road
San Diego, CA 92123
(858) 467-4201
www.dfg.ca.gov

December 16, 2011

Ms. Megan Hamilton
County of San Diego Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego CA 92123

Subject: Notice of Preparation of a Draft Environmental Impact Report/ Environmental Impact Statement for the San Elijo Lagoon Restoration Project, SCH # 2011111013, San Diego County

Dear Ms. Hamilton:

The Department of Fish and Game (Department) has reviewed the above-referenced Notice of Preparation (NOP) of a Draft Environmental Impact Report/Environmental Impact Statement (DEIR/S) for the San Elijo Lagoon Restoration Project (Project) dated November 4, 2011. The Department has identified potential effects of this project on wildlife and sensitive habitats. The comments provided herein are based on the information provided in the NOP for the DEIR/S, our knowledge of sensitive and declining vegetation communities, and our participation in regional conservation planning efforts.

The Department is a Trustee Agency and a Responsible Agency pursuant to the California Environmental Quality Act (CEQA; Sections 15386 and 15381, respectively) and is responsible for ensuring appropriate conservation of the State's biological resources, including rare, threatened, and endangered plant and animal species, pursuant to the California Endangered Species Act (CESA; Fish and Game Code §2050 et seq.) and other sections of the Fish and Game Code. The Department also administers the Natural Community Conservation Planning (NCCP) program. In addition, the Department owns approximately 348 acres of the proposed lagoon restoration site, and the project proponent will need Department authorization to proceed with the restoration on those lands.

The Project goals are to protect, restore, and maintain the San Elijo Lagoon estuarine, brackish marsh and upland habitats, restore and maintain the lagoon hydrology, and improve water quality, and avoid or minimize impacts to recreational opportunities within and adjacent to the lagoon. The project proposes to accomplish these goals through dredging or excavation, channel clearing, repositioning of the lagoon inlet, or other hydrologic modifications.

The Department offers the following comments and recommendations to assist the County of San Diego (County) in avoiding or minimizing potential project impacts on biological resources.

SPECIFIC COMMENTS

1. To enable reviewers of the forthcoming DEIR/S to understand the biological baseline used for it, we request that the DEIR/S include information regarding the

regional perspective of existing amounts of estuarine and brackish marsh habitats available and the ability of this project to achieving regional needs for these habitat types. In addition, the project's impacts and benefits should be analyzed in the context of the goals of the regional NCCP planning efforts that encompass the lagoon and its watershed.

2. As proposed, the project would include restoration/enhancement of estuarine and brackish marsh habitats and additional upland habitats. The Department recommends a minimum of a 100-foot upland buffer as measured from the edge of the natural and re-vegetated wetland habitat within the project footprint, where feasible. Within this buffer there should be prohibitions or significant restrictions regarding public access or development, with the possible exception of the existing trails where they cannot be relocated to achieve this setback. Consideration should be given to elevating trails to boardwalks to reduce impacts to wetlands where relocation is infeasible.

3. The DEIR/S should address compatibility of the proposed project, including future maintenance of the project features, with the Department's Marine Protected Areas.

4. The DEIR/S should include a detailed analysis of the potential effects of future climate change, especially sea level rise, on the lagoon restoration, and incorporate sea level rise estimates into the restoration design.

5. The Department is particularly concerned about the potential short-term impacts to two State-endangered species, the Belding's savannah sparrow and the light-footed clapper rail, from the implementation of the restoration plan. The DEIR/S needs to clearly explain how the restoration project will avoid and/or minimize impacts to these species in both the short and long-term, and attain the California Endangered Species Act standard of "full mitigation" for unavoidable impacts. The project should consider possible phasing of construction to minimize impacts if necessary.

6. The DEIR/S should include a detailed discussion of the costs of maintaining the lagoon once restored (e.g., dredging costs and frequency, etc.) and on-going management costs.

GENERAL COMMENTS

BIOLOGICAL IMPACTS

1. The Department has responsibility for wetland and riparian habitats. It is the policy of the Department to strongly discourage development in wetlands or conversion of wetlands to uplands. We typically oppose any development or conversion which would result in a reduction of wetland acreage or wetland habitat values, unless, at a minimum, project mitigation assures there will be "no net loss" of either wetland habitat values or acreage. Development and conversion include but are not limited to conversion to subsurface drains, placement of fill or building of structures within

the wetland, and canalization or removal of materials from the streambed. All wetlands and watercourses, whether intermittent or perennial, should be retained or enhanced and provided with substantial setbacks which preserve the riparian and aquatic values and maintain their value to on-site and off-site wildlife populations. Mitigation measures to compensate for impacts to wetlands must be included in the DEIR/S and must compensate for the loss of function and value of a wildlife corridor.

a. The project area supports aquatic, riparian, and wetland habitats; therefore, a jurisdictional delineation of the creeks and their associated riparian habitats should be included in the DEIR/S. The delineation should be conducted pursuant to the U. S. Fish and Wildlife Service wetland definition adopted by the Department.[1] Please note that some wetland and riparian habitats subject to The Department's authority may extend beyond the jurisdictional limits of the U.S. Army Corps of Engineers.

b. The Department also has regulatory authority over activities in streams and/or lakes that will divert or obstruct the natural flow, or change the bed, channel, or bank (which may include associated riparian resources) of a river or stream, or use material from a streambed. For any such activities, the project applicant (or "entity") must provide written notification to the Department pursuant to Section 1602 *et seq.* of the Fish and Game Code. Based on this notification and other information, the Department determines whether a Lake and Streambed Alteration Agreement (LSA) with the applicant is required prior to conducting the proposed activities. The Department's issuance of a LSA for a project that is subject to CEQA will require CEQA compliance actions by the Department as a responsible agency. The Department as a responsible agency under CEQA may consider the local jurisdiction's (lead agency) Negative Declaration or Environmental Impact Report for the project. To facilitate issuance of an Agreement, if necessary, the environmental impact report should fully identify the potential impacts to the stream or riparian resources and provide adequate avoidance, mitigation, monitoring and reporting commitments for issuance of the LSA (a notification package for a LSA may be obtained by accessing the Department's web site at www.dfg.ca.gov/1600). Early consultation is recommended, since modification of the project may be required to avoid or reduce impacts to fish and wildlife resources. Again, the failure to include this analysis in the project environmental impact report could preclude the Department from relying on the County's analysis to issue an Agreement without the Department first conducting its own, separate lead agency subsequent or supplemental analysis for the Project.

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[1] Cowardin, Lewis M., et al. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Department of the Interior, Fish and Wildlife Service.

2. The Department considers adverse impacts to a species protected by CESA, for the purposes of CEQA, to be significant without mitigation. As to CESA, take of any endangered, threatened, or candidate species that results from the project is prohibited, except as authorized by state law. (See Fish and Game Code, §§ 2080, 2085.) Consequently, if the Project, Project construction, or any Project-related activity during the life of the Project could result in take of a species designated as endangered or threatened, or a candidate for listing under CESA, the Department recommends that the project proponent seek appropriate take authorization under CESA prior to implementing the project. Appropriate authorization from the Department may include an incidental take permit (ITP) or a consistency determination in certain circumstances, among other options. Early consultation is encouraged, as significant modification to a project and mitigation measures may be required in order to obtain an ITP. CESA-listed species of particular relevance in this regard include the coastal California gnatcatcher (*Polioptila californica californica*), Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*), light-footed clapper rail (*Rallus longirostris levipes*), least Bell's vireo (*Vireo bellii pusillus*), California least tern (*Sterna antillarum browni*) and southwestern willow flycatcher (*Empidonax traillii extimus*). Revisions to the Fish and Game Code, effective January 1998, may require that the Department issue a separate CEQA document for the issuance of an ITP unless the project CEQA document addresses all project impacts to CESA-listed species and specifies a mitigation monitoring and reporting program that will meet the requirements of an ITP. For these reasons, the following information is requested:

    a. Biological mitigation monitoring and reporting proposals should be of sufficient detail and resolution to satisfy the requirements for an ITP.

   Please note that pursuant to Section 3511 of the California Fish and Game Code, the CESA-listed light-footed clapper rail and California least tern are also designated as State Fully Protected species. This designation prohibits take or possession of these species at any time, that is, there is no take authorization available from the Department.

3. If it is anticipated that the proposed project would result in increased traffic volumes on highways and roads adjacent to the proposed project area. The DEIR/S should discuss the need for any road improvements that would be necessary to off-set increased traffic volumes resulting from the proposed project. Furthermore, the DEIR/S should identify any on- and/or off-site impacts to sensitive species or habitats that would result from any proposed road improvements associated with the project.

4. To enable the Department to adequately review and comment on the proposed project from the standpoint of the protection of plants, fish and wildlife, we recommend the following information be included in the DEIR/S.

    a. The document should contain a complete discussion of the purpose and need for, and description of, the proposed project, including all staging areas and access routes to the construction and staging areas.

  b. A range of feasible alternatives should be included to ensure that alternatives to the proposed project are fully considered and evaluated; the alternatives should avoid or otherwise minimize impacts to sensitive biological resources. Specific alternative locations should be evaluated in areas with lower resource sensitivity where appropriate.

5. The document should provide a complete assessment of the flora and fauna within and adjacent to the project area, with particular emphasis upon identifying endangered, threatened, sensitive, and locally unique species and sensitive habitats. This should include a complete floral and faunal species compendium of the entire project site, undertaken at the appropriate time of year. The DEIR/S should include the following information.

   a. CEQA Guidelines, §15125(c), direct that knowledge of the regional setting is critical to an assessment of environmental impacts, and that special emphasis should be placed on resources that are rare or unique to the region.

   b. A thorough assessment of rare plants and rare natural communities, following the Department's Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (see: http://www.dfg.ca.gov/habcon/plant/, hard copy available on request).

   c. A current inventory of the biological resources associated with each habitat type on site and within the area of potential effect. The Department's California Natural Diversity Data Base in Sacramento should be contacted at (916) 322-2493 or www.dfg.ca.gov/biogeodata/ to obtain current information on any previously reported sensitive species and habitat, including Significant Natural Areas identified under Chapter 12 of the Fish and Game Code.

   d. An inventory of rare, threatened, and endangered, and other sensitive species on site and within the area of potential effect. Species to be addressed should include all those which meet the CEQA definition (see CEQA Guidelines, Section 15380). This should include sensitive fish, wildlife, reptile, and amphibian species. Seasonal variations in use of the project area should also be addressed. Focused species-specific surveys, conducted at the appropriate time of year and time of day when the sensitive species are active or otherwise identifiable, are required. Acceptable species-specific survey procedures should be developed in consultation with the Department and the U.S. Fish and Wildlife Service.

6. The DEIR/S should provide a thorough discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts. This discussion should focus on maximizing avoidance, and minimizing impacts.

a. A discussion of impacts associated with increased lighting, noise, human activity, changes in drainage patterns, changes in water volume, velocity, and quality, soil erosion, and /or sedimentation in streams and water courses on or near the project site, with mitigation measures proposed to alleviate such impacts should be included.

b. Project impacts should be analyzed relative to their indirect impacts on biological resources, including resources in nearby public lands, open space, adjacent natural habitats, riparian ecosystems, and any designated and/or proposed or existing reserve lands (e.g., preserve lands associated with a NCCP). Impacts on, and maintenance of, wildlife corridor/movement areas, including access to undisturbed habitats in adjacent areas, should be fully evaluated.

c. A discussion of potential adverse impacts from lighting, noise, human activity (including the establishment or designation of trail uses), exotic species, and drainage. The latter subject should address: project-related changes on drainage patterns on and downstream of the project site; the volume, velocity, and frequency of existing and post-project surface flows; polluted runoff; soil erosion and/or sedimentation in streams and water bodies; and post-project fate of runoff from the project site. The discussions should also address the proximity of the extraction activities to the water table, whether dewatering would be necessary, and the potential resulting impacts on the habitat, if any, supported by the groundwater.

d. The zoning of areas for development projects or other uses that are nearby or adjacent to natural areas may inadvertently contribute to wildlife-human interactions. A discussion of possible conflicts and mitigation measures to reduce these conflicts should be included in the environmental document.

e. A cumulative effects analysis should be developed as described under CEQA Guidelines, §15130. General and specific plans, as well as past, present, and anticipated future projects, should be analyzed relative to their impacts on similar plant communities and wildlife habitats.

MITIGATION AND MINIMIZATION MEASURES

1. In order to avoid impacts to nesting birds, the DEIR/S should require that clearing of vegetation, or construction activities which significantly affect bird behavior, occur outside of the peak avian breeding season which generally runs from March 1 through September 1 (as early as January for some raptors). If project construction is necessary during the bird breeding season, a qualified biologist should conduct a survey for nesting birds, within three days prior to the work in the area, and ensure no nesting birds in the project area would be impacted by the project. If an active nest is identified, a buffer shall be established between the construction activities and the nest so that nesting activities are not interrupted. The buffer shall be a minimum width of 300 feet (500 feet for raptors), shall be delineated by temporary fencing, and shall remain in effect as long as construction

is occurring or until the nest is no longer active. No project construction shall occur within the fenced nest zone until the young have fledged, are no longer being fed by the parents, have left the nest, and will no longer be impacted by the project.

2. The DEIR/S should include mitigation measures for adverse project-related impacts to sensitive plants, animals, and habitats. Mitigation measures should emphasize avoidance and reduction of project impacts. For unavoidable impacts, on-site habitat restoration or enhancement should be discussed in detail. If on-site mitigation is not feasible or would not be biologically viable and therefore not adequately mitigate the loss of biological functions and values, off-site mitigation through habitat creation and/or acquisition and preservation in perpetuity should be addressed.

3. For proposed preservation and/or restoration, the DEIR/S should include measures to perpetually protect the targeted habitat values from direct and indirect negative impacts. The objective should be to offset the project-induced qualitative and quantitative losses of wildlife habitat values. Issues that should be addressed include restrictions on access, proposed land dedications, monitoring and management programs, control of illegal dumping, water pollution, increased human intrusion, etc.

4. The Department generally does not support the use of relocation, salvage, and/or transplantation as mitigation for impacts to rare, threatened, or endangered species. Studies have shown that these efforts are experimental in nature and largely unsuccessful.

5. Plans for restoration and re-vegetation should be prepared by persons with expertise in southern California ecosystems and native plant re-vegetation techniques. Each plan should include, at a minimum: (a) the location of the mitigation site; (b) the plant species to be used, container sizes, and seeding rates; (c) a schematic depicting the mitigation area; (d) planting schedule; (e) a description of the irrigation methodology; (f) measures to control exotic vegetation on site; (g) specific success criteria; (h) a detailed monitoring program; (i) contingency measures should the success criteria not be met; and (j) identification of the party responsible for meeting the success criteria and providing for conservation of the mitigation site in perpetuity.

We appreciate the opportunity to comment on the referenced NOP. Questions regarding this letter and further coordination on these issues should be directed to Tim Dillingham at (858) 467-4250 or TDilling@dfg.ca.gov.

Sincerely,

Stephen M. Juarez
Environmental Program Manager
South Coast Region

Attachment

cc: State Clearinghouse, Sacramento

ec: Tim Dillingham, tdilling@dfg.ca.gov
Doug Gibson, San Elijo Lagoon Conservancy, dgibson@selrp.org
Mike Porter, RWQCB, mporter@waterboards.ca.gov
Sally Brown, FWS, sally_brown@fws.us.gov

Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities

State of California
CALIFORNIA NATURAL RESOURCES AGENCY
Department of Fish and Game
November 24, 2009[1]

INTRODUCTION AND PURPOSE

The conservation of special status native plants and their habitats, as well as natural communities, is integral to maintaining biological diversity. The purpose of these protocols is to facilitate a consistent and systematic approach to the survey and assessment of special status native plants and natural communities so that reliable information is produced and the potential of locating a special status plant species or natural community is maximized. They may also help those who prepare and review environmental documents determine when a botanical survey is needed, how field surveys may be conducted, what information to include in a survey report, and what qualifications to consider for surveyors. The protocols may help avoid delays caused when inadequate biological information is provided during the environmental review process; assist lead, trustee and responsible reviewing agencies to make an informed decision regarding the direct, indirect, and cumulative effects of a proposed development, activity, or action on special status native plants and natural communities; meet California Environmental Quality Act (CEQA)[2] requirements for adequate disclosure of potential impacts; and conserve public trust resources.

DEPARTMENT OF FISH AND GAME TRUSTEE AND RESPONSIBLE AGENCY MISSION

The mission of the Department of Fish and Game (DFG) is to manage California's diverse wildlife and native plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. DFG has jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations (Fish and Game Code §1802). DFG, as trustee agency under CEQA §15386, provides expertise in reviewing and commenting on environmental documents and makes protocols regarding potential negative impacts to those resources held in trust for the people of California.

Certain species are in danger of extinction because their habitats have been severely reduced in acreage, are threatened with destruction or adverse modification, or because of a combination of these and other factors. The California Endangered Species Act (CESA) provides additional protections for such species, including take prohibitions (Fish and Game Code §2050 *et seq.*). As a responsible agency, DFG has the authority to issue permits for the take of species listed under CESA if the take is incidental to an otherwise lawful activity; DFG has determined that the impacts of the take have been minimized and fully mitigated; and, the take would not jeopardize the continued existence of the species (Fish and Game Code §2081). Surveys are one of the preliminary steps to detect a listed or special status plant species or natural community that may be impacted significantly by a project.

DEFINITIONS

Botanical surveys provide information used to determine the potential environmental effects of proposed projects on all special status plants and natural communities as required by law (i.e., CEQA, CESA, and Federal Endangered Species Act (ESA)). Some key terms in this document appear in **bold font** for assistance in use of the document.

For the purposes of this document, **special status plants** include all plant species that meet one or more of the following criteria[3]:

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[1] This document replaces the DFG document entitled "Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities."

[2] http://ceres.ca.gov/ceqa/

[3] Adapted from the East Alameda County Conservation Strategy available at http://www.fws.gov/sacramento/EACCS/Documents/080228_Species_Evaluation_EACCS.pdf

- Listed or proposed for listing as threatened or endangered under ESA or candidates for possible future listing as threatened or endangered under the ESA (50 CFR §17.12).

- Listed[4] or candidates for listing by the State of California as threatened or endangered under CESA (Fish and Game Code §2050 *et seq.*). A species, subspecies, or variety of plant is **endangered** when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (Fish and Game Code §2062). A plant is **threatened** when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish and Game Code §2067).

- Listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 *et seq*.). A plant is **rare** when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901).

- Meet the definition of rare or endangered under CEQA §15380(b) and (d). Species that may meet the definition of rare or endangered include the following:

    - Species considered by the California Native Plant Society (CNPS) to be “rare, threatened or endangered in California” (Lists 1A, 1B and 2);

    - Species that may warrant consideration on the basis of local significance or recent biological information[5];

    - Some species included on the California Natural Diversity Database’s (CNDDB) *Special Plants, Bryophytes, and Lichens List* (California Department of Fish and Game 2008)[6].

- Considered a **locally significant species,** that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.

Special status natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special status species or their habitat. The most current version of the Department’s *List of California Terrestrial Natural Communities*[7] indicates which natural communities are of special status given the current state of the California classification.

Most types of wetlands and riparian communities are considered special status natural communities due to their limited distribution in California. These natural communities often contain special status plants such as those described above. These protocols may be used in conjunction with protocols formulated by other agencies, for example, those developed by the U.S. Army Corps of Engineers to delineate jurisdictional wetlands[8] or by the U.S. Fish and Wildlife Service to survey for the presence of special status plants[9].

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[4] Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

[5] In general, CNPS List 3 plants (plants about which more information is needed) and List 4 plants (plants of limited distribution) may not warrant consideration under CEQA §15380. These plants may be included on special status plant lists such as those developed by counties where they would be addressed under CEQA §15380. List 3 plants may be analyzed under CEQA §15380 if sufficient information is available to assess potential impacts to such plants. Factors such as regional rarity vs. statewide rarity should be considered in determining whether cumulative impacts to a List 4 plant are significant even if individual project impacts are not. List 3 and 4 plants are also included in the California Natural Diversity Database’s (CNDDB) *Special Plants, Bryophytes, and Lichens List.* [Refer to the current online published list available at: http://www.dfg.ca.gov/biogeodata.] Data on Lists 3 and 4 plants should be submitted to CNDDB. Such data aids in determining or revising priority ranking.

[6] Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

[7] http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf. The rare natural communities are asterisked on this list.

[8] http://www.wetlands.com/regs/tlpge02e.htm

[9] U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

BOTANICAL SURVEYS

Conduct botanical surveys prior to the commencement of any activities that may modify vegetation, such as clearing, mowing, or ground-breaking activities. It is appropriate to conduct a botanical field survey when:

- Natural (or naturalized) vegetation occurs on the site, and it is unknown if special status plant species or natural communities occur on the site, and the project has the potential for direct or indirect effects on vegetation; or
- Special status plants or natural communities have historically been identified on the project site; or
- Special status plants or natural communities occur on sites with similar physical and biological properties as the project site.

SURVEY OBJECTIVES

Conduct field surveys in a manner which maximizes the likelihood of locating special status plant species or special status natural communities that may be present. Surveys should be **floristic in nature**, meaning that every plant taxon that occurs on site is identified to the taxonomic level necessary to determine rarity and listing status. "Focused surveys" that are limited to habitats known to support special status species or are restricted to lists of likely potential species are not considered floristic in nature and are not adequate to identify all plant taxa on site to the level necessary to determine rarity and listing status. Include a list of plants and natural communities detected on the site for each botanical survey conducted. More than one field visit may be necessary to adequately capture the floristic diversity of a site. An indication of the prevalence (estimated total numbers, percent cover, density, etc.) of the species and communities on the site is also useful to assess the significance of a particular population.

SURVEY PREPARATION

Before field surveys are conducted, compile relevant botanical information in the general project area to provide a regional context for the investigators. Consult the CNDDB[10] and BIOS[11] for known occurrences of special status plants and natural communities in the project area prior to field surveys. Generally, identify vegetation and habitat types potentially occurring in the project area based on biological and physical properties of the site and surrounding ecoregion[12], unless a larger assessment area is appropriate. Then, develop a list of special status plants with the potential to occur within these vegetation types. This list can serve as a tool for the investigators and facilitate the use of reference sites; however, special status plants on site might not be limited to those on the list. Field surveys and subsequent reporting should be comprehensive and floristic in nature and not restricted to or focused only on this list. Include in the survey report the list of potential special status species and natural communities, and the list of references used to compile the background botanical information for the site.

SURVEY EXTENT

Surveys should be comprehensive over the entire site, including areas that will be directly or indirectly impacted by the project. Adjoining properties should also be surveyed where direct or indirect project effects, such as those from fuel modification or herbicide application, could potentially extend offsite. Pre-project surveys restricted to known CNDDB rare plant locations may not identify all special status plants and communities present and do not provide a sufficient level of information to determine potential impacts.

FIELD SURVEY METHOD

Conduct surveys using **systematic field techniques** in all habitats of the site to ensure thorough coverage of potential impact areas. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity, which determines the distance at which plants can be identified. Conduct surveys by walking over the entire site to ensure thorough coverage, noting all plant taxa

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[10] Available at http://www.dfg.ca.gov/biogeodata/cnddb

[11] http://www.bios.dfg.ca.gov/

[12] Ecological Subregions of California, available at http://www.fs.fed.us/r5/projects/ecoregions/toc.htm

observed. The level of effort should be sufficient to provide comprehensive reporting. For example, one person-hour per eight acres per survey date is needed for a comprehensive field survey in grassland with medium diversity and moderate terrain[13], with additional time allocated for species identification.

TIMING AND NUMBER OF VISITS

Conduct surveys in the field at the time of year when species are both evident and identifiable. Usually this is during flowering or fruiting. Space visits throughout the growing season to accurately determine what plants exist on site. Many times this may involve multiple visits to the same site (e.g. in early, mid, and late-season for flowering plants) to capture the floristic diversity at a level necessary to determine if special status plants are present[14]. The timing and number of visits are determined by geographic location, the natural communities present, and the weather patterns of the year(s) in which the surveys are conducted.

REFERENCE SITES

When special status plants are known to occur in the type(s) of habitat present in the project area, observe reference sites (nearby accessible occurrences of the plants) to determine whether those species are identifiable at the time of the survey and to obtain a visual image of the target species, associated habitat, and associated natural community.

USE OF EXISTING SURVEYS

For some sites, floristic inventories or special status plant surveys may already exist. Additional surveys may be necessary for the following reasons:

- Surveys are not current[15]; or
- Surveys were conducted in natural systems that commonly experience year to year fluctuations such as periods of drought or flooding (e.g. vernal pool habitats or riverine systems); or
- Surveys are not comprehensive in nature; or fire history, land use, physical conditions of the site, or climatic conditions have changed since the last survey was conducted[16]; or
- Surveys were conducted in natural systems where special status plants may not be observed if an annual above ground phase is not visible (e.g. flowers from a bulb); or
- Changes in vegetation or species distribution may have occurred since the last survey was conducted, due to habitat alteration, fluctuations in species abundance and/or seed bank dynamics.

NEGATIVE SURVEYS

Adverse conditions may prevent investigators from determining the presence of, or accurately identifying, some species in potential habitat of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any given year. Discuss such conditions in the report.

The failure to locate a known special status plant occurrence during one field season does not constitute evidence that this plant occurrence no longer exists at this location, particularly if adverse conditions are present. For example, surveys over a number of years may be necessary if the species is an annual plant having a persistent, long-lived seed bank and is known not to germinate every year. Visits to the site in more

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[13] Adapted from U.S. Fish and Wildlife Service kit fox survey guidelines available at www.fws.gov/sacramento/es/documents/kitfox_no_protocol.pdf

[14] U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

[15] Habitats, such as grasslands or desert plant communities that have annual and short-lived perennial plants as major floristic components may require yearly surveys to accurately document baseline conditions for purposes of impact assessment. In forested areas, however, surveys at intervals of five years may adequately represent current conditions. For forested areas, refer to “Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations”, available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

[16] U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/botanicalinventories.pdf

than one year increase the likelihood of detection of a special status plant especially if conditions change. To further substantiate negative findings for a known occurrence, a visit to a nearby reference site may ensure that the timing of the survey was appropriate.

REPORTING AND DATA COLLECTION

Adequate information about special status plants and natural communities present in a project area will enable reviewing agencies and the public to effectively assess potential impacts to special status plants or natural communities[17] and will guide the development of minimization and mitigation measures. The next section describes necessary information to assess impacts. For comprehensive, systematic surveys where no special status species or natural communities were found, reporting and data collection responsibilities for investigators remain as described below, excluding specific occurrence information.

SPECIAL STATUS PLANT OR NATURAL COMMUNITY OBSERVATIONS

Record the following information for locations of each special status plant or natural community detected during a field survey of a project site.

- A detailed map (1:24,000 or larger) showing locations and boundaries of each special status species occurrence or natural community found as related to the proposed project. Mark occurrences and boundaries as accurately as possible. Locations documented by use of global positioning system (GPS) coordinates must include the datum[18] in which they were collected;
- The site-specific characteristics of occurrences, such as associated species, habitat and microhabitat, structure of vegetation, topographic features, soil type, texture, and soil parent material. If the species is associated with a wetland, provide a description of the direction of flow and integrity of surface or subsurface hydrology and adjacent off-site hydrological influences as appropriate;
- The number of individuals in each special status plant population as counted (if population is small) or estimated (if population is large);
- If applicable, information about the percentage of individuals in each life stage such as seedlings vs. reproductive individuals;
- The number of individuals of the species per unit area, identifying areas of relatively high, medium and low density of the species over the project site; and
- Digital images of the target species and representative habitats to support information and descriptions.

FIELD SURVEY FORMS

When a special status plant or natural community is located, complete and submit to the CNDDB a California Native Species (or Community) Field Survey Form[19] or equivalent written report, accompanied by a copy of the relevant portion of a 7.5 minute topographic map with the occurrence mapped. Present locations documented by use of GPS coordinates in map and digital form. Data submitted in digital form must include the datum[20] in which it was collected. If a potentially undescribed special status natural community is found on the site, document it with a Rapid Assessment or Relevé form[21] and submit it with the CNDDB form.

VOUCHER COLLECTION

Voucher specimens provide verifiable documentation of species presence and identification as well as a public record of conditions. This information is vital to all conservation efforts. Collection of voucher specimens should

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[17] Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata. For Timber Harvest Plans (THPs) please refer to the “Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations”, available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

[18] NAD83, NAD27 or WGS84

[19] http://www.dfg.ca.gov/biogeodata

[20] NAD83, NAD27 or WGS84

[21] http://www.dfg.ca.gov/biogeodata/vegcamp/veg_publications_protocols.asp

be conducted in a manner that is consistent with conservation ethics, and is in accordance with applicable state and federal permit requirements (e.g. incidental take permit, scientific collection permit). Voucher collections of special status species (or suspected special status species) should be made only when such actions would not jeopardize the continued existence of the population or species.

Deposit voucher specimens with an indexed regional herbarium[22] no later than 60 days after the collections have been made. Digital imagery can be used to supplement plant identification and document habitat. Record all relevant permittee names and permit numbers on specimen labels. A collecting permit is required prior to the collection of State-listed plant species[23].

BOTANICAL SURVEY REPORTS

Include reports of botanical field surveys containing the following information with project environmental documents:

- **Project and site description**
  - A description of the proposed project;
  - A detailed map of the project location and study area that identifies topographic and landscape features and includes a north arrow and bar scale; and,
  - A written description of the biological setting, including vegetation[24] and structure of the vegetation; geological and hydrological characteristics; and land use or management history.
- **Detailed description of survey methodology and results**
  - Dates of field surveys (indicating which areas were surveyed on which dates), name of field investigator(s), and total person-hours spent on field surveys;
  - A discussion of how the timing of the surveys affects the comprehensiveness of the survey;
  - A list of potential special status species or natural communities;
  - A description of the area surveyed relative to the project area;
  - References cited, persons contacted, and herbaria visited;
  - Description of reference site(s), if visited, and phenological development of special status plant(s);
  - A list of all taxa occurring on the project site. Identify plants to the taxonomic level necessary to determine whether or not they are a special status species;
  - Any use of existing surveys and a discussion of applicability to this project;
  - A discussion of the potential for a false negative survey;
  - Provide detailed data and maps for all special plants detected. Information specified above under the headings “Special Status Plant or Natural Community Observations,” and “Field Survey Forms,” should be provided for locations of each special status plant detected;
  - Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms should be sent to the CNDDB and included in the environmental document as an Appendix. It is not necessary to submit entire environmental documents to the CNDDB; and,
  - The location of voucher specimens, if collected.

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[22] For a complete list of indexed herbaria, see: Holmgren, P., N. Holmgren and L. Barnett. 1990. Index Herbariorum, Part 1: Herbaria of the World. New York Botanic Garden, Bronx, New York. 693 pp. Or: http://www.nybg.org/bsci/ih/ih.html

[23] Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

[24] A vegetation map that uses the National Vegetation Classification System (http://biology.usgs.gov/npsveg/nvcs.html), for example *A Manual of California Vegetation*, and highlights any special status natural communities. If another vegetation classification system is used, the report should reference the system, provide the reason for its use, and provide a crosswalk to the National Vegetation Classification System.

- **Assessment of potential impacts**
    - A discussion of the significance of special status plant populations in the project area considering nearby populations and total species distribution;
    - A discussion of the significance of special status natural communities in the project area considering nearby occurrences and natural community distribution;
    - A discussion of direct, indirect, and cumulative impacts to the plants and natural communities;
    - A discussion of threats, including those from invasive species, to the plants and natural communities;
    - A discussion of the degree of impact, if any, of the proposed project on unoccupied, potential habitat of the species;
    - A discussion of the immediacy of potential impacts; and,
    - Recommended measures to avoid, minimize, or mitigate impacts.

QUALIFICATIONS

Botanical consultants should possess the following qualifications:

- Knowledge of plant taxonomy and natural community ecology;
- Familiarity with the plants of the area, including special status species;
- Familiarity with natural communities of the area, including special status natural communities;
- Experience conducting floristic field surveys or experience with floristic surveys conducted under the direction of an experienced surveyor;
- Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
- Experience with analyzing impacts of development on native plant species and natural communities.

SUGGESTED REFERENCES

Barbour, M., T. Keeler-Wolf, and A. A. Schoenherr (eds.). 2007. Terrestrial vegetation of California (3rd Edition). University of California Press.

Bonham, C.D. 1988. Measurements for terrestrial vegetation. John Wiley and Sons, Inc., New York, NY.

California Native Plant Society. Most recent version. Inventory of rare and endangered plants (online edition). California Native Plant Society, Sacramento, CA. Online URL http://www.cnps.org/inventory.

California Natural Diversity Database. Most recent version. Special vascular plants, bryophytes and lichens list. Updated quarterly. Available at www.dfg.ca.gov.

Elzinga, C.L., D.W. Salzer, and J. Willoughby. 1998. Measuring and monitoring plant populations. BLM Technical Reference 1730-1. U.S. Dept. of the Interior, Bureau of Land Management, Denver, Colorado.

Leppig, G. and J.W. White. 2006. Conservation of peripheral plant populations in California. Madroño 53:264-274.

Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley and Sons, Inc., New York, NY.

U.S. Fish and Wildlife Service. 1996. Guidelines for conducting and reporting botanical inventories for federally listed plants on the Santa Rosa Plain. Sacramento, CA.

U.S. Fish and Wildlife Service. 1996. Guidelines for conducting and reporting botanical inventories for federally listed, proposed and candidate plants. Sacramento, CA.

Van der Maarel, E. 2005. Vegetation Ecology. Blackwell Science Ltd., Malden, MA.

State of California • Natural Resources Agency
Edmund G. Brown Jr., *Governor*
DEPARTMENT OF PARKS AND RECREATION
Ruth Coleman, *Director*

December 15, 2011

Ms. Megan Hamilton
County of San Diego Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego, CA 92123
megan.hamilton@sdcounty.ca.gov

RE: San Elijo Lagoon Restoration Project Notice of Preparation

Dear Ms. Hamilton,

Thank you for allowing California State Parks (CSP) the opportunity to comment on the San Elijo Lagoon Restoration Project Notice of Preparation (NOP). In general we support the aims and goals of the Project, but are concerned that some of the Project features may affect some of the recreational uses and access within San Elijo State Beach and Cardiff State Beach. We encourage careful consideration of some of the Project features, for example, changes to the location and/or dynamics of the lagoon mouth and the effects of these changes with respect to erosion at San Elijo State Beach campgrounds, access to Cardiff State Beach, and potential effects to public safety and aquatic recreational uses. It is crucial that these potential effects are thoroughly investigated in the Environmental Impact Report.

Please feel free to contact me or Environmental Scientist, Darren Smith (darren@parks.ca.gov or 619-952-3895) for questions regarding our concerns or if you need any other information or assistance.

Sincerely,

Brian Ketterer, North Sector Superintendent

Cc

Clay Phillips, Acting San Diego Coast District Superintendent
William Mennell, District Services Manager
Darren Scott Smith, Natural Resources Program Manager, SD Coast District
Reading File

STATE OF CALIFORNIA Edmund G. Brown, Jr., *Governor*

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
ds_nahc@pacbell.net

November 17, 2011

Ms. Megan Hamilton, Planner
San Diego County Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego, CA 92123

Re: SCH#2011111013 CEQA Notice of Preparation (NOP); draft Environmental Impact Report (DEIR) for the **"San Elijo Lagoon Restoration Project (SEIRP) Project;"** located near the cities of Encinitas and Solana Beach; San Diego County, California

Dear Ms. Hamilton:

The Native American Heritage Commission (NAHC), the State of California 'Trustee Agency' for the protection and preservation of Native American cultural resources pursuant to California Public Resources Code §21070 and affirmed by the Third Appellate Court in the case of EPIC v. Johnson (1985: 170 Cal App. 3rd 604). The court held that the NAHC has jurisdiction and special expertise, as a state agency, over affected Native American resources, impacted by proposed projects including archaeological, places of religious significance to Native Americans and burial sites. The NAHC wishes to comment on the proposed project.

Sacred Lands Inventory are confidential and exempt from the Public Records Act pursuant to California Government Code §6254 (r).

Early consultation with Native American tribes in your area is the best way to avoid unanticipated discoveries of cultural resources or burial sites once a project is underway. Culturally affiliated tribes and individuals may have knowledge of the religious and cultural significance of the historic properties in the project area (e.g. APE). We strongly urge that you make contact with the list of Native American Contacts on the list of Native American contacts, to see if your proposed project might impact Native American cultural resources and to obtain their recommendations concerning the proposed project. Special reference is made to the *Tribal Consultation* requirements of the California 2006 Senate Bill 1059: enabling legislation to the federal Energy Policy Act of 2005 (P.L. 109-58), mandates consultation with Native American tribes (both federally recognized and non federally recognized) where electrically transmission lines are proposed. This is codified in the California Public Resources Code, Chapter 4.3 and §25330 to Division 15.

Furthermore, pursuant to CA Public Resources Code § 5097.95, the NAHC requests that the Native American consulting parties be provided pertinent project information. Consultation with Native American communities is also a matter of environmental justice as defined by California Government Code §65040.12(e). Pursuant to CA Public Resources Code §5097.95, the NAHC requests that pertinent project information be provided consulting tribal parties. The NAHC recommends *avoidance* as defined by CEQA Guidelines §15370(a) to pursuing a project that would damage or destroy Native American cultural resources and Section 2183.2 that requires documentation, data recovery of cultural resources.

Native American consulting parties, on the NAHC

To be effective, consultation on specific projects must be the result of an ongoing relationship between Native American tribes and lead agencies, project proponents and their contractors, in the opinion of the NAHC. Regarding tribal consultation, a relationship built around regular meetings and informal involvement with local tribes will lead to more qualitative consultation tribal input on specific projects.

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton
Program Analyst

Cc: State Clearinghouse

Attachment: Native American Contact List

California Native American Contacts
San Diego County
November 17, 2011

Manzanita Band of the Kumeyaay Nation
Leroy J. Elliott, Chairperson
P.O. Box 1302 Diegueno/Kumeyaay
Boulevard , CA 91905
(619) 766-4930
(619) 766-4957 - FAX

Kumeyaay Diegueno Land Conservancy
M. Louis Guassac
P.O. Box 1992 Diegueno/Kumeyaay
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November 17, 2011

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City of
Encinitas

December 18, 2011

Ms. Megan Hamilton
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5500 Overland Avenue, Suite 410
San Diego, CA 92123

Ms. Michelle Lee Mattson
U.S. Army Corps of Engineers
Los Angeles District, Regulatory Division
6010 Hidden Valley Road, Suite 105
Carlsbad, CA 92011

RE: Notice of Preparation / Notice of Intent to prepare an EIR/EIS for the San Elijo Lagoon Restoration Project

Dear Ms. Hamilton and Ms. Mattson:

The City of Encinitas appreciates the opportunity to comment on the Notice of Preparation (NOP) for the Environmental Impact Report for the San Elijo Lagoon Restoration Project. On behalf of the City of Encinitas and its residents, the City is submitting the following comments for review and consideration in the preparation of the draft EIR/EIS for the San Elijo Lagoon Restoration Project.

City of Encinitas Responsibilities

The City of Encinitas supports the efforts of the applicant to restore the functions of the lagoon while at the same time the City is committed to protecting the existing infrastructure, reducing the flooding and maintaining the integrity of the interior shoreline for the restaurants, homes and roadways along Coast Hwy 101 and Manchester Avenue. The California Coastal Commission will be the primary authority during the permitting process due to jurisdictional boundaries in wetlands although the City of Encinitas is considered a CEQA Responsible Agency.

Sea Level Rise Report

During the initial study phase of the project the sea level rise analysis was only completed for the internal sections of the San Elijo Lagoon. The City of Encinitas respectfully requests the project team evaluate the Sea Level Rise along the shoreline and Coast Hwy 101 then determine how this will impact the Coast Highway, State Parks and the existing Bridge inlet. The existing Coast Hwy has already experienced coastal erosion to the point of undermining the bike lane along Hwy 101. The USACE Shoreline Project for Solana Beach and Encinitas has evaluated three Sea Level Rise curves required for Federal projects. This project should be required to examine wave run-up and tsunami inundation and damage analysis due to different wave energy scenarios for each alternative.

FEMA Responsibilities & Hydrology Report

The City of Encinitas implements the Flood Insurance Rate Maps (FIRMS) for FEMA. According to the rules and regulations, a hydrologic and hydraulic analysis must be performed prior to the start of development, and must demonstrate that the development would not cause any rise in base flood levels. No rise is permitted within regulatory floodways. The proposed dredging in the San Elijo Lagoon will impact the flood boundaries. A hydrology study shall be submitted to the City for review and process with FEMA. The study shall include a detail HEC-RAS analysis modeling the upstream and downstream flood water elevations.

Existing Highway 101 Bridge

The Highway 101 Bridge over the San Elijo Lagoon is located about 0.2 Miles south of Chesterfield Drive on South Coast Highway 101 in the City of Encinitas. The structure was originally built in 1934 and was subsequently widened on the western side in 1953. In each direction the bridge carries a bike lane (2 total) and two lanes of traffic (4 total) separated by a striped median and narrow sidewalks located on each side of the bridge. The posted speed limit is 45 mph. A summary of the bridge description is shown below:

San Elijo Lagoon Bridge (No. 57C-210)

	Original Bridge	Widening
Year Built	1934	1953
Length	182.5-ft	215.0-ft
Width	40-ft	31-ft
No. of Spans	4 spans (45-ft max span)	6 spans (45-ft max span)
Superstructure	Cast-in-place reinforced concrete slab	Cast-in-place reinforced concrete slab
Piers	14-inch square precast concrete pile extensions, total 13	16-inch diameter precast concrete pile extensions, total 6 min 9 max
Abutments	End diaphragm abutment founded on 14-in square precast concrete piles.	End diaphragm abutment founded on 16-in diameter precast concrete piles

The City of Encinitas has recently completed a Seismic Vulnerability Analysis (SVA) of the bridge. The SVA determined that the San Elijo Bridge is susceptible to collapse during the design seismic event, based on a combination of deficiencies due to the current condition of the bridge, liquefiable soils, and scour issues related to the level of the current channel due to dredging operations. The SVA recommended that a Seismic Retrofit Strategy be developed for the leading to a determination of whether to retrofit or replace the bridge.

The SVA described that in the early 1990's, many of the pile extensions on the original bridge had experienced major, if not complete, section loss of both concrete and reinforcing steel, and were no longer supporting any vertical loads from the structure. Repairs were made at a later date (sometime after 1993) to the pile extensions for the original bridge consisting of shotcrete pier walls that encapsulated the original pile extensions. However, due to the minimal reinforcing provided in the pile extensions taken with the complete or extreme reinforcing steel section loss, the pile extensions can essentially be considered an un-reinforced concrete member. This condition raises a great concern over the capability the structure to resist the cyclic loads that occur during both seismic and other lateral load effects.

The SVA determined through geotechnical investigations that the site is prone to ground rupture, ground shaking, ground settlement and flooding, and in particular that the upper 20' of the soil profile is subject to liquefaction that could result in loss of support and settlement of the structure.

Finally, it was determined in the SVA that the dredging currently performed at the San Elijo Lagoon on an annual basis leaves up to several feet of the pile extensions beneath the pier wall repairs exposed at Piers 3 and 4. This dredging combined with localized scour reduces the vertical load carrying capacity of the pile extensions, and increases the likelihood of structural failure due to axial buckling and out of plane loads.

It is understood that the proposed Alternatives 1A and 1B for the San Elijo Lagoon Restoration Project would increase the depth of dredging performed at the bridge. This proposed dredging will expose a greater length and reduce the lateral support of the existing pile extensions. Also the proposed dredging may uncover and contribute to additional section loss that the pile extensions that would require immediate repair.

Based on the results of the SVA it is the City's opinion that any increase in the depth of dredging in the lagoon, beyond which is currently performed at the bridge, will further decrease the lateral support and vertical load carrying capacity of the pile extensions and thereby increase the susceptibility of the existing San Elijo Lagoon Bridge to collapse.

Bridge Report

The proposed dredging will impact Coast Hwy 101 bridge abutment/piers, which could significantly impact the bridge stability. The need for reinforcement/replacement of the bridge shall be investigated and a report submitted to the City addressing the findings and recommendations.

Utilities Report

There are existing utilities in San Elijo Lagoon, therefore a study identifying all existing utilities should be submitted to the City explaining how the utilities are protected during and after project construction.

Grading Plan

If the dredged materials are to be placed in any areas under City of Encinitas jurisdiction, a grading permit will be required for such operation. The grading plan shall include an erosion and sediment control plan and program in compliance with the latest State Construction Permit.

Water Quality

Through potential hydrodynamic changes to the lagoon, it will be important to evaluate the impacts of the project on lagoon and coastal water quality. These assessments should be made in consideration of current conditions versus proposed conditions, currently identified and emergent (due to changing physical or hydrologic conditions) water quality pollutants of concern, as well as the larger watershed area contributions. Further, a complete analysis of the project should bring project outcomes in line with local water quality objectives, standards, and regulatory mandates.

General Plan Consistency

Demonstrate project consistency with local plans (General Plan, Bikeway Master Plan, Trails Master Plan, etc.) and proposed CIP project segments (bikeway plan). Identify any inconsistencies between the project and applicable general plans and regional plan.

Dredge Plan

The project description for the EIR should include a plan that provides details and requirements for ongoing dredging activities that would be conducted after the initial work is completed. The EIR should analyze the environmental effects associated with the ongoing activities.

Noise Report

The EIR should analyze the noise effects of heavy equipment operations on surrounding land uses during project implementation

The City of Encinitas welcomes the opportunity to restore the function of this important and highly valued coastal estuarine ecosystem. As a CEQA Responsible Agency, the City requests copies of all technical reports prepared for the project.

Sincerely,

Katherine Weldon

Katherine Weldon
Program Administrator

cc: Gus Vina, City Manager
Larry Watt, Director of Public Works
Doug Gibson, Executive Director San Elijo Lagoon Conservancy

CITY OF SOLANA BEACH
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December 6, 2011

Ms. Megan Hamilton
County of San Diego
Department of Parks and Recreation
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San Diego, CA. 92123

Ms. Michelle Lee Mattson
U.S. Army Corps of Engineers
Los Angeles District, Regulatory Division
6010 Hidden Valley Road, Suite 105
Carlsbad, CA 92011

Re: Notice of Preparation (NOP) / Notice of Intent (NOI) to prepare an EIR/EIS for the San Elijo Lagoon Restoration Project

Dear Ms. Hamilton and Ms. Mattson:

The City of Solana Beach (City) has reviewed the Notice of Preparation (NOP) and Notice of Intent (NOI) to prepare an Environmental Impact Report (EIR)/Environmental Impact Statement (EIS) for the San Elijo Lagoon Restoration Project (SELRP). The City appreciates the opportunity to provide comments on the NOP/NOI to the County of San Diego (County) and the U.S. Army Corps of Engineers (USACE) as the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) lead agencies, respectively. On behalf of the City of Solana Beach (City) and its residents, the City is submitting these comments for review and consideration in the preparation of the draft EIR/EIS for the San Elijo Lagoon Restoration Project.

City of Solana Beach is a CEQA Responsible Agency

The City supports the efforts of the San Elijo Lagoon Conservancy (Applicant) to restore the biological resources and enhance the ecological function of the coastal San Elijo Lagoon. Like other restored and functioning lagoons in the County, restoration of the tidal prism and maintaining an open coastal - lagoon inlet will support the greatest diversity of habitat. The City welcomes the effort to restore the function of this important and highly valued coastal estuarine ecosystem.

The City's northern boundary is formed by the San Elijo Lagoon. In addition, the City owns and operates the Solana Beach Sewer Pump Station and related waste water and storm water infrastructure and facilities in the northwestern portion of the City. The pump station and related facilities are located east of the North County Transit District (NCTD) railroad right-of-way and adjacent to the San Elijo Lagoon. These City facilities have been operated by the City since its incorporation in 1986, and were operated by the County prior to that. As such, the City is a key interested stakeholder as well as a Responsible Agency under the California Environmental Quality Act (CEQA).

The NOP/NOI states that the overall goals of the San Elijo Lagoon Restoration Project (SELRP or project) are to:

1. To protect, restore, and then maintain, via adaptive management, the San Elijo Lagoon ecosystem and adjacent uplands
2. To perpetuate native flora and fauna characteristics of southern California
3. To restore, then maintain estuarine and brackish marsh hydrology
4. To avoid and minimize impacts to recreational opportunities within and adjacent to the San Elijo Lagoon
5. To improve water quality

Assumptions and Timing of Related Public Infrastructure Projects

The NOP/NOI states that the project alternatives assume that the North County Transit District (NCTD) infrastructure improvements, the Interstate 5 (I-5) improvements proposed by the California Department of Transportation (Caltrans) and the U.S. Highway 101 improvements are assumed completed. However, the NOP/NOI does not identify either the timeframe for these transportation improvements or the completion of the SELRP. Through previous stakeholder meetings the Applicant has indicated that regulatory permit would be obtained in December 2013. Based on this information it is unlikely that the I-5, NCTD or Highway 101 infrastructure improvements would be in place.

Additionally, the NOP/NOI does not mention or describe the relationship of the SELRP and the I-5 widening project and its dependency on Transnet funding as provided through the San Diego Association of Governments (SANDAG). The relationship of the SELRP to these large transportation projects (both in terms of timing and engineering design) is important information and the assumptions that the Applicant and the CEQA and NEPA lead agencies are relying upon must be disclosed in the EIR/EIS. Additionally, these projects should be discussed under the cumulative impacts analysis contained in the EIR/EIS.

Enhancement and Protection of Biological and Recreational Resources

The EIR/EIS should also address the potential effects of the SELRP on the offshore biological resources such as: natural reefs, eel grass, marine life, etc.; as well as recreational resources such as: surfing, fishing, boating, etc. The area of potential affect should extend to the southern boundary of the City. Field observations, surveys and video and photographic monitoring currently underway by the project team for use in the EIR/EIS to determine the baseline condition should include the entirety of the City. The City would be happy to provide information on key natural and recreational resources in the City if interested.

USACE, Solana Beach & Encinitas 50-Year Shoreline Protection Project

Originally, the SELRP was an element of the USACE/Solana Beach & Encinitas 50-Year Shoreline Protection Project Feasibility Study originally authorized by Congress in 2000. The SELRP was bifurcated from the beach restoration project in 2005. The Cities of Solana Beach and Encinitas and the USACE are currently preparing a draft EIR/EIS for the long-term shoreline protection project expected to be released for public review and comment in 2012. Depending on the timing of the SELRP, the recovered material generated from the lagoon could be used on local beaches to supplement the volume that would otherwise have to be excavated from offshore borrow sites. This potential scenario should be addressed as an alternative in the EIR/EIS as the construction time frames could be synchronized.

Preliminary estimates of the potential volume of material that may be recovered from the SELRP are approximately 1 million cubic yards of sand. The City requests that if this material is determined to be beach compatible that as much of this material is placed down coast of the lagoon mouth on the City's beaches. The City would like to receive a copy of the "material placement study" that is currently underway when the report is complete. In addition, if an offshore mitigation reef is determined to be a necessary project component or a required regulatory permit condition, the City requests that the area offshore and down coast of the lagoon be considered for the possible siting of such a reef or structure.

Conclusion

The City welcomes the effort to restore the function of this important and highly valued coastal lagoon to achieve the greatest diversity of habitat. As a CEQA Responsible Agency, the City requests copies of all technical reports prepared for the project and would like to meet directly with you to discuss the City's interests and concerns. Please contact me at 858-720-2434 to schedule a meeting.

Sincerely,

David Ott
City Manager

CC: Doug Gibson, Executive Director San Elijo Lagoon Conservancy
Gus Vina, City Manager, City of Encinitas

SDGE
A Sempra Energy utility®

Thomas G. Acuna
Land Planning Supervisor
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December 16, 2011

County of San Diego
Department of Parks and Recreation
Attn: Megan Hamilton
55000 Overland Avenue, Suite 410
San Diego, CA 92123

RE: San Elijo Lagoon Restoration Project, CESPL-2009-00575-MLM

The purpose of this letter is to provide comment prior to the preparation of the draft EIS/EIR for the proposed San Elijo Lagoon Restoration Project (SELRP). Each of the proposed alternatives may have impacts to regional energy facilities owned and operated by San Diego Gas & Electric Company.

SDG&E Facilities Potentially Affected

To help illustrate the location of these facilities, we have attached a map showing their location. A brief description of each facility identified with corresponding color as keyed on the attached map is described below:

1) Orange line – Represents approximate location of existing underground high pressure gas transmission lines. One line shows the approximate location of a buried high pressure 12-inch high pressure gas transmission pipeline. It parallels an existing access road and lies beneath the San Elijo main channel bisecting the West and Central Basin. Another line shows the approximate location of a buried 30-inch high pressure gas transmission pipeline beneath the East Basin. This line parallels existing overhead electric transmission and distribution lines within easement.

2) Green line – Represents the approximate location of existing high voltage electric transmission lines. The lines are built on wood power poles and parallel the existing access road bisecting the West and Central Basin while other circuits are located on the East Basin built on wood power poles that parallel an existing buried 30-inch high pressure gas transmission pipeline within easement.

3) Yellow line- Represents approximate location of existing SDG&E easements.

4) Red line- Represents approximate location of existing overhead electric distribution lines. One line shows the approximate location of an overhead electric distribution line built on wood pole structures traversing across the lagoon and on an existing dirt access road bisecting the West and Central Basin. Another line shows the approximate location of an overhead electric distribution line built on wood pole structures as it traverses across the East Basin and parallels the existing SDG&E electric distribution lines and existing SoCalGas buried high pressure gas line.

5) Dashed Red Line – Represents approximate location of existing buried electric distribution lines. One line shows the approximate location of an existing buried electric distribution line as it lies across the Coastal Area.

Key Concerns & Recommend Assessment

1) Changes in tidal flushing or enhancements may cause structural integrity issues to SDG&E facilities. Engineering evaluation should be conducted to identify issues and protection measures.

2) Closure, alterations or changes in existing access roads, work pads, and other supporting right-of-way features need to be evaluated and discussed with SDG&E prior to being adopted as an alternative. All relocation requirements will also need to be permitted and mitigated by the project proponent.

3) Relocation or modification of any electric transmission facility will need to be thoroughly discussed in the environmental document in order to receive exemption from CPUC permit requirements. Failure to do so may result in the CPUC requiring individual permits and amendment of the SELRP EIR/EIS.

SDG&E Coordination

Prior to scoping proposed alternatives, we recommend that a kick-off meeting be held with Jefferey Sykes, SDG&E Right of Way Supervisor. He can provide all as-built drawings showing exact SDG&E facility locations and can coordinate the attendance of key SDG&E stakeholders affected by the SELRP. He can be reached at (858)-654-1235. In the meantime, should you have any questions, please do not hesitate to contact me.

Sincerely,

Thomas G. Acuna

Thomas G. Acuna
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Cc: U.S. Army Corps of Engineers
Los Angeles District, Regulatory Division
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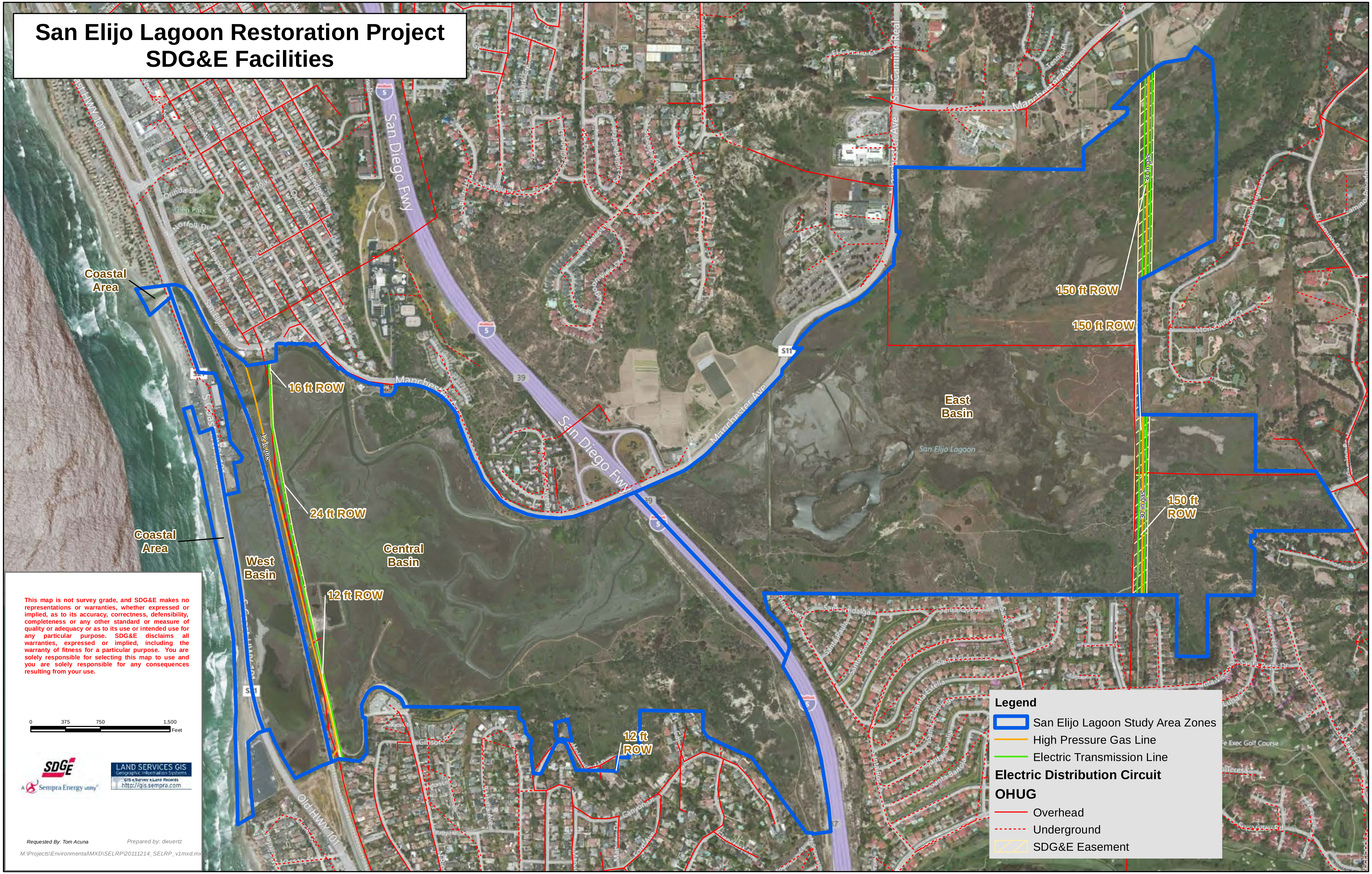
San Elijo Lagoon Restoration Project
SDG&E Facilities



Legend

🟦 San Elijo Lagoon Study Area Zones

High Pressure Gas Line

Electric Transmission Line

Electric Distribution Circuit

OHUG

Overhead

Underground

▨ SDG&E Easement

0 375 750 1,500 Feet

SDGE
A Sempra Energy utility

LAND SERVICES GIS
Geographic Information Systems
GIS • Survey • Land Records
http://gis.sempra.com

Requested By: Tom Acuna

Prepared by: dwuertz

M:\Projects\Environmental\MXD\SELRP\20111214_SELRP_v1mxd.mxd

Surfrider Foundation, San Diego County Chapter
P.O. Box 1511
Solana Beach, California 92075
Phone (858) 792-9940 Fax (858) 755-5627

December 18, 2011 ***Delivered via email***

Ms. Megan Hamilton
megan.hamilton@sdcounty.ca.gov
County of San Diego Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego CA 921232

RE: Comments regarding Notice of Preparation: San Elijo Lagoon Restoration Project

Dear Ms. Hamilton,

The Surfrider Foundation is a non-profit, environmental organization dedicated to the protection and enjoyment of the world's oceans, waves and beaches for all people, through a powerful activist network. The Surfrider Foundation has over 50,000 members and 80+ chapters in the United States. Please accept these comments on behalf of the San Diego Chapter of the Surfrider Foundation.

Surfrider San Diego has the following concerns regarding the proposed San Elijo Restoration Project: impacts to surfing, impacts to beach access, impacts from initial and ongoing sand placement and dredging, proper modeling and ongoing monitoring of impacts to surfing resources, visual impacts and implications of any structures used to maintain the inlet in alternative 2A. All of these concerns need to be addressed in the upcoming Environmental Impact Report (EIR)

We are greatly concerned with possible impacts to the surf resources in the vicinity of the proposed restoration project. Cardiff Reef is one of the most popular breaks in San Diego County; it has a long history of surf culture surrounding it, and because of its wide spread popularity it contributes significantly to the local economy. Any negative impacts to this surfing and tourism treasure must be avoided.

Furthermore, substantial monitoring and modeling needs to be conducted in the technical studies for this project to ensure that negative impacts to surfing resources can be avoided. For all of the alternatives being considered project proponents need to conduct modeling which includes all of these parameters: long-shore transport, cross-shore transport, impacts of tidal flow on long-shore and cross-shore transport, and modeling of breaking waves using at least these variables as inputs. In order to properly model the surf breaks, high-resolution bathymetry of the region is needed. Surfrider would like to see updates of bathymetry data (similar to the LIDAR surveys conducted by the US Army Corps of Engineers) before and during project design for use in the surf break model.

There are feasible modeling technologies based on the Boussinesq approximation, which can and should be used in the technical reports for this project. Funwave is an example of one of these modeling tools and Falk Feddersen at Scripps has his own version. Given the complexity of modeling in hydrodynamics of tidal action, this type of modeling for impacts is not beyond the scope of an EIR impact analysis. Further, the models must consider cross-shore, long-shore transport impacts along with tidal action in conjunction with such modeling. Quasi-static approximations of the individual variable contributions of all these factors are a feasible way to achieve adequate predictive models. Reliance on monitoring only is not adequate to predicting impact analysis. Calibration of the model to known conditions would also be useful.

The following questions must be answered in the EIR. If Alternatives 1A and 1B increase flow at Cardiff reef, how does that change the cross and/or long-shore profile? How would surf quality be impacted if the lagoon mouth were moved South of Las Olas restaurant? How might a lack of tidal action at the existing inlet and increased action at the new inlet impact surf – both the new and old dynamics are of concern. Surf monitoring should be continued post project for at least 5 years to ensure negative impacts do not gradually accumulate.

The impacts of any sand placed in the nearshore environment from dredging during construction must be thoroughly studied. Placing approximately one million cubic yards of sand in a dynamic nearshore environment will have huge impacts. Those impacts must be thoroughly studied and modeled, incorporating at least the parameters mentioned above. Sand quantities of even 1/10 that amount can impact sand transport and beach profiles which in turn may impact recreation. Excess sand may have other impacts as well, including negative impacts on habitat. These dynamic processes need to be studied and modeled so that any negative impacts to recreation or habitat can be avoided. Analysis of any ongoing or maintenance dredging and sand placement should be studied as well.

What type of material or hard structures will be used to maintain the new inlet in Alternative 2A? What kind of impact will this have on nearby surfing resources? The refraction caused by a structure, for example, could be a destructive or constructive interference to the wave front. These dynamics need to be studied and modeled to prevent negative impacts.

Additionally, how will changes associated with Alternative 2A affect access? Will beach-users still be able to walk from the restaurants to Seaside Reef? Will beach-users still be able to run and walk along this beautiful stretch of beach? Or will they have to leave the sand and cross the new inlet in Alternative 2A via Highway 101? How will access from the restaurants to Seaside Reef be affected during project construction and post construction?

What will the visual impacts of the three proposed alternatives be? Will raising Highway 101 to allow for alternative 2A disrupt the view corridor? What are the aesthetic impacts of the entire project?

The proposed lagoon restoration project is adjacent to a unique, beautiful and popular stretch of coastline. Any potential impacts to the area must be carefully studied to ensure that recreational resources are not jeopardized in an effort to restore biological resources. Will moving the lagoon inlet endanger surfing resources and access? The most up-to-date and comprehensive shoreline modeling and monitoring need to be utilized in this project to ensure that the rich surfing and beach culture of Encinitas California are not diminished in any way.

Thank you for your time and consideration.

Sincerely,

Julia Chunn-Heer
Campaign Coordinator
San Diego Chapter
Surfrider Foundation

Jim Jaffee and Tom Cook
Expert Advisors
San Diego Chapter
Surfrider Foundation

Comments to the San Elijo Lagoon Restoration Project Proposal

Submitted by Paul Henkart, phenkart@gmail.com, 918 Santa Hidalga, Solana Beach, CA 92075

13 December 2011

Ms. Megan Hamilton
County of San Diego Department of Parks and Recreation
5500 Overland Ave, Suite 410
San Diego CA 92123

The restoration of the San Elijo Lagoon Ecological Reserve (SELER) should and must include more than just the hydrology presented at the public meetings. The entire SELER must be considered. A project of this size will limit financing for other projects within SELER for the foreseeable future, thus all possible enhancements should be considered.

The hydrological proposal must consider and publically show ALL the side effects of increased tidal flow to SELER over the next 25 years. E.G. What hiking trails will become inundated. The proposal must also consider which trails will become impassable due to sea level rise.

The restoration proposal should address other sources contributing to poor water quality such as pet waste, agricultural runoff, and freeway runoff.

The proposal should address the possibility of odors caused by low tides.

If some of the affected property is not public (is the 15 acres of Conservancy land owned by the public?), what steps will be taken to ensure that public money is not used to benefit a private landholder? (Ensure that the Conservancy cannot sell their property for more money).

The removal of the dike in east basin is of major concern to many homeowners and SELER users. The dike is the only access to the center part of the lagoon and is used daily by numerous bird watchers and photographers. (Suggestion: replace the dike with a continuous boardwalk). Doesn't the dike increase the overall biodiversity of SELER by having both salt and fresh water habitat?

Over

The restoration should be performed in phases over many (10?) years in order to minimize the disturbance to the existing wildlife (what happens to the snails that the birds eat? What happens to the rodents and snakes? What happens to the Northern Harrier nesting area?).

What is the current human usage of SELER and how will that be affected? (birders vs dog walkers vs runners).

The proposal should consider the loss of wildlife habitat due to the increasing illegal use of the Solana Beach bluffs (several new trails up the side of the bluffs as well as increased graffiti, alcohol containers, campfires, and general bluff destruction).

The proposal should consider the loss of wildlife habitat due to unleashed dogs off-trail.

From: Hamilton, Megan [Megan.Hamilton@sdcounty.ca.gov]
Sent: Monday, December 19, 2011 9:48 AM
To: Kinkade, Cindy
Cc: michelle.l.mattson@usace.army.mil; Doug Gibson
Subject: FW: San Elijo Lagoon

Expires: Thursday, December 16, 2021 12:00 AM

Resident Comment

Megan Hamilton
Group Program Manager/Resource Management Division
County of San Diego Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego CA, 92123
(858) 966 1377

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From: kathyjaray@aol.com [mailto:kathyjaray@aol.com]
Sent: Wednesday, November 30, 2011 8:27 PM
To: Hamilton, Megan; Michelle.l.mattson@usace.army.mil
Subject: San Elijo Lagoon

Megan Hamilton
Michelle Mattson

My husband and I are residents of Olivenhain. We are both strongly in favor of any plan to preserve
and encourage the health and vitality of the lagoon. How we do this is not within our personal expertise so we will defer to the scientists who share our opinion. Our lagoons are treasures to be appreciated now and always. They make our coastal communities a wonderful place to live, work and visit.

Kathy Jaray
Doug Katz

Robert T. Patton
Consulting Biologist
4444 La Cuenta Dr.
San Diego, CA 92124
(858) 560-0923
rpatton@san.rr.com

Megan Hamilton
County of San Diego Department of Parks and Recreation
5500 Overland Ave., Suite 410
San Diego, CA 92123
megan.hamilton@sdcounty.ca.gov

Michelle Mattson
USACE
LA District, Regulatory Division
Carlsbad Field Office
6010 Hidden Valley Rd., Suite 105
Carlsbad, CA 92011
michelle.l.mattson@usace.army.mil

16 December 2011

Re: Comments on scoping for DEIS/EIR for the San Elijo Lagoon Restoration Project

Thank you for the opportunity to provide input on the preparation for the Draft Environmental Impact Statement/Environmental Impact Report for the San Elijo Lagoon Restoration Project. I have been involved in monitoring and management of the lagoon area's natural resources for 28 years as a consulting biologist under contract to multiple agencies on multiple projects, as County staff, as a Conservancy board member, and most recently as a volunteer coordinating the 10-year series of monthly bird counts.

Thank you also for the time, effort, and detail that have gone into preparation of the initial three proposed project alternatives. However, I was a bit alarmed that the schematics of the proposed alternatives presented at the Public Meetings were not made available for review on the website. As a result, while Alternative 1A appears to maintain existing conditions with minimal channel dredging, I am unsure whether it also includes some removal of saltmarsh vegetation and reduction of substrate elevation in the central basin. If it does include restoration of non-vegetated tidal mudflats in the central basin, I argue for it as the preferred project alternative with the least potential for negative impacts to endangered species and habitats. If it does not include mudflat restoration but only channel enhancement, then I propose that a modified alternative be included for consideration. Such an alternative should include the four aspects of Alternative 1A, but also two additional options in the central basin and one in the east basin:

- use the existing tidal inlet,
- create a north-south-trending tidal channel in the West Basin,
- enlarge the channel linking the Central Basin and East Basin beneath Interstate 5,
- enhance existing tidal channels in the East Basin, and
- enhance existing tidal channels in the Central Basin,
- restore non-vegetatated tidal mudflat habitat in the central portion of the central basin by removal of vegetation and reduction of substrate elevation to that necessary to maintain a non-vegetated intertidal state,
- enhance drainage and management capabilities in the east basin by replacing and adding additional flood gate valves and culverts to the existing dike.

Alternatives 1B and 2A propose significant but unnecessary increases in the tidal prism through the creation of subtidal basins. The existing tidal prism is sufficient to maintain year-round tidal flow and the inlet open to the ocean with annual inlet channel maintenance at minimal cost. Also, given the predictions of potential sealevel rise due to climate change, excavation to subtidal may be unnecessary. Since the project area is of finite acreage, and every other habitat type has endangered species, creation of subtidal habitat would simply reduce acreage of the more important habitats. Each of the other existing habitats have endangered bird species (upland sage scrub California gnatcatchers, riparian Bell's vireo, freshwater/ brackish/saltmarsh clapper rail, saltmarsh Belding's savannah sparrow, saltpanne least tern, saltpanne/ mudflat snowy plover) and bird groups of concern (open water waterfowl, mudflats shorebirds).

Alternatives 1B and 2A propose removal of the east basin flood control dike. However, removal would eliminate a heavily used public access route and wildlife observation opportunities. It also would eliminate a vehicle access route used for maintenance and operations of the Ecological Reserve, including trail maintenance, erosion control, control of non-native invasive species, vector control, environmental education, and law enforcement. Removal would also eliminate the one direct route to the trail system for emergency responders from the Encinitas side, for example in case of brushfire, severe injury, or illegal activity.

Removal of the east basin dike would eliminate the possibility of controlling water levels in the east basin, which would eliminate some important habitats. The lack of being able to impound water in winter and draw down in spring would likely result in loss of saltpanne/mudflat habitat in the east basin due to increased growth and coverage of marsh vegetation, it would reduce winter waterfowl open water habitat, spring and fall shorebird foraging mudflat and shallows habitats, and eliminate the existing least tern, snowy plover, stilt, avocet, and killdeer saltpanne nesting habitat. Rather than remove the dike, management capabilities and water circulation in the east basin would be increased by replacing and adding additional flood gate valves and culverts to the existing dike.

As indicated in the SELC website's restoration project background material and the Public Meeting presentation, the habitat type most diminished in recent years at San Elijo has been non-vegetated intertidal mudflats. Since it is a habitat type not based on plant community components, it has frequently been overlooked and/or excluded in wetland restoration planning, resulting in significant losses coast-wide. Recently there has been increasing recognition of the declining populations and sensitivity of multiple species of shorebirds which are dependent on such habitat for foraging, particularly during periods of high physical stress such as migration and wintering. This restoration project provides the opportunity to restore and enhance this habitat type at San Elijo and possibly benefit both migratory shorebirds and locally breeding species, including the federally threatened western snowy plover. I urge the agencies involved to prioritize restoration, enhancement, and creation of such critical shorebird habitat.

The majority of the area in the central basin that was previously intertidal mudflat and has recently been converting to saltmarsh remains relatively low elevation and intertidal, with little to no potential for nesting by clapper rails and savannah sparrows. Restoration of non-vegetated intertidal mudflats should focus on this area rather than in areas of well-established saltmarsh. Due to the existing high quality habitats at San Elijo, their endangered species, and the potential for negative impacts, extreme conservatism should be practiced in planning any restoration project.

I applaud the lack in the proposed project of any jetties, groins, or structures which would potentially impact longshore sand movement. Likewise, I'm glad to see that consideration will be given to local beach replenishment using any appropriate dredge material from the project. The question of where non-beach-suitable dredge spoils will be deposited needs to be addressed, particularly given the sensitive nature of all on-site habitats. The proposed phasing of aspects of the project to minimize impacts to endangered species and other plants and wildlife is good in theory, but needs to be detailed to thoroughly assess and avoid impacts. Likewise, all work should be done in the non-nesting season.

All three alternatives should and do include creation of a new least tern/snowy plover nesting site. Any newly created nesting site should be in excess of at least three to five acres to accommodate a sustainable tern colony or multiple pairs of plovers. At any location, a new nesting site would need posts and signs removed or topped with anti-perch devices to reduce potential perching by raptors. Lighting and glare should be minimal to minimize visibility of nesting birds to nocturnal predators. The substrate needs to be relatively coarse sand-shell to prevent egg-adherence to the substrate and relatively light in color to attract terns. The edges of the site need to be graded to gently slope to non-vegetated mudflats for foraging and clear movement back and forth by plover chicks. The area will need to be posted with signs and fenced to exclude human and pet access, but must allow access for heavy equipment for annual vegetation control. Funding for annual site maintenance, monitoring, and predator control must be secured.

The proposed nesting site at the old settling ponds adjacent to the railroad tracks has some concerns. Location at this site would require existing utility lines to be undergrounded and poles removed. Site constraints may limit its size to less than what could accommodate a sustainable tern colony or multiple pairs of plovers. The existing habitat that the new nesting site replaces would need to be mitigated for since it includes saline pond/flats and saltmarsh used by Belding’s savannah sparrows, stilts, avocets, etc. Although its existence is due to manmade levees, it is a natural habitat with high value in brine fly production and other invertebrates for migrating, wintering, and breeding shorebird species as well as resident Belding’s savannah sparrows.

I look forward to the continuing progress of the studies and reports for this project.

Sincerely,

Robert T. Patton

From: Hamilton, Megan [Megan.Hamilton@sdcounty.ca.gov]
Sent: Monday, December 19, 2011 9:51 AM
To: Kinkade, Cindy
Cc: michelle.l.mattson@usace.army.mil; Doug Gibson
Subject: FW: Public Comment on San Elijo Lagoon Restoration Project

Expires: Thursday, December 16, 2021 12:00 AM

Resident comment

Megan Hamilton

Group Program Manager/Resource Management Division
County of San Diego Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego CA, 92123
(858) 966 1377

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From: Jeff Schwartz [mailto:jeff.schwartz@uclalumni.net]
Sent: Wednesday, November 23, 2011 5:03 PM
To: Hamilton, Megan; michelle.l.mattson@usace.army.mil
Cc: Surfrider Foundation San Diego Chapter
Subject: Public Comment on San Elijo Lagoon Restoration Project

Dear Ms. Hamilton and Ms. Mattson,

I am writing to express my concern over the San Elijo Lagoon Restoration Project, in particular the prospect of relocating the inlet in front of Cardiff Reef.

Inlets like this are essential to the creation of surfable waves. Removing this inlet therefore threatens to destroy the surf break at Cardiff Reef, and potentially the reef breaks in front of the San Elijo campground as well. Cardiff Reef and the adjacent surf breaks are central to the Cardiff community, the popularity of the campground, and the Cardiff economy. Indeed, the quality of these surf breaks is what Cardiff is known for.

As a Cardiff resident, I urge you to reconsider moving this inlet or doing anything else that would jeopardize Cardiff Reef.

Sincerely,
Jeff Schwartz

From: Hamilton, Megan [Megan.Hamilton@sdcounty.ca.gov]
Sent: Monday, December 19, 2011 9:45 AM
To: Kinkade, Cindy
Cc: michelle.l.mattson@usace.army.mil; Doug Gibson
Subject: FW: San Elijo Restoration Project - NOP
Attachments: NOP_SELRP.pdf

Expires: Thursday, December 16, 2021 12:00 AM

Biologist Comments

Megan Hamilton
Group Program Manager/Resource Management Division
County of San Diego Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego CA, 92123
(858) 966 1377

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From: Tu, Melissa M. [mailto:MMTu@tecinc.com]
Sent: Monday, December 12, 2011 4:27 PM
To: Hamilton, Megan
Subject: San Elijo Restoration Project - NOP

Good Afternoon Ms. Hamilton,

I am writing to comment on the “NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT for the San Elijo Lagoon Project.

I would like to comment on the project description on the first page, the sentence following item #5.

The San Elijo Lagoon Ecological Reserve also provides habitat for sensitive, threatened, and endangered wildlife, not just plants.

Rare species include the California gnatcatcher, the Belding savannah sparrow, light-footed clapper rail, California least tern, western snowy plovers, and yellow warbler

Thank you for your time.

Melissa Tu

Melissa Tu | TEC Inc. | www.tecinc.com
Biologist

858.509.3157
514 Via De La Valle, Suite 308 | Solana Beach | California | 92075
MMTU@tecinc.com

SAN ELIJO
JOINT POWERS AUTHORITY

BOARD OF DIRECTORS
Teresa Barth
Thomas M. Campbell
Mark Muir
David W. Roberts

ADMINISTRATION
Michael T. Thornton
General Manager

December 15, 2011

Ms. Megan Hamilton
County of San Diego
Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego, CA 92123

SUBJECT: Notice of Preparation of an Environmental Impact Report/Environmental Impact Statement for the San Elijo Lagoon Restoration Project

Dear Ms. Hamilton,

The San Elijo Joint Powers Authority (SEJPA) hereby submits comments on the subject project. The following issues should be considered when preparing the EIR/EIS.

SEJPA owns and operates a pipeline and associated appurtenances crossing the San Elijo Lagoon that were installed in 1965 for the purpose of discharging treated wastewater from the San Elijo Water Reclamation Facility into the Pacific Ocean under NPDES permit CA0107999 via the San Elijo Ocean Outfall. The SEJPA requests that consideration be given to potential impacts that dredging or restoration activities may have on this infrastructure. Furthermore, the SEJPA requests that consideration is given to the establishment of an access road or walking trail along the existing pipeline to provide inspection and maintenance access for the outfall infrastructure as well as to improve "walkability" of the lagoon trail system.

The SEJPA also operates four sewer pump stations and a sewer siphon station that are located inside the study area. The pumps stations and associated force mains are owned by the City of Solana Beach and the City of Encinitas. The project will need to allow full access to the pump stations and force mains so that they can be properly maintained and operated.

Please call me if you have any questions.

Sincerely,

SAN ELIJO JOINT POWERS AUTHORITY

Michael T. Thornton, P.E.
General Manager

Recieved 11/29
mtg

Environmental Impact Statement/Environmental Impact Report

for the

San Elijo Lagoon Restoration Project

COMMENTS

(please hand in during the meeting)

Name: MICHAEL LARISON
Organization (if any): LARISON CONSTRUCTION CO.
Address (optional): 7732 DUTRA DR.
City, State, Zip: HEMET, CA, 92545

The United States Army Corps of Engineers in conjunction with the County of San Diego will prepare a joint EIS/EIR in accordance with the California Environmental Quality Act (CEQA) for the San Elijo Lagoon Restoration Project. Please provide specific comments as to the scope and content of the environmental information that will be addressed in the EIS/EIR. Thank you!

COMMENTS: IN FAVOR OF THE PROJECT
CALL ME FOR MORE COMMENTS

LARISONCONSTRUCTION @ YAHOO.COM

M M Larison

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Attn: Megan Hamilton
5500 Overland Ave., Suite 410
San Diego, CA 92123

U.S. Department of Homeland Security
FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA. 94607-4052

November 9, 2011

Michelle L. Mattson, Project Manager
U. S. Army Corps of Engineers
Los Angeles District, Regulatory Division
Carlsbad Field Office
6010 Hidden Valley Road, Suite 105
Carlsbad, California 92011

Dear Ms. Mattson:

This is in response to your request for comments on Public Notice CESPL-2009-00575-MLM, San Elijo Lagoon Restoration Project (Gen2) in the City of Encinitas, San Diego County, California.

Please review the current effective countywide Flood Insurance Rate Maps (FIRMs) for the County of San Diego (Community Number 060284) and City of Encinitas (Community Number 060726), Maps revised September 29, 2006. Please note that the City of Encinitas, San Diego County, California is a participant in the National Flood Insurance Program (NFIP). The minimum, basic NFIP floodplain management building requirements are described in Vol. 44 Code of Federal Regulations (44 CFR), Sections 59 through 65.

A summary of these NFIP floodplain management building requirements are as follows:

- All buildings constructed within a riverine floodplain, (i.e., Flood Zones A, AO, AH, AE, and A1 through A30 as delineated on the FIRM), must be elevated so that the lowest floor is at or above the Base Flood Elevation level in accordance with the effective Flood Insurance Rate Map.

- If the area of construction is located within a Regulatory Floodway as delineated on the FIRM, any ***development*** must not increase base flood elevation levels. **The term *development* means any man-made change to improved or unimproved real estate, including but not limited to buildings, other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, and storage of equipment or materials.** A hydrologic and hydraulic analysis must be performed *prior* to the start of development, and must demonstrate that the development would not cause any rise in base flood levels. No rise is permitted within regulatory floodways.

- All buildings constructed within a coastal high hazard area, (any of the "V" Flood Zones as delineated on the FIRM), must be elevated on pilings and columns, so that the lowest horizontal structural member, (excluding the pilings and columns), is elevated to or above the base flood elevation level. In addition, the posts and pilings foundation and the structure attached thereto, is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components.

- Upon completion of any development that changes existing Special Flood Hazard Areas, the NFIP directs all participating communities to submit the appropriate hydrologic and hydraulic data to FEMA for a FIRM revision. In accordance with 44 CFR, Section 65.3, as soon as practicable, but not later than six months after such data becomes available, a community shall notify FEMA of the changes by submitting technical data for a flood map revision. To obtain copies of FEMA's Flood Map Revision Application Packages, please refer to the FEMA website at http://www.fema.gov/business/nfip/forms.shtm.

Please Note:

Many NFIP participating communities have adopted floodplain management building requirements which are more restrictive than the minimum federal standards described in 44 CFR. Please contact the local community's floodplain manager for more information on local floodplain management building requirements. The Encinitas floodplain manager can be reached by calling Larry Watt, City Engineer, at (760) 633-2770. The San Diego County floodplain manager can be reached by calling Cid Tesoro, Flood Control District Manager, at (858) 694-3672.

If you have any questions or concerns, please do not hesitate to call Robert Durrin of the Mitigation staff at (510) 627-7057.

Sincerely,

Gregor Blackburn, CFM, Branch Chief
Floodplain Management and Insurance Branch

cc:
Larry Watt, City Engineer, Engineering Department, City of Encinitas
Cid Tesoro, Flood Control District Manager, San Diego County
Megan Hamilton, Department of Parks and Recreation, County of San Diego
Garret Tam Sing/Salomon Miranda, State of California, Department of Water Resources,
    Southern Region Office
Robert Durrin, Floodplanner, CFM, DHS/FEMA Region IX
Alessandro Amaglio, Environmental Officer, DHS/FEMA Region IX

-----Original Message-----
From: David.H.Sulouff@uscg.mil [mailto:David.H.Sulouff@uscg.mil]
Sent: Monday, November 07, 2011 11:43 AM
To: Megan.Hamilton@sdcounty.ca.gov; Mattson, Michelle L SPL
Subject: RE: San Elijo Lagoon CESPL-2009-00575-MLM

Please include the U.S. Coast Guard, Eleventh District Bridge Office as a Cooperating Agency for NEPA.
The CG permits & regulates bridges and causeways in/over/on navigable waters of the US under the provisions of the General Bridge Act of 1946, as amended.

We should be invited in writing to be a cooperating agency & will provide written comments in reply.

Here is the web site for our bridge program. This includes the CG Bridge Permit Application guide and other resources for your use.
http://www.uscg.mil/hq/cg5/cg551/

I can be contacted during normal working hours Mon-Fri at (510) 437-3516 to discuss this project.

Thank you,

David H. Sulouff
Chief, Bridge Section
Eleventh Coast Guard District
50-2 Coast Guard Island
Alameda, CA 94501
(510) 437-3516 Office
(510) 219-4366 cel
(510) 437-5836 fax

-----Original Message-----
From: Megan.Hamilton@sdcounty.ca.gov [mailto:Megan.Hamilton@sdcounty.ca.gov]
Sent: Monday, November 07, 2011 10:42 AM
To: Sulouff, David; Michelle.L.Mattson@usace.army.mil
Subject: RE: San Elijo Lagoon CESPL-2009-00575-MLM

Hi David,
The alternative (2A) that requires moving the San Elijo Lagoon inlet would require bridge related work at Highway 101. This alternative would also need to be closely coordinated with the proposed NCTD rail double tracking project (a separate project).
Regards,

Megan Hamilton
Group Program Manager/Resource Management Division County of San Diego
Department of Parks and Recreation
5500 Overland Avenue, Suite 410

San Diego CA, 92123
(858) 966 1377

www.sdparks.org

-----Original Message-----
From: David.H.Sulouff@uscg.mil [mailto:David.H.Sulouff@uscg.mil]
Sent: Monday, November 07, 2011 7:33 AM
To: Michelle.L.Mattson@usace.army.mil; Hamilton, Megan
Subject: San Elijo Lagoon CESPL-2009-00575-MLM

Greetings Michelle & Megan:

Will the subject proposed project include any bridge related work?

Thank you,

David H. Sulouff
Chief, Bridge Section
Eleventh Coast Guard District
50-2 Coast Guard Island
Alameda, CA 94501
(510) 437-3516 Office
(510) 219-4366 cel
(510) 437-5836 fax

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

December, 16 2011

Ms. Michelle Mattson
Senior Project Manager
U.S. Army Corps of Engineers
Los Angeles District
Regulatory Division
Carlsbad Field Office,
Attn: CESPL-2009-00575-MLM
6010 Hidden Valley Road, Suite 105
Carlsbad, CA 92011

Dear Ms. Mattson:

The Environmental Protection Agency (EPA) has reviewed the Notice of Intent to prepare an environmental impact statement (EIS) for the San Elijo Lagoon Restoration Project, San Diego County, California. Our review is pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

EPA has no formal comments on the Notice of Intent at this time. Please send one hard copy and 4 CD copies of the Draft EIS (DEIS) to this office mail code CED-2 at the same time it is officially filed with our Washington D.C. Office. If you have any questions, please call me at (415) 972-3800.

Sincerely,

James Munson

James Munson
Environmental Review Office
Communities and Ecosystems Division

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY EDMUND G. BROWN, Jr., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 11, DIVISION OF PLANNING
4050 TAYLOR ST, M.S. 240
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December 21, 2011

11-SD-5
PM 38.62
San Elijo Lagoon Restoration
NOP / CESPL-2009-00575-MLM

Ms. Michelle Lee Mattson
U.S. ACOE
LA District, Regulatory Division
Carlsbad Field Office
6010 Hidden Valley Road, Suite 105
Carlsbad, CA 92011

Dear Ms. Mattson:

The California Department of Transportation (Caltrans) received the Notice of Preparation (NOP) for the San Elijo Lagoon Restoration project (CESPL-2009-00575-MLM). Caltrans has the following comments:

Any work performed within Caltrans right-of-way (R/W) will require discretionary review and approval by Caltrans and an encroachment permit will be required for any work within the Caltrans' R/W prior to construction.

As part of the encroachment permit process, the applicant must provide an approved final environmental document including the California Environmental Quality Act (CEQA) determination addressing any environmental impacts within the Caltrans' R/W, and any corresponding technical studies. If these materials are not included with the encroachment permit application, the applicant will be required to acquire and provide these to Caltrans before the permit application will be accepted. Identification of avoidance and/or mitigation measures will be a condition of the encroachment permit approval as well as procurement of any necessary regulatory and resource agency permits. Encroachment permit submittals that are incomplete can result in significant delays in permit approval.

If you have any questions, please contact Leila Ibrahim of the Development Review branch at (619) 688-6802.

Sincerely,

JACOB ARMSTRONG, Branch Chief
Development Review Branch

"Caltrans improves mobility across California"

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Thomas G. Acuna
Land Planning Supervisor
Environmental Programs

San Diego Gas & Electric Co.
8316 Century Park Ct.
San Diego, CA 92123

Tel: (858)-637-3701
tgacuna@semprautilities.com

December 16, 2011

U.S. Army Corps of Engineers
Los Angeles District, Regulatory Division
Carlsbad Field Office
Attn: Michelle Lee Mattson
6110 Hidden Valley Road, Suite 105
Carlsbad, CA 92011

RE: San Elijo Lagoon Restoration Project, CESPL-2009-00575-MLM

The purpose of this letter is to provide comment prior to the preparation of the draft EIS/EIR for the proposed San Elijo Lagoon Restoration Project (SELRP). Each of the proposed alternatives may have impacts to regional energy facilities owned and operated by San Diego Gas & Electric Company.

SDG&E Facilities Potentially Affected

To help illustrate the location of these facilities, we have attached a map showing their location. A brief description of each facility identified with corresponding color as keyed on the attached map is described below:

1) Orange line – Represents approximate location of existing underground high pressure gas transmission lines. One line shows the approximate location of a buried high pressure 12-inch high pressure gas transmission pipeline. It parallels an existing access road and lies beneath the San Elijo main channel bisecting the West and Central Basin. Another line shows the approximate location of a buried 30-inch high pressure gas transmission pipeline beneath the East Basin. This line parallels existing overhead electric transmission and distribution lines within easement.

2) Green line – Represents the approximate location of existing high voltage electric transmission lines. The lines are built on wood power poles and parallel the existing access road bisecting the West and Central Basin while other circuits are located on the East Basin built on wood power poles that parallel an existing buried 30-inch high pressure gas transmission pipeline within easement.

3) Yellow line- Represents approximate location of existing SDG&E easements.

4) Red line- Represents approximate location of existing overhead electric distribution lines. One line shows the approximate location of an overhead electric distribution line built on wood pole structures traversing across the lagoon and on an existing dirt access road bisecting the West and Central Basin. Another line shows the approximate location of an overhead electric distribution line built on wood pole structures as it traverses across the East Basin and parallels the existing SDG&E electric distribution lines and existing SoCalGas buried high pressure gas line.

5) Dashed Red Line – Represents approximate location of existing buried electric distribution lines. One line shows the approximate location of an existing buried electric distribution line as it lies across the Coastal Area.

Key Concerns & Recommend Assessment

1) Changes in tidal flushing or enhancements may cause structural integrity issues to SDG&E facilities. Engineering evaluation should be conducted to identify issues and protection measures.

2) Closure, alterations or changes in existing access roads, work pads, and other supporting right-of-way features need to be evaluated and discussed with SDG&E prior to being adopted as an alternative. All relocation requirements will also need to be permitted and mitigated by the project proponent.

3) Relocation or modification of any electric transmission facility will need to be thoroughly discussed in the environmental document in order to receive exemption from CPUC permit requirements. Failure to do so may result in the CPUC requiring individual permits and amendment of the SELRP EIR/EIS.

SDG&E Coordination

Prior to scoping proposed alternatives, we recommend that a kick-off meeting be held with Jefferey Sykes, SDG&E Right of Way Supervisor. He can provide all as-built drawings showing exact SDG&E facility locations and can coordinate the attendance of key SDG&E stakeholders affected by the SELRP. He can be reached at (858)-654-1235. In the meantime, should you have any questions, please do not hesitate to contact me.

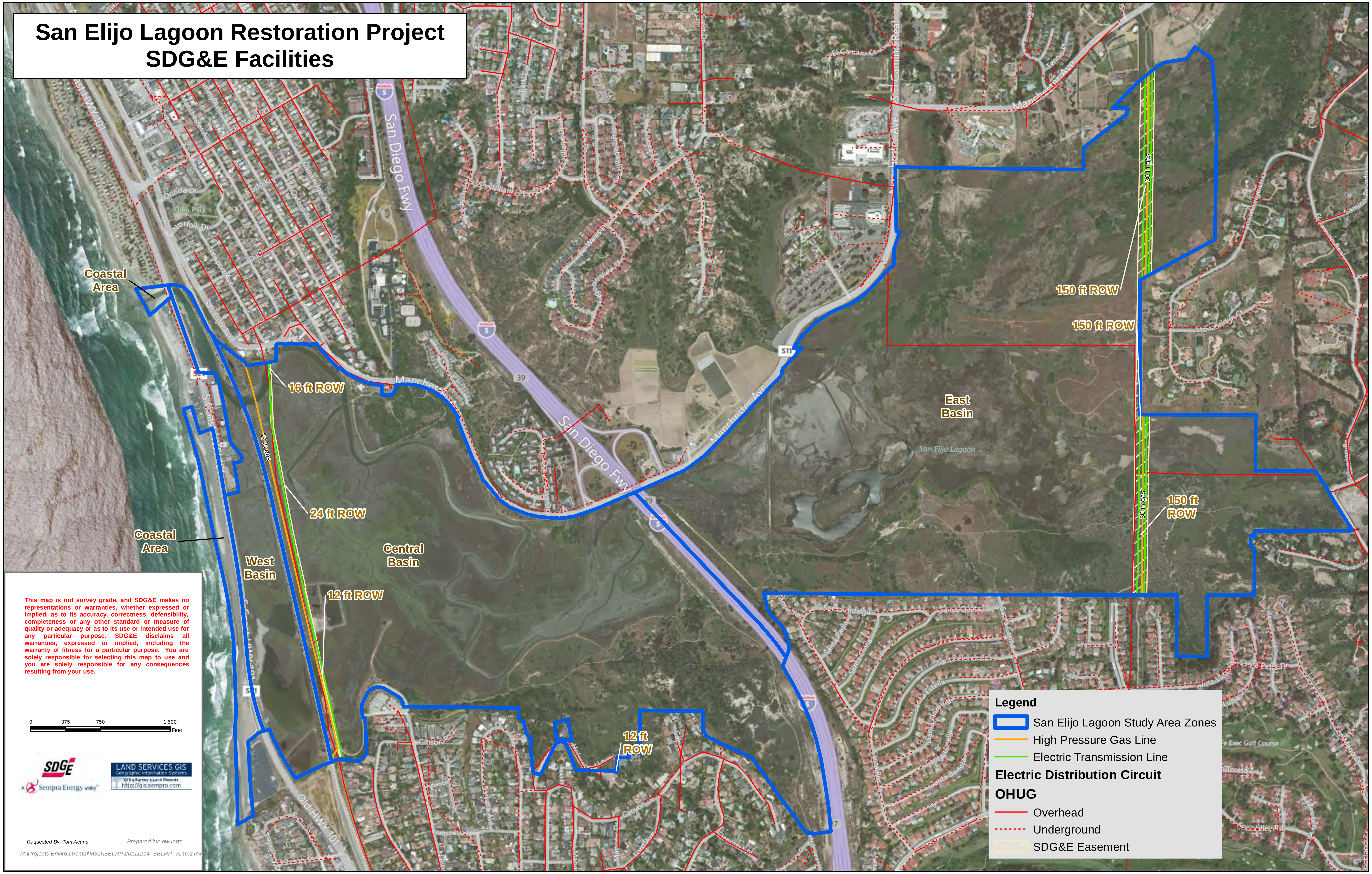
Sincerely,

Thomas G. Acuna

Thomas G. Acuna
Land Planning Supervisor
Mobile: 619-884-0566
8316 Century Park Court
San Diego, CA 92123

Cc: County of San Diego
Department of Parks and Recreation
Attn: Megan Hamilton
55000 Overland Avenue, Suite 410
San Diego, CA 92123

San Elijo Lagoon Restoration Project
SDG&E Facilities



This map is not survey grade, and SDG&E makes no representations or warranties, whether expressed or implied, as to its accuracy, correctness, defensibility, completeness or any other standard or measure of quality or adequacy or as to its use or intended use for any particular purpose. SDG&E disclaims all warranties, expressed or implied, including the warranty of fitness for a particular purpose. You are solely responsible for selecting this map to use and you are solely responsible for any consequences resulting from your use.

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http://gis.sempra.com

Requested By: Tom Acuna *Prepared by: dwuertz*

M:\Projects\Environmental\MXD\SELRP\20111214_SELRP_v1mxd.mxd

-----Original Message-----
From: carolchilds@cox.net [mailto:carolchilds@cox.net]
Sent: Friday, December 16, 2011 5:55 PM
To: megan.hamilton@sdcounty.ca.gov; Mattson, Michelle L SPL
Subject: CESPL-2009-00575-MLM (San Elijo)

Megan Hamilton
Michelle L. Mattson

RE: San Elijo Lagoon Restoration Project, CESPL-2009-00575-MLM

Dear Ms. Hamilton and Ms. Mattson:

The question below relates to PEDESTRIAN ACCESS if ALTERNATIVE 2A is chosen for implementation.

PRELIMINARY COMMENT: A number of people, residents and visitors alike, frequently walk between North Cardiff State Beach and South Cardiff State Beach. There are large parking lots at each location. Except at extreme high tide, pedestrians currently can walk uninterrupted along the shoreline between those two State beaches.

QUESTION: If Alternative 2A is chosen, will that Alternative include a REQUIRED (1) SAFE and (2) VISUALLY ATTRACTIVE pedestrian walkway from the beach onto Highway 101 (traversing whatever distance on 101 is needed to cross over the relocated inlet) so that pedestrians can continue to walk the shoreline beach between North Cardiff State Beach and South Cardiff State Beach?

Thank you.

Carol Childs
Solana Beach resident

-----Original Message-----
From: Marc Friedmann [mailto:friedmann.marc@gmail.com]
Sent: Sunday, December 04, 2011 3:02 PM
To: megan.hamilton@sdcounty.ca.gov; Mattson, Michelle L SPL
Cc: Friedmann, Lynne
Subject: San Elijo Lagoon EIS/EIR Input

Hi Megan and Michelle -

We attended the recent presentation related to the draft EIS/EIR for the San Elijo Lagoon. As residents living near the Rios trailhead, we have the following input based on the presentation:

* We favor moving the outlet to the center of the of the lagoon. We believe this will substantially improve tidal flows and overall health of the lagoon.
* The dike in the east basin should be removed.
* The settling pond in the central basin should be removed or converted to a natural state. It is no longer used or needed and is a disruptive eyesore.
* We would like to see a trail that crosses the central basin from south to north. We believe this would provide even greater recreational opportunities and better access to the nature center.
* The power lines in the central basin should be buried as part of the project.
* We believe the Rios trailhead may be one of the main access points for construction for the central basin. Consideration for traffic and noise management should be given during the construction period.
* Double railing of tracks should be done contemporaneously with the lagoon construction. Two separate periods of construction would inevitably more costly and disruptive.

--
Marc and Lynne Friedmann
(858) 793-3537

Michelle/Meagan - My understanding from last nights scoping meeting on SELRP (11-29-2011) is that possible DEIS/EIR will be "published and circulated by fall 2012" at which time public hearings will be held. Based on four alternatives. Doug Gibson did not have a dollar value on the potential alternatives. Can you supply a best guess on the contract value? Is Federal money involved? Doug Gibson did not supply an email address or phone number. If you can give me his contact information, it would be helpful. Also contact information for Cindy Kinkade of AECOM.

Michael Larison

-----Original Message-----
From: MIKE LARISON [mailto:larisonconstruction@yahoo.com]
Sent: Wednesday, November 30, 2011 10:31 AM
To: Mattson, Michelle L SPL; megan.hamilton@sdcounty.ca.gov
Cc: Dan Chow; jneal@dutragroup.com; vtaylor@dutragroup.com
Subject: San Elijo Lagoon Restoration Project (SELRP)

-----Original Message-----
From: Jeff Schwartz [mailto:jeff.schwartz@uclalumni.net]
Sent: Wednesday, November 23, 2011 5:03 PM
To: megan.hamilton@sdcounty.ca.gov; Mattson, Michelle L SPL
Cc: Surfrider Foundation San Diego Chapter
Subject: Public Comment on San Elijo Lagoon Restoration Project

Dear Ms. Hamilton and Ms. Mattson,

I am writing to express my concern over the San Elijo Lagoon Restoration Project, in particular the prospect of relocating the inlet in front of Cardiff Reef.

Inlets like this are essential to the creation of surfable waves. Removing this inlet therefore threatens to destroy the surf break at Cardiff Reef, and potentially the reef breaks in front of the San Elijo campground as well. Cardiff Reef and the adjacent surf breaks are central to the Cardiff community, the popularity of the campground, and the Cardiff economy. Indeed, the quality of these surf breaks is what Cardiff is known for.

As a Cardiff resident, I urge you to reconsider moving this inlet or doing anything else that would jeopardize Cardiff Reef.

Sincerely,
Jeff Schwartz

Received 11/29/11 meeting

Environmental Impact Statement/Environmental Impact Report

for the

San Elijo Lagoon Restoration Project

COMMENTS

(please hand in during the meeting)

Name: JIM DIETZ
Organization (if any):
Address (optional): 458 HOLMWOOD LN, SOLANA BEACH, 92075
City, State, Zip:

The United States Army Corps of Engineers in conjunction with the County of San Diego will prepare a joint EIS/EIR in accordance with the California Environmental Quality Act (CEQA) for the San Elijo Lagoon Restoration Project. Please provide specific comments as to the scope and content of the environmental information that will be addressed in the EIS/EIR. Thank you!

COMMENTS:

- WHATEVER IS DONE WITH PLANT LIFE NEEDS TO CONSIDER THE IMPACT ON FIRE DANGER TO THE ADJACENT STRUCTURES

- NEED TO CONSIDER THE POTENTIAL FOR ENHANCING THE RECREATION POSSIBILITIES IN A RE-STRUCTURED LAGOON, SPECIFICALLY, THIS COULD OFFER NEW FISHING, KAYAKING, SUP. CONSERVATION IS IMPORTANT, BUT PUBLIC USE IS TOO.

- WOULD IMPACT OF EUCALYPTUS TREES BE PART OF THIS STUDY?

- WHAT IS IMPACT ON INSECT LIFE, SPECIFICALLY, MOSQUITOES + FLIES WHICH NEED TO BE REDUCED.

- PROJECT IS A GREAT IDEA, DO IT.

Place
First
Class
Postage
Here

USACE Los Angeles District, Regulatory Division
Attn: Michelle Mattson
6010 Hidden Valley Rd., Suite 105
Carlsbad, CA 92011

Received 11/29/11 meeting

Environmental Impact Statement/Environmental Impact Report

for the

San Elijo Lagoon Restoration Project

COMMENTS

(please hand in during the meeting)

Name: SEAN BERGQUIST

Organization (if any):

Address (optional): 136 3rd St.

City, State, Zip: Encinitas, CA

The United States Army Corps of Engineers in conjunction with the County of San Diego will prepare a joint EIS/EIR in accordance with the California Environmental Quality Act (CEQA) for the San Elijo Lagoon Restoration Project. Please provide specific comments as to the scope and content of the environmental information that will be addressed in the EIS/EIR. Thank you!

COMMENTS: GREAT PROJECT!

I look forward to following the progress.

MOFFATT & NICHOL

AECOM

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Attn: Michelle Mattson
6010 Hidden Valley Rd., Suite 105
Carlsbad, CA 92011

Received 11/29/11 meeting

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San Elijo Lagoon Restoration Project

COMMENTS

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Organization (if any):

Address (optional): 458 HOLMWOOD LN, SOLANA BEACH, 92075

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- PROJECT IS A GREAT IDEA. DO IT.

- -

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Recieved 11/29
mty

Environmental Impact Statement/Environmental Impact Report

for the

San Elijo Lagoon Restoration Project

COMMENTS

(please hand in during the meeting)

Name: MICHAEL LARISON

Organization (if any): LARISON CONSTRUCTION CO.

Address (optional): 7732 DUTRA DR.

City, State, Zip: HEMET, CA, 92545

The United States Army Corps of Engineers in conjunction with the County of San Diego will prepare a joint EIS/EIR in accordance with the California Environmental Quality Act (CEQA) for the San Elijo Lagoon Restoration Project. Please provide specific comments as to the scope and content of the environmental information that will be addressed in the EIS/EIR. Thank you!

COMMENTS: IN FAVOR OF THE PROJECT

CALL ME FOR MORE COMMENTS

LARISONCONSTRUCTION @ YAHOO.COM

M M Larison

MOFFATT & NICHOL

AECOM

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County of San Diego Department of Parks and Recreation
Attn: Megan Hamilton
5500 Overland Ave., Suite 410
San Diego, CA 92123

Received 11/29/11 meeting

Environmental Impact Statement/Environmental Impact Report

for the

San Elijo Lagoon Restoration Project

COMMENTS

(please hand in during the meeting)

Name: SEAN BERGQUIST

Organization (if any):

Address (optional): 136 3rd St.

City, State, Zip: Encinitas, CA

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COMMENTS: GREAT PROJECT!

I look forward to following the progress.

MOFFATT & NICHOL

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Attn: Michelle Mattson
6010 Hidden Valley Rd., Suite 105
Carlsbad, CA 92011

APPENDIX C

REGULATORY SETTING

Acronyms and Abbreviations

AB	Assembly Bill
ARB	Air Resources Board
BECA	Beach Erosion Concern Area
BMP	best management practice
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CAAQS	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Protection
CalEPA	California Environmental Protection Agency
CalRecycle	California Department of Resources Recycling and Recovery
CAP	Climate Action Plan
CBC	California Building Code
CCAA	California Clean Air Act
CCC	California Coastal Commission
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQ	Council for Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CHHSL	California Human Health Screening Level
CIWMB	California Integrated Waste Management Board
CLSC	California State Lands Commission
CNRA	California Natural Resources Agency
CO	carbon monoxide
Conservancy	California State Coastal Conservancy
Corps	U.S. Army Corps of Engineers
County DPR	County of San Diego Department of Parks and Recreation
County	County of San Diego
CPUC	California Public Utilities Commission
CSCC	California State Coastal Conservancy
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
diesel PM	diesel particulate matter
DMG	Division of Mines and Geology
DOT	U.S. Department of Transportation
EFH	Essential Fish Habitat

EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
HCP	habitat conservation plan
HMP	Hydromodification Management Plan
JURMP	Jurisdictional Urban Runoff Management Plan
LCP	Local Coastal Program
LHP	Landslide Hazard Program
LID	Low Impact Development
LIP	Local Implementation Plan
LUP	Land Use Plan
MBTA	Migratory Bird Treaty Act
MLPA	Marine Life Protection Act
MMPA	Marine Mammal Protection Act
MPRSA	Marine Protection, Research, and Sanctuaries Act
MSCP	Multiple Species Conservation Program
MT	metric ton(s)
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NC Plan	North County Multiple Species Conservation Plan
NCMSP	North County Multiple Species Conservation Program
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NHS	National Highway System
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NRHP	National Register of Historic Places
PDP	Priority Development Project
$PM_{2.5}$	particulate matter 2.5 micrometers or less
PRC	Public Resources Code
RPS	Renewables Portfolio Standard
RSM Plan	Regional Sediment Management Plan
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments

SDAB	San Diego Air Basin
SDAPCD	San Diego Air Pollution Control District
SDCVCP	San Diego County Vector Control Program
SELRP	San Elijo Lagoon Restoration Project
SHMA	Seismic Hazards Mapping Act
SIP	State Implementation Plan
SMCA	State Marine Conservation Area
SPS	Shoreline Preservation Strategy
SRA	State Responsibility Area
SUSMP	Standard Urban Runoff Mitigation Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TMDL	total maximum daily load
UBC	Uniform Building Code
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

APPENDIX C
REGULATORY SETTING

The regulations described in this section are applicable to the proposed project. The following table lists all regulations presented and the topic area to which they are generally applicable.

Regulation	Applicable Resource Sections
Federal Regulations	
Civil Rights Act of 1964	Socioeconomics/ Environmental Justice
Coastal Zone Management Act	Land Use/Recreation, Coastal Processes, Water Quality, Hydrology
Marine Protection, Research, and Sanctuaries Act	Land Use/Recreation, Coastal Processes, Water Quality, Hydrology
Clean Air Act	Air Quality, Geology and Soils
Clean Air Act General Conformity	Air Quality
Clean Air Act Toxic Air Contaminants	Air Quality
Clean Air Act Section 202(a)	Global Climate Change and Greenhouse Gas Emissions
Clean Water Act	Water Quality, Geology/Soils, Biological Resources
Clean Water Act Section 303(d) Total Maximum Daily Loads	Water Quality, Geology/Soils
Clean Water Act Section 401 Water Quality Certification	Water Quality, Geology/Soils
Clean Water Act Section 402 National Pollutant Discharge Elimination Program	Water Quality
Clean Water Act Section 404 Discharge of Dredge or Fill Material	Water Quality, Biological Resources
Council on Environmental Quality Guidance	Global Climate Change and Greenhouse Gas Emissions
Earthquake Hazards Reduction Act	Geology and Soils
Endangered Species Act	Biological Resources
Executive Order 11990 – Protection of Wetlands	Water Quality, Biological Resources
Executive Order 11988 – Floodplain Management Conditional Letter of Map Revision and Letter of Map Revision	Water Quality, Hydrology, Biological Resources, Hazards and Public Safety
Executive Order 12088	Air Quality, Water Quality, Hazards and Public Safety
Executive Order 12898 – Environmental Justice	Socioeconomics/ Environmental Justice
Executive Order 13045 – Protection of Children from Environmental Health Risks and Safety Risks	Socioeconomics/ Environmental Justice
Executive Order 13112, Invasive Species	Biological Resources
Magnuson-Stevens Fishery Management and Conservation Act, as amended 1996 (Public Law 104-267)	Biological Resources
Mandatory Greenhouse Gas Reporting Rule	Global Climate Change and Greenhouse Gas Emissions

Regulation	Applicable Resource Sections
Migratory Bird Treaty Act	Biological Resources
National Flood Insurance Act	Water Quality, Hazards and Public Safety
National Environmental Policy Act	All resource areas
National Highway System Designation Act	Visual Resources
National Highway Transportation Safety Administration Fuel Economy Standards for Medium- and Heavy-Duty Engines	Global Climate Change and Greenhouse Gas Emissions
National Historic Preservation Act	Cultural Resources
Norman Y. Mineta and Special Programs Improvement Act	Public Service and Utilities, Hazards and Public Safety
Rivers and Harbors Act, Section 10	Water Quality
U.S. Geological Survey Landslide Hazard Program	Geology and Soils
State Regulations	
Assembly Bill 32: California Global Warming Solutions Act of 2006	Global Climate Change and Greenhouse Gas Emissions
Assembly Bill 32: Climate Change Scoping Plan	Global Climate Change and Greenhouse Gas Emissions
Assembly Bill 411: Beach Sanitation: Posting	Water Quality
Assembly Bill 939: Integrated Waste Management Act	Public Services and Utilities
Assembly Bill 1493	Global Climate Change and Greenhouse Gas Emissions
Alquist-Priolo Earthquake Fault Zoning Act	Geology and Soils
Building Codes	Geology and Soils
Administrative Code; Title 14, Section 4307	Cultural Resources, Paleontological Resources
California Clean Air Act	Air Quality
California Coastal Act	Land Use/Recreation, Coastal Processes, Water Quality
California Code of Regulations; Title 14 Division 1.5	Hazards and Public Safety
California Code of Regulations: Title 14 Section 630(b)(103)	Land Use and Recreation
California Code of Regulations Title 17	Global Climate Change and Greenhouse Gas Emissions
California Department of Fish and Game Code	Water Quality, Hydrology, Biological Resources
California Endangered Species Act	Biological Resources
California Environmental Quality Act	All resource areas
California Environmental Quality Act Title 14 California Code of Regulations Section 15131	Socioeconomics/ Environmental Justice
California Fish and Game Code Section 1602 Streambed Alteration	Water Quality, Hydrology, Biological Resources
California Fish and Game Code Section 3503 and 3503.5 Protection of Birds, Nests, and Raptors	Biological Resources
California Fish and Game Code Fully Protected Species	Biological Resources
California Government Code, Section 4216: Protection of Underground Infrastructure	Public Services and Utilities
California Government Code Sections 6253, 6254, 6254.10	Cultural Resources
California Government Code Section 65860	Cultural Resources
California Health and Safety Code Sections 7050.5, 7051, and 7052	Cultural Resources
California Human Health Screening Levels	Hazards and Public Safety
California Native Plant Protection Act	Biological Resources
California Penal Code, Title 14, Sections 622.5, 623	Cultural Resources
California Public Resources Code Section 5097.5	Cultural Resources

Regulation	**Applicable Resource Sections**
California Public Resources Code Sections 5097.9 to 5097.991	Cultural Resources
California Resolution Number 43	Cultural Resources
California Scenic Highway Law	Visual Resources
The California State Coastal Conservancy 2013-2018 Strategic Plan	Global Climate Change and Greenhouse Gas Emissions
California State Lands Commission Public Trust Doctrine	Land Use/Recreation
California Street and Highways Code	Visual Resources
Construction General Permit	Water Quality, Hydrology, Geology/Soils
Executive Order S-1-07	Global Climate Change and Greenhouse Gas Emissions
Executive Order S-3-05	Global Climate Change and Greenhouse Gas Emissions
Executive Order S-13-08	Global Climate Change and Greenhouse Gas Emissions
Marine Life Protection Act	Land Use/Recreation, Biological Resources
Natural Community Conservation Plans and Habitat Conservation Plans	Biological Resources
Porter-Cologne Water Quality Control Act	Water Quality, Biological Resources
Public Utilities Code (California Public Utilities Commission General Order 131-D)	Public Services and Utilities
San Diego Coastal State Park General Plan	Land Use/Recreation, Biological Resources, Cultural Resources
Seismic Hazards Mapping Act of 1990	Geology/Soils
Senate Bill 97	Global Climate Change and Greenhouse Gas Emissions
Senate Bill 922	Cultural Resources
Senate Bill 1374: Local Government Construction and Demolition Guide	Public Services and Utilities
Senate Concurrent, Resolution Number 87	Cultural Resources
Senate Bill X1-2	Global Climate Change and Greenhouse Gas Emissions
State Implementation Plan	Air Quality
Surface Mining and Reclamation Act	Land Use
Local Regulations	
Air Resources Board 2008 Scoping Plan	Air Quality, Global Climate Change and Greenhouse Gas Emissions
City of Encinitas Climate Action Plan	Air Quality, Global Climate Change and Greenhouse Gas Emissions
City of Encinitas General Plan and Local Coastal Program, Land Use Plan	Land Use and Recreation
City of Encinitas General Plan Resource Management Element	Cultural Resources, Paleontological Resources, Visual Resources
City of Encinitas General Plan Resource Management Element	Land Use and Recreation
City of San Diego General Plan and Local Coastal Program	Land Use and Recreation
City of Solana Beach General Plan and Local Coastal Program, Land Use Plan, Local Implementation Plan	Land use and Recreation
City of Solana Beach General Plan Circulation Element	Visual Resources, Traffic and Circulation

Regulation	**Applicable Resource Sections**
City of Solana Beach General Plan Conservation and Open Space Element	Paleontological Resources, Visual Resources
City of Solana Beach General Plan Conservation and Open Space Element	Land Use and Recreation
Coastal Regional Sediment Management Plan	Water Quality
Construction Dewatering Permits	Water Quality
Noise Ordinances	Noise
San Diego County Code Chapter 6. Resource Protection Ordinance	Biological Resources, Cultural Resources
County of San Diego General Plan and San Dieguito Community Plan	Land Use and Recreation
County of San Diego Guidelines for Determining Significance for Climate Change	Global Climate Change and Greenhouse Gas Emissions
San Diego County Vector Control Program	Hazards and Public Safety
Escondido Creek Watershed Restoration Action Plan	Land Use and Recreation, Water Quality, Hydrology
San Diego Municipal Storm Water Permit	Water Quality, Hydrology
San Diego Association of Governments Board Policy No. 25: Public Participation/ Involvement Policy	Socioeconomics and Environmental Justice
San Diego Regional Water Quality Control Board Basin Plan	Water Quality
San Elijo Lagoon Action Plan	Land Use and Recreation
San Elijo Lagoon Area Enhancement Plan	Land Use and Recreation, Biological Resources
San Elijo Lagoon Ecological Reserve Vegetation Management Plan	Hazards and Public Safety
Shoreline Preservation Strategy	Land Use and Recreation

Air Resources Board 2008 Scoping Plan

The Air Resources Board's (ARB) Scoping Plan states that local governments are "essential partners" in the effort to reduce greenhouse gas (GHG) emissions. The Scoping Plan also acknowledges that local governments have "broad influence" and, in some cases, exclusive jurisdiction over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. Many of the proposed measures to reduce GHG emissions rely on local government actions. The Scoping Plan encourages local governments to reduce GHG emissions by approximately 15% from current levels by 2020.

Assembly Bill 32: California Global Warming Solutions Act of 2006

Assembly Bill (AB) 32 was signed in September 2006, requiring ARB to adopt a statewide limit on GHG emissions equivalent to 1990 levels to be achieved by 2020; requiring ARB to adopt rules and regulations, and authorizing ARB to adopt market-based mechanisms, to achieve the

GHG emissions limit; and requiring reporting and monitoring of GHG emissions from major-emitting sources.

AB 32 identifies specific dates by which ARB must prepare and approve a Scoping Plan that identifies measures for achieving GHG reductions by 2020. Further, AB 32 states that the GHG emissions limit shall remain in effect beyond 2020 and that ARB shall provide guidance to achieving GHG emissions reductions beyond 2020. AB 32 also recognizes the Governor's Climate Action Team's role in continuing to coordinate overall climate policy. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

Climate Change Scoping Plan

In December 2008, ARB adopted its Climate Change Scoping Plan (Scoping Plan) with updates in 2010 and is currently undergoing updates at this time. The Scoping Plan contains a comprehensive set of strategies designed to achieve the 2020 GHG emissions limit. The measures in the Scoping Plan also put California on a path to meet the long-term 2050 goal of reducing California's GHG emissions to 80% below 1990 levels. Implementing light-duty vehicle GHG emission standards, LCFS, regional transportation-related GHG targets, and the RPS as set forth in the Scoping Plan would continue to achieve reductions through at least 2030. However, the Scoping Plan does not recommend additional measures for meeting specific GHG emissions limits beyond 2020. The Scoping Plan is currently being updated, and additional information on revised measures is not available at the time this analysis was developed. ARB's Scoping Plan includes measures that would indirectly address GHG emissions levels associated with construction activities, including the phasing in of cleaner technology for diesel engine fleets (including construction equipment) and the development of an LCFS. The Scoping Plan calls for over half of the reductions in GHG emissions to be achieved by implementing the following measures and standards:

- improved emissions standards for light-duty vehicles;
- the Low-Carbon Fuel Standard;
- energy efficiency measures in buildings and appliances, and the widespread development of combined heat and power systems; and
- a renewable portfolio standard for electricity production.

The Scoping Plan is currently being updated, and additional information on revised measures is not available at the time of publication.

AB 32 states that the 1990 emissions limit would remain in effect “unless otherwise amended or repealed.” However, unlike the specific requirements and timelines for achieving GHG emissions reductions by 2020, AB 32 did not provide specific timelines for ARB to develop recommended GHG reductions beyond 2020. In addition, the Scoping Plan reiterates California’s role in the long-term goal established in Executive Order (EO) S-3-05, which is to reduce GHG emissions 80% below 1990 levels by 2050. The Scoping Plan states that this will be achieved through development of new technologies not based on fossil fuels and a “shift into a landscape of new ideas, clean energy, and green technology.” The plan also states that, to be on the trajectory toward the 2050 goal to 2030, the State of California would need reduce emissions an average of 4% per year between 2020 and 2030; however, it did not establish specific emissions limits beyond those defined in AB 32. The Scoping Plan included a discussion of how the framework presented for meeting the 2020 goal is “expandable” to allow for additional reductions, including further reducing the emissions limit in the cap-and-trade system, further expanding the renewable portfolio standard, and further reducing the carbon intensity of transportation fuels. Finally, the Scoping Plan states that measures needed to achieve the 2050 goal are “too far in the future to define in detail” and does not present an example framework for achieving this goal.

Assembly Bill 411: Beach Sanitation: Posting

AB 411 requires the State Department of Health Services to adopt regulations requiring the following:

- Test waters adjacent to all public beaches for microbiological contaminants, including but not limited to, total coliform, fecal coliform, and *Enterococci* bacteria;
- Establish protective minimum standards for the microbiological indicators that the department determines are appropriate for testing;
- Establish protocols for the following:
    - Determining monitoring site locations and monitoring frequency based on risks to public health.
    - Making decisions regarding public notification of health hazards, including, but not limited to the posting, closing, and reopening of public beaches.
- Perform testing weekly between April 1 and October 31 of each year if the beach is visited by 50,000 or more people annually and the storm drain is adjacent with summer flows.

- Monitoring frequency and locations may be reduced if the established minimum standards are not exceeded for 2 consecutive years.

Assembly Bill 939: Integrated Waste Management Act

AB 939 mandates a reduction of waste being disposed and establishes an integrated framework for program implementation, solid waste planning, and solid waste facility and landfill compliance. The California Integrated Waste Management Board (CIWMB) oversees a disposal reporting system, and facility and program planning. On January 1, 2010, all CIWMB duties and responsibilities, along with the Division of Recycling of the Department of Conservation, transferred to the new California Department of Resources Recycling and Recovery (CalRecycle, formerly CIWMB), which is within the Natural Resources Agency.

Assembly Bill 1493

AB 1493, signed in 2002, required that ARB develop and adopt by January 1, 2005, regulations that achieve reduction of GHG emissions from passenger vehicles and light-duty trucks, to begin with vehicles of model year 2009 and later. In 2004, ARB adopted standards requiring automobile manufacturers to meet fleet-average GHG emissions limits for all passenger vehicles with model years 2009–2016; emissions for the 2016 model year are approximately 37% lower than the 2009 model year limits. This is also known as Pavley I.

In April 2010, the U.S. Department of Transportation (DOT) and U.S. Environmental Protection Agency (EPA) established GHG emission and fuel economy standards for model year 2012–2016 light-duty cars and trucks. In the fall of 2010, California accepted compliance with these federal GHG standards as meeting similar state standards as adopted in 2004, resulting in the first coordinated national program, and is currently working with DOT and EPA on the new fuel economy and GHG standards for model year 2017–2025 cars and light-duty trucks. This standard is also known as Pavley II.

Alquist-Priolo Earthquake Fault Zoning Act

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act of 1972 (renamed in 1994) is “to regulate development near active faults so as to mitigate the hazard of surface fault rupture.” The State Geologist (Chief of the California Division of Mines and Geology [DMG]) is required to delineate Earthquake Fault Zones (formerly known as “Special Studies Zones”) along known active faults. As defined by DMG, an active fault is one that has had surface displacement within Holocene time (roughly the last 11,000 years) and/or has an instrumental record of seismic activity. Potentially active faults are those that show evidence of surface displacement during

Quaternary time (roughly the last 2 million years), but for which evidence of Holocene movement has not been established. DMG evaluates faults on an individual basis to determine if a fault will be classified as an Alquist-Priolo Earthquake Fault Zone. In general, faults must meet certain DMG criteria, including seismic activity, historic rupture, and geologic evidence to be zoned as an Earthquake Fault Zone. Cities and counties affected by the zones must regulate certain development within the zones.

California Administrative Code; Title 14, Section 4307

Title 14 Section 4307 requires that no person shall remove, injure, deface, or destroy any object of paleontological, archaeological, or historical interest or value.

Building Codes

Chapter 16A, Division IV of the California Building Code (CBC), titled "Earthquake Design," states that "The purpose of the earthquake provisions herein is primarily to safeguard against major structural failures or loss of life." The CBC and the Uniform Building Code (UBC) regulate the design and construction of excavations, foundations, building frames, retaining walls, and other building elements to mitigate the effects of seismic shaking and adverse soil conditions. The procedures and limitations for the design of structures are based on site characteristics, occupancy type, configuration, structural system height, and seismic zoning. Seismic zones range from 0 to 4, with areas mapped as Zone 4 being potentially subject to the highest accelerations due to seismic shaking and the shortest recurrence intervals. According to the UBC and CBC, the entire San Diego region is within seismic Zone 4. The CBC also contains (1) specific provisions to classify soils as expansive, (2) exploratory boring procedures, (3) soil boring reporting procedures, and (4) special building foundation and investigation requirements.

California Clean Air Act

ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA was adopted in 1988 and required ARB to establish the California Ambient Air Quality Standards (CAAQS). ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and criteria air pollutants. In most cases, the CAAQS are more stringent than the National Ambient Air Quality Standards (NAAQS) and incorporate a margin of safety to protect sensitive individuals.

ARB and local air pollution control districts are currently developing plans for meeting new national air quality standards for ozone and particulate matter 2.5 micrometers or less ($PM_{2.5}$).

California’s adopted 2007 State Strategy was submitted to EPA as a revision to the State Implementation Plan (SIP) in November 2007 (ARB 2008).

California Coastal Act

The California Coastal Commission (CCC) was established in 1972 by voter initiative via Proposition 20. The California Coastal Act of 1976 tasked the agency with protection of coastal resources. The state authority controls construction along the state’s 1,100 miles of shoreline through the issuance of coastal development permits. The CCC assists local governments in implementing local coastal planning and regulatory powers. Under the California Coastal Act, local governments are encouraged to adopt Local Coastal Programs (LCPs). The LCP consists of a Land Use Plan (LUP) with goals and regulatory policies as well as a set of Implementing Ordinances. The cities of Encinitas, Solana Beach, and San Diego have approved LCPs that address potential materials placement sites. Relevant policies specific to each LCP are discussed below under each jurisdiction. San Elijo Lagoon is located within retained jurisdiction and is not addressed by a local LCP.

Several sections of the California Coastal Act focus on shoreline construction, specifically Sections 30235, 30233, and 30706. All of these sections contain an element pertaining to the protection of existing structures and the protection of public beaches in danger of erosion. Under these sections, construction will be allowed through revetments, breakwaters, groins, or other means that alter natural shoreline processes; dredging of open coastal waters, lakes, wetlands, and other areas will be permitted only where less feasible environmentally damaging alternatives are not available. In particular, in Section 30233, dredging and spoils disposal, planned to avoid significant disruption to marine and wildlife habitats and water circulation, is allowed for restoration purposes. Section 30233 states further that dredge spoils suitable for beach replenishment should be transported to appropriate beaches or into suitable longshore current systems.

California Code of Regulations; Title 14 Division 1.5

California Code of Regulations (CCR) Title 14 Division 1.5 establishes the regulations for the California Department of Forestry and Fire Protection (CAL FIRE) and is applicable in all State Responsibility Areas (SRAs)—areas where CAL FIRE is responsible for wildfire protection. Most of the unincorporated area of San Diego County is SRA and any development in these areas must comply with these regulations. Among other things, Title 14 establishes minimum standards for emergency access, fuel modification, setback to property line, signage, and water supply.

California Code of Regulations; Title 14 Section 630(b)(103)

California Code of Regulations; Title 14 Section 630(b)(103) allows for the State Fish and Game Commission to designate areas as ecological reserves. All ecological reserves are maintained for the primary purpose of developing a statewide program for protection of rare, threatened, or endangered native plants, wildlife, aquatic organisms, and specialized terrestrial or aquatic habitat types. Pursuant to this regulation, the State Fish and Game Commission declared the property owned by the County and the State to be the San Elijo Lagoon Ecological Reserve.

California Code of Regulations Title 17

On December 12, 2008, ARB approved subarticle 1 of CCR Title 17 to significantly reduce emissions from existing on-road diesel vehicles operating in California. The regulation requires affected trucks and buses to meet performance requirements between 2011 and 2023. Successful implementation of this measure will reduce diesel fuel consumption, truck operating costs, and nitrogen oxide emissions, as well as accelerate industry adoption of existing technologies to reduce GHG emissions.

California Fish and Game Code

Under Sections 1601–1603 of the Fish and Game Code, agencies are required to notify the California Department of Fish and Wildlife (CDFW) prior to implementing any project that would divert, obstruct, or change the natural flow or bed, channel, or bank of any river, stream, or lake.

California Endangered Species Act

California Endangered Species Act (CESA) (Fish and Game Code Section 2050 et seq.) prohibits the “take” (defined as “to hunt, pursue, catch, capture, or kill”) of state-listed species except as otherwise provided in state law. CESA, administered by CDFW, is similar to the federal Endangered Species Act (ESA), although unlike the federal law, CESA applies incidental take prohibitions to species currently petitioned for state-listing status (i.e., candidate species). State lead agencies are required to consult with CDFW to ensure that their authorized actions are not likely to jeopardize the continued existence of any state-listed species or result in the degradation of occupied habitat.

Under Section 2081, CDFW authorizes “take” of state-listed endangered, threatened, or candidate species through incidental take permits or memoranda of understanding if (1) the take is incidental to otherwise lawful activities, (2) impacts of the take are minimized and fully mitigated, (3) the permit is consistent with regulations adopted in accordance with any recovery plan for the species in questions, and (4) the applicant ensures suitable funding to implement the measures required by CDFW.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) is a California statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. CEQA applies to certain activities of state and local public agencies. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a “project.” A project is an activity undertaken by a public agency or a private activity that must receive some discretionary approval (meaning that the agency has the authority to deny the requested permit or approval) from a government agency that may cause either a direct physical change in the environment or a reasonably foreseeable indirect change in the environment. The environmental review required imposes both procedural and substantive requirements. At a minimum, an initial review of the project and its environmental effects must be conducted. Depending on the potential effects, a further, and more substantial, review may be conducted in the form of an environmental impact report. A project may not be approved as submitted if feasible alternatives or mitigation measures are able to substantially lessen the significant environmental effects of the project.

Title 14 CCR Section 15131

The regulations implementing CEQA state that economic or social factors of a project may be included in a CEQA document but shall not be treated as significant effects on the environment. However, economic or social effects of a project may be used to determine the significance of physical changes caused by a project. Additionally, economic, social, and housing factors should be considered by public agencies together with technological and environmental factors in deciding whether changes in a project are feasible to reduce or avoid the significant effects on the environment.

California Fish and Game Code Section

Section 1602 – Streambed Alteration

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by CDFW under Fish and Game Code Section 1602. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying CDFW:

- substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake; or
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The California Fish and Game Commission defines “stream” as a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. CDFW’s jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. In practice, the CDFW typically extends its jurisdictional limit to the top of a stream, the bank of a lake, or outer edge of the riparian vegetation, whichever is wider. Riparian habitats do not always have identifiable hydric soils, or clear evidence of wetland hydrology as defined by the U.S. Army Corps of Engineers (Corps). Therefore, CDFW wetland boundaries often include, but extend beyond, Corps wetland boundaries. Jurisdictional boundaries under Fish and Game Code Section 1600–1616 (CDFW’s Lake and Streambed Alteration Program) may encompass an area that is greater than that under the jurisdiction of The Clean Water Act (CWA) Section 404. Therefore, jurisdictional waters of the state include jurisdictional “waters of the U.S.”; federal and state jurisdictions do overlap, but would remain distinct for regulatory administration and permitting purposes. A CDFW Streambed Alteration Agreement must be obtained for any project that would result in an impact on a river, stream, or lake.

Section 3503 and 3503.5 – Protection of Birds, Nests, and Raptors

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for the issuance of any type of incidental take permit.

Fully Protected Species

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species and do not provide for authorization of incidental take of fully protected species.

California Government Code, Section 4216: Protection of Underground Infrastructure

This section of the California Government Code requires that an excavator must contact a regional notification center at least 2 days prior to excavation of any subsurface installation. The notification center will notify the utilities that may have buried lines within 1,000 feet of the excavation. Representatives of the utilities are required to mark the specific location of their facilities within the work area prior to the start of excavation. The construction contractor is required to probe and expose the underground facilities by hand prior to using power equipment.

California Government Code Sections 6253, 6254, and 6254.10

These sections authorize county and city governments, respectively, to enact zoning ordinances for the protection and regulation of buildings and structures of special historical value.

California Government Code Section 65860

This section allows counties or cities to regulate the use of buildings, structures, and land between business, industry, residential, and open space.

California Health and Safety Code Sections 7050.5, 7051, and 7052

Section 7050.5 establishes that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. Section 7052 establishes that disturbance of Indian cemeteries is a felony. Section 7052 addresses the removal of human remains from internment or a place of storage while awaiting internment or cremation, with the intent to sell them or to dissect them without authority or with malice or wantonness as a public offense punishable by imprisonment in a state prison.

California Human Health Screening Levels

The California Human Health Screening Levels (CHHSLs) are concentrations of 54 hazardous chemicals in soil or soil gas that the California Environmental Agency (Cal/EPA) considers to be below thresholds of concern for risks to human health. The CHHSLs were developed by the Office of Environmental Health Hazard Assessment on behalf of Cal/EPA and are contained in their report entitled *Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil*. The thresholds of concern used to develop the CHHSLs are an excess lifetime cancer risk of one in a million (10-6) and a hazard quotient of 1.0 for noncancer health effects. The CHHSLs were developed using standard exposure assumptions and chemical toxicity values published by EPA and Cal/EPA. The CHHSLs can be used to screen sites for potential human health concerns where releases of hazardous chemicals to soils have occurred. Under most circumstances, the presence of a chemical in soil, soil gas, or indoor air at concentrations below the corresponding CHHSLs can be assumed to not pose a significant health risk to people who may live (residential CHHSLs) or work (commercial/industrial CHHSLs) at the site.

California Native Plant Protection Act

The Native Plant Protection Act (NPPA) of 1977 (Fish and Game Code Sections 1900–1913) directed CDFW to carry out the Legislature’s intent to “preserve, protect and enhance rare and endangered plants in this State.” The NPPA gave the California Fish and Game Commission the power to designate native plants as “endangered” or “rare” and to protect endangered and rare plants from take.

California Penal Code, Title 14, Sections 622.5 and 623

These sections establish that it is a misdemeanor offense for any person other than the owner to willfully damage or destroy archaeological or historical features on public or privately owned land.

California Public Resources Code Section 5097.5

Public Resources Code (PRC) Section 5097.5 provides that no person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands. Violation of Section 5097.5 is a misdemeanor.

California Public Resources Code Sections 5097.9 through 5097.991

Sections 5097.9 through 5097.991 establish regulations for the protection of Native American religious places; establishes the Native American Heritage Commission (NAHC); establishes repatriation of Native American artifacts; and requires notification of discovery of Native American human remains to a most likely descendant.

California Resolution Number 43

Resolution Number 43 requires all state agencies to cooperate with programs of archaeological survey and excavation, and to preserve known archaeological resources whenever reasonable.

California Scenic Highway Law

The California Scenic Highway Law created the California Scenic Highway Program to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of adjacent lands. The State Legislature established the program through Senate Bill (SB) 1467 (Farr), which was then added to the Streets and Highways Code, Section 260-283. The program defines the process for the designation of official scenic highways. A legislatively appointed body, the Departmental Transportation Advisory Committee, recommends program criteria, reviews applications, and advises the Director of the California Department of Transportation to revoke scenic highways that are no longer in compliance with the program.

California State Coastal Conservancy 2013–2018 Strategic Plan

The California State Coastal Conservancy (Conservancy) recently released their draft 2013–2018 Strategic Plan (CSCC 2012). The Conservancy works with the regulatory agency, the California Coastal Commission, to protect, preserve, and restore the resources of the coastal zone. In 2012, the California legislature approved Senate Bill 1066, which amended Section 31113 of the Public Resources Code to clarify that the Conservancy may undertake and fund projects that address impacts to climate change. The draft 2013–2018 Strategic Plan (Strategic Plan) updated goals from the previous strategic plan to specifically include a goal to “enhance the resiliency of coastal communities and ecosystems to the impacts of climate change.” This is also aligned with the Conservancy’s *Climate Change Policy and Project Selection Criteria*, which identified new approaches to project design and implementation, recognizing that most projects will be affected by a changing climate and that “restoration” should be based on restoring processes rather than a static environmental setting.

California State Lands Commission Public Trust Doctrine

The California State Lands Commission (CSLC) has exclusive jurisdiction over all of California’s tide and submerged lands and the beds of naturally navigable rivers and lakes, which lands are sovereign lands, and swamp and overflow lands and State School Lands (proprietary lands). Authority of the CSLC originates and is exercised from the state’s position as a landowner. The CSLC has statutory authority (Division 6 of the California Resources Code) to approve appropriate uses of state lands under its jurisdiction and is the administrator of the Public Trust Doctrine over sovereign lands.

The Public Trust is a sovereign public property right held by the state or its delegated trustee for the benefit of the people. This right limits the uses of these lands to waterborne commerce, navigation, fisheries, open space, recreation, or other recognized Public Trust purposes. Sovereign lands may only be used for purposes consistent with this public trust; uses include commerce, navigation, fisheries, open space, wetlands, and other related trust uses. The CSLC has an oversight responsibility for tide and submerged lands legislatively granted in trust to local jurisdictions (PRC Section 6301).

Management responsibilities of the CSLC extend to activities within submerged lands (from mean high tide line) and those within 3 nautical miles offshore. These activities include oil and gas developments; harbor development and management oversight; construction and operation of any offshore pipelines or other facilities; dredging; reclamation; use of filled sovereign lands; topographical and geological studies; and other activities that occur on these lands. The CSLC also surveys and maintains title records of all state sovereign lands as well as settles issues of title and jurisdiction. Authorization from the CSLC would be required for implementation of the materials disposal/reuse project component.

California Street and Highways Code

The California Street and Highways Code establishes standards for undertaking the development and designation of official scenic highways and assigns responsibility for the development of scenic highways to local jurisdictions. It establishes the State Scenic Highway system by designating highways that are either eligible for designation as a State Scenic Highway or have been designated as such. The code defines the criteria under which freeways may be designated a California Historic Parkway as a part of the overarching State Scenic Highway system.

City of Encinitas Climate Action Plan

The City of Encinitas adopted a climate action plan (CAP) in 2011 that provides the framework for reducing citywide GHG emissions 12% from their 2005 emissions level by the year 2020. The strategies that the City will implement to achieve those reductions include encouraging alternative transportation, energy efficiency requirements for new residential and nonresidential buildings, installing renewable energy sources, and water use and waste reduction measures. The CAP describes future actions that may include developing an implementation checklist for project compliance and developing GHG thresholds. The CAP focuses GHG reduction strategies on development projects and does not include specific project-level quantitative thresholds.

City of Encinitas General Plan and Local Coastal Program Land Use Plan

The Encinitas General Plan (last amended in 2009 and currently being updated) identifies issues and opportunities relative to planning decisions within Encinitas. The General Plan designates San Elijo Lagoon as Ecological Resource/Open Space/Parks. San Elijo Lagoon and the materials placement sites within Encinitas are located within the coastal zone and are subject to the policies and provisions included in the General Plan's LCP LUP in compliance with the California Coastal Act of 1976. The General Plan's Resource Management Element identifies policies relevant to both lagoon restoration and materials placement activities. The City has authorization to issue coastal development permits, but the California Coastal Commission retains permitting authority over San Elijo Lagoon.

The City of Encinitas General Plan specifies the following goal relative to protection of aesthetic resources (City of Encinitas 1995):

> *Goal* 9: *Preserve the existence of present natural open spaces, slopes, bluff, lagoon areas, and maintain the sense of spaciousness and semirural living within the I-5 View Corridor and within other view corridors, scenic highways, and vista/view sheds as identified in the Resource Management Element (Coastal Act/30240/30251).*

City of Encinitas General Plan; Resource Management Element

The Resource Management Element of the General Plan lists the following goals and policies relative to protection of visual access and vista points:

> *Goal 4*: *The City, with the assistance of the State, Federal, and Regional Agencies, shall provide the maximum visual access to coastal and inland views through the acquisition and development of a system of coastal and inland vista points (Coastal Act/30251).*
>
> *Policies 4.1, 4.2, and 4.3 specify development and/or maintenance of the following vista points within the study area:*
>
> - *San Elijo and Kilkenny (overlooking lagoon and coast)*
> - *West end of "D" Street*
> - *West end of "F" Street*
> - *West end of "J" Street*
> - *West end of "I" Street*

- *Leucadia Beach State Park*
- *Moonlight State Beach*

Existing vista points to be maintained include:

- *Vista point on southbound I-5*
- *Cardiff Beach State Park*

Goal 4.7 identifies scenic highways/visual corridors to be designated as:

- *San Elijo Ave. (and Highway 101) south of Cardiff Beach State Park to Santa Fe Drive*
- *Manchester Ave. from San Elijo Ave. to Encinitas Blvd. Interstate 5, crossing San Elijo*

The Resource Management Element of the General Plan lists the following policy relative to protection of paleontological and cultural resources:

Policy 7.1: Require that paleontological, historical, and archaeological resources in the planning area are documented, preserved or salvaged if threatened by new development.

City of San Diego General Plan and Local Coastal Program

The proposed materials placement site at Torrey Pines is located within the coastal zone as designated by the City of San Diego General Plan (2008). The City's LCP guides development in sensitive coastal areas and provides for the preservation of natural resources. The City's LCP requires any project occurring within the coastal zone to be reviewed by the City and the California Coastal Commission. The materials placement site is also subject to the plans and policies identified in the San Diego Coastal State Park System General Plan, Volume 8: Torrey Pines State Beach and State Reserve (DPR 1984). This plan identifies improvements to facilities at Torrey Pines State Beach and policies intended to protect natural resources in the vicinity of the State Beach.

City of Solana Beach General Plan and Local Coastal Program Land Use Plan Local Implementation Plan (LIP)

The City of Solana Beach General Plan identifies policies and programs to protect and conserve the city's natural resources and sensitive open space areas. It also identifies goals and policies regarding shoreline protection and supports regional efforts to manage beach sand placement. Solana Beach is also located entirely within the state's coastal zone. On March 7, 2012, the

California Coastal Commission approved the City's first LCP/LUP (City of Solana Beach 2012). The City's LCP consists of a LUP and LIP, which together would meet the Coastal Act requirements. The LCP/LUP represents a collaborative planning effort initiated by the City and developed over the course of many years with the participation of various interests, including environmental groups and property owners. The next step is for the City Council to ratify the LCP/LUP. In addition, the LIP still needs to be approved by both the Coastal Commission and the City Council.

The General Plan specifies the following policy relative to aesthetic resources:

Goal 3.2: Protect and enhance sensitive open space areas and viewsheds.

City of Solana Beach General Plan; Circulation Element

The City of Solana Beach Circulation Element of the City of Solana Beach's General Plan states that Highway 101 is classified as a state-designated scenic highway. This is identified as:

- A route with unique or special aesthetic and visual resources that should be protected and upgraded through sensitive highway design and the regulation of development within the scenic corridor.
- A route that provides a pleasant driving environment and community enhancement.

City of Solana Beach General Plan; Conservation and Open Space Element

The Open Space and Conservation Element of the General Plan list the following objectives and policies relative to protection of cultural and paleontological resources:

Objective 6.0: Prevent the loss of important historical, archaeological, and paleontological resources.

The Open Space and Conservation Element of the General Plan lists the following objectives and policies relative to protection of visual access and vista points:

Objective 1.0: Preserve existing open spaces at appropriate locations throughout the city.

Policy 1a. The city shall restrict development along the bluffs overlooking Solana Beach and other areas … to those uses which retain the open space character of these areas …in accordance with the open space plan.

Policy 1b: The city shall ensure the preservation of existing public beaches, parks, trails, open space areas, and golf courses pursuant to the adopted land use element of this general plan.

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Civil Rights Act of 1964

Title VI of the Civil Rights Act prohibits discrimination on the basis of race, color, or national origin by all federal agencies or activities receiving federal financial assistance.

Clean Air Act

At the federal level, EPA is charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970. The most recent major amendments made by Congress occurred in 1990.

The CAA required EPA to establish primary and secondary NAAQS. The CAA also required each state to prepare an air quality control plan, which is referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. EPA is responsible for reviewing all SIPs to determine conformation to the mandates of the CAAA and to determine whether implementation would achieve air quality goals. If EPA determines an SIP is inadequate, a Federal Implementation Plan that imposes additional control measures may be prepared for the nonattainment area.

General Conformity

General conformity requirements were adopted by Congress as part of the CAA and were implemented by EPA regulations in 1993. The purpose of the general conformity program is to ensure that actions taken by the federal government do not undermine state or local efforts to achieve and maintain NAAQS.

The General Conformity Rule (40 CFR Sections 51.850–51.860 and 93.150–93.160), requires any federal agency responsible for an action in a federal nonattainment or attainment/ maintenance area to demonstrate conformity to the applicable SIP. To do so, the federal agency must determine that the action is either exempt from General Conformity Rule requirements or subject to a formal conformity determination. All reasonably foreseeable emissions predicted to result from the action—both direct and indirect—must be considered, and the location and quantity of emissions must be identified.

A federal action is exempt and considered to conform to the SIP if an applicability analysis shows that total direct and indirect emissions of pollutants from construction and operation of the action would be less than specified emission-rate thresholds, known as *de minimis* levels. The *de minimis* levels are based on the attainment/maintenance and nonattainment designations and classifications for the project area. If the action is not determined to be exempt and the emissions would exceed the *de minimis* levels, a formal air quality conformity analysis is required. The action cannot proceed unless mitigation measures are identified that would bring the project into conformance. Only federal nonattainment and maintenance pollutant emissions are considered under a general conformity analysis.

Toxic Air Contaminants

In addition to criteria pollutants, air quality regulations also focus on localized hazardous air pollutants, which are also called toxic air contaminants (TACs). For those TACs that may cause cancer there is, in general, no minimum concentration that does not present some risk. This contrasts with the criteria air pollutants, for which acceptable levels of exposure can be determined and ambient standards have been established (i.e., NAAQS).

EPA and ARB have ongoing programs to identify and regulate TACs. Among the many substances identified as TACs are diesel exhaust particulates, asbestos, and inorganic lead. The regulation of TACs is generally through statutes and rules that require the use of the “maximum achievable” or “best available” control technology (MACT or BACT) to limit TAC emissions.

Particulate exhaust emissions from diesel-fueled engines (diesel PM) were identified as a TAC by ARB in 1998. The control of diesel PM emissions is a prominent concern of regulatory agencies at all levels. The majority of the estimated local health risk from TACs is from diesel PM. The composition of diesel PM emissions from diesel-fueled engines varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present. Federal and state efforts to reduce diesel PM emissions have focused on the use of improved fuels, adding particulate filters to engines, and requiring the production of new-technology engines that emit fewer exhaust particulates.

MACT/BACT for asbestos and lead have been identified for many years and there are established rules and procedures to prevent dispersion and inhalation of these substances. Asbestos is a naturally occurring mineral that was used in building materials for thermal and acoustical insulation and fire resistance until the mid-1980s and a partial ban by EPA was imposed in 1989. Lead was used in paint for housing until 1978 when lead-based paint was banned by EPA for use in housing. Asbestos and lead, when disturbed during building demolition, can become airborne as inhalable health hazard pollutants and, therefore, require abatement before demolition.

Proposed Findings for Greenhouse Gases under the Federal Clean Air Act

On December 7, 2009, EPA signed two distinct findings regarding GHGs under Section 202(a) of the CAA:

- Endangerment Finding: The Administrator finds that the current and projected concentrations of the six principal GHGs threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The Administrator finds that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution which threatens public health and welfare.

Clean Water Act

The principal law that serves to protect the nation’s waters is the Federal Water Pollution Control Act, which was originally enacted in 1948. This legislation, more commonly referred to as the Clean Water Act (CWA), underwent significant revision when Congress, in response to the public’s growing concern of widespread water pollution, passed the Federal Water Pollution Control Act Amendments of 1972. The 1972 legislation established two fundamental, national goals: eliminate the discharge of pollutants into the nation’s waters and achieve water quality that is both “fishable” and “swimmable.” The 1972 amendments to the CWA also prohibited the discharge of any pollutant to waters of the U.S. from any point source (e.g., a discharge pipe) unless the discharge was authorized by a National Pollutant Discharge Elimination System (NPDES) permit. However, non-point source discharges (i.e., storm water or urban runoff) were not fully covered under the NPDES permit program until Congress amended the CWA in 1987. In the 1987 CWA amendments, Congress directed EPA to establish a permitting framework under the NPDES program to address non-point source storm water discharges associated with urban areas and certain industrial activities.

Relative to water quality protection and management for the proposed project, several sections of the CWA are important:

- Section 303(d) – TMDLs
- Section 401 – Water Quality Certification
- Section 402 – NPDES Program
- Section 404 – Discharge of Dredge or Fill Material

These sections are further described below:

Section 303(d) – Total Maximum Daily Loads

CWA Section 303 requires states to adopt water quality standards for all surface waters of the U.S. As defined by the CWA, water quality standards consist of four elements:

- designated beneficial uses of water bodies,
- water quality criteria to protect designated uses,
- an anti-degradation policy to maintain and protect existing uses and high quality waters, and
- general policies addressing implementation issues.

Under CWA Section 303(d), states, territories, and authorized tribes are required to develop a list of water bodies that are considered to be "impaired" from a water quality standpoint. Water bodies that appear on this list either do not meet or are not expected to meet water quality standards, even after the minimum required levels of pollution control technology have been implemented to reduce point-source discharges. The law requires that respective jurisdictions establish priority rankings for surface water bodies on the list and develop action plans (TMDLs) to improve water quality. A TMDL is a calculation of the maximum amount of a specific pollutant that a water body can receive and still meet federal water quality standards as provided in the CWA. TMDLs account for all sources of pollution, including point sources, nonpoint sources, and natural background sources.

The CWA Section 303(d) list of impaired water bodies provides a prioritization and schedule for development of TMDLs for states. The SWRCB, in compliance with CWA Section 303(d), publishes the list of water quality-limited segments in California, which includes a priority schedule for development of TMDLs for each contaminant or "stressor" affecting the water body (SWRCB 2011).

Section 401 – Water Quality Certification

Every applicant for a federal permit or license for any activity that may result in a discharge to a waterbody must obtain State Water Quality Certification for the proposed activity and comply with state water quality standards prescribed in the certification. In California, these certifications are issued by the State Water Resources Control Board (SWRCB) under the auspices of the RWQCB. Most certifications are issued in connection with the Corps' CWA Section 404 permits for dredge and fill discharges.

Section 402 – NPDES Program

Section 402 of the CWA establishes the NPDES permit program to regulate the discharge of pollutants from point sources. The CWA defines point sources of water pollutants as "any discernible, confined, and discrete conveyance" that discharges or may discharge pollutants.

In November 1990, in compliance with the 1987 amendments to the CWA, EPA published NPDES permit application requirements for municipal and industrial storm water discharges. These application requirements include the following:

- Municipalities that own and operate separate storm drain systems serving populations of 100,000 or more, or that contribute significant pollutants to waters of the U.S., must obtain a municipal storm water NPDES permit.
- A municipality must develop and implement a storm water management program to obtain a permit.
- The municipal storm water management program must address how to reduce pollutants in industrial storm water discharges and other discharges that are contributing a substantial pollutant load to their systems.
- Facilities that are discharging storm water associated with industrial activity, including construction activities that disturb 5 or more acres, must acquire industrial storm water NPDES permit coverage.

Permitting the construction or modification of outfall structures, where the discharged effluent is authorized or otherwise complies with an NPDES Permit, also is governed under Nationwide Permit #7, requiring the permittee to submit a pre-construction notification to the district USACE engineer before beginning any project activity.

Although the NPDES Permit program initially focused on point source discharges of municipal and industrial wastewater that were assigned individual permits for specific outfalls, results of the Nationwide Urban Runoff Program identified contaminated storm water as one of the primary causes of water quality impairment. To regulate runoff-related (nonpoint source) discharges, the U.S. Environmental Protection Agency developed a variety of general NPDES Permits for controlling industrial, construction, and municipal storm water discharges, including:

- Commercial, light industrial, and institutional activities;
- Construction activities under 5 acres; and
- Municipal storm drain systems serving populations under 100,000.

The NPDES permit program requires the development and implementation of storm water management plans to reduce such discharges and the pollutants that they contain.

Implementation of the CWA is the responsibility of EPA; however, in many states, EPA has delegated administration of the NPDES permit program to the state water quality control authority. In California, the SWRCB and its RWQCBs administer the NPDES permit program. Currently, discharges from construction, industrial, and municipal activities are regulated under the NPDES permit program.

Section 404 – Discharge of Dredge or Fill Material

This section of the CWA establishes a permit program, administered by the Corps, to regulate the discharge of dredge or fill materials into waters of the U.S., including wetlands. Activities in waters of the U.S. that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry.

Coastal Regional Sediment Management Plan (RSM Plan)

The San Diego Association of Governments' (SANDAG) Coastal Regional Sediment Management Plan (RSM Plan) is a guidance and policy document that outlines solutions to restore and maintain coastal beaches and other critical areas of sediment deficit or excess in the San Diego region. The RSM Plan specifically identifies Beach Erosion Concern Areas (BECAs) throughout California. All materials placement sites for the proposed project are identified as BECAs. The RSM plan also identifies potential sources sediment for beach nourishment, including materials dredged as part of coastal wetlands and lagoon restoration (SANDAG 2009). The proposed project presents an opportunity to further the goals of the RSM Plan through reuse of beach-quality sand in areas along the coast identified as being in critical sediment defect.

Coastal Zone Management Act

The U.S. Congress passed the 1972 Coastal Zone Management Act (CZMA) to manage the nation's coastal resources. The CZMA is administered by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Resource Management. The CZMA balances competing land and water issues in coastal zones through the National Coastal Zone Management Program. Its goal is to preserve, protect, develop, and, where possible, restore or enhance the resources of the nation's coastal zone. Federal activities within or affecting the coastal zone must, to the maximum extent practicable, be consistent with the state's coastal management program.

Construction Dewatering Permits

Construction dewatering discharges must be permitted either by the San Diego RWQCB under the general NPDES Permit Order R9-2008-0002 for construction dewatering discharge to surface waters or authorized to discharge to local publicly owned treatment works (i.e., industrial or sanitary sewer system of municipal wastewater treatment plants). Discharge via either of these mechanisms must meet applicable water quality objectives, constituent limitations, and pretreatment requirements.

Construction General Permit

The State of California adopted a new Construction General Permit effective on July 17, 2012. SWRCB Water Quality Order 2009-0009-DWQ (Construction General Permit; as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ) regulates construction site storm water management. Dischargers whose projects disturb 1 or more acres of soil, or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the general permit for discharges of storm water associated with construction activity. Construction activity subject to this permit includes clearing, grading, and disturbances to the ground, such as stockpiling or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility.

Permit applicants are required to submit a Notice of Intent to the SWRCB and to prepare a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP identifies best management practices (BMPs) that must be implemented to reduce construction effects on receiving water quality based on pollutants. The BMPs identified are directed at implementing both sediment and erosion control measures and other measures to control chemical contaminants. The SWPPP must also include descriptions of the BMPs to reduce pollutants in storm water discharges after all construction phases have been completed at the site (post-construction BMPs). The SWPPP must also contain monitoring programs dependent on site activities and 303(d) impairments of water bodies that are affected by project drainage.

Council on Environmental Quality Guidance

On February 18, 2010, the Council on Environmental Quality (CEQ) Chair issued a memorandum recognizing that many federal actions would result in the emission of GHGs, and that, where a proposed federal action may emit GHG emissions "in quantities that the agency finds may be meaningful," CEQ proposes that an agency's National Environmental Policy Act (NEPA) analysis focus on aspects of the environment that are affected by the proposed action and the significance of climate change for those aspects of the affected environment. In particular, the guidance proposes a reference point of 25,000 metric tons (MT) per year of direct GHG emissions as a "useful indicator" of when agencies should evaluate climate change impacts in their NEPA documents. CEQ notes that this indicator is not an absolute standard or threshold to trigger the discussion of climate change impacts.

County of San Diego General Plan and San Dieguito Community Plan

The County of San Diego General Plan and San Dieguito Community Plan identify San Elijo Lagoon as an important natural preserve and recreational area. The General Plan's Conservation and Open Space Element contains policies related to the management of valuable natural resources where public recreational opportunities are compatible with the preservation of those resources.

Earthquake Hazards Reduction Act

In 1977, Congress passed the Earthquake Hazards Reduction Act (Public Law 95-124) establishing the National Earthquake Hazards Reduction Program as a long-term earthquake risk reduction program for the United States. The program initially focused on research, led by the U.S. Geologic Survey (USGS) and National Science Foundation, toward understanding and ultimately predicting earthquakes. The current program activities are focused on four broad areas:

- Developing effective measures to reduce earthquake hazards;
- Promoting the adoption of earthquake hazard reduction activities by federal, state, and local governments, national building standards and model building code organizations, engineers, architects, building owners, and others who play a role in planning and constructing buildings, bridges, structures, and critical infrastructure or "lifelines";

- Improving the basic understanding of earthquakes and their effects on people and infrastructure, through interdisciplinary research involving engineering, natural sciences, and social, economic, and decision sciences; and
- Developing and maintaining the Advanced National Seismic System, the George E. Brown Jr. Network for Earthquake Engineering Simulation, and the Global Seismic Network.

Endangered Species Act

The federal ESA of 1973 (16 United States Code [USC] Sections 1531 et seq.) directs the U.S. Fish and Wildlife Service (USFWS) to identify and protect endangered and threatened species and their critical habitat, and to provide a means to conserve their ecosystems. Section 9 of the ESA makes it unlawful for a person to take a listed animal without a permit. "Take" is defined by the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" (16 USC 1532(19). Through regulations, the term "harm" is interpreted to include actions that modify or degrade habitats to a degree that significantly impairs essential behavioral patterns, including breeding, feeding, or sheltering.

Section 7 of the ESA directs USFWS to use its existing authority to conserve threatened and endangered species and, in consultation with federal agencies, ensure that any action authorized, funded, or carried out by such agency does not jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that would be needed for its recovery.

Section 7(a)(2) requires federal agencies to consult with USFWS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species. In consultation for those species with critical habitat, federal actions must also ensure that activities do not adversely modify critical habitat to the point that it would no longer aid in the species' recovery.

Escondido Creek Watershed Restoration Action Plan

The Escondido Creek Watershed Restoration Action Plan provides background information about the Escondido Creek Watershed for use in watershed analyses; to identify gaps in information; and to prioritize potential restoration, enhancement, and acquisition of natural areas. Restoration of San Elijo Lagoon was identified within this plan as an action that would help restore and improve watershed quality.

Executive Order 11990 – Protection of Wetlands

EO 11990 is an overall wetlands policy for all agencies managing federal lands, sponsoring federal projects, or providing federal funds to state or local projects. This EO 11990 requires that when a construction project involves wetlands, a finding must be made by the federal agency that there is no practicable alternative to such construction, and that the proposed action includes all practicable measures to minimize impacts to wetlands resulting from such use.

Executive Order 12088

EO 12088 requires federal compliance with applicable pollution control standards concerning air and water pollution, and hazardous materials and substances. Federal agencies are directed to consult with state and local agencies concerning the best techniques and methods available for the prevention, control, and abatement of environmental pollution.

Executive Order 12898

EO 12898 and the President's February 11, 1994 Memorandum on Environmental Justice (sent to the heads of all departments and agencies) are intended to ensure that federal departments and agencies identify and address disproportionately high and adverse human health or environmental effects of their policies, programs, and activities on minority populations and low-income populations. This consideration extends to permits issued by federal agencies.

Executive Order 13045

EO 13045, Protection of Children from Environmental Health Risks and Safety Risks, focuses on environmental health risks and safety risks that may affect children. EO 13045 was prompted by the recognition that children are more sensitive than adults to adverse environmental health and safety risks because they are still undergoing physiological growth and development.

Executive Order 13112, Invasive Species

EO 13112 requires federal agencies to "prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health effects that invasive species cause." An invasive species is defined by EO 13112 as "an alien species [a species not native to the region or area] whose introduction does or is likely to cause economic or environmental harm or harm to human health."

Executive Order S-1-07

EO S-1-07, which was signed in 2007, establishes a goal that the carbon intensity of transportation fuels sold in California should be reduced by a minimum of 10% by 2020.

Executive Order S-3-05

EO S-3-05, signed in 2005, states that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea level. To combat those concerns, EO S-3-05 established total GHG emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80% below the 1990 level by 2050.

Further, the Secretary of CalEPA is directed to coordinate a multi-agency effort to reduce GHG emissions to the target levels. The Secretary will also submit biannual reports to the governor and California State legislature describing progress made toward reaching the emission targets, impacts of global warming on California's resources, and mitigation and adaptation plans to combat these impacts.

Executive Order S-13-08

EO S-13-08 launched a major initiative for improving the state's adaptation to climate impacts from sea level rise, increased temperatures, shifting precipitation, and extreme weather events. It ordered a California Sea Level Rise Assessment Report to be conducted by the National Academy of Sciences, which was released in 2012 (COSLR 2012). It also ordered the development of a California Climate Change Adaptation Strategy by the California Natural Resources Agency (CNRA). The Strategy, published in December 2009, assesses the state's vulnerability to climate change impacts, and outlines possible solutions that can be implemented within and across state agencies to promote resiliency (CNRA 2009). The Strategy focuses on seven areas: public health, biodiversity and habitat, ocean and coastal resources, water management, agriculture, forestry, and transportation and energy infrastructure. A progress report was been issued in 2010 describing progress for each sector, amending CEQA, and the Cal-Adapt website was developed to support local governments in adaptation planning (CNRA 2010).

Executive Order 11988 – Floodplain Management

Executive Order 11988 directs federal agencies to avoid, to the extent practicable and feasible, short- and long-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever a practicable alternative exists. Furthermore, Executive Order 11988 requires the prevention of uneconomic, hazardous, or incompatible use of floodplains; protection and preservation of natural and beneficial floodplain values; and consistency with the standards and criteria of the National Flood Insurance Program (NFIP). The basic tools for regulating construction in potentially hazardous floodplain areas are local zoning techniques and Federal Emergency Management Agency (FEMA) floodplain mapping. The Federal Insurance Rate Map (FIRM) is the official map created and distributed by FEMA and NFIP that delineates Special Flood Hazard Areas (SFHAs)—areas that are subject to inundation by a base flood—for every county and community that participates in the NFIP.

For projects that would, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source, and thus would result in the modification of the existing regulatory floodway, effective Base Flood Elevations, or an SFHA, a Conditional Letter of Map Revision (CLOMR) would be necessary. A CLOMR is FEMA's comment on a proposed project that would make such hydrologic modifications. A Letter of Map Revision (LOMR) is FEMA's modification to an effective FIRM based on the implementation of physical measures that affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway.

Magnuson-Stevens Fishery Management and Conservation Act, as amended 1996 (Public Law 104-267)

Federal agencies must consult with National Oceanic and Atmospheric Administration (NOAA) Fisheries on actions that may adversely affect Essential Fish Habitat (EFH). EFH is defined as those "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." NOAA Fisheries encourages streamlining the consultation process using review procedures under NEPA, Fish and Wildlife Coordination Act, CWA, and/or federal ESA provided that documents meet requirements for EFH assessments under Section 600.920(g). EFH assessments must include (1) a description of the proposed action, (2) an analysis of effects, including cumulative effects, (3) the federal agency's views regarding the effects of the action on EFH, and (4) proposed mitigation, if applicable.

Mandatory Greenhouse Gas Reporting Rule

On October 30, 2009, EPA published the final version of the Mandatory Greenhouse Gas Reporting Rule in the *Federal Register*. In general, this national reporting requirement will provide EPA with accurate and timely GHG emissions data from facilities that emit 25,000 MT or more of carbon dioxide (CO_2) per year.

Marine Life Protection Act

The Marine Life Protection Act (MLPA) of 1999 directs the state to redesign California's system of marine protected areas to function as a network in order to increase coherence and effectiveness in protecting the state's marine life and habitats, marine ecosystems, and marine natural heritage, as well as to improve recreational, educational, and study opportunities provided by marine ecosystems subject to minimal human disturbance. Under the MLPA, San Elijo Lagoon is designated as State Marine Conservation Area (SMCA). The Moonlight Beach and Cardiff receiver sites, as well as SO-6, fall within the Swami's State Marine Conservation Area.

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) was enacted on October 21, 1972. All marine mammals are protected under the MMPA. The MMPA was enacted in response to increasing concerns among scientists and the public that significant declines in some species of marine mammals were caused by human activities. The MMPA established a national policy to prevent marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part. The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States. The MMPA was amended substantially in 1994 to provide certain exceptions to the take prohibitions, including for small takes incidental to specified activities, when access by Alaska Natives to marine mammal subsistence resources can be preserved, and permits and authorizations for scientific research; and a program to authorize and control the taking of marine mammals incidental to commercial fishing operations.

Marine Protection, Research, and Sanctuaries Act

In 1972, Congress enacted the Marine Protection, Research, and Sanctuaries Act (MPRSA, also known as the Ocean Dumping Act) to prohibit the dumping of material into the ocean that would unreasonably degrade or endanger human health or the marine environment. MPRSA regulates the ocean dumping of all material beyond the territorial limit (three miles from shore) and prevents or strictly limits dumping material that "would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities." Virtually all material ocean dumped today is dredged material (sediments) removed from the bottom of waterbodies in order to maintain navigation channels and berthing areas. Other materials that are currently ocean disposed include fish wastes, human remains, and vessels. Ocean dumping cannot occur unless a permit is issued under the MPRSA. Section 103 of

MPRSA authorizes the Corps to issue permits for transport and disposal of dredged material (i.e., material excavated from navigable U.S. waters) at designated ocean disposal sites, using EPA's environmental criteria and subject to EPA's concurrence. For all other materials, EPA is the permitting agency. EPA is also responsible for designating recommended ocean dumping sites for all types of materials.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC Sections 703–712) makes it unlawful to take or possess migratory birds, except as permitted by USFWS. The MBTA protects all migratory bird, their eggs, their body parts, or their nests. Essentially all avian species native to the United States are protected under the provisions of the MBTA; introduced species and nonmigratory upland game birds are not protected by the MBTA. "Take" under the MBTA is defined "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" protected birds (50 Code of Federal Regulations [CFR] 10.12). The current list of species protected by the MBTA includes several hundred species. Nearly all native birds in the San Diego region are considered migratory. Permits for take of nongame migratory birds can be issued only for specific activities, such as scientific collecting, rehabilitation, propagation, education, taxidermy, or protection of human health or safety and personal property.

National Flood Insurance Act

The National Flood Insurance Act of 1968 established the NFIP. The NFIP is a federal program administered by the Flood Insurance Administration of the Federal Emergency Management Agency (FEMA). It enables individuals who have property (a building or its contents) within the 100-year floodplain to purchase insurance against flood losses. FEMA works with the states and local communities to identify flood hazard areas and publishes a flood hazard boundary map of those areas.

Natural Community Conservation Plans and Habitat Conservation Plans

Over the past two decades, regional planners have focused considerable effort on preparation of four habitat conservation plans (HCPs): the Multiple Species Conservation Program (MSCP) South, finalized in 1998; the Multiple Habitat Conservation Program (MHCP), finalized in 2003; the North County Multiple Species Conservation Program (NCMSCP), anticipated for completion in 2011; and the East County MSCP, which is expected to begin after the NCMSCP is adopted.

Six jurisdictions (the cities of Carlsbad, Chula Vista, La Mesa, Poway, San Diego, and the southern portion of the County of San Diego), have approved HCPs and signed implementing agreements that collectively cover 20% of the San Diego region. Seven jurisdictions (the cities of Encinitas, Escondido, Oceanside, San Marcos, Santee, Vista, and the northern portion of the County of San Diego) are working on agreements that cover another 73% of the region. Seven jurisdictions (the cities of Coronado, Del Mar, El Cajon, Imperial Beach, Lemon Grove, National City, and Solana Beach), which collectively cover slightly more than 1% of the region, are not pursuing agreements because they have limited natural habitats within their boundaries. The remaining 6% of the San Diego region is on military land conserved by Integrated Natural Resource Management Plans, which are developed under voluntary, cooperative agreements among a Department of Defense installation, USFWS, and CDFW.

The regional HCPs in the San Diego region are designed to provide an umbrella of protection for multiple species by conserving their habitats and the linkages that allow them to travel between habitats. The HCPs were designed under the State’s Natural Communities Conservation Planning program.

Two regional planning documents cover the San Elijo Lagoon Ecological Reserve, the North County Multiple Species Conservation Plan (NC Plan) (County of San Diego 2009) and the MHCP (AMEC et al. 2003). The NCMSCP NC Plan expands the County MSCP into the northwestern unincorporated areas of the County. The portions of the lagoon owned by the County of San Diego are within the NC Plan area. Portions of the Biological Study Area are within conservation areas referred to as the Preserve Area and Pre-Approved Mitigation Area under the draft NCMSCP NC Plan (County of San Diego 2009).

The MHCP plan serves as an umbrella document to guide the preparation of subarea plans by each participating city and does not itself receive any permits (AMEC et al. 2003). To be approved, subarea plans must be consistent with the conservation and policy guidelines of the MHCP plan. The Encinitas Subarea Plan is the MHCP implementing document within the Project Area (Ogden et al. 2001). The Encinitas Subarea Plan includes lands under the ownership of the San Elijo Lagoon Conservancy and State of California as well as some lands owned by the County of San Diego within the MHCP. The Encinitas Subarea Plan designates the planned land use for the lagoon as parks/open space. The lagoon is considered a part of the Hardline Focused Planning Area within the Subarea Plan.

Both the NCMSCP NC Plan and Encinitas Subarea Plan are currently in draft form; however, lands in both plans would eventually need to be reconciled in one plan or the other. Activities within these areas need to be consistent with the NCMSCP NC Plan and MHCP. However, any take would be issued, as needed, by USFWS and CDFW through Section 7 consultation and CESA.

National Environmental Policy Act, *as amended*

NEPA established a U.S. national policy promoting the enhancement of the environment and also established the CEQ. NEPA requires federal agencies to conduct an interdisciplinary analysis of the environmental consequences of their actions early in the decision-making process. NEPA is to ensure that environmental factors are weighted equally when compared to other factors in the decision-making process undertaken by federal agencies. CEQ regulations (40 CFR Parts 1500–1508) set the standard for NEPA compliance. CEQ also requires agencies to create their own NEPA implementing procedures. These procedures must meet the CEQ standard while reflecting each agency's unique mandate and mission. Consequently, NEPA procedures vary from agency to agency. Further procedural differences may derive from other statutory requirements and the extent to which federal agencies use NEPA analyses to satisfy other review requirements.

National Highway System Designation Act of 1995

This landmark legislation designates almost 260,000 kilometers (160,955 miles) of roads as the National Highway System (NHS). Title III, Section 304 of the legislation Guidelines for Determining Significance 8 Visual Resources allows, but does not mandate, design standards for NHS projects that take into account the constructed and natural environment of the area including the environmental, scenic, aesthetic, historic, community, and preservation impacts of the proposed activity.

National Highway Transportation Safety Administration Fuel Economy Standards for Medium- and Heavy-Duty Engines

On August 9, 2011, EPA and the National Highway Transportation Safety Administration announced the first national fuel economy standards for medium- and heavy-duty trucks that will be implemented for new engines with model years 2014 through 2018. The agencies estimate that the standards will save an estimated 270 million metric tons of CO_2e for vehicles subject to this ruling

National Historic Preservation Act

The National Historic Preservation Act (NHPA), as amended (16 USC Sections 470–470w), is the fundamental law concerning the protection of cultural resources on federal land, or that may be affected by an undertaking that requires federal financial assistance, or a federal permit, license, or approval. Under the NHPA, its amendments, and its implementing regulations, federal agencies are required to responsibly manage federally owned or controlled cultural resources. Federal agency requirements pertinent to the San Elijo Lagoon Restoration Project (SELRP) are addressed in Section 106 of the NHPA and its implementing regulations.

Section 106

Section 106 of the NHPA requires federal agencies to take into consideration the potential effects of their undertakings on historic properties, and is generally applicable when an undertaking is the type of activity that has the potential to affect such properties. Federal undertakings include federal projects, permits, grants, and loans. The purpose of Section 106 is to avoid unnecessary impacts to historic properties from federal undertakings. The Section 106 review process is described in the Advisory Council on Historic Preservation regulations (36 CFR Part 800, as amended August 5, 2004) and Corps regulations at 33 CFR Part 325, Appendix C. Section 106 regulations (36 CFR Section 800.16[1]) define historic properties as archaeological sites, districts, buildings, structures, or objects that are included or eligible for inclusion in the National Register of Historic Places (NRHP) (36 CFR Section 60). Significance in American history, architecture, archaeology, engineering, and culture is defined as follows:

> …districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association; and (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (d) that have yielded, or may be likely to yield, information important in prehistory or history (36 CFR Section 60.4).

Typically, to be eligible for listing in the NRHP, a property must be at least 50 years old, or have reached 50 years old by the project completion date and retain a high level of integrity of those attributes that contribute to the property’s qualifications for the NRHP.

Section 106 and the implementing regulations provide a systematic mechanism for taking into account the effects on NRHP-eligible resources from actions that are federally sponsored, funded, or licensed. It requires that the State Historic Preservation Officer and Native American tribes with historic ties to the area (and possibly other parties) be afforded an opportunity to comment on the undertaking. Native American consultation to meet Section 106 requirements will be conducted by the Corps.

Noise Ordinances

Most of the jurisdictions in which the SELRP would occur have noise ordinances that establish construction noise standards that would be applicable to the SELRP. A noise ordinance typically includes limitations on the hours that construction work may be performed, maximum allowable noise levels, or both. In addition to the specific requirements, each ordinance typically includes a "General Prohibition" on noise that prohibits disturbing, excessive, or offensive noise that causes discomfort or annoyance to reasonable persons of normal sensitivity. A noise ordinance usually contains conditions and procedures for obtaining variances from construction noise limitations. Table F-1 summarizes the standards applicable at sensitive receptors. There are no applicable noise standards at materials placement sites within the California State Parks System (four of the five beach sites) nor for the offshore disposal locations (LA-5 and SO-5/SO-6).

Table F-1
Applicable Noise Ordinance Criteria

Location	Jurisdiction	Construction Hours Prohibited	Construction Noise Limits
Dredging, New Hwy 101 and NCTD Bridges			
San Elijo Lagoon	Encinitas [1]	7:00 p.m.–7:00 a.m. weekdays, 7:00 p.m.–8:00 a.m., Saturday; Sundays; holidays	75 $\text{dBA}_{(8)}$ per 24-hr. period at residential properties
	Solana Beach[2]	7:00 p.m.–7:00 a.m. weekdays, 7:00 p.m.–8:00 a.m., Saturdays; Sundays; holidays	75 $\text{dBA}_{(8)}$ per 24-hr. period at residential properties
	County of San Diego[3]	7:00 p.m.–7:00 a.m. weekdays, 7:00 p.m.–8:00 a.m., Saturdays; Sundays; holidays	75 $\text{dBA}_{(8)}$ per 24-hr. period at residential properties
Sand Placement Sites			
Solana Beach	Solana Beach	7:00 p.m.–7:00 a.m. weekdays, 7:00–8:00 a.m., Saturdays; Sundays; holidays	75 $\text{dBA}_{(8)}$ per 24-hr. period at residential properties
Moonlight Beach	California Department of Parks and Recreation	None	None
Leucadia			
Cardiff			
Torrey Pines			

Sources:

[1] Encinitas Municipal Code Section 9.32.410, Variance procedures – Section 9.32.424.

[2] Solana Beach Municipal Code Section 7.34.100. Variance procedures – Section 7.34.240–400.

[3] County of San Diego Code Sections 36.408, 36.416, Variance procedures – Section 36.423

Norman Y. Mineta and Special Programs Improvement Act [Public Law 108-426]

This act, established by DOT, Pipeline and Hazardous Materials Safety Administration, regulates safe movement of hazardous materials to industry and consumers by all modes of transportation, including pipelines. The regulations require pipeline owners and operators to meet specific standards and qualifications, including participating in public safety programs that "notify an operator of proposed demolition, excavation, tunneling, or construction near or affecting a pipeline." This includes identifying pipelines that may be affected by such activities and identifying any hazards that may affect a pipeline. In California, pipeline safety is administered by the Office of the Fire Marshal.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act (California Water Code Division 7 Section 13000), the SWRCB is provided with the ultimate authority over state water quality policy. However, Porter-Cologne also established nine RWQCBs to provide oversight on water quality issues at a regional and local level. The RWQCB must prepare and periodically update water quality control plans (basin plans). Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Projects that affect wetlands or waters of the state may require waste discharge requirements from the RWQCB, which may be issued in addition to a water quality certification or waiver under Section 401 of the CWA.

Public Utilities Code [California Public Utilities Commission General Order 131-D]

Public electric utilities are regulated by the California Public Utilities Commission (CPUC). General Order 131-D sets forth provisions that must be adhered to when public electric utilities construct any new electric power generating plant or modify an existing electric power generating plant, substation, or electric transmission, power, or distribution line. A Permit to Construct must be obtained from CPUC, except when planned electrical facilities would be under 200 kilovolts and are part of a larger project that has undergone the adequate level of CEQA review and approval.

CPUC regulates Investor-Owned Utilities, including those that offer electric, natural gas, steam, and petroleum service to consumers. CPUC regulates both electric and natural gas rates and services provided by these utilities, including in-state transportation over the utilities' transmission and distribution pipeline systems, storage, procurement, metering, and billing.

Rivers and Harbors Act, Section 10

Section 10 of the Rivers and Harbors Act, administered by the Corps, requires permits for all structures (such as riprap) and activities (such as dredging) in navigable waters of the U.S.

San Diego Coastal State Park General Plan

The San Diego Coastal State Parks General Plan was prepared in 1984 by the California State Department of Parks and Recreation. The plan outlines long-range goals for the nine State Park System units on the San Diego County Coast, including the following state beaches: Carlsbad, South Carlsbad, Leucadia, Moonlight, San Elijo, Cardiff, Torrey Pines, and Silver Strand. The plan establishes a variety of management objectives that are intended to reduce or eliminate erosion, protect natural and cultural resources, and provide direction for future development effort near these state beaches.

San Diego County Code Chapter 6, Resource Protection Ordinance

The Resource Protection Ordinance, Chapter 6, provides definitions pertaining to natural and cultural resources, and presents measures for the protection of San Diego County sensitive lands, defined as wetlands, floodplains, steep slopes, sensitive biological habitats, and prehistoric and historic sites.

San Diego County Vector Control Program

The San Diego County Vector Control Program (SDCVCP) is a branch within the County of San Diego – Department of Environmental Health. The SDCVCP is responsible for mosquito and vector-borne disease surveillance and control services in all 18 incorporated cities and the unincorporated areas of San Diego County. The SDCVCP has been reducing and controlling mosquitoes and other vectors since the 1930s. It is managed by County staff and is governed by the San Diego County Board of Supervisors.

San Diego Municipal Storm Water Permit

In May of 2013, the RWQCB adopted Order R9 -2013-0001, also referred to as the Municipal Storm Water Permit to the County of San Diego, the 18 incorporated cities of San Diego County, San Diego Unified Port District, and the San Diego County Regional Airport Authority. This was the fourth renewal of the Municipal Storm Water Permit (first issued on July 16, 1990, and then renewed in 2001, 2007, and 2013). The Municipal Storm Water Permit requires that each jurisdiction covered under the permit prepare a Jurisdictional Urban Runoff Management Plan

(JURMP). Each of these JURMPs includes a component addressing municipal activities, industrial/commercial activities, construction, development planning, residential activities, and public education/outreach.

In accordance with the provisions of the Municipal Permit, the County of San Diego developed a Standard Urban Runoff Mitigation Plan (SUSMP) (County of San Diego 2011) and an SUSMP manual (County of San Diego 2008). The SUSMP and manual identify mitigation strategies required to protect storm water quality for new development and significant redevelopment within the San Diego region. The County's model SUSMP outlines a template for municipalities within the San Diego region to follow in preparing their respective SUSMPs. Development within each respective County of San Diego municipality is subject to each respective SUSMP, accordingly.

The County's SUSMP establishes a series of source control, site design, and treatment control BMPs that are to be implemented by all Priority Development Projects (PDP). Adherence with the guidance provided by the County of San Diego Low Impact Development (LID) Handbook (County of San Diego 2007) and compliance with the Stormwater Pollutant Sources/Source Control Checklist included in the County's Model SUSMP (County of San Diego 2011) or related municipal SUSMP would reduce potential storm water runoff impacts to levels of insignificance.

The City of Encinitas complied with County SUSMP requirements through the development of their Stormwater Manual, Chapter 7 of their Engineering Design Manual (City of Encinitas 2009). The Stormwater Manual was developed as a resource for project applicants and is enforceable by reference to the City of Encinitas Best Management Practices (BMP) Manual II. The Stormwater Manual is a policy document that defines the process and procedure for project applicants and should be used to choose and design LID and Integrated Management Practices features to ensure compliance with storm water standards. The BMP Manual II establishes minimum storm water standards and legal authority for water quality requirements of PDP.

Hydromodification Management Plan

Provision D.1 of RWQCB Order R9-2013-0001 requires the San Diego Stormwater Copermittees (the cities within the San Diego region as well as the County government) to implement a Hydromodification Management Plan (HMP) "to manage increases in runoff discharge rates and durations from all PDP, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force."

To address this permit condition, the Copermittees proceeded with developing an HMP that meets the intent of RWQCB Order R9-2013-0001 as a part of their SUSMP. The HMP requires PDP to implement hydrologic control measures so that post-project runoff flow rates and durations do not exceed pre-project flow rates and durations where they would result in an increased potential for erosion or significant impacts to beneficial uses or violate the channel standard. Since the proposed project would discharge to the Pacific Ocean and/or a tidally influenced area, the proposed project would be exempt from the HMP requirements.

SANDAG Board Policy No. 25: Public Participation/Involvement Policy

The SANDAG Public Involvement Program is designed to inform and involve the region's residents in the decision-making process on issues such as growth, transportation, and public transit; environmental management; housing; open space; air quality; energy; fiscal management; economic development; interregional and binational collaboration; and public safety. The goal of this policy is to ensure that all people are treated fairly and are given equal opportunity to participate in the planning and decision-making process, with an emphasis on ensuring that traditionally disadvantaged groups are not left behind. This policy also ensures that plans, policies, and actions do not disproportionally affect low-income and minority communities.

San Diego Regional Water Quality Control Board Basin Plan

The Basin Plan for the San Diego Basin, most recently amended in 2012, sets forth water quality objectives for constituents that could have a significant impact related to the beneficial uses of water. Specifically, the Basin Plan is designed to accomplish the following:

(1) Designate beneficial uses for surface water and groundwater,

(2) Set the narrative and numerical water quality objectives that must be attained or maintained to protect the designated beneficial uses and conform to California's antidegradation policy,

(3) Describe implementation programs to protect the beneficial uses of all water in the region, and

(4) Describe surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan.

Under the CWA, 303(d) listed water body segments are impaired for specific pollutants. These impairments are dependent upon the beneficial uses of the water body. When beneficial uses, as defined in the Basin Plan, of a water body are impaired by a particular pollutant, the water body would be a candidate for 303(d) listing and the establishment of a TMDL.

San Elijo Lagoon Action Plan

The San Elijo Lagoon Action Plan (1998) identifies specific implementable actions to improve the biological productivity of San Elijo Lagoon. It also describes an endowment structure, management plan, and procedures for establishing a mechanism for providing long-term financial support for sustaining tidal flushing and implementing important creation, restoration, and enhancement projects at the lagoon.

San Elijo Lagoon Area Enhancement Plan

The San Elijo Lagoon Enhancement Plan (1996) provides a long-range plan to preserve and provide for the habitat needs of wildlife while maximizing passive recreational and educational opportunities for the public. The plan details existing conditions and identifies enhancement planning concepts such as dredging, alternate inlet locations, transportation corridor modifications, and removal of invasive species.

San Elijo Lagoon Ecological Reserve Vegetation Management Plan

The Vegetation Management Plan has been prepared to address risks associated with fire to lives and property in the Solana Beach neighborhoods adjacent to the project area and to protect the public’s interest in the Reserve. The Vegetation Management Plan provides a comprehensive plan for locations where wildland interface exists in the Reserve and guides the removal of exotic vegetation and thinning of native vegetation in select areas to help reduce risks.

Senate Bill 97

SB 97, signed August 2007, acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the California Office of Planning and Research to develop amendments to the CEQA Guidelines for addressing GHG emissions. The amendments became effective March 18, 2010.

Senate Bill 922

SB 922 provides an exemption for Native American graves, cemeteries, archaeological site information, and sacred places in the possession of the NAHC, state, or local agencies from the California Public Records Act.

Senate Bill 1374: Local Government Construction and Demolition (C&D) Guide

SB 1374 seeks to assist jurisdictions with diverting their C&D material, with a primary focus on CalRecycle (formerly CIWMB) developing and adopting a model C&D diversion ordinance for voluntary use by California jurisdictions.

Senate Bill X1-2

In 2002, California established a Renewables Portfolio Standard (RPS) program, with the goal of increasing the percentage of renewable energy in retail sales of electricity. SB 1078 (2002) required investor-owned utilities to attain 20% RPS goal by 2020; SB 107 (2006) accelerated the timeframe for the goal to be achieved by 2010. On April 12, 2011, SB X1-2 was signed, requiring California electric utilities to procure 33% of their total energy supplies from certified renewable sources by December 31, 2020.

Senate Concurrent, Resolution Number 87

Resolution Number 87 provides for the identification and protection of traditional Native American resource-gathering sites on state land.

Seismic Hazards Mapping Act of 1990

The Seismic Hazards Mapping Act (SHMA) of 1990 (PRC Sections 2690–2699.6) directs the California Geological Survey to identify and map areas prone to earthquake hazards of liquefaction, earthquake-induced landslides, and amplified ground shaking. The purpose of the SHMA is to reduce the threat to public safety and to minimize the loss of life and property by identifying and mitigating these seismic hazards. Staff geologists in the Seismic Hazard Mapping Program compile Seismic Hazard Zone Maps to designate Zones of Required Investigation for areas prone to liquefaction and earthquake–induced landslides. Cities and counties are required to use the Seismic Hazard Zone Maps in their land use planning and building permit processes.

Shoreline Preservation Strategy

SANDAG’s Shoreline Preservation Strategy (SPS) was developed in 1993 and proposes an extensive beach building and maintenance program for critical shoreline erosion areas in the region. The SPS emphasizes the importance of the shoreline to San Diego’s environment and economy, and emphasizes the need to protect critical shoreline erosion areas, including the project study area, through a menu of activities, including beach building as the primary shoreline management tactic. Sand sources include opportunistic use of projects being implemented within the region. Information from the SPS established a baseline guideline for the level of comprehensive nourishment needed for the San Diego region considered in the Coastal Regional Sediment Management Plan.

State Implementation Plan

In San Diego County, the San Diego Air Pollution Control District (SDAPCD) is the agency responsible for protecting the public health and welfare through the administration of federal and state air quality laws and policies. SDAPCD is responsible for monitoring air pollution, preparing the San Diego County portion of the SIP, and publicizing rules and regulations. The SIP includes strategies and tactics to be used to attain and maintain acceptable air quality in the County; this list of strategies is called the Regional Air Quality Strategy. The rules and regulations include procedures and requirements to control the emission of pollutants and prevent significant adverse impacts.

In response to the federal nonattainment designation for the 8-hour ozone standard, SDAPCD prepared, and ARB approved and submitted, the *Eight-Hour Ozone Attainment Plan for San Diego County* to EPA in May 2007. The plan identifies control measures and associated emission reductions necessary to demonstrate attainment of the 8-hour ozone NAAQS. The SIP provides plans for attaining and maintaining the 8-hour NAAQS for ozone and demonstrates how the San Diego Air Basin (SDAB) would continue to maintain compliance with federal carbon monoxide (CO) standards. SDAB achieved the NAAQS for CO in 1993 and EPA approved a 10-year maintenance plan in 1998. The current version of the maintenance plan is the *2004 Revision to the California State Implementation Plan for Carbon Monoxide Updated Maintenance Plan for Ten Federal Planning Areas*.

SDAPCD does not have quantitative emissions limits for construction activities, nor for long-term emissions that may result from increased vehicle use. The Rules and Regulations include procedures and requirements to control emissions of pollutants and to prevent adverse impacts.

Surface Mining and Reclamation Act of 1975

The Surface Mining and Reclamation Act (SMARA) (PRC Sections 2710–2796) provides a comprehensive surface mining and reclamation policy with the regulation of surface mining operations to ensure that adverse environmental impacts are minimized and mined lands are reclaimed to a usable condition. SMARA also encourages the production, conservation, and protection of the state’s mineral resources. PRC Section 2207 provides annual reporting requirements for all mines in the state, under which the State Mining and Geology Board is also granted authority and obligations.

U.S. Geological Survey Landslide Hazard Program

The USGS created the Landslide Hazard Program (LHP) in fulfillment of the requirements of Public Law 106-113. The primary objective of the LHP is to reduce long-term losses from landslide hazards by improving the understanding of the causes of ground failure and suggesting mitigation strategies. The federal government takes the lead role in funding and conducting this research, whereas the reduction of losses due to geologic hazards is primarily a state and local responsibility. In the San Diego region, the Unified Disaster Council is the governing body of the Unified San Diego County Emergency Services Organization.

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APPENDIX D

HYDROLOGY/HYDRAULIC STUDY

San Elijo Lagoon Restoration Project Hydrology/Hydraulic Study

Final Report

June 2012

Revised: March 14, 2014

Amended: July 18, 2014

Prepared for:

The San Elijo Lagoon Conservancy

Prepared by:

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This hydrology and hydraulic study report has been prepared by or under supervision of the following Registered Engineer. The Registered Civil Engineer attests to the technical information contained herein and has judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

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No. C59026
Exp. 6/30/15

Weixia Jin

Weixia (Way-sha) Jin, Ph.D. PE
Registered Civil Engineer

7/18/2014

Date

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1.0 INTRODUCTION

The San Elijo Lagoon is located approximately 20 miles north of the City of San Diego, between the Cities of Solana Beach and Encinitas, as shown in Figure 1-1. The California Department of Fish and Game generally owns the San Elijo Lagoon west of Interstate 5 (I-5), the County of San Diego generally owns the Lagoon east of I-5, and the San Elijo Lagoon Conservancy (SELC) owns smaller areas west of I-5. The study area boundary is illustrated in Figure 1-2.

The Lagoon is a coastal wetland with significant biological and ecological resources. The San Elijo Lagoon Restoration Project (SELRP) is an effort to restore the Lagoon functions and values given the constraints placed on it by surrounding current and historic development activities. The project aims to enhance the tidal prism of the Lagoon by proposing modifications to known infrastructure “choke points” such as Highway 101, the North County Transit District (NCTD) railroad, and the I-5 freeway. The approximate target construction start date of the SELRP is the year 2015.

The overarching goal of the SELRP is to protect, restore, then maintain, via adaptive management, the San Elijo Lagoon ecosystem and the adjacent uplands to perpetuate native flora and fauna characteristics of Southern California, as well as to restore, then maintain estuarine and brackish marsh hydrology (EDAW 2009). A clear challenge of this project is a design that will protect and promote biodiversity by protecting habitat types over a very long period of time.

This project goal can be further refined into three categories of objectives:

- Physical restoration of lagoon estuarine hydrologic functions;
- Biological restoration of habitat and species within the lagoon; and
- Management and maintenance to ensure long-term viability of the restoration efforts.

The SELRP is located primarily within tidal lands, and will be designed to provide optimal wetland habitat based on tidal hydrology. This study analyzes tidal hydraulics and hydrology, and storm flood hydraulics to determine the conditions predicted to exist at the marsh in the future. This study serves as the technical foundation for multiple subsequent studies. Tidal hydrology and hydraulics provides the basis for determining future habitat distribution, tidal inlet stability, shoaling and scour in the lagoon, tidal muting, and water quality. Storm flow hydrology serves as the basis for design of structures, and for analyzing water quality and future flood conditions. These additional studies will occur in the future and directly utilize the data and results generated for this study.

Figure 1-1: Project Vicinity Map

(Source: EDAW, 2009)

Figure 1-2: Project Study Area

2.0 SCOPE OF WORK

The scope of work for this study consists of analyzing tidal and storm flood hydraulics for all project alternatives using the RMA-2 model previously employed by the U.S. Army Corps of Engineers (USACE) for this site. Model results will provide water level and flow velocity data for use in assessing the performance of each alternative. These data will be used to:

- Analyze the potential for increased flooding of adjacent areas from restoration;
- Predict the hydrology required to establish new wetland habitat areas;
- Size the openings of a new tidal inlet and channels under highway and railroad bridges;
- Estimate the long-term stability of the tidal inlet (in a separate study), and
- Provide the basis for water quality modeling (in a separate study).

Specific modeling tasks include:

1. Modify the modeling domain (mesh grid) to include all areas of interest and potential influence. The mesh will need to be modified to stabilize the model, to optimally represent existing bathymetry, and to cover all areas to be modified for proposed conditions.

2. Calibrate the model to existing hydraulic conditions, with limited verification and sensitivity analyses. The hydrodynamic model is to be calibrated to match tide, current and discharge conditions measured in the field by the SELC and/or USACE during a specific time period. Model predictions are to be verified by replicating conditions also measured in the field by the SELC and/or USACE during a different time period from the calibration data set if the data are available. This task does not include any additional field data collection. Sensitivity analyses will be accomplished by adjusting dependent variables within the model (e.g., bed roughness, eddy viscosity and possibly others) to ascertain model sensitivity and range of predictions for hydraulics only.

3. Run the model to predict hydraulic and hydrologic conditions for five options, including existing conditions. The model will be used to predict future conditions for five alternatives.

3.0 ALTERNATIVE WETLANDS RESTORATION CONCEPTS

Five project alternatives have been identified by the Stakeholder Committee as likely to be included in the environmental document. They include:

- No Project – Existing Conditions;
- Alternative 1A – Minimum Changes;
- Alternative 1B – Maximum Habitat Diversity, Existing Inlet Location;
- Alternative 2A – Maximum Habitat Diversity, New Inlet Location; and
- Alternative 2B – Maximum Tidal Expression.

The conceptual design of these alternatives is required to perform engineering analyses and numerical modeling of their performance. Brief descriptions of the alternatives are provided below, and habitat graphics of all alternatives are provided in this section. More detailed descriptions of the alternatives are provided in the Final Alternatives Assessment (Nordby et al. 2012) Report.

3.1 No Project - Existing Conditions

No Project assumes no changes are made to the project site and existing conditions remain into perpetuity. The Lagoon presently experiences mouth constriction and manual re-opening annually, and sometimes more frequently. Tidal flushing is restricted, and water quality conditions are impaired for nutrients and sediment. Habitat is distributed at elevations and locations that are related to relic closed mouth conditions, and are progressively transitioning to distributions more reflective of managed mouth conditions. For example, mudflat habitat is located too high for a full tidal lagoon because it formed when the mouth was closed and Lagoon water levels were higher from impoundment. Now that the mouth is managed to be open, the mudflat is converting to vegetated marsh because hydrologic conditions are favorable for salt marsh plant growth. Figure 3-1 shows existing conditions.

3.2 Alternative 1A – Minimum Changes

Alternative 1A provides minimal physical changes to the site, with the exception of enlarging the main feeder channel throughout the site and redirecting its course just west of I-5. The main tidal channel is also extended farther into the East Basin and existing constricted channel connections are cleared and enlarged. Existing habitat areas will essentially remain intact. The tidal prism of Alternative 1A will be slightly increased compared to existing conditions. A relatively small area of transitional habitat above tidal elevations will be placed in the northwest portion of the Central Basin. Figure 3-2 shows Alternative 1A.

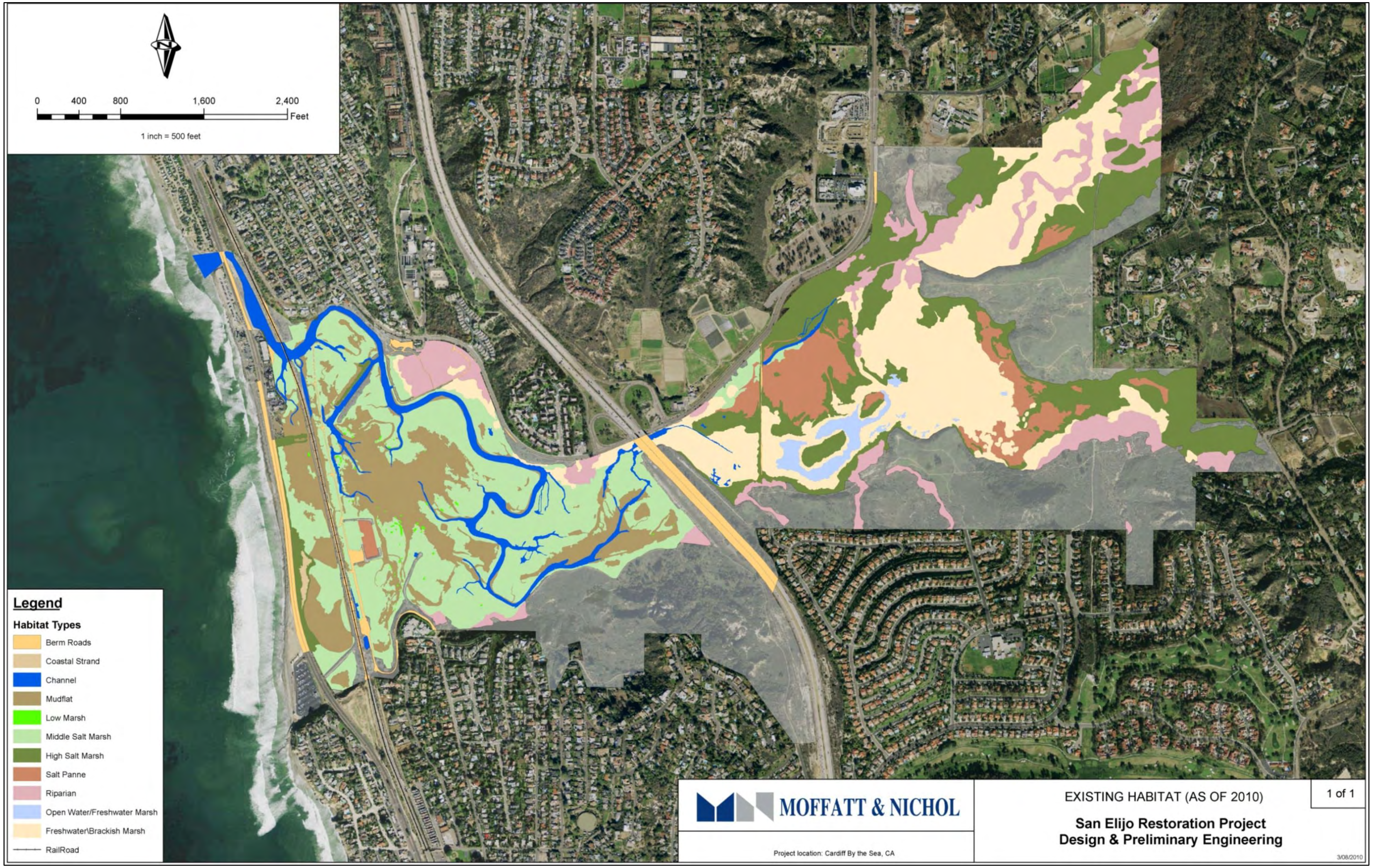


Figure 3-1: No Project - Existing Habitat

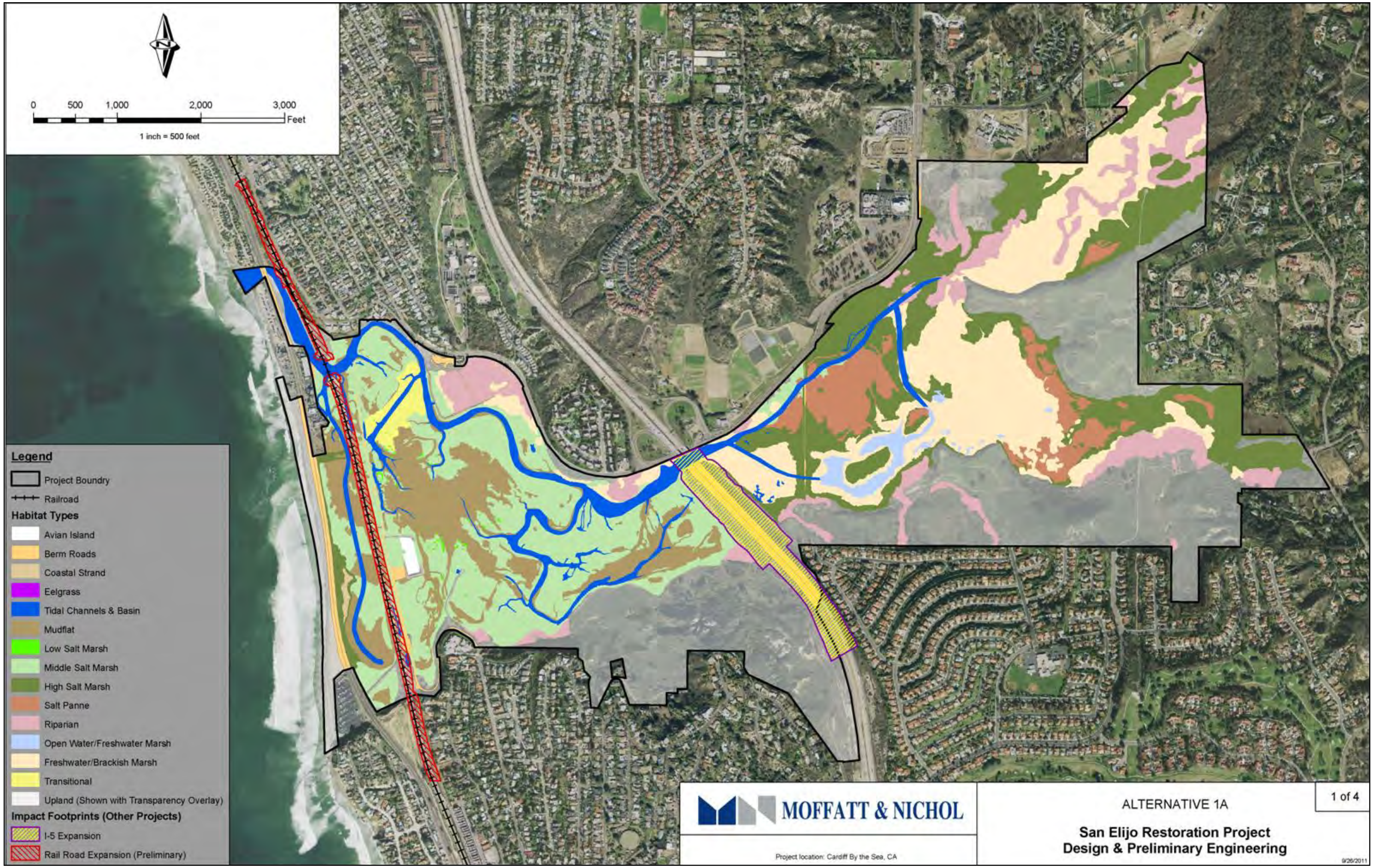


Figure 3-2: Alternative 1A

3.3 Alternative 1B – Maximum Habitat Diversity, Existing Inlet location

Alternative 1B provides a more substantial change to the existing site to create a greater diversity of habitats than currently exists. The existing tidal inlet remains the source of seawater, and the main tidal channel extends throughout the Lagoon. The main feeder channel is redirected just west of I-5, and extended farther into the East Basin. The channel in the East Basin is significantly enlarged in cross-sectional area to promote more tidal exchange east of I-5. The tidal prism of Alternative 1B will be significantly increased compared to Alternative 1A. Non-tidal habitat areas will still exist in the East Basin. Several areas of transitional habitat above tidal elevations will be placed in the western portion of the Central Basin. Figure 3-3 shows Alternative 1B.

3.4 Alternative 2A – Maximum Habitat Diversity, New Inlet location

Alternative 2A also provides changes to the existing site to create a greater diversity of habitats than presently exists. Seawater would enter the Lagoon via a new tidal inlet located south of the existing inlet and a new subtidal basin would be created just landward of the new inlet in the West and Central Basins. The main tidal channel would extend throughout the Lagoon and be redirected just west of I-5, and extend into the East Basin. The channel in the East Basin is identical to that for Alternative 1B. The tidal prism of Alternative 2A will increase compared to Alternative 1B. Non-tidal habitat areas remain in the East Basin. Transitional habitat areas above tidal elevations will also be included in the Central Basin as with Alternative 1B. Figure 3-4 shows Alternative 2A.

3.5 Alternative 2B – Maximum Tidal Expression

Alternative 2B provides the maximum level of change throughout the Lagoon. As the largest-tidal prism alternative, it requires a new tidal inlet to be located south of the existing inlet. Extensive subtidal basins will exist in the West, Central, and East Basins of the Lagoon. The East Basin becomes nearly entirely tidally-influenced habitat area. Figure 3-5 shows Alternative 2B.

3.6 Summary of Inlet and Channel Dimensions

The dimensions of each channel cross-section at each bridge constraint are optimized in the San Elijo Lagoon Bridge Optimization Study (Moffatt & Nichol 2012) and are shown in Table 3-1 below. The selection of optimum channel widths and depths was based on a sensitivity analysis conducted for each bridge crossing under typical dry weather tidal fluctuations and extreme stormflow conditions (100-year storm and 100-year water levels). Tidal range was used as the primary indicator for benefits to the wetland ecosystem, and extreme flood elevations were used to evaluate the potential for flooding of Manchester Avenue. Using these indicators, the optimum channel width and depth were identified as the point at which tidal range and flood conveyance are most favorable and further increases in channel width and depth result in only minimal benefit.

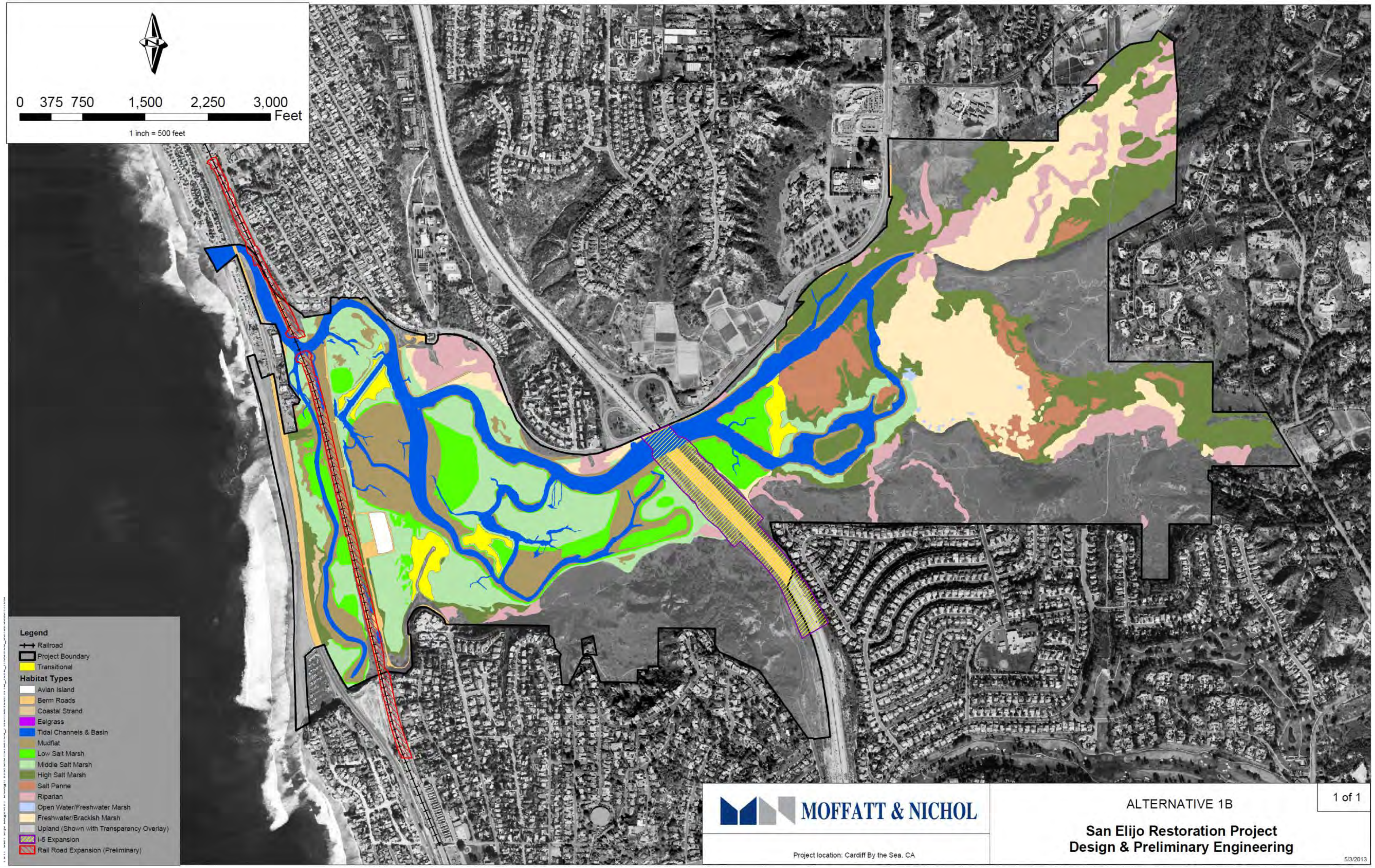


Figure 3-3: Alternative 1B

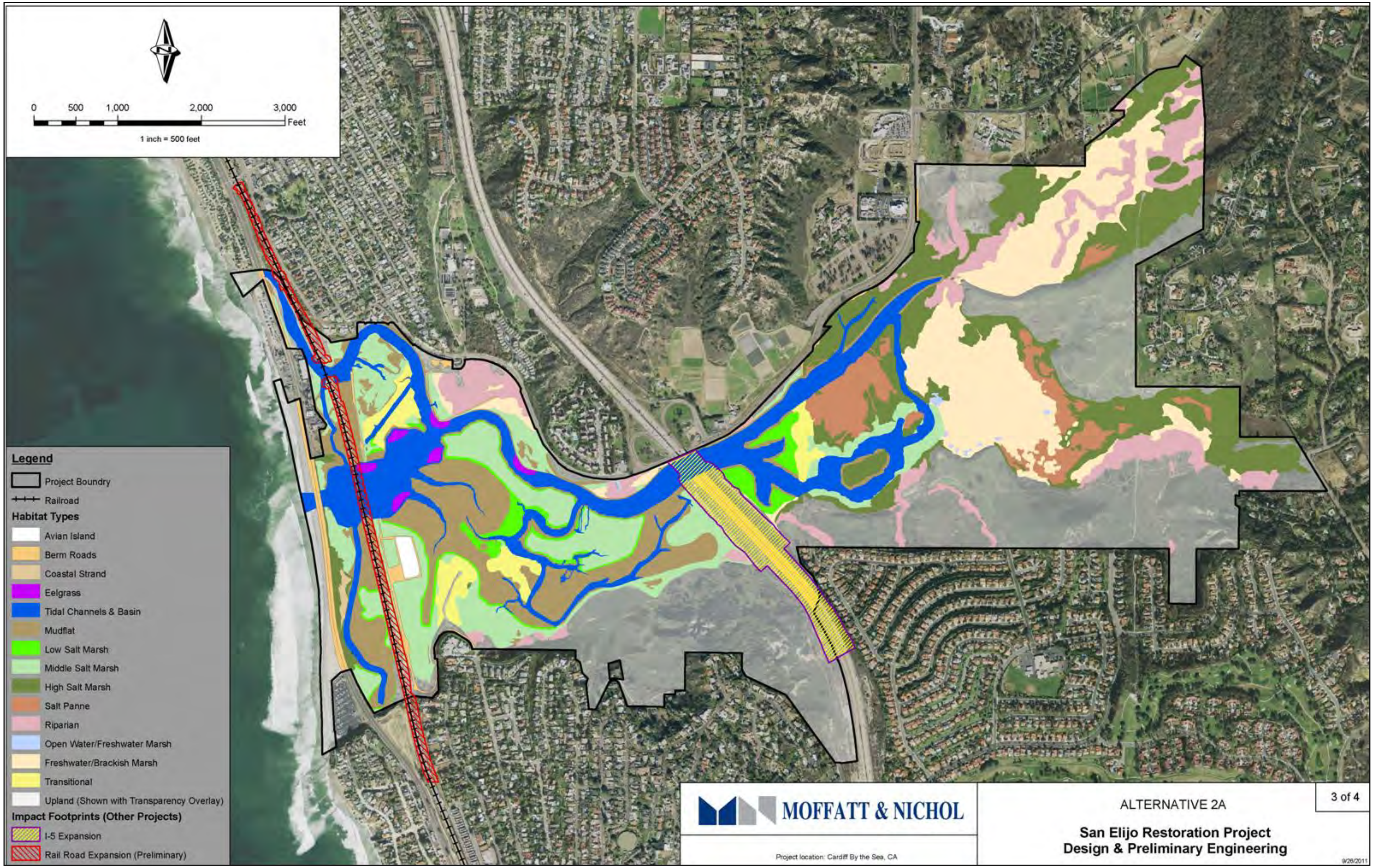


Figure 3-4: Alternative 2A

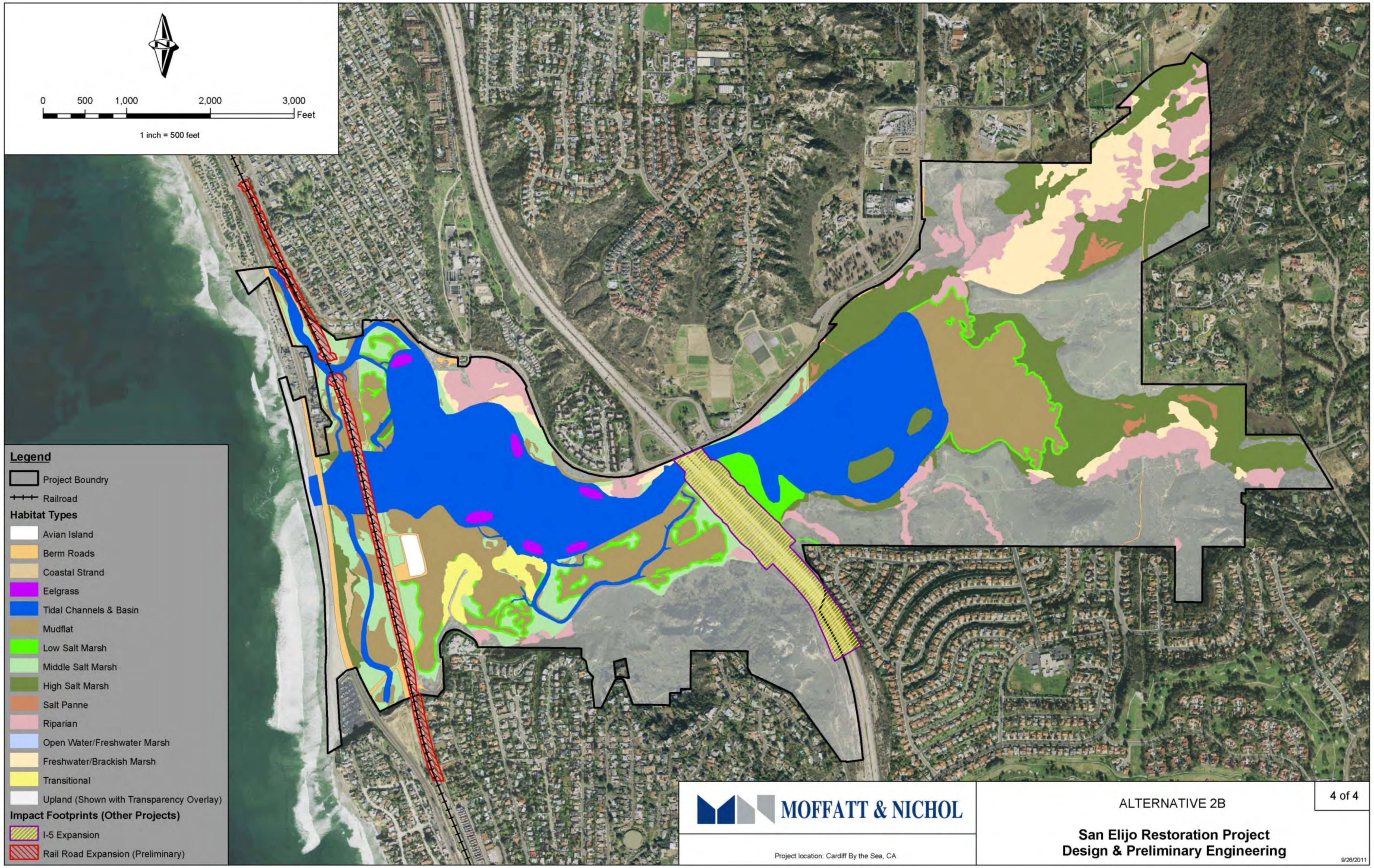


Figure 3-5: Alternative 2B

Table 3-1: Summary of Inlet and Channel Dimensions

Alternative	HW101/Inlet		Railroad Trestle		I-5 Bridge	
	Bottom Width (ft)	Invert (ft, NGVD)	Bottom Width (ft)	Invert (ft, NGVD)	Bottom Width (ft)	Depth (ft, NGVD)
Existing	105	-0.87	187	-0.87	130	0.74
1A	115	-4.0	187	-5.5	130	-6.0
1B	130	-4.0	187	-5.5	261	-6.0
2A	200	-6.5	590	-7	261	-6.5
2B	200	-6.5	590	-7	261	-6.5

3.6.1 Hwy 101 Bridge

The HW101 Bridge, shown in Figure 3-6, crosses over the existing inlet of the lagoon. The existing inlet is unstable and subject to siltation and possibly closure if not dredged on a regular basis. Although the current active inlet channel is approximately 70 feet as-built drawings and field measurements indicate the maximum opening of the HW101 bridge, from abutment to abutment, is approximately180 feet. The lowest possible invert at the current inlet is about -4 feet NGVD due to hard bottom reef and bedrock. Accounting for side slopes and pier width, the maximum effective width of HW101 is about 160 feet at an invert elevation of -4 feet NGVD. The minimum bridge soffit elevation, indicated on the as-built drawings, is +10 feet NGVD.

Alternatives 1A and 1B retain the existing HW101 bridge, but assume significant deepening for improved hydraulics. The existing bridge may need some form of protection to prevent undermining by increased channel depths. Alternatives 2A, and 2B assume a new inlet channel location that is wider and deeper as shown in Table 3-1. The bridge optimization study confirmed the inlet channel dimensions proposed in this lagoon restoration study.

Figure 3-6: HW 101 Bridge (Existing Lagoon Inlet)

3.6.2 Railroad Bridge

The Railroad, shown in Figure 3-7, runs just east of and parallel to HW101 across the San Elijo Lagoon. Survey data of the existing railroad bridge indicate a channel width of approximately 250 feet from abutment to abutment at an elevation of +5 feet, NGVD. Assuming 3:1 (H:V) side slopes, the maximum bottom width of the existing channel under the bridge is approximately 187 feet at the dredge depth of -5.5 feet, NGVD for Alternatives 1A and 1B. The bridge is supported by 23 piers spaced at approximately 14 feet on center. The piers consist of round piles about 16 inches in diameter. Subtracting for pier widths, the effective channel width at an elevation of -5.5 feet, NGVD is approximately 161 feet. The minimum bridge soffit elevation, according to a 2007 PDC survey provided by HDR, is about +15.6 feet NGVD.

This width is significantly larger than the tidal inlet channel and most of the main channel east of the railroad bridge. Results from the tidal and flood optimization models for No Project, Alternatives 1A and 1B indicated there is no benefit to increasing the channel width below the existing railroad bridge. Alternatives 2A and 2B propose a new railroad bridge over a wide subtidal basin. The proposed channel width under the bridge would be 590 feet, significantly wider than the inlet channel and main channel throughout the lagoon.

Figure 3-7: Railroad Bridge

3.6.3 Interstate 5 Freeway Bridge

The I-5 freeway runs north to south across the San Elijo Lagoon. The I-5 Bridge crosses near the middle of the lagoon serving as the boundary between the Central and East basins of the lagoon. The I-5 Bridge also spans Manchester Avenue, as shown in Figure 3-8. The as-built plans and survey data indicate the existing channel width below the Bridge, from abutment to abutment, is approximately 155 feet at an elevation of +5 feet, NGVD. Assuming 2:1 side slopes, the existing channel bottom width in a dredged condition would be approximately 130 feet. The effective channel width modeled in RMA-2 further reduced the channel width to account for the 4-foot diameter piers supporting the bridge. The minimum bridge soffit elevation, indicated on the as-built drawings, is +31.5 feet NGVD.

Alternatives 1A and 1B retain the existing I-5 bridge, but assume significant deepening for improved hydraulics. The existing bridge may need some form of protection to prevent undermining by increased channel depths. Alternatives 2A, and 2B assume a wider and deeper channel as shown in Table 3-1. The bridge optimization study confirmed the inlet channel dimensions proposed for this restoration study.

Figure 3-8: Interstate-5 Bridge

4.0 TIDAL AND FLOOD HYDRAULICS STUDY

Numerical modeling of tidal and flood hydraulics was performed for the five alternatives to evaluate wetland hydraulics under both dry weather and wet weather (100-yr) flood conditions, and to size connections between basins to achieve desired wetland hydraulics.

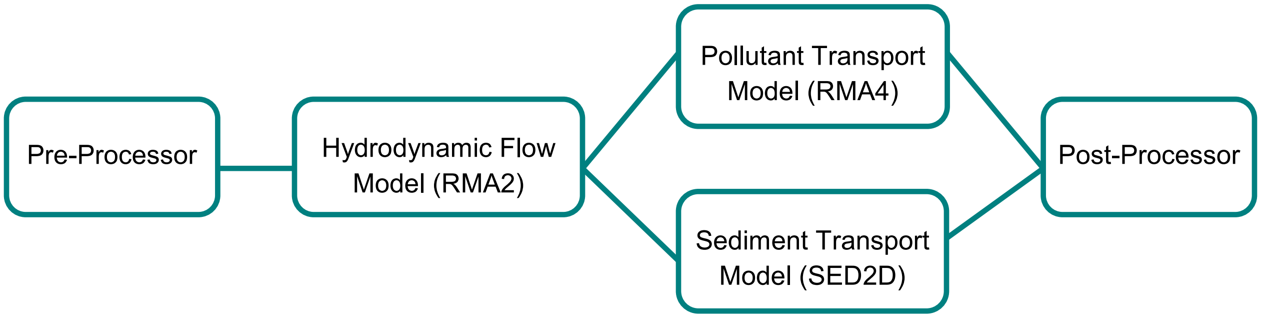
4.1 Model Selection and Description

The numerical modeling system used in this study is summarized in the following sections. The TABS2 (McAnally and Thomas, 1985) modeling system was applied to this project. TABS2 was developed by the USACE, and consists of the following components:

1. Two-dimensional, vertically-averaged finite element hydrodynamics model (RMA2);
2. Pollutant transport/water quality model (RMA4); and
3. The sediment transport model (SED2D-WES).

TABS2 is a collection of generalized computer programs and pre- and post-processor utility codes integrated into a numerical modeling system for studying 2-D depth-averaged hydrodynamics, transport and sedimentation problems in rivers, reservoirs, bays, and estuaries. The finite element method provides a means of obtaining an approximate solution to a system of governing equations by dividing the area of interest into smaller sub-areas called elements. Time-varying partial differential equations are transformed into finite element form and then solved in a global matrix system for the modeled area of interest. The solution is smooth across each element and continuous over the computational area. This modeling system is capable of simulating tidal wetting and drying of marsh and intertidal areas of the estuarine system.

A schematic representation of the system is shown below. TABS2 can be used either as a stand-alone solution technique or as a step in the hybrid modeling approach. RMA2 calculates water surface elevations and current patterns which are input to the pollutant transport and sediment transport models. Existing and proposed wetland geometry can be analyzed to determine the impact of project designs on flow, circulation (this study), salinity and water quality (a subsequent study) and sedimentation (another subsequent study) on the estuarial system. The three models listed above are solved by the finite element method using Galerkin weighted residuals.



TABS2 Schematic

The hydrodynamic model simulates 2-D flow in rivers and estuaries by solving the depth-averaged Navier Stokes equations for flow velocity and water depth. The equations account for friction losses, eddy viscosity, Coriolis forces and surface wind stresses. The general governing equations are:

$$\frac{\partial h}{\partial t}+\frac{\partial (hu)}{\partial x}+\frac{\partial (hv)}{\partial y}=0$$

$$h\frac{\partial u}{\partial t}+uh\frac{\partial u}{\partial x}+vh\frac{\partial u}{\partial y}+gh\frac{\partial a}{\partial x}+gh\frac{\partial h}{\partial x}-h\frac{\varepsilon_{xx}}{\rho}\frac{\partial^2 u}{\partial x^2}-h\frac{\varepsilon_{xy}}{\rho}\frac{\partial^2 u}{\partial y^2}+S_{f_x}+\tau_x=0$$

$$h\frac{\partial v}{\partial t}+uh\frac{\partial v}{\partial x}+vh\frac{\partial v}{\partial y}+gh\frac{\partial a}{\partial y}+gh\frac{\partial h}{\partial y}-h\frac{\varepsilon_{yx}}{\rho}\frac{\partial^2 v}{\partial x^2}-h\frac{\varepsilon_{yy}}{\rho}\frac{\partial^2 v}{\partial y^2}+S_{f_y}+\tau_y=0$$

where:

u,v = x and y velocity components

t = time

h = water depth

a = bottom elevation

Sf_x = bottom friction loss term in x-direction

Sf_y = bottom friction loss term in y-direction

τ_x = wind and Coriolis stresses in x-direction

τ_y = wind and Coriolis stresses in y-direction

ε_{xx} = normal eddy viscosity in the x-direction on x-axis plane

ε_{xy} = tangential eddy viscosity in the x-direction on y-axis plane

ε_{yx} = tangential eddy viscosity in the y-direction on x-axis plane

ε_{yy} = normal eddy viscosity in the y-direction on y-axis plane

Wind stress is computed using the following formula:

$$\tau_S = 3.8 \cdot 10^{-6} W^2$$

where

τs is wind stress (lb/ft/sec2) on the water surface, and

W is the wind speed in miles per hour at 10 meters (33 feet) above the water surface.

4.2 Model Setup

The setup for the tidal and flood hydraulic models for existing conditions and all alternatives included determination of the model area, bathymetry, wetland habitat area, mesh selection, and boundary conditions. For this study, a RMA2 model was previously created by the USACE (2006) for this site based on the 1990 topographic survey (Towill Inc. 2009). That RMA2 model setup was modified to include all areas of interest and potential tidal and/or storm flow influence, and to contain the most current topographic and bathymetry data.

The horizontal coordinate system for the modeling work is North American Datum (NAD) 83, California state plan zone 6, and the vertical datum is National Geodetic Vertical Datum (NGVD) 1929, which is equivalent to Mean Sea Level (MSL) at that time. As sea level has risen since 1929, NGVD is lower than existing MSL by approximately 0.44 feet. The reason that the vertical datum is NGVD is that the existing topographic survey of the site is referenced to NGVD. Both horizontal and vertical units are in feet.

4.2.1 Model Area

The numerical model covers the nearshore ocean and the area below the +12.9 foot NGVD (15-foot NAVD) contour line of West Basin, Central Basin, and East Basin as shown in Figure 4-1. The original USACE model, which only covers the tidally-influenced area approximately below the +6.5 foot contour line, was raised to the +12.9 foot contour line to contain water levels during the 100-year flood condition.

The ocean boundary is approximately one mile from the shoreline. The side boundaries of the offshore area are approximately one mile north and two miles south from the existing inlet location, so the offshore ocean area will remain the same for all alternatives, regardless of the location of the tidal inlet.

Figure 4-1: Numerical Modeling Area

4.2.2 Bathymetry

The ocean bathymetry used in the model is the same data used in model meshes created by the USACE (2006) for this location. The USACE created the mesh of the lagoon area based on the 1990 topographic survey (Towill Inc. 1990). The 1990 survey only covers the area above +1.8 feet NGVD as the area below +1.8 feet was under water at the time of the survey and not measured. To fill the data gap below +1.8 feet NGVD, measurements of channel cross-sections were conducted in October 2000 in the Lagoon by Dr. Terrell (Terrell et. al. 2009) and Coastal Environments (2000). Electronic data of these cross-sections were provided through the SELC.

A recent survey of the San Elijo Lagoon was conducted by KDM Meridian in 2011 for the San Elijo Lagoon Conservancy and included aerial photogrammetric mapping augmented with a bathymetric survey of the main channel and tributaries. This data set provides the existing surface both above and below the water level for the entire model area east of HW 101. The RMA2 models for all project alternatives were updated to represent the 2011 survey and bathymetry data within the Lagoon. The ocean bathymetry was beyond the limits of the KDM Meridian survey and therefore was not updated. The ocean bathymetry data used in the model will not affect results for two reasons. One reason is that changes in ocean bathymetry mostly are confined to nearshore areas with little or no change in offshore bathymetry. The second reason is that modeling results are not sensitive to small changes in offshore bathymetry because the relatively large ocean depths result in little or no energy loss during fluctuating sea levels. The No Project and Alternative 1A models are most sensitive to the updated bathymetry since there is little or no grading proposed for these alternatives. The 2011 survey indicates the ground surface throughout most of the lagoon is about 0.5 to 1 foot higher when compared to the 1990 topography.

Figure 4-2 shows the existing bathymetry of the entire modeling area under the existing condition. Figure 4-3 shows only the existing Lagoon bathymetry.

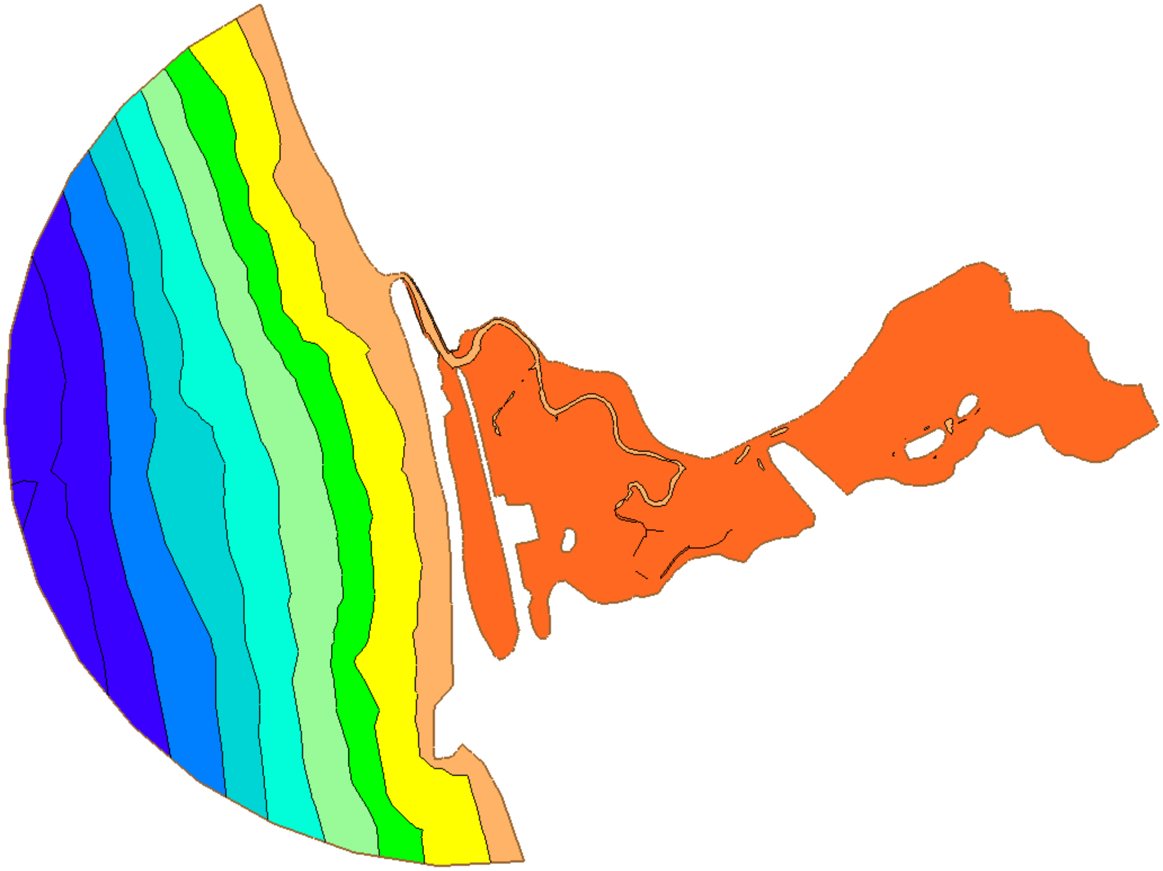


Figure 4-2: Existing Bathymetry for the Entire Modeling Area

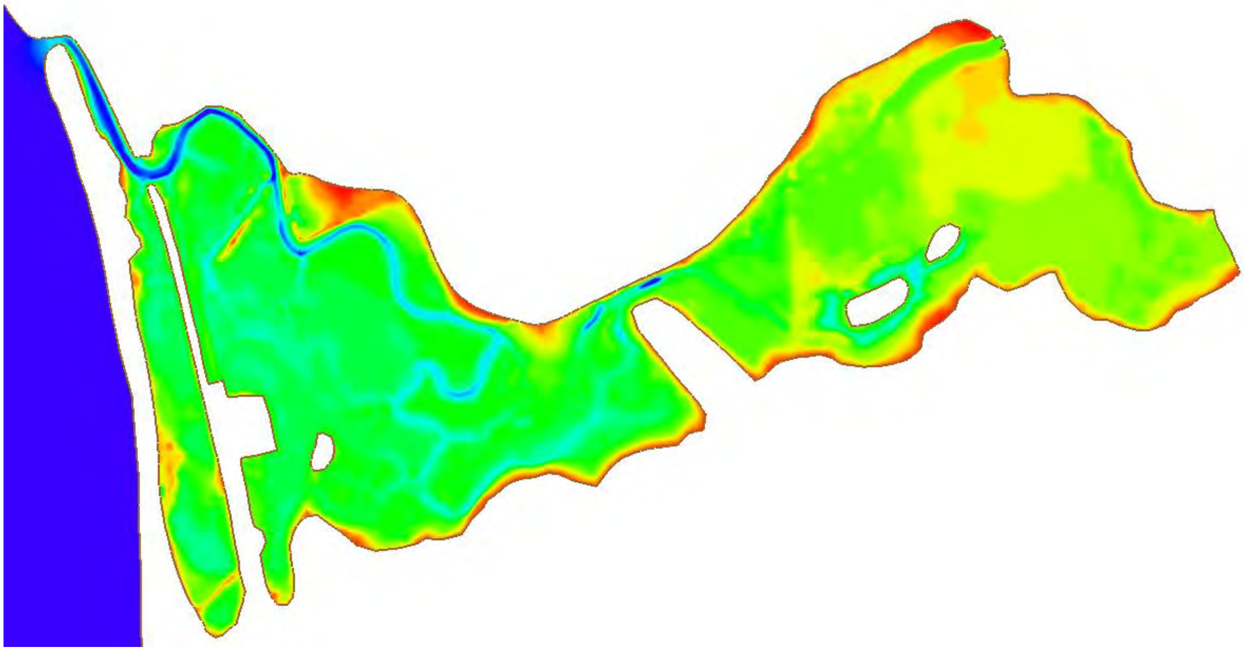


Figure 4-3: Existing Lagoon Bathymetry

4.2.3 Finite Element Mesh

The RMA2 modeling system requires that the estuarial system be represented by a network of nodal points and elements, points defined by coordinates in the horizontal plane and water depth, and areas made up by connecting these adjacent points, respectively. Nodes can be connected to form 1- and 2-D elements, having from two to four nodes. The resulting nodal/element network is commonly called a finite element mesh and provides a computerized representation of the estuarial geometry and bathymetry.

It is noted that evaluations discussed herein correspond to 2-D analyses. Each alternative was sufficiently dissimilar that a unique finite element mesh was developed to reflect the bathymetry and wetland boundaries for each alternative considered.

The two important aspects to consider when designing a finite element mesh are (1) determining the level of detail necessary to adequately represent the estuary, and (2) determining the extent or coverage of the mesh. Accordingly, the bathymetric features of the estuary generally dictate the level of detail appropriate for each mesh. These concerns present trade-offs for the modeler to consider. Too much detail can lead the model to run slowly or even become unstable and “crash.” Too little detail renders the results less useful. For this project, a balance was achieved with a stable and efficient model that yields the level of detail required for planning. The model described in this section is numerically robust and capable of simulating tidal elevations, flows, and constituent transport with reasonable resolution.

There are several factors used to decide the aerial extent of each mesh. First, it is desirable to extend mesh open boundaries to areas which are sufficiently distant from the proposed areas of change so as to be unaffected by that change. Additionally, mesh boundaries must be located along sections where conditions can reasonably be measured and described to the model. Finally, mesh boundaries can be extended to an area where conditions have been previously collected to eliminate the need to interpolate between the boundary conditions from other locations.

The finite element meshes for the calibration and model runs for alternatives are shown in Figure 4-4 through Figure 4-8. Each mesh contains a section of ocean sufficiently large to eliminate potential model boundary effects. The wetland portion of the mesh is bounded by Highway 101, Manchester Avenue and dry land considered to be at the outermost extents of the flood influence. The nearshore mesh is the same for each alternative.

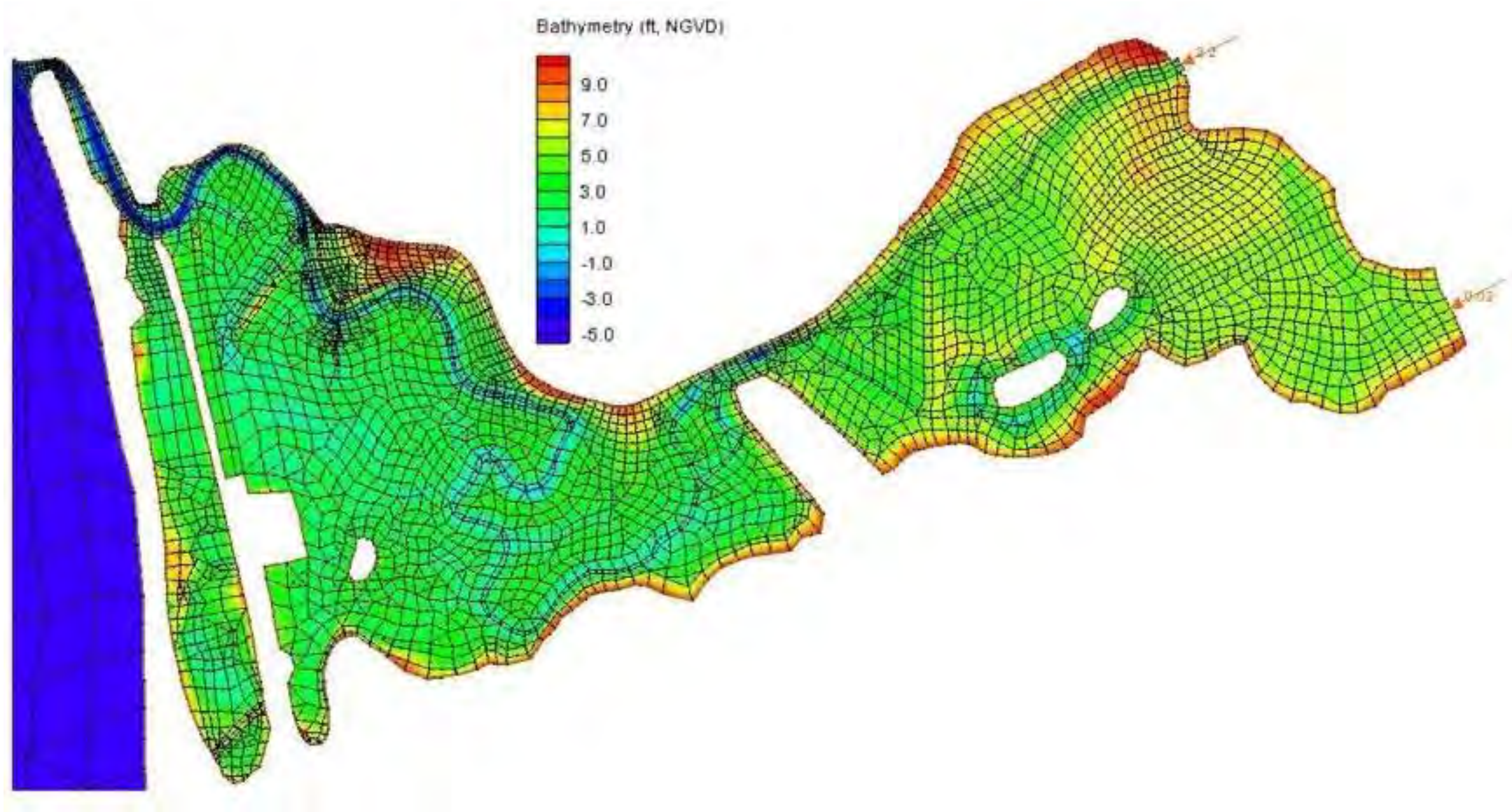


Figure 4-4: RMA2 Model Mesh for Existing Conditions

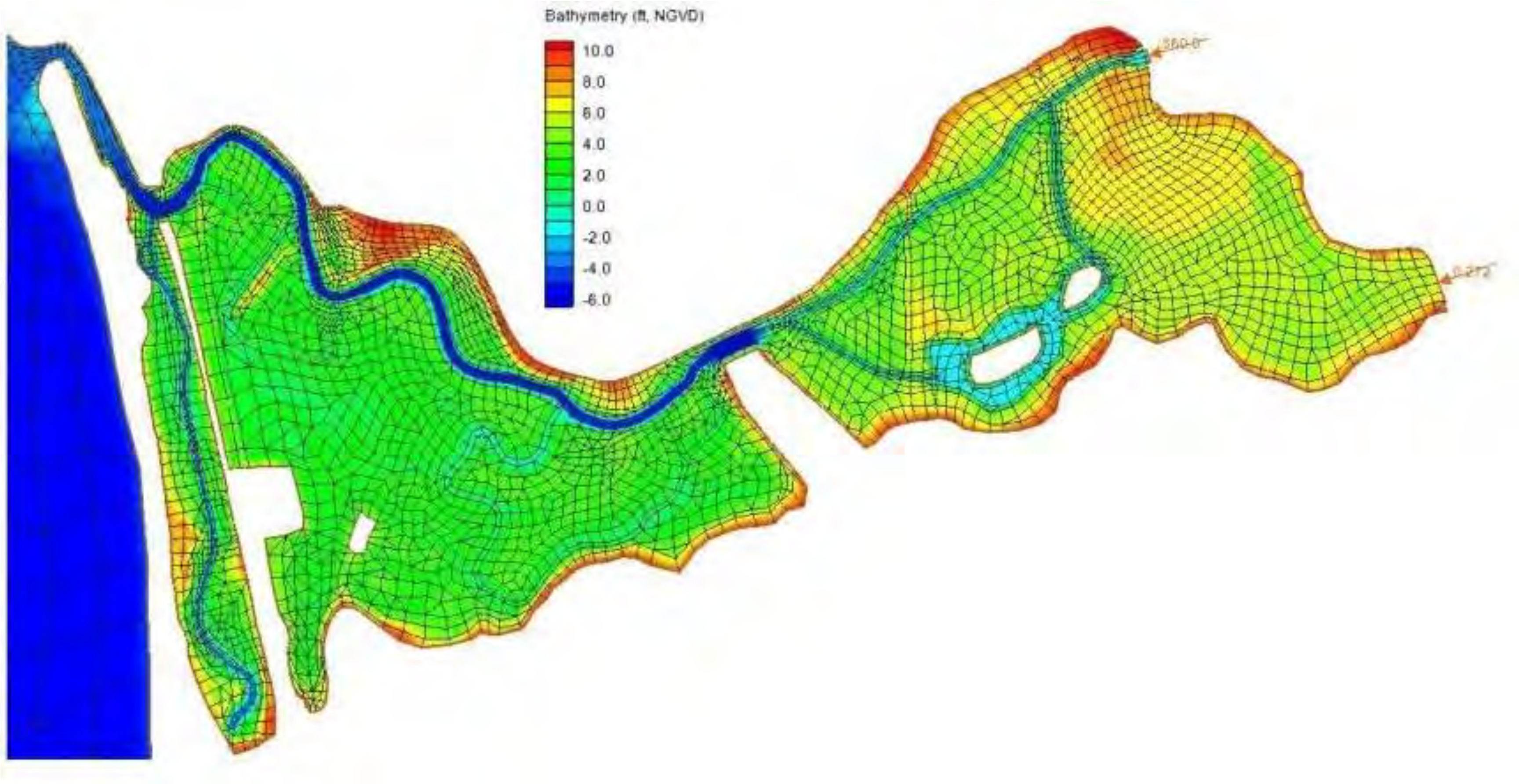


Figure 4-5: RMA2 Modeling Mesh for Alternative 1A

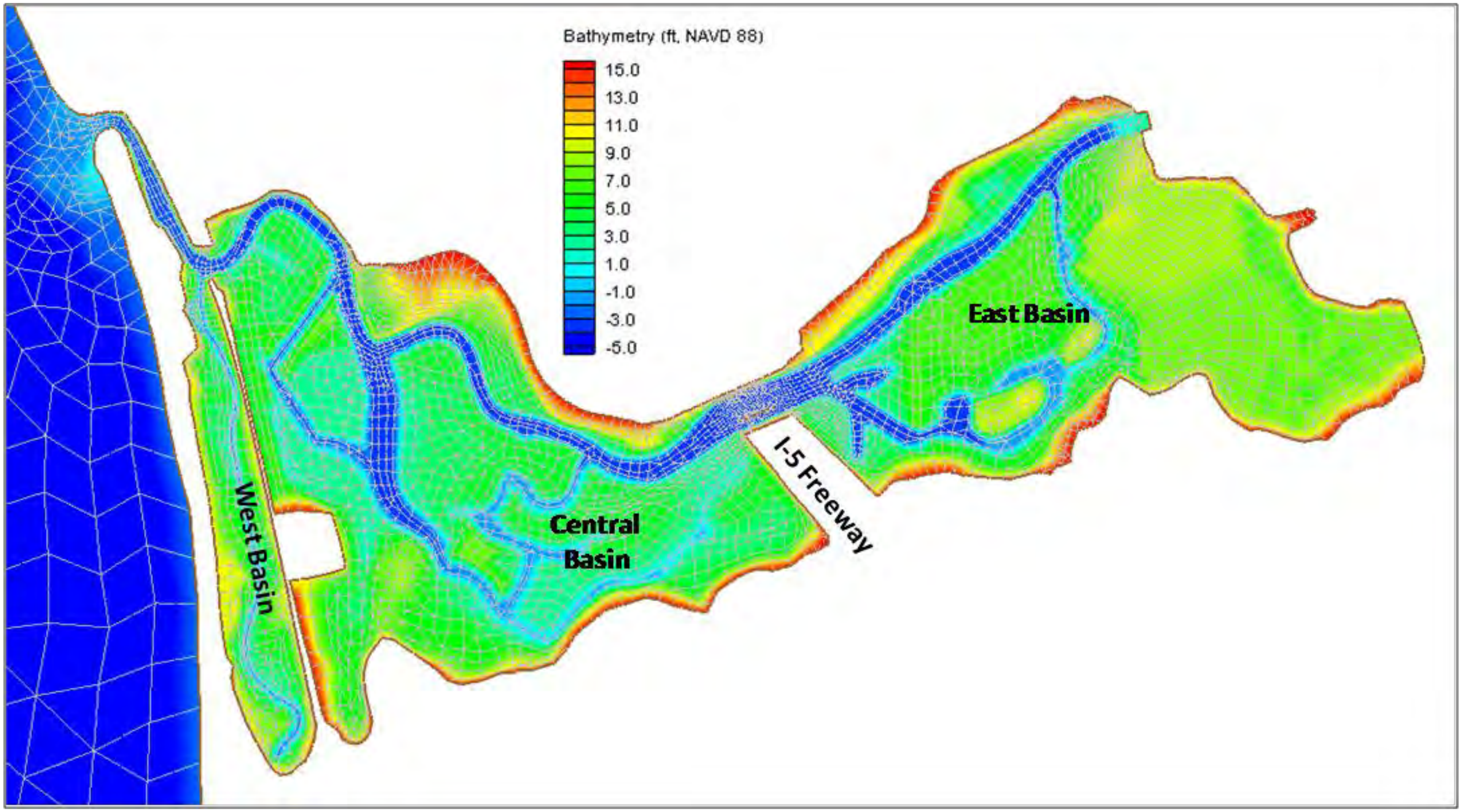


Figure 4-6: RMA2 Modeling Mesh for Alternative 1B

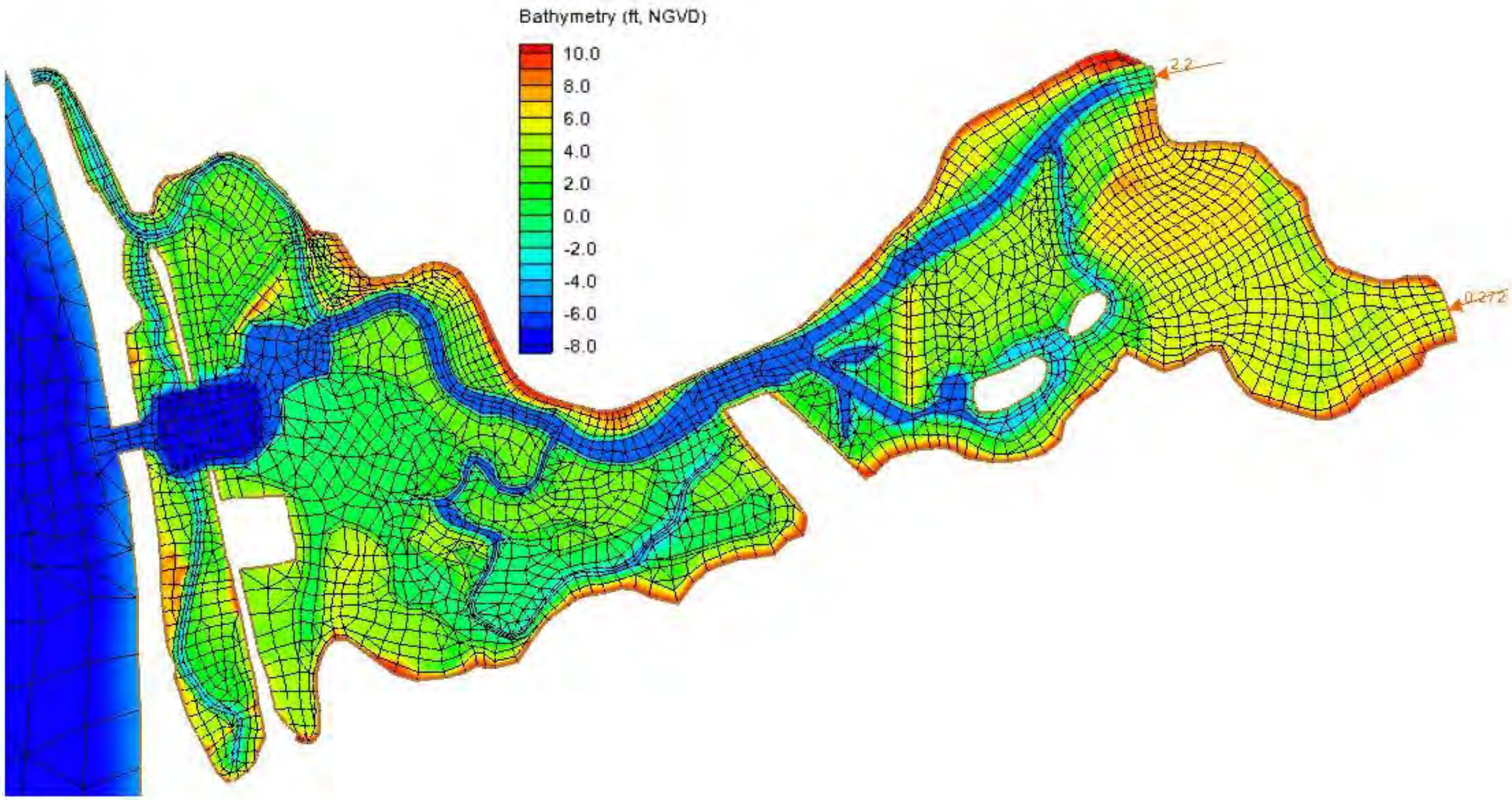


Figure 4-7: RMA2 Modeling Mesh for Alternative 2A

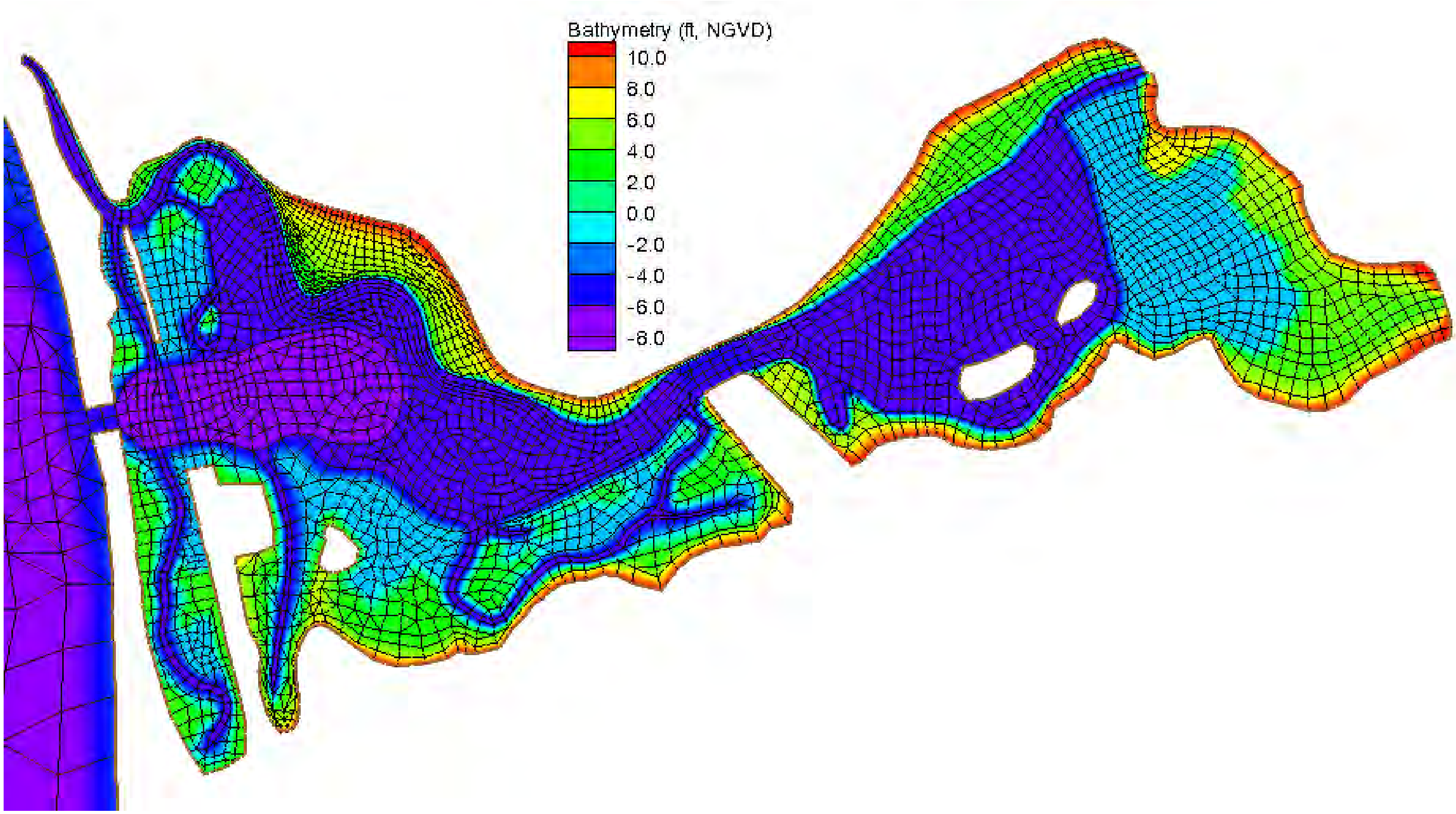


Figure 4-8: RMA2 Modeling Mesh for Alternative 2B

The entire modeling area, approximately 2.54 square miles, is represented as a finite element mesh consisting of elements and nodes detailed in Table 4-1.

Table 4-1: Model Mesh Elements and Nodes

Alternative	Number of Elements	Number of Nodes
Existing Conditions	3,790	11,114
Alternative 1A	4,654	13,280
Alternative 1B	4,663	13,017
Alternative 2A	4,339	12,379
Alternative 2B	4,037	11,710

4.2.4 Boundary Conditions

4.2.4.1 Tides

Since there are no tide stations at San Elijo Lagoon, the nearest La Jolla gage (National Oceanic and Atmospheric Administration Station ID: 9410230) was used to represent the ocean tide at the project site as shown in Table 4-4. The diurnal tide range is approximately 5.33 feet Mean Lower Low Water, MLLW, to Mean Higher High Water, MHHW, and MSL is at +2.73 feet MLLW. Water level data records provide astronomical tides and other components including barometric pressure tide, wind setup, seiche, and the El Nino Southern Oscillation. Tidal variations can be resolved into a number of sinusoidal components having discrete periods. The longest significant periods, called tidal epochs, are approximately 19 years. In addition, seasonal variations in MSL can reach amplitudes of 0.5 feet in some areas. Superimposed on this cycle is a 4.4-year variation in the MSL that may increase the amplitude by as much as 0.25 feet. Water level gage records are typically analyzed over a tidal epoch to account for these variations and to obtain statistical water level information (e.g., MLLW and MHHW).

Table 4-2: Recorded Water Levels at La Jolla (1983-2001 Tidal Epoch)

Description	Elevation (feet, MLLW)	Elevation (feet, NGVD)
Extreme High Water (11/13/1997)	7.65	5.35
Mean Higher High Water (MHHW)	5.33	3.03
Mean High Water (MHW)	4.60	2.30
Mean Tidal Level (MTL)	2.75	0.46
Mean Sea Level (MSL)	2.73	0.44
National Geodetic Vertical Datum 1929 (NGVD)	2.30	0.00
Mean Low Water (MLW)	0.91	-1.39
North America Vertical Datum 1988 (NAVD)	0.19	-2.11
Mean Lower Low Water (MLLW)	0.00	-2.30
Extreme Low Water (12/17/33)	-2.87	-5.16

4.2.4.2 Modeling Tidal Series

The tide series used for modeling was a representative period from November 7-21, 2008. Modeling long-term hydrologic conditions is typically done using a synthetic (artificially-created) tide series that represents average spring tide conditions over the most recent 19-year tidal epoch, referred to as a Tidal Epoch Analysis (TEA) tide series. The benefit of using a statistical tide is that the long-term condition can be modeled over a shorter time period with less computation time.

The most recent previous modeling of this site was done by the USACE without the benefit of preparing a TEA tide, and significant effort (beyond the scope of this study) is required to prepare a new TEA tide for this site. Therefore, a real tide series was used that matched average spring tide data available from National Oceanic and Atmospheric Administration (2009).

Not using a statistical TEA tide for modeling is not a serious information gap. To address this potential shortcoming, the modeler evaluated existing tide data from NOAA for San Diego at Scripp's Pier (NOAA 2011). NOAA began publishing spring high and spring low tidal elevations of all tidal cycles in January of 2008. The modeler averaged the spring high and spring low tidal elevations of all tidal cycles from January of 2008 through July of 2011 (42 months), then examined the existing data to identify a real two week tidal cycle that matched them. Tides during the period of June 7 through June 21, 2011 reached nearly the exact same spring high and spring low tidal elevations of NOAA's longer 42-month record. Also, the average tidal elevation of that June 7 through June 21, 2011 period compared with the average tidal elevation of the 19-year tidal epoch and was within 0.01 foot. Therefore, the modeler concluded that tides during the period of June 7 through June 21, 2011 sufficiently matched long-term tides at the site, and use of this record poses no implications on habitat designs and analyses. The modeling tide includes both spring and neap tidal ranges as shown in Figure 4-9. This tidal series is used in the tidal hydraulics modeling of this study.

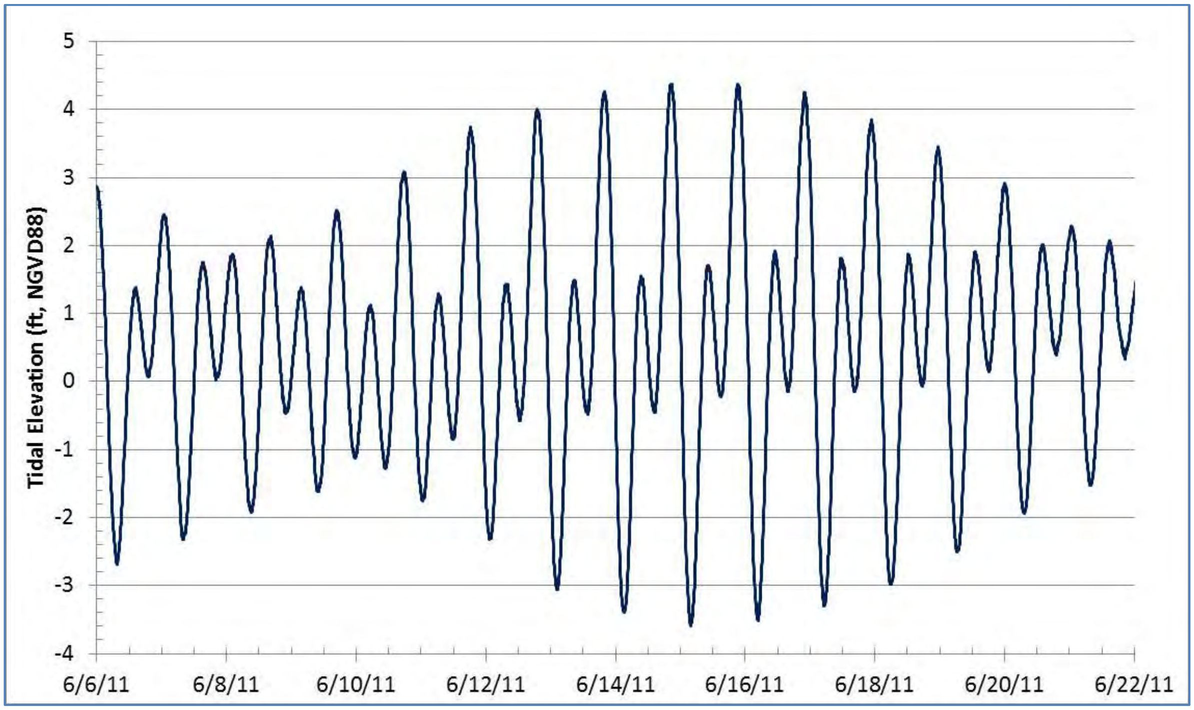


Figure 4-9: Modeling Tidal Series

4.2.4.3 Recorded Highest Tidal Series

In Southern California, the winter riverine storm season coincides with the season of the winter King Tides. King Tides occur from two to four times a year when the gravitational forces of the sun, the Earth, and a full moon are in alignment. As a consequence, it is recommended that fluvial hydraulic modeling with the unsteady model RMA2 be conducted with a design sea level value of the highest observed ocean water level of 5.4 feet, NGVD because this elevation is very close to the 100-yr extreme tidal elevation of 5.3 feet. This was done for Caltrans as part of a separate subsequent study called the Hydraulic Study of I-5 Bridge over San Elijo Lagoon (M&N 2014) that is discussed later in this report. The simultaneous occurrence a peak 100-year fluvial flood event and the 100-year extreme tidal elevation provides a reasonable and conservative boundary condition. Figure 4-10 shows the recorded tidal elevations (NOAA 2013) during the highest observed tidal event that were used in the I-5 Bridge Hydraulic Study (M&N 2014) to assess the 100-year storm water levels.

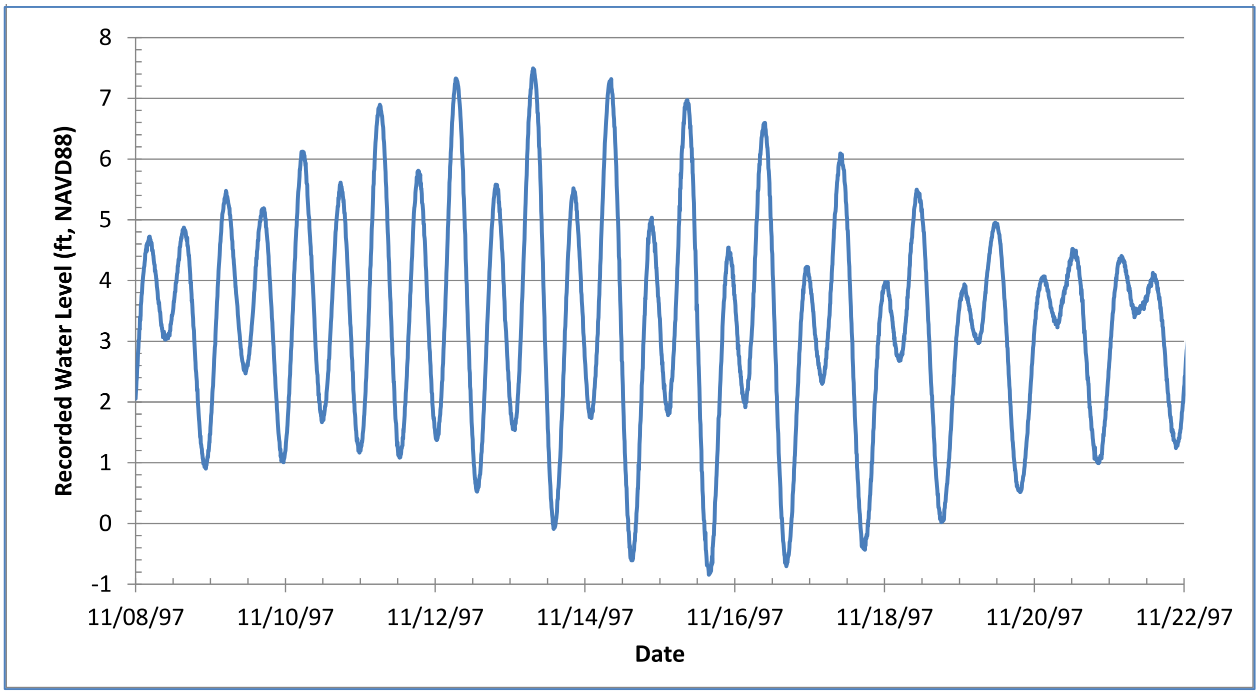


Figure 4-10: Recorded Highest Tidal Series

4.2.4.4 Flood Flows from Creeks

San Elijo Lagoon is the estuary of both Escondido and La Orilla Creeks. The Escondido Creek watershed extends approximately 28 miles from its headwaters in Bear Valley to the San Elijo Lagoon before discharging into the Pacific Ocean. The watershed covers approximately 54,112 acres in area and is long and narrow. La Orilla Creek is a very short stream that has only a marginal contribution of flood and sediment discharges compared to Escondido Creek. In the past, these creeks were considered to be ephemeral, but in the last few decades low flows from urbanization are present all year long.

The SELC installed and has managed a network of stream gauges in the Carlsbad Hydrology Unit since 2004, which is partially supported by the San Diego Regional Water Quality Control Board (SDRWQCB) and the California State Coastal Conservancy (CSCC). The gage on Escondido Creek is located at Camino del Norte Bridge. A 15-minute interval data set for the period from November 4, 2004 through January 2010 was provided by the SELC. A period of the data set for January 2008 was used in RMA2 numerical model verification. A storm event with a peak flow rate of 1,140 cubic feet per second (cfs) in January 2008 was also selected to represent a 2-yr event for analyzing salinity and water quality modeling of bacteria in a subsequent study. However, the period of the recorded flows is insufficient for statistically generating 50 and 100-yr return period flood flows for storm flow modeling.

A statistical analysis was performed by Exponent Inc. (2000) to determine 50- and 100-year flood flows based on data from a neighboring stream gage on Las Flores Creek near Oceanside Harbor, as the stream gage record for Escondido Creek is too short to generate statistics and no stream gage exists on La Orilla Creek. The 100-year peak flood was determined to be 21,000 cubic feet per second (cfs) for Escondido Creek, which is the same as the flood flow rate used by FEMA for the National Flood Insurance Program. The watershed area of La Orilla Creek is about 10 percent of that for Escondido Creek; therefore the combined peak flow from both creeks is estimated to be 23,255 cfs. This value was used by Dokken Engineering (2007) in their location hydraulic study for the I-5 Bridge. A daily hydrograph was developed by Exponent (2000) and was raised to the peak flow rate of 23,255 cfs to represent storm flood flows into the Lagoon, shown in Figure 4-11.

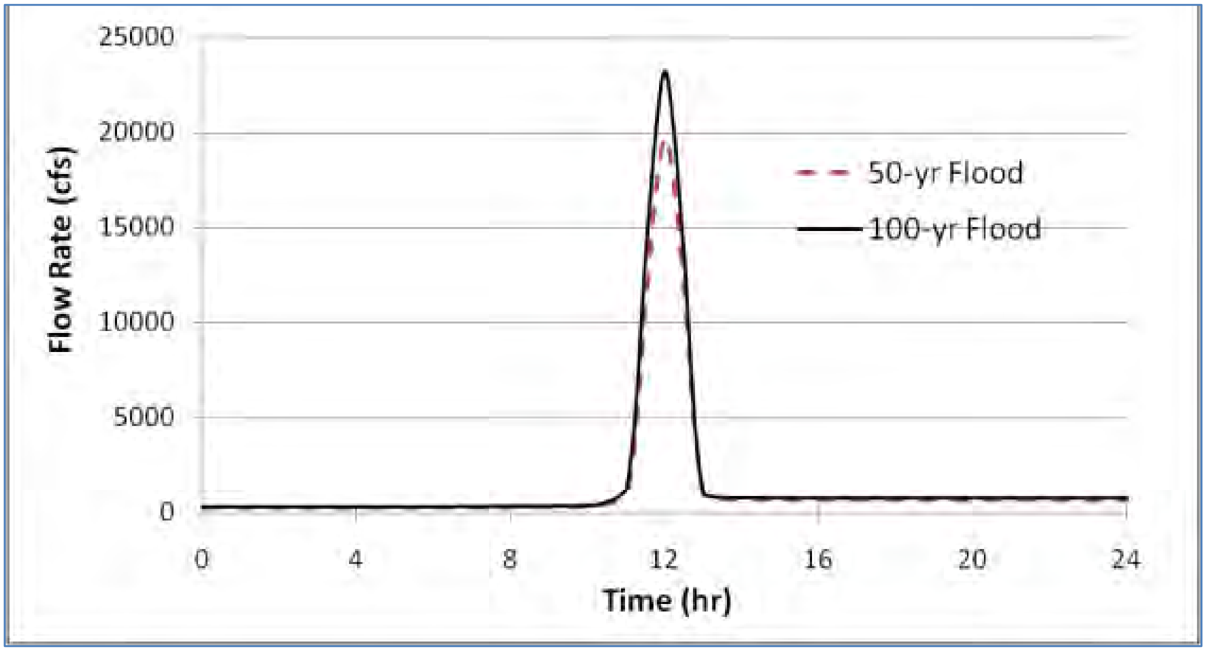


Figure 4-11: Flood Hydrographs

Table 4-3 shows the model simulations necessary to (1) perform the RMA2 model calibration, (2) predict water surface elevations in the Lagoon under both tidal and flood flow conditions, and (3) predict velocity in the tidal inlet for inlet stability analyses. The extreme tidal series discussed in Section 4.2.4.3 was used in the RMA2 modeling to provide the extreme maximum water surface elevation under the 100-year storm event in the Lagoon for flood protection assessment.

Analyses were also performed on an ad hoc basis at the request of the Stakeholder group to assess whether a flood training dike is necessary downstream of I-5 Bridge in the Central Basin to reduce potential scour under the flood event. Model results were useful to determine that the flood training is not necessary and it was eliminated as a project component. No formal additional reporting of that effort was prepared, other than inclusion of the model runs in the table on the following page.

Table 4-3: Suite of RMA2 Numerical Hydrodynamic Simulations

Alternative	Flood Flow	Tide Condition	Purpose
Existing	N/A	Measured	RMA2 Calibration
	None	Actual	Tidal ranges Inlet velocity Inundation frequency
	100-year	Highest Measured	Flood Elevations
1A	None	Actual	Tidal ranges Inlet velocity Inundation frequency
	100-year	Highest Measured	Flood Elevations
1B	None	Actual	Tidal ranges Inlet velocity Inundation frequency
	100-year	Highest Measured	Flood elevations
2A	None	Actual	Tidal ranges Inlet velocity Inundation frequency
	100-year	Highest Measured	Flood Elevations
2B	None	Actual	Tidal ranges Inlet velocity Inundation frequency
	100-year	Highest Measured	Flood Elevations

4.3 Model Calibration for Existing Tidal Conditions

RMA2 calibration involves matching model predictions with measured data by selecting appropriate input variable values (e.g., Manning's roughness coefficient (n), peclet numbers, and marsh porosity) to the model. The model was calibrated using measured tides for the existing tidal hydraulic system of San Elijo Lagoon. Tidal elevations measured at both the railroad trestle bridge (RR) and I-5 Bridge (I-5) in the late summer of 2002 were used for the calibration. The calibration data were provided by the USACE (2006), although the data were originally collected by the San Elijo Lagoon Conservancy (2002). The gage locations are shown in Figure 4-12. Verification could not be performed due to the short calibration data period.

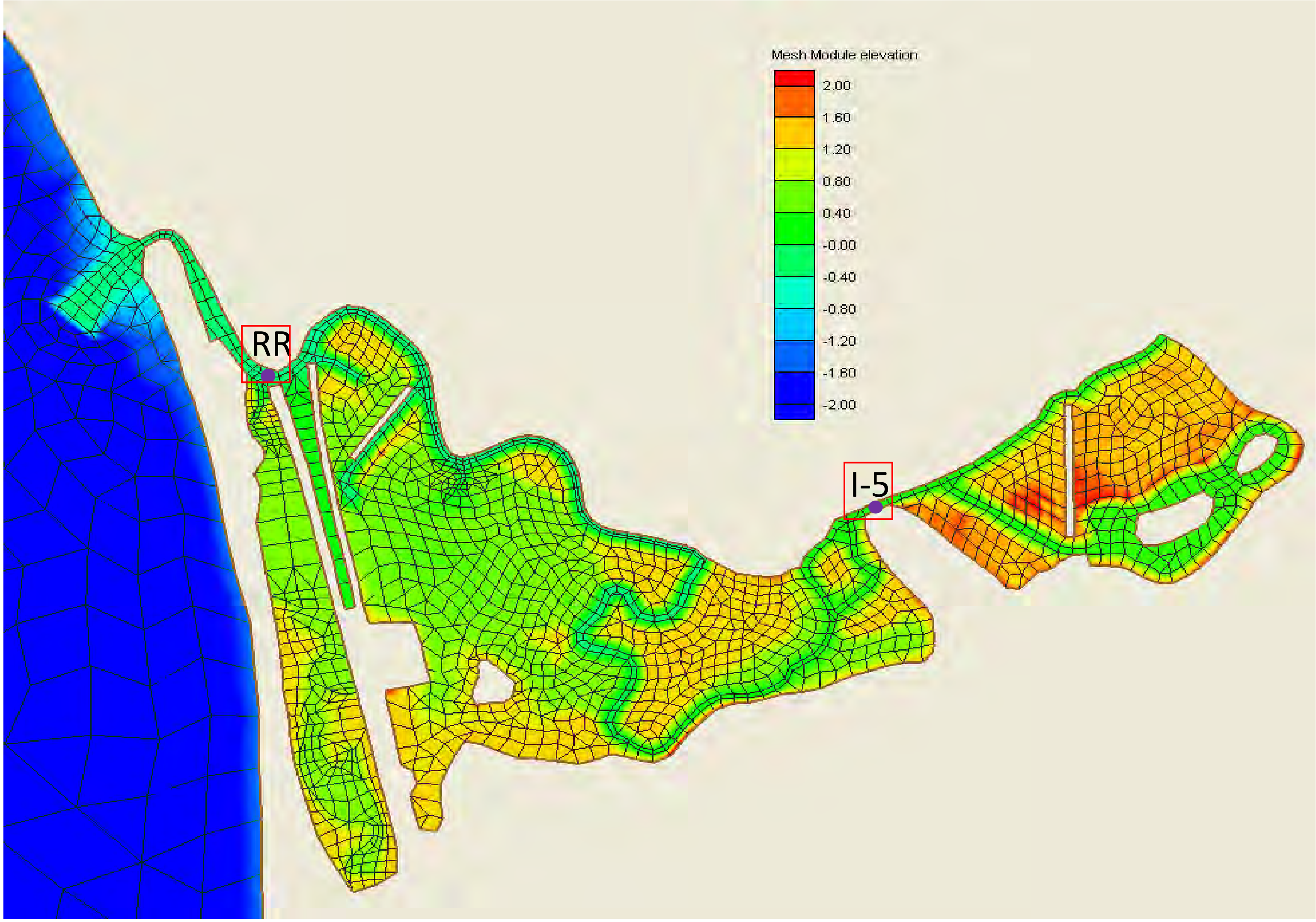


Figure 4-12: RMA2 Model Calibration Gage Locations

4.3.1 Model Setup for Calibration

The RMA2 User's Manual recommends ranges of values for Manning's roughness coefficient (n) and eddy viscosity to be used in the model (U.S. Army Corps of Engineers WES, 2009). The value of Manning's roughness coefficient (n) is a function of the physics of the hydraulic system and represents the roughness of the channel bed. As discussed in Chaudhry (1993), values can range from 0.011 to 0.075 or higher for natural rivers and estuaries. Relatively high values (0.04 to 0.05) are specified for rough surfaces, such as channels with cobbles or large boulders. Mid-range values (0.03) represent clean and straight natural streams. Low values (0.013 to 0.02) are specified for smooth surfaces, such as concrete, cement, wood, or gunite. Values of Manning's roughness coefficient (n) used for this analysis are in the middle range of the recommended values.

The modeling grid size depends on and is limited by the Peclet number and eddy viscosity. The Peclet number is defined as,

$$\frac{\rho V \Delta X}{E_{ij}}$$

in which ρ, V, ΔX, and E_{ij} are the water density, velocity, grid size and eddy viscosity, respectively. In order for the solution to be stable, the Peclet number has to be less than 50. The Peclet number can be reduced by increasing the mesh density or by increasing the eddy viscosity. However, it is unrealistic and time-consuming to perform this modeling with a very fine grid. Eddy viscosity is another variable often specified in modeling. It represents the degree of turbulence in the flow. A higher value represents greater turbulence, while a low value suggests less turbulence. The modeling approach can either be based on use of the Peclet number or eddy viscosity. This modeling was based on specifying the Peclet number to maximize model stability and to minimize "crashing." Calibration parameters were adjusted until model results approximated field measurements. The resulting calibration parameters are presented in Table 4-4.

Table 4-4: Setup Values For Model Calibration

Model Area	Manning's Roughness Coefficient (n)	Peclet Number
Offshore Area	0.025	40
Tidal Inlet and Channels	0.020	10
Mudflat	0.025	0.1
Low Marsh	0.030	0.1
High Marsh	0.035	0.1
Riparian	0.040	0.1
Upland	0.045	0.1

The time step is another very important parameter in the modeling. Sensitivity tests were conducted and results showed that the RMA2 model becomes unstable with increasing the time step, if the tidal wetting and drying processes are considered. Therefore, a relatively fine time step of 0.1 hour was used in order for the solution to be stable and to reflect the dynamic tidal series and flood flow hydrograph.

4.3.2 Model Sensitivity

Sensitivity tests were performed to evaluate the robustness of the model during the model calibration process by varying the calibration parameters. The calibration parameters for RMA2 model include roughness (Manning's coefficient), Peclet number (Eddy viscosity), and Marsh Porosity.

- The model is not very sensitive to the roughness parameter; water level variations are less than 0.16 feet with a 25 percent of change in Manning's coefficients.

- The eddy viscosity is a parameter which defines turbulent transfer of momentum by eddies. Peclet number is used as the input parameter in this study instead of the traditional eddy viscosity method. The relationship between Peclet number and eddy viscosity is discussed in the previous section. With the Peclet number changing from 10 to 0.4 (25 times difference) in the channel, the maximum departure of water level is about 0.4 feet at the Railroad trestle and 0.8 feet at I-5 within the calibration time period. With the Peclet number changing from 0.1 to 1 (10 times difference) in the marsh area, the maximum departure of water level is about 0.16 feet at the Railroad Trestle and 0.3 feet at I-5 within the calibration period. The model is not significantly sensitive to Peclet number, but it could cause large distortion with inappropriate inputs, especially within regions that have significant velocity change.

The marsh porosity technique is used in conjunction with the traditional wetting and drying technique to enhance the model stability. The marsh porosity technique allows elements to transit gradually between wet and dry states. Several sets of marsh porosity parameters were tested, and results indicate that water levels are not sensitive to marsh porosity. However, velocities appear to be more sensitive to marsh porosity than water levels, especially at intertidal areas. However, sensitivity can be reduced with proper marsh porosity parameters.

4.3.3 Calibration Results

Model calibration was done for the same time period that the USACE used for their modeling of the site, the period from 3:00 AM on August 6 to 2:00 AM on August 7, 2002. Model predictions of tidal elevations were compared to measured tides at the railroad and I-5 bridges and are shown in Figure 4-13 and Figure 4-14. Tidal elevations simulated by the model correspond reasonably well with those measured both in terms of tidal phase (timing) and range (elevation). Calibration results at the I-5 Bridge are slightly better than that at the Railroad Bridge. The accuracy of calibration results are limited by the fact that tidal inlet bathymetry was not measured on the same day the tidal elevations were measured. However, for purposes of comparing alternatives for this study, the model can reasonably replicate (predict) the existing tidal conditions in the wetlands as compared with measured values, and is therefore suitable for alternative simulations. A longer period of tidal calibration would be useful in evaluating possible systematic model error. A systematic error in the model could result in a trend of mean sea level either upward or downward over time. Due to the basic equations of continuity used for its calculations, this model has not shown this type of error in previous applications and is not anticipated to show it at San Elijo Lagoon. The relatively short calibration period is adequate to test the model's accuracy and can be relied on to show its suitability for predicting water levels over time at this site.

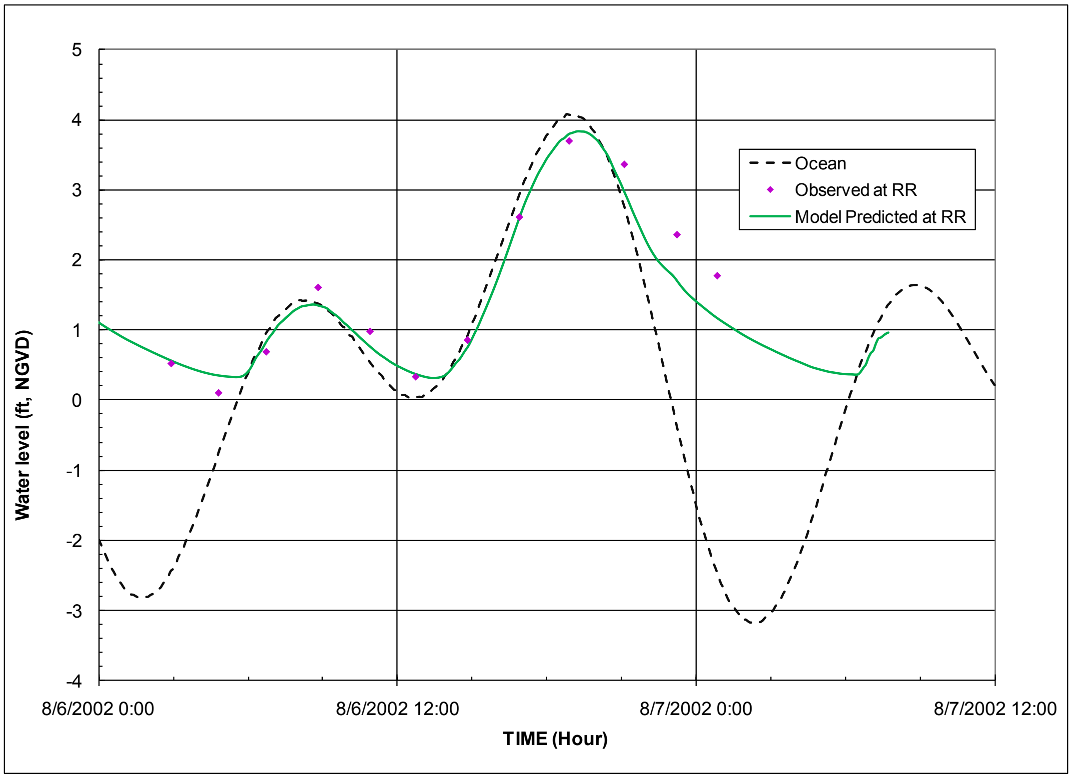


Figure 4-13: RMA2 Model Calibration Results at the Railroad Bridge

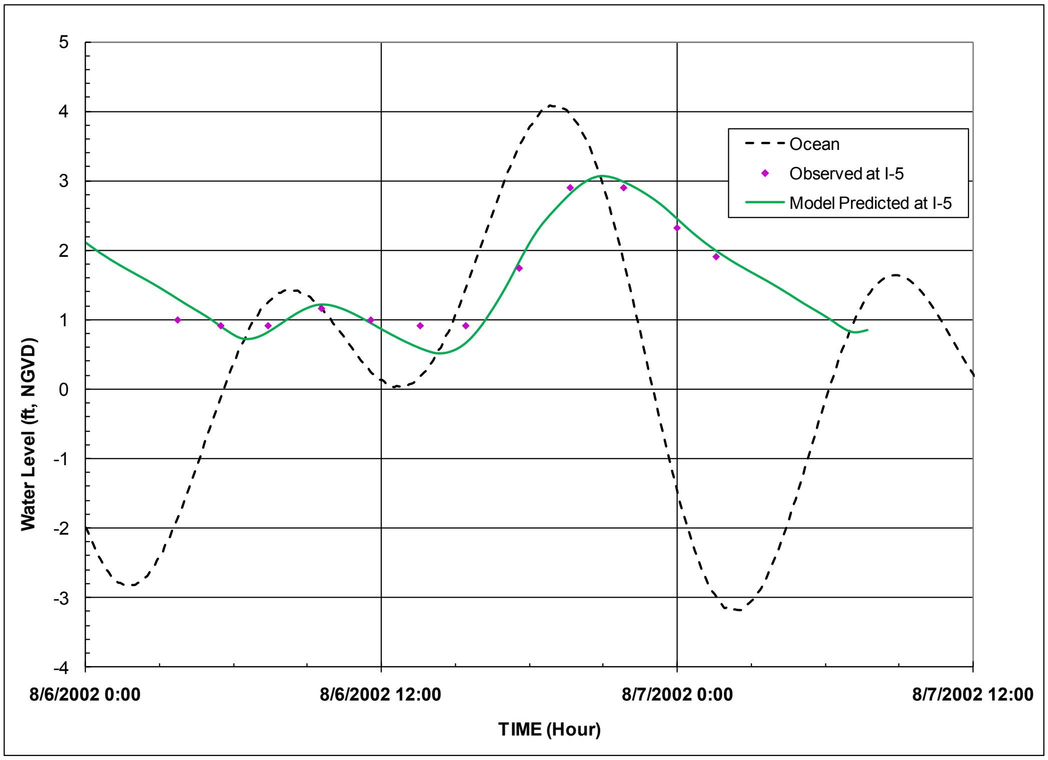


Figure 4-14: RMA2 Model Calibration Results at I-5 Bridge

4.3.4 Verification Results

Model verification was performed with numerical model parameters determined in the model calibration. The verification period was from January 1st to January 4th, 2008 corresponding to an event when relative water depths were measured in the lagoon. Water depths were measured as part of the development of TMDLs and were provided by the City of Encinitas. Water depths were collected in three locations: 1) the inlet, 2) Segment 2 (near the Nature Center), and 3) Segment 1 (immediate downstream of the I-5 Bridge) as shown in Figure 4-15. The measured water depths were converted into water levels by shifting them vertically to approximately match those predicted by the model. The timing of the readings was also shifted one hour to match the phasing of the ocean tide at the tidal inlet. It is possible that the time of depth measurements were based on daylight savings time which would offset the recorded time by one hour.

Model verification results are shown in Figure 4-16 through Figure 4-18. In general, both predicted tidal range in the lagoon matched well with the measured data, and phasing matched as well. The verification accuracy is limited by the lack of simultaneous bathymetry survey data available for the inlet and the I-5 bridge section, and by the water level data not being tied to a vertical datum. However, the model verification is considered adequate to demonstrate reasonable model predictions of tidal range, lags, and phasing for the purposes of preliminary engineering analyses and relative comparison of alternatives.

Figure 4-15: RMA2 Model Verification Gage Locations (Created in Google Earth)

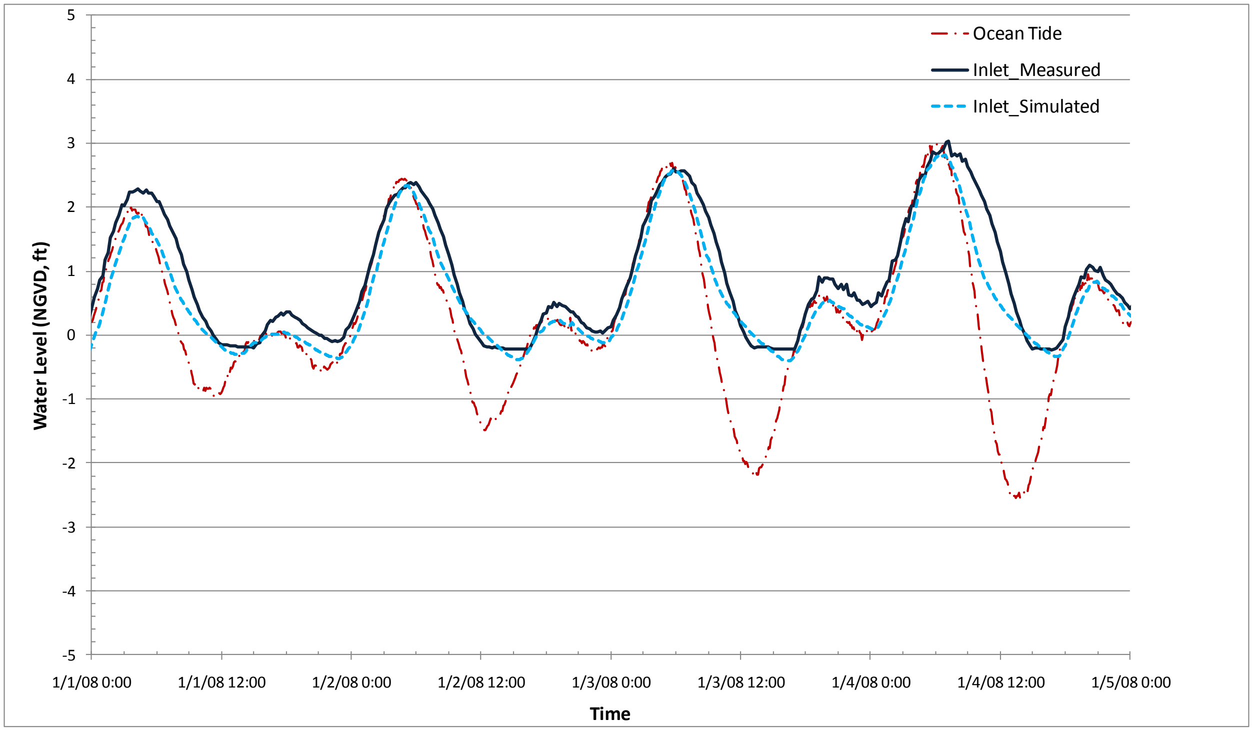


Figure 4-16: RMA2 Model Verification Results at the Tidal Inlet

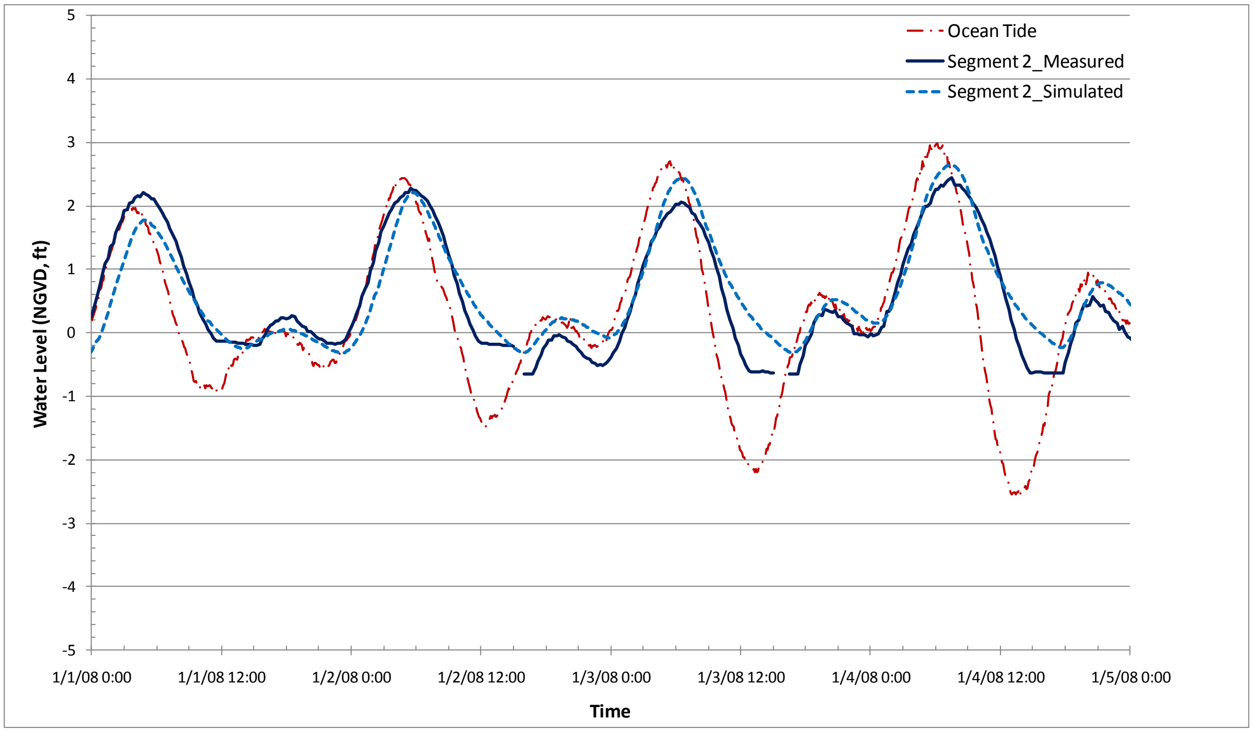


Figure 4-17: RMA2 Model Verification Results at Segment 2

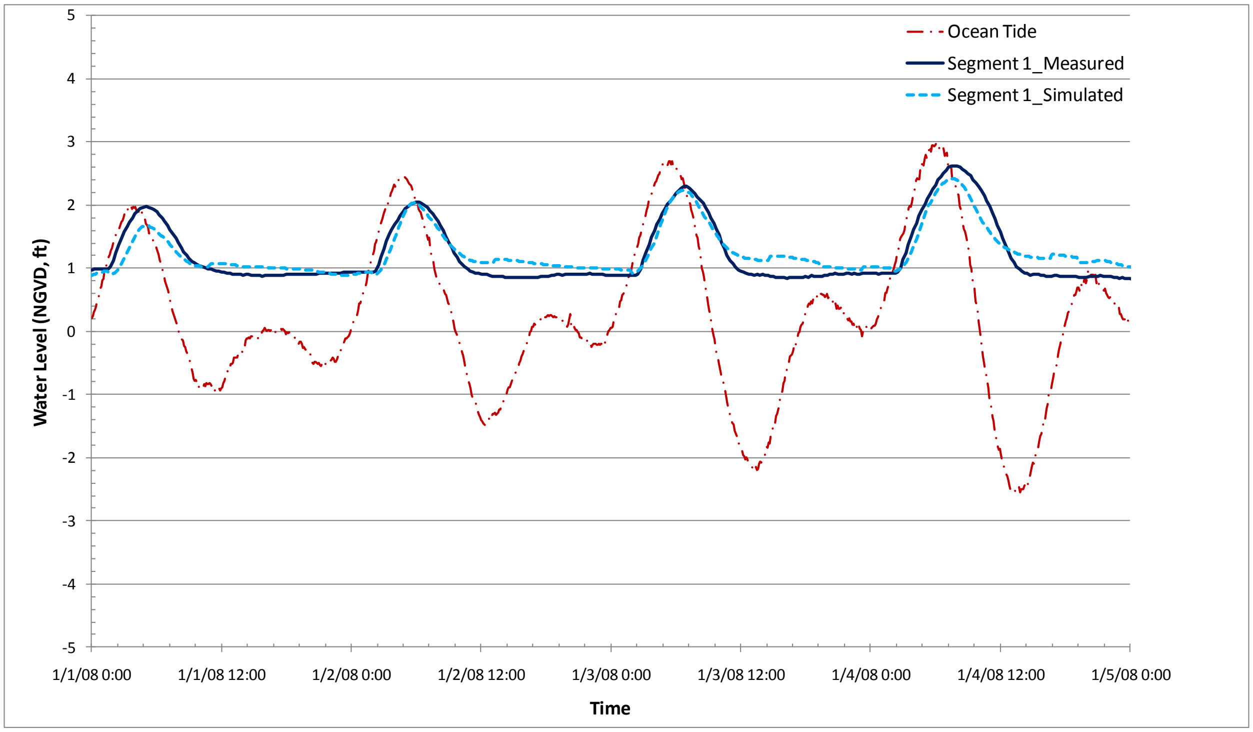


Figure 4-18: RMA2 Model Verification Results at Segment 1

4.4 Hydraulic Modeling Results

Modeling simulations were performed for tidal and flood flows for existing conditions and four proposed alternatives. The modeling parameters of the roughness coefficients and Peclet numbers calibrated for existing conditions were assigned for the alternative modeling. Results of the hydraulic modeling are discussed below.

Figure 4-19 shows virtual gage locations where hydraulic results are analyzed for existing conditions, Alternatives 1A, and 1B. Figure 4-20 shows virtual gage locations for Alternatives 2A and 2B. These locations are fixed for all modeling scenarios except they vary by alternative at the tidal inlet, depending on inlet location. To best present modeling results to inform the planning and design efforts, different sets of gages may be used for varying purposes, such as water level prediction, inundation frequency analyses, tidal velocity patterns, etc.

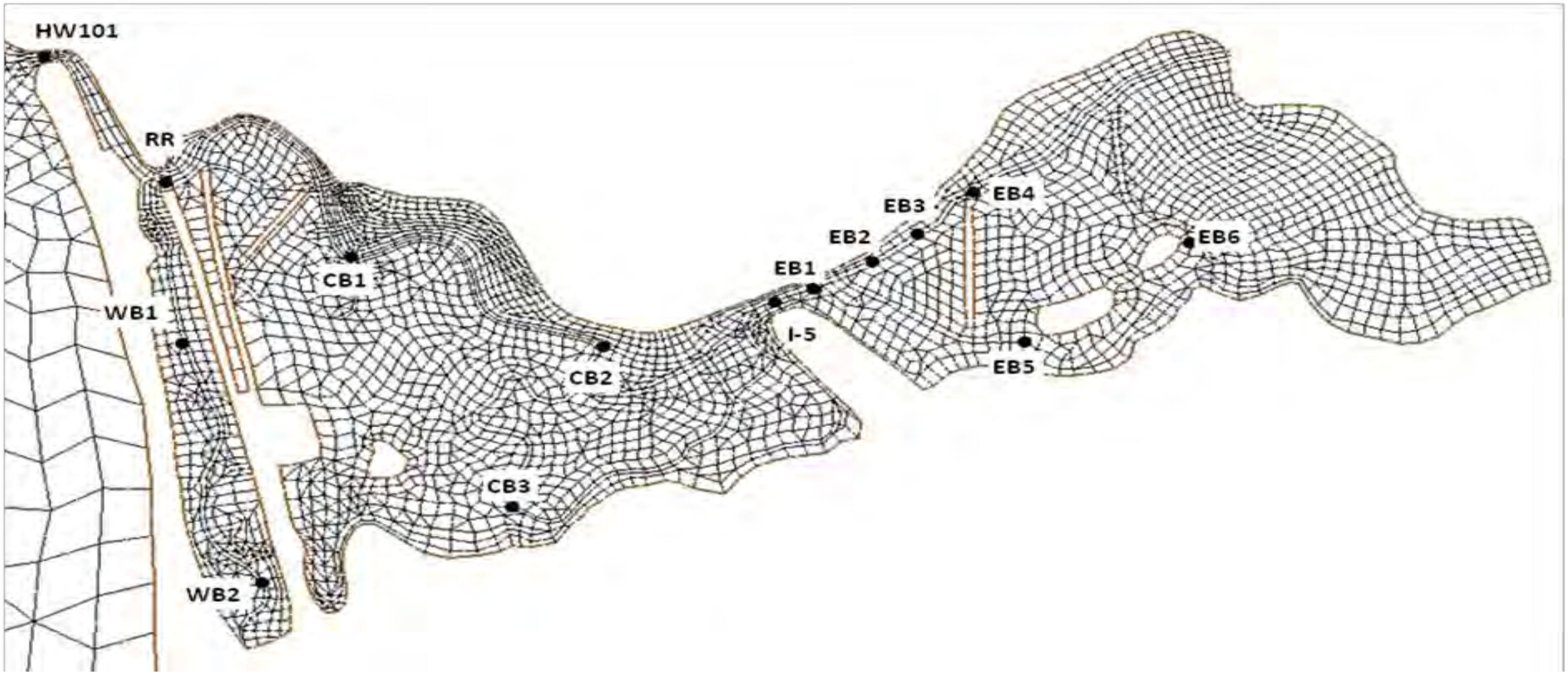


Figure 4-19: Virtual Gage Locations for Existing Conditions and Alternatives 1A and 1B

Figure 4-20: Virtual Gage Locations for Alternatives 2A and 2B

4.4.1 Flood Flow Hydraulics

4.4.1.1 Maximum Water Levels

The purpose of the flood hydraulic modeling is to determine the maximum water levels throughout the lagoon to a level of accuracy appropriate for planning purposes to quantify impacts of restoration on potential flooding. The hydrodynamic model runs were conducted for all alternatives under the 100-year flood combined with a highest measured high spring tide. For a specific location, the highest water level occurs when the highest measured high tide and the peak flood occur simultaneously. Results represent conditions of the tidal inlet and wetland basins immediately after construction is complete.

Sediment may accumulate in the lagoon over time, but will be flushed out from the main channel during stormflows prior to occurrence of the peak lagoon water level, so sufficient stormflow drainage will still occur to prevent flooding of adjacent areas. The flow velocity required for sand erosion is 3 feet per second (fps), and the flood will generate velocities of up to between 3 to 5 feet per second according to modeling. Modeling for Alternative 1B indicates that the stormflow velocity reaches 3 fps in the entrance channel approximately one hour prior to the water surface elevation peak in the central basin, so the shoal in the entrance channel will be cleared before the occurrence of the peak water surface elevation. Modeling presents velocities under the post-construction condition without any shoals. If shoals were in place, the stormflow velocity at the shoal will be even higher. Tidal flow monitoring in 2010 confirmed peak velocities of ebb tides at 5.5 fps. Sand bars should not impede the flood.

This process has been documented at nearby San Dieguito Lagoon where pre- and post-storm season measurements by Coastal Environments (2013) showed the erosion of the flood shoal in the entrance channel during a 13-year storm event in 1993. Shoals at San Elijo Lagoon will be monitored and if discovered it will be removed during regular maintenance.

Ideally, multiple model runs would be required to determine the absolutely highest water level throughout the lagoon with the greatest level of accuracy. However, this study is not a flood control design effort, but rather a component of wetland restoration analyses. Therefore, results can be slightly less detailed but still sufficiently accurate to render information suitable for planning and decision-making within the constrained schedule and budget. Modeling runs were performed for each alternative with the modelingtidal series shown in Figure 4-9**Error! eference source not found.** as boundary input. Model runs was intended to maximize water levels in each basin and to maximize water levels at the tidal inlet. Results are summarized in Table 4-5**Error! Reference source not found.**.

The main roadway of concern is Manchester Avenue that extends along the entire northern boundary of the Lagoon. Other important features are the three bridges at Highway 101, the NCTD Railroad, and I-5. These features have been the focus of flood studies over time by Caltrans. Results indicate that for existing conditions and for Alternative 1A, a reach of

Manchester Avenue in the East Basin will be flooded during the combined event. However, the flood water level will be reduced by one half of a foot with proposed Alterative 1A. The table also shows the existing surface elevation of Manchester Avenue for comparison.

In contrast, the results also indicate that the maximum water level will be below Manchester Avenue for Alternatives 1B and 2A. Storm flood water levels are clearly reduced by the project upstream of I-5. Alternative 2B would provide similar flood water level reduction as Alternative 2A although it was not modeled as it was eliminated from consideration by the Lagoon Conservancy from being carried forward in environmental review. Alternatives 2A & 2B may not provide a 3 foot freeboard required by FEMA, but the future condition should be an improvement over existing flood conditions.

Table 4-5: Maximum 100-Year Flood Elevation (ft, NGVD) in the Wetlands in 2015 Based on +5.4-ft NGVD (Recorded Highest) Downstream Tidal Elevation

Virtual Gage Locations	Manchester Avenue Elevation	Existing	Alt 1A	Alt 1B	Alt 2A
HW101	N/A	5.3	5.3	5.3	5.3
RR	N/A	8.5	7.9	8.1	6.3
CB1	29.0	8.9	8.4	8.7	6.5
CB2	9.8	9.0	8.5	8.7	6.7
I-5	12.7	9.4	8.9	8.8	7.3
EB1	12.9	9.8	9.8	8.8	7.5
EB2	9.3	12.3	11.7	9.0	8.1
EB3	10.3	12.4	11.7	9.0	8.3
EB4	10.4	12.3	11.8	9.0	8.4
	Note: Values in red indicate elevations above the roadway and represent flooding.				

4.4.2 Tidal Hydraulics and Hydrology for 2015

The purposes of the tidal hydraulic studies are to:

- Predict tidal elevations and flow velocities over time and space within the Lagoon, as compared to the open ocean (to serve as the basis for analyses of water quality and shoaling, and other related studies);
- Determine the tidal inundation frequency in the wetlands to determine probable habitat distribution; and
- Predict the statistics of tidal inlet hydraulics for the inlet design and stability analyses.

Tidal hydraulic modeling was done for both immediate post-construction conditions assumed to be in 2015, and for future 50-year conditions in 2065 estimated using a rate of sea level rise of 2 feet from 2015 (Moffatt & Nichol, 2010). The hydraulic modeling results in the wetland system and tidal inlet are discussed in the following sections.

4.4.2.1 Tidal Elevations

Hydraulic modeling results for each wetland alternative are analyzed for conditions representing immediate post-construction in 2015. Table 4-6 presents predicted tidal ranges, and the ocean tidal range for comparison. The tidal range difference between a wetland and the ocean represents the potential tidal muting in that specific location for that alternative. Table 4-7 presents the model-predicted spring high and low tide elevations. The table also provides additional information on muting and indicates whether the tidal muting occurs for high tides, low tides, or for both tidal conditions.

Table 4-6: Predicted Tidal Ranges for 2015

Alternative	Tidal Range (ft)					
	Ocean	HW101	WB1	CB2	I-5	EB4
Existing	7.97	4.56	3.99	3.85	3.78	3.76
1A	7.97	7.11	5.56	5.26	5.21	5.15
1B	7.97	6.58	5.44	5.42	5.42	5.43
2A	7.97	7.97	7.93	7.92	7.87	7.88
2B	7.97	7.97	7.88	7.88	7.88	7.88

Table 4-7: Predicted Spring High and Low Tidal Elevations for 2015

Alternative (1)	High and Low Tidal Elevations (ft, NGVD29)											
	Ocean		HW101		WB1		CB2		I-5		EB4	
	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
Existing	4.38	-3.59	4.18	-0.38	3.65	-0.34	3.53	-0.32	3.51	-0.27	3.51	-0.25
1A	4.38	-3.59	4.35	-2.77	3.92	-1.64	3.76	-1.50	3.75	-1.46	3.75	-1.40
1B	4.38	-3.59	4.29	-2.29	3.88	-1.56	3.88	-1.54	3.88	-1.54	3.88	-1.54
2A	4.38	-3.59	4.38	-3.59	4.38	-3.56	4.37	-3.55	4.38	-3.49	4.39	-3.49
2B	4.38	-3.59	4.38	-3.59	4.38	-3.50	4.38	-3.50	4.38	-3.50	4.38	-3.50

Figure 4-21 through Figure 4-25 show the predicted tidal series in the wetlands and ocean for the existing and proposed alternative scenarios. The results are summarized below.

- For No Project (existing conditions), the inlet is narrow and long, and the inlet depth is limited by a bedrock and cobble sill at the mouth. Both high and low tides in the West Basin are muted by more than 1 foot compared to the ocean tides. The tides are further muted in the Central and East Basins due to the constriction of the Railroad Bridge and narrow and meandering channels in the Central Basin.

- For Alternative 1A and Alternative 1B with the inlet at the existing location and inlet depth limited by the nearshore sill, the overall hydraulics are similar and controlled by the constriction at the mouth. Both high and low tides are muted, with low tides muted by more than 2 feet in the Central Basin. The narrow channel between Highway 101 Bridge and Railroad Bridge restricts flow to the Central Basin. The predicted tidal range in the East Basin is similar to that in the Central Basin, which indicates that the proposed channel cross-section under the I-5 Bridge is sufficient to not cause further muting in the East Basin. Both alternatives significantly reduce tidal muting and improve circulation in the wetland basins compared to existing conditions.

- For Alternatives 2A and 2B with the same proposed new tidal inlet location, the general wetland hydraulics are similar. There is no muting of the high tide, and muting of the low tide is very small. The low tide is muted approximately 0.1 feet in both the Central and East Basins. Hydraulically, these two alternatives reduce tidal muting and improve circulation in the wetland basins.

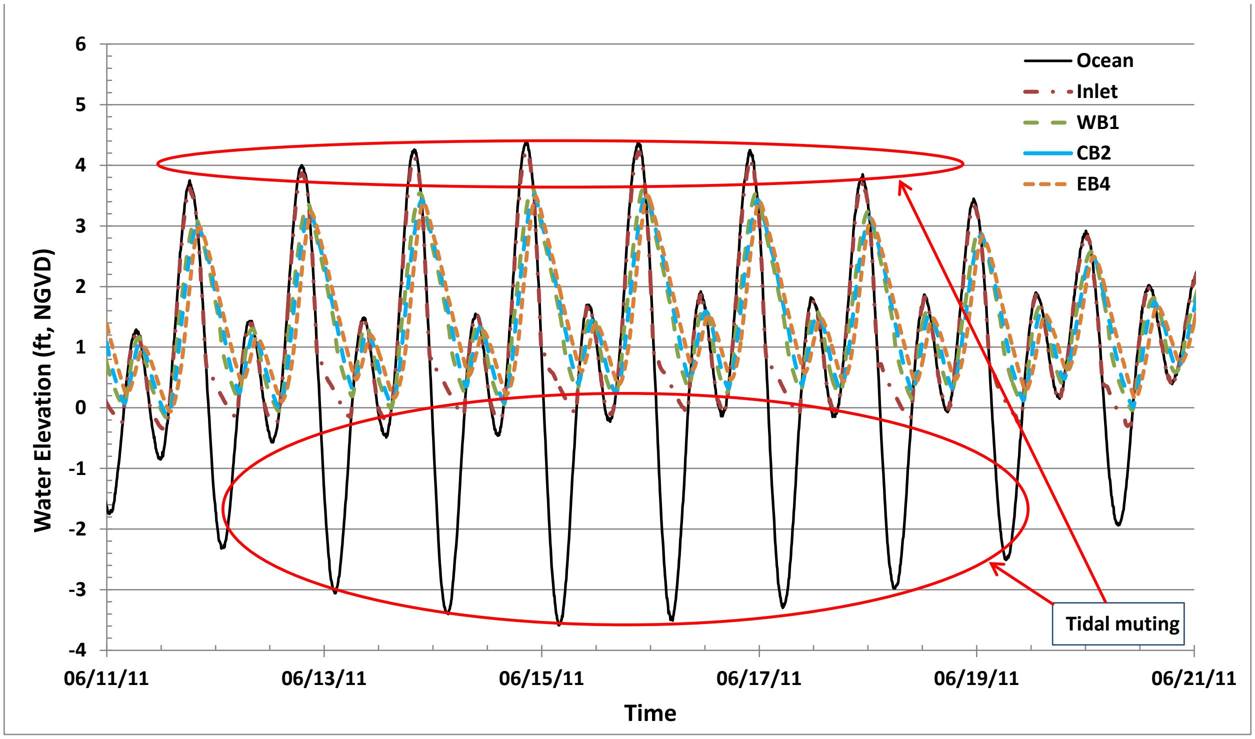


Figure 4-21: Predicted Tidal Elevations for No Project at 2015

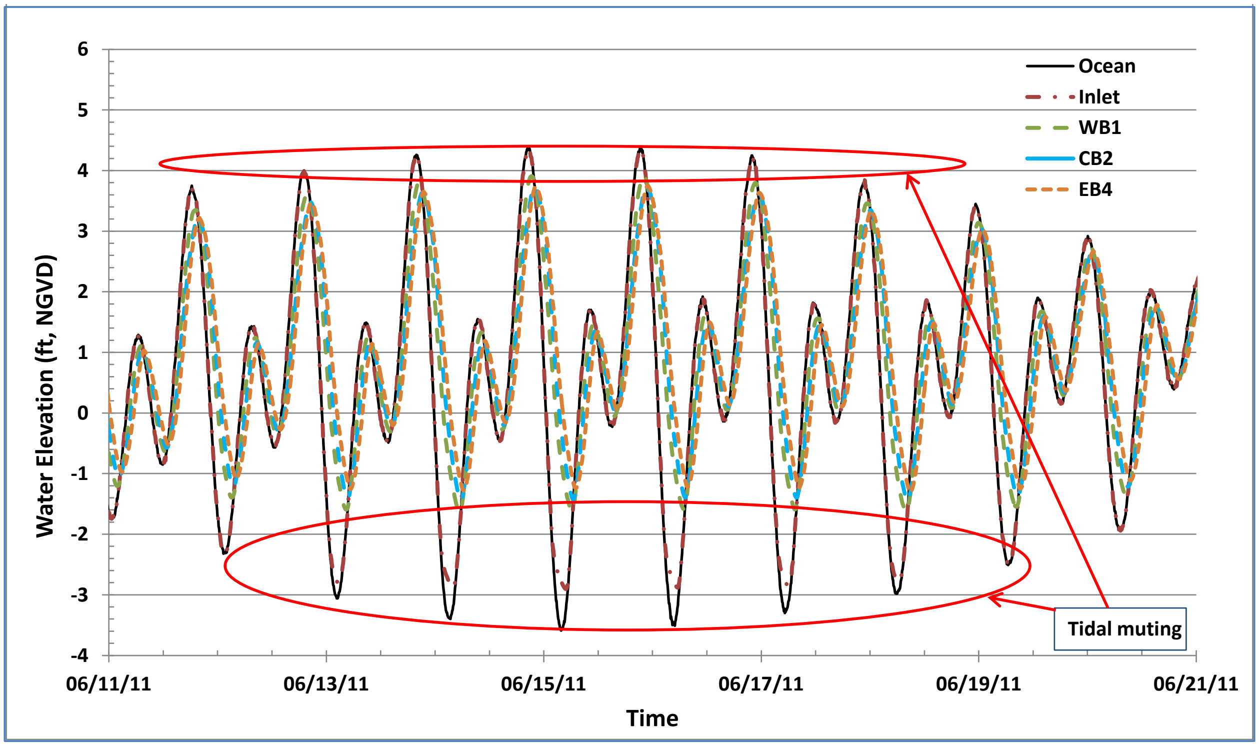


Figure 4-22: Predicted Tidal Elevations for Alternative 1A at 2015

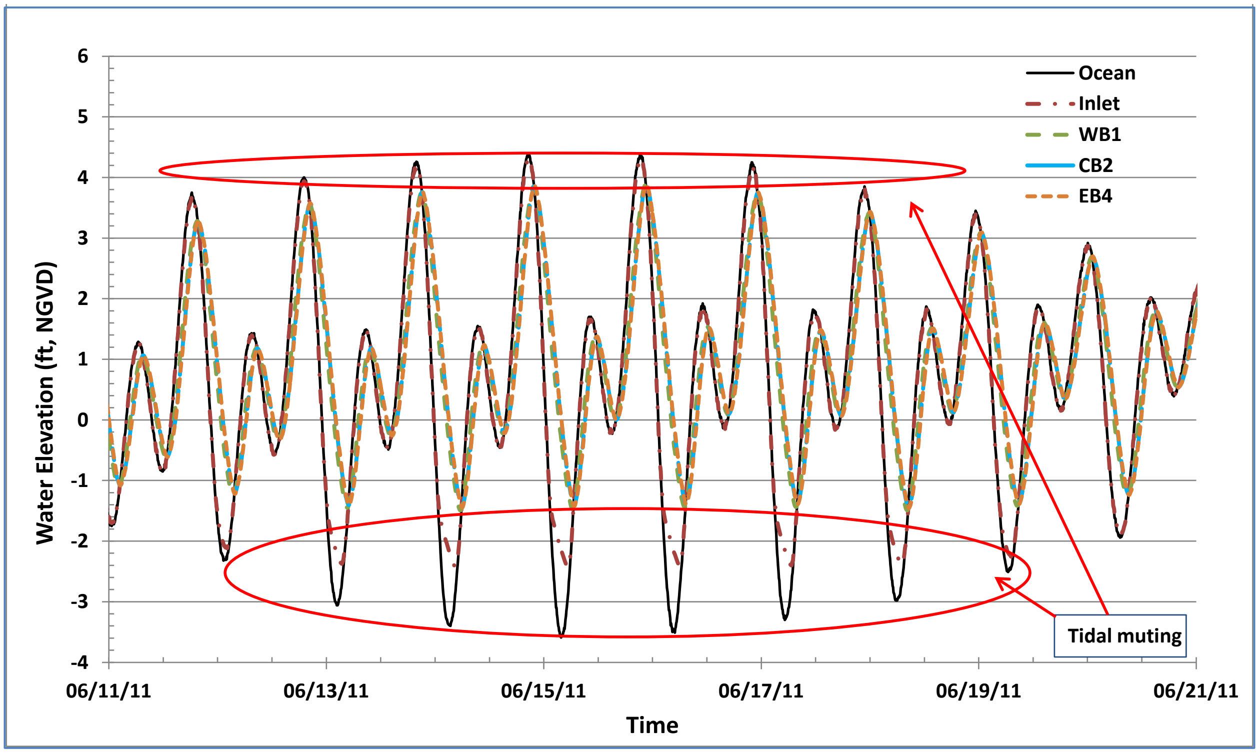


Figure 4-23: Predicted Tidal Elevations for Alternative 1B at 2015

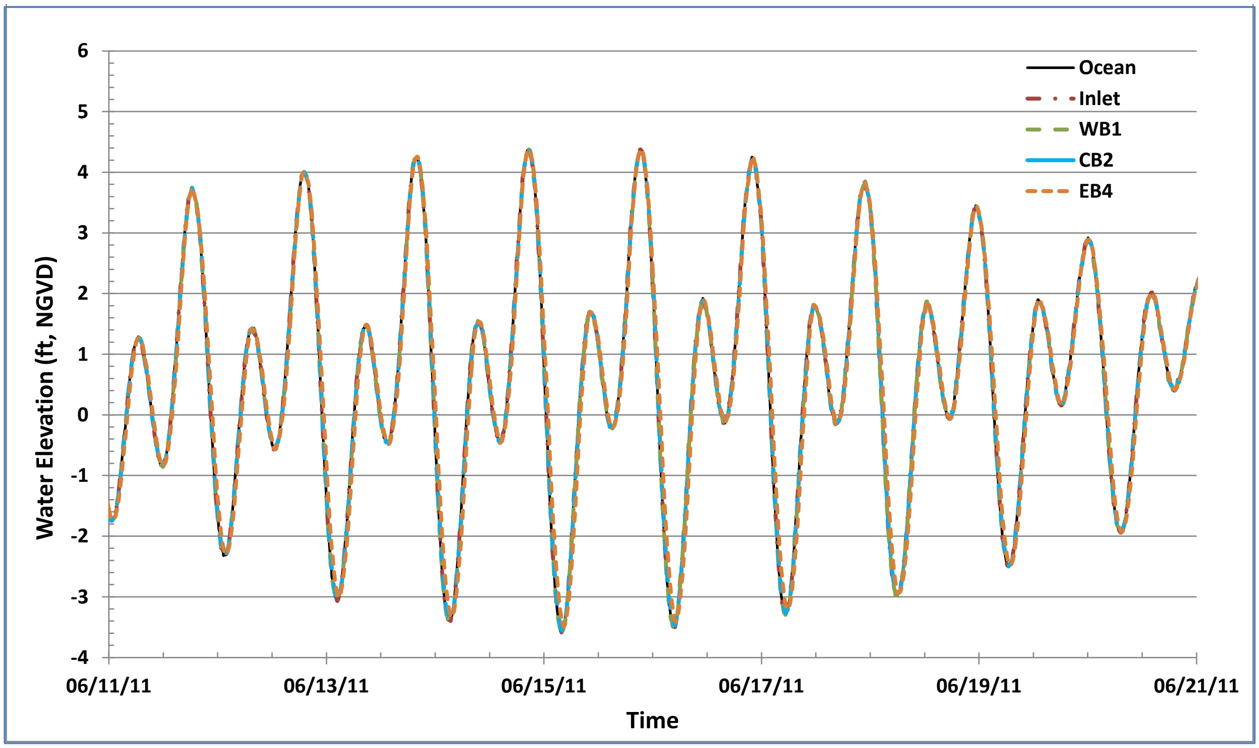


Figure 4-24: Predicted Tidal Elevations for Alternative 2A at 2015

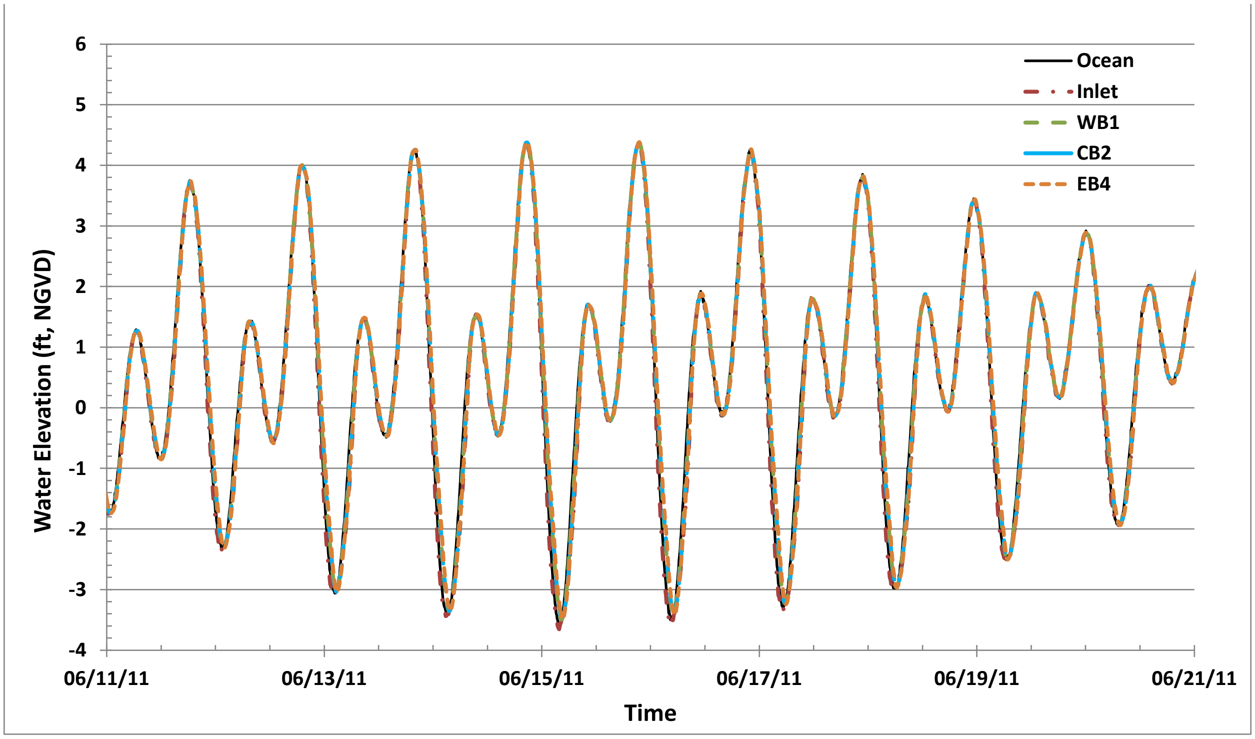


Figure 4-25: Predicted Tidal Elevations for Alternative 2B at 2015

4.4.2.2 Tidal Inundation Frequency

Tidal inundation frequency analyses were performed with tidal hydraulic modeling results. Inundation frequency is the percentage of time that the tidal elevation exceeds a certain elevation. It is an important factor for habitat design and distribution because the plants become established at particular inundation frequencies. Figure 4-26 through Figure 4-30 present predicted inundation frequencies for existing and four proposed wetland scenarios at 2015, or the post-construction condition. The following can be concluded from the tidal inundation frequency analyses:

- For No Project (existing conditions), both high and low tides are muted. Therefore, the vertical zonation (range of occurrence) of intertidal habitat is relatively narrow (compared to an un-muted, open-ocean condition) and is approximately 3 to 4 feet. Tidal inundation frequency in each basin is different due to effects of channel constriction caused by infrastructure, with a progressive decrease in the vertical range of possible intertidal habitat with distance to the east. A range of salt marsh habitats can occur on-site, but their areas will be constrained by the tidal range, and the habitat distribution on-site may be dominated by fewer species more suited to the tidal elevations.

- For Alternatives 1A and 1B, tides are still muted, but much less relative to existing conditions. Therefore, the vertical zonation of intertidal habitat is more extensive than for existing conditions. Elevations range 5.5 feet in the West Basin for both Alternatives. Elevations range 5.2 feet for Alternative 1A in the Central and East Basins and 5.4 feet for Alternative 1B in the same basins. A greater range of salt marsh habitat can occur on-site compared to existing conditions, but their areas will still be constrained by the tidal range. Any tidal muting could further constrain the elevations and distribution of salt marsh habitat. For Alternative 1B, creating a greater range of elevations on-site by grading/dredging would be appropriate to provide greater habitat diversity. Tidal muting from shoaling would constrain the tidal range and distribution of habitats, indicating maintenance dredging would be important in preserving habitat areas. Shoaling is addressed in a subsequent study. Shoaling does not bear on storm flood elevations in the Lagoon during significant flood events, however, as discussed previously.

- For Alternatives 2A and 2B, the inundation frequencies in the wetland basins closely mimic that in the ocean, and the vertical zonation of intertidal habitats is maximized at 7.9 feet in the entire Lagoon. This situation indicates that the tidal inlet design is sufficient in cross-sectional area and bed elevation to approximately convey full tidal circulation in all wetland basins. As a result, the full range of salt marsh habitats should occur on-site. Similar to Alternative 1B, creating a greater range of elevations on-site by grading/dredging would be appropriate to provide greater habitat diversity. As with previous alternatives, any tidal muting from shoaling (addressed in a subsequent study) would constrain the tidal range and distribution of habitats, thus maintenance dredging would be important in preserving habitat areas. Shoaling does not bear on storm flood elevations in the Lagoon during significant flood events, however, as discussed previously.

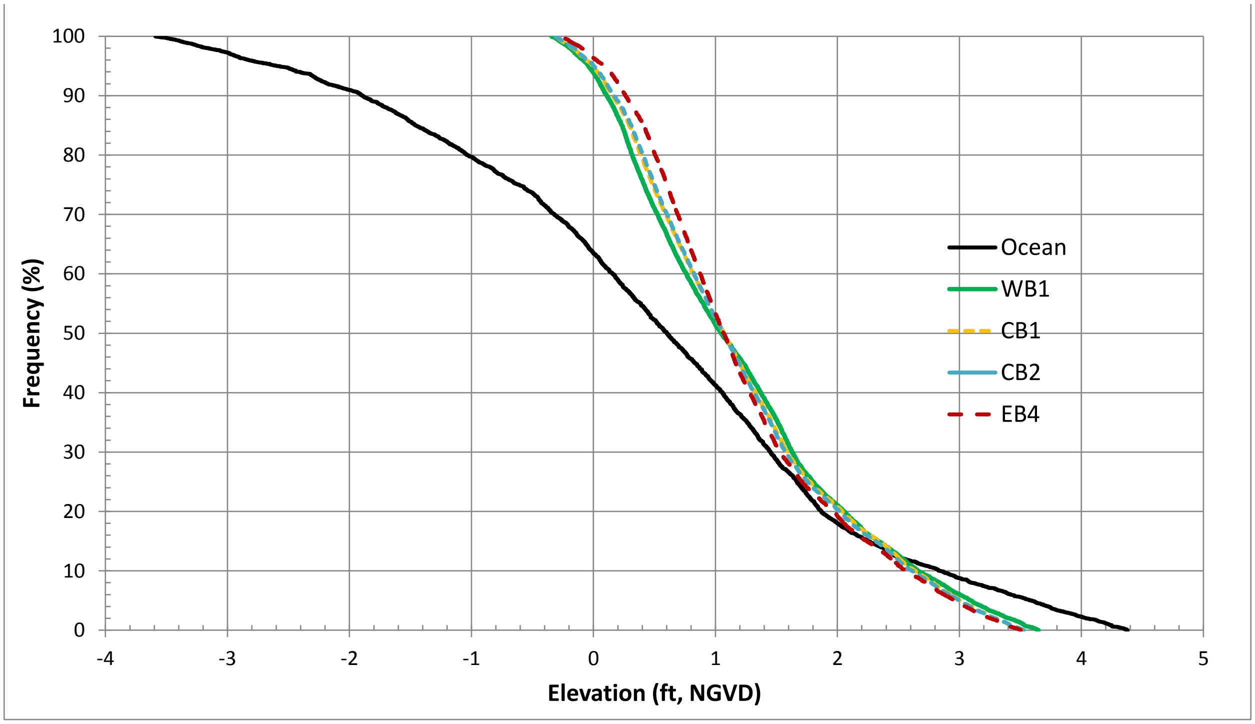


Figure 4-26: Inundation Frequency of No Project at 2015

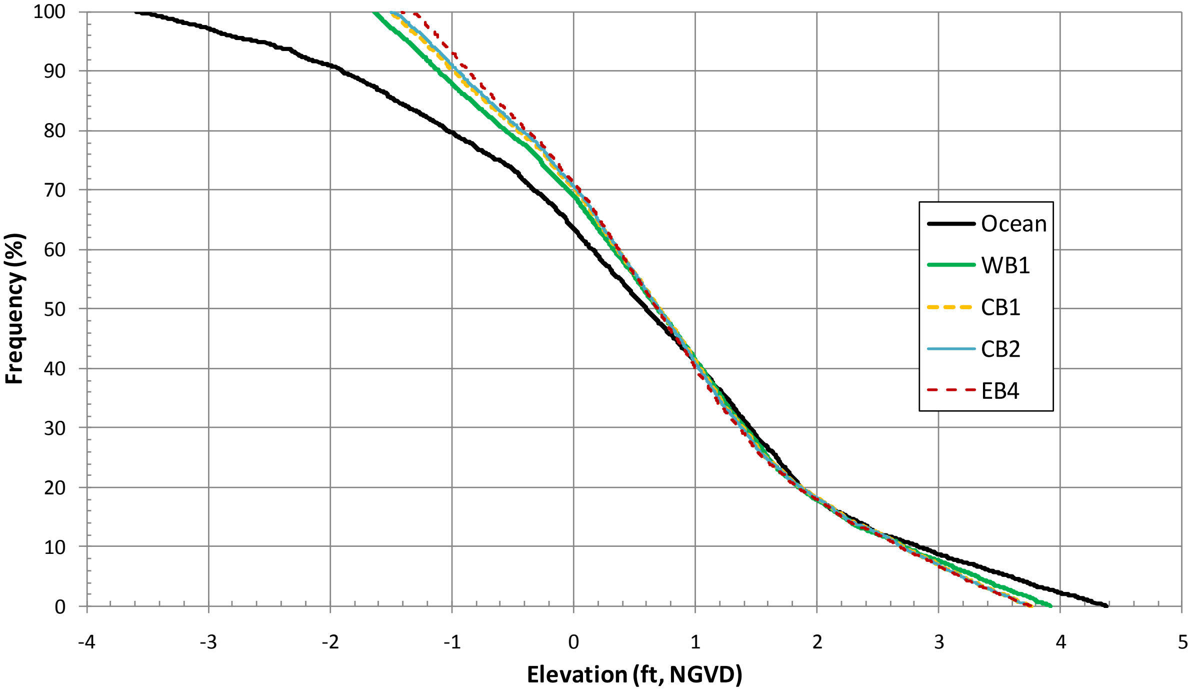


Figure 4-27: Inundation Frequency for Alternative 1A at 2015

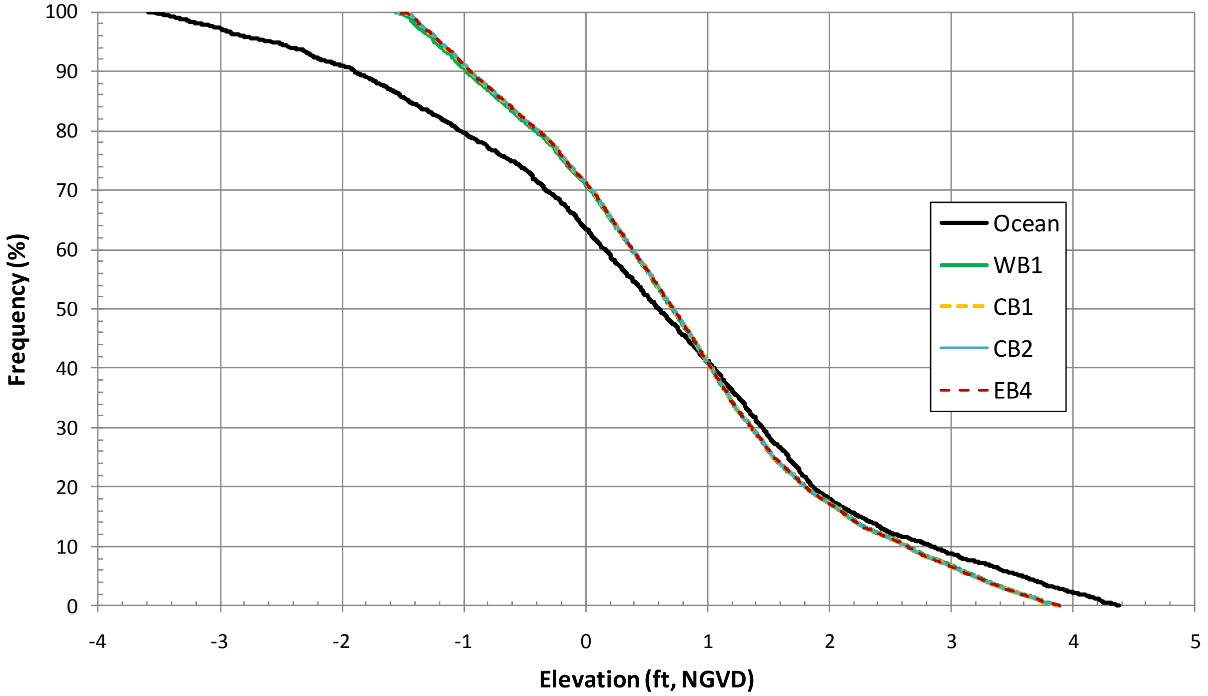


Figure 4-28: Inundation Frequency for Alternative 1B at 2015

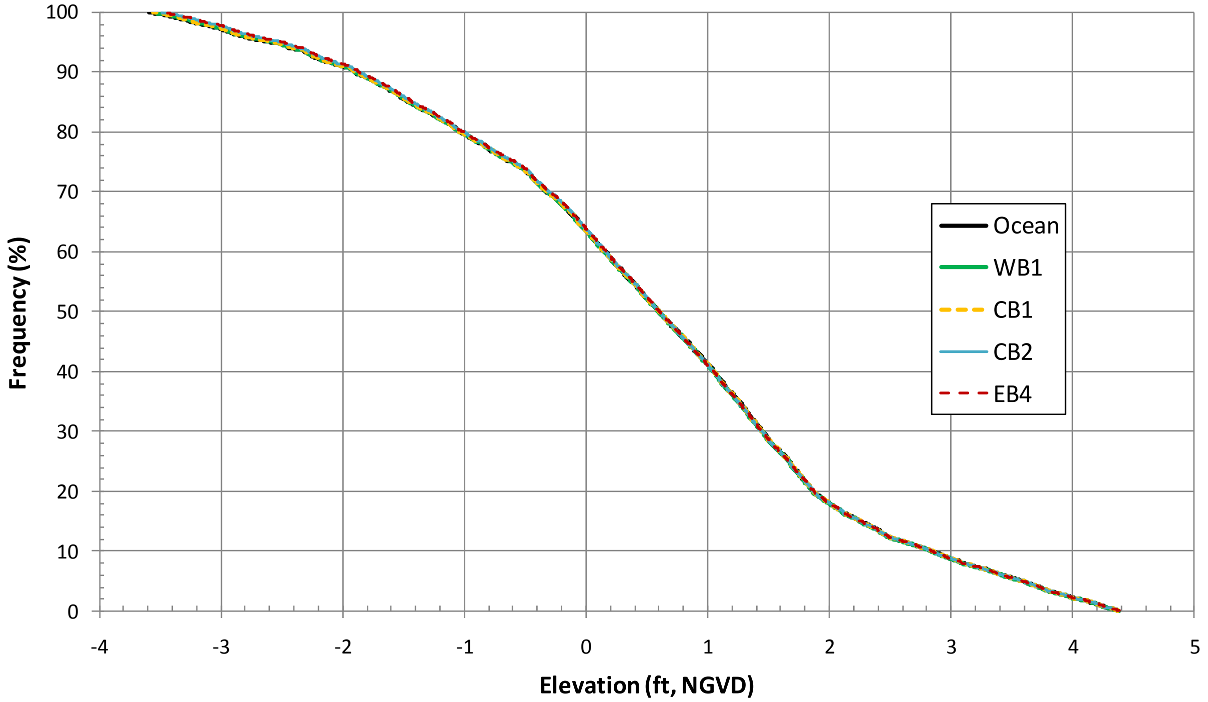


Figure 4-29: Inundation Frequency for Alternative 2A at 2015

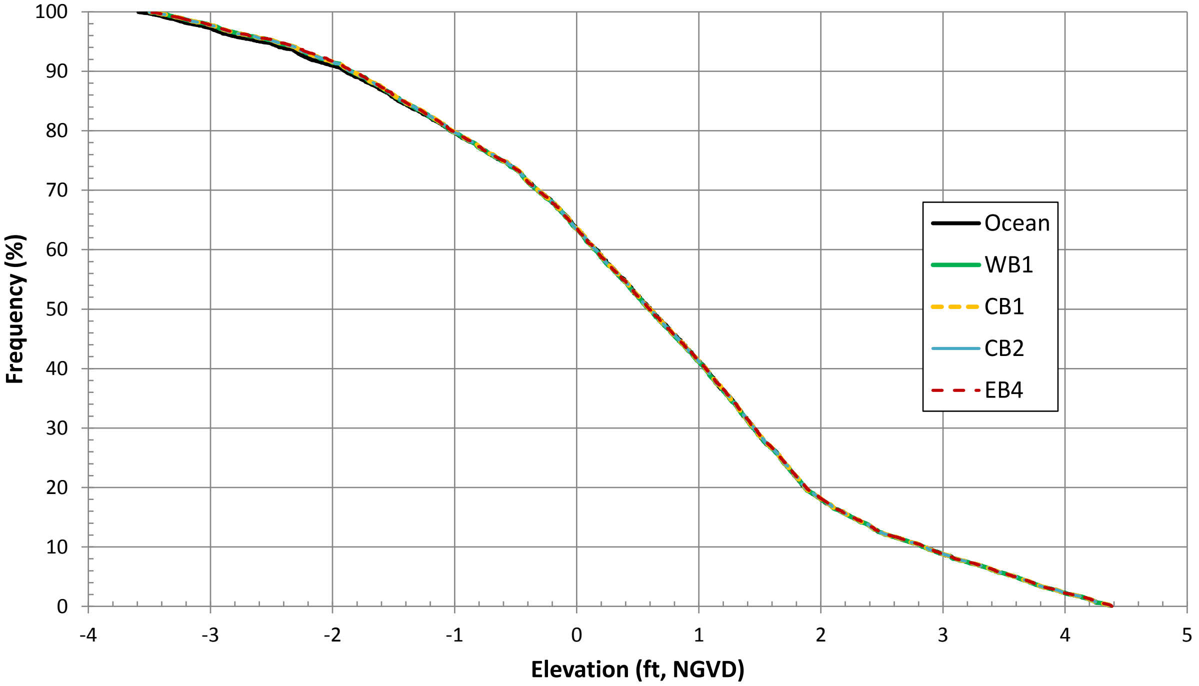


Figure 4-30: Inundation Frequency for Alternative 2B at 2015

4.4.2.3 Tidal Hydraulics at the Tidal Inlet

Tidal flow velocities vary within the wetlands and peak at the inlet. The magnitude and duration of tidal flow velocities at the inlet are important to inlet stability. The depth-averaged tidal velocities at the center of the inlet for the No Project (existing conditions) and for the alternatives are summarized in Table 4-10. The duration of outgoing (ebbing) tides is also important to inlet stability. Columns (5) and (6) give the percentage of time of tidal ebbing and flooding at the inlet. The ratio of the duration of the tidal ebb to the tidal flood shown in column (7) is equal to the ebb values in column (5) divided by the flood values in column (6). The larger the ratio, the longer the ebb duration and the greater the probability of inlet stability. For Alternative 1A (with a deeper inlet to -4 feet NGVD), the duration ratio of 1.48 means the total duration of tidal ebbing is 48 percent longer than that of tidal flooding. Figure 4-31 illustrates tidal inlet velocities and tidal elevations for Alternative 1A.

Both the tidal flow velocity and the tidal series at the inlet are not symmetrical. The general water depth in the inlet is greater during tidal flooding periods than that during tidal ebbing periods (shaded in yellow) in Figure 4-31. Therefore, it requires more time for the basin to drain during ebbing than to fill by the ocean during flooding because of the shallow inlet depth. Also, the ebb tidal flow velocity is higher than the flood tidal flow velocity. A minimum tidal flow velocity of 3 feet per second (fps) is typically required to suspend and erode sand to help maintain a stable inlet (scour velocities). The duration of ebb and flood velocities higher than 3 fps is given in Columns (8) and (9). The values in these columns are the percentage of time velocities exceed 3 fps during the particular flow direction. For example in existing conditions, the value 14 (8) is the percent of time of the ebbing velocities exceed 3 fps at the inlet.

Tidal inlet flow velocity is one of many indicators determining inlet stability. The maximum ebb tidal velocity is greater than the flood tidal velocity for all scenarios (the existing condition, and all alternatives), which is the minimum requirement for a self-scouring inlet. However, as the existing inlet is not stable due to various factors, the data need closer scrutiny in the inlet stability study. Also, the peak ebb tidal velocity at the inlet is higher than the peak flood tidal velocity for each scenario, indicating that the inlet is ebb-dominant for all scenarios at 2015. Variations in wave climate (direction, frequency, height, and period) and sediment supply are equally important in evaluating inlet stability and will be considered in a subsequent inlet stability study.

Table 4-8: Summary of Tidal Inlet Hydraulic Results at 2015

Alternative (1)	Year (2)	Maximum Velocity at Inlet (fps)		Overall Duration at the Inlet (% of Time)		Ratio of Overall Duration of Ebb versus Flood at Inlet (%) (7)	Duration of Velocity over 3 fps at Inlet (%)	
		Ebb (3)	Flood (4)	Ebbing (5)	Flooding (6)		Ebbing (8)	Flooding (9)
Existing	2015	5.1	3.2	60	40	1.48	14	1.0
1A	2015	5.2	1.8	52	48	1.10	9.5	0.0
1B	2015	6.9	2.1	52	48	1.09	8.3	0.0
2A	2015	3.0	2.6	51	49	1.03	0.1	0.0
2B	2015	7.2	6.7	50	50	1.00	16	18

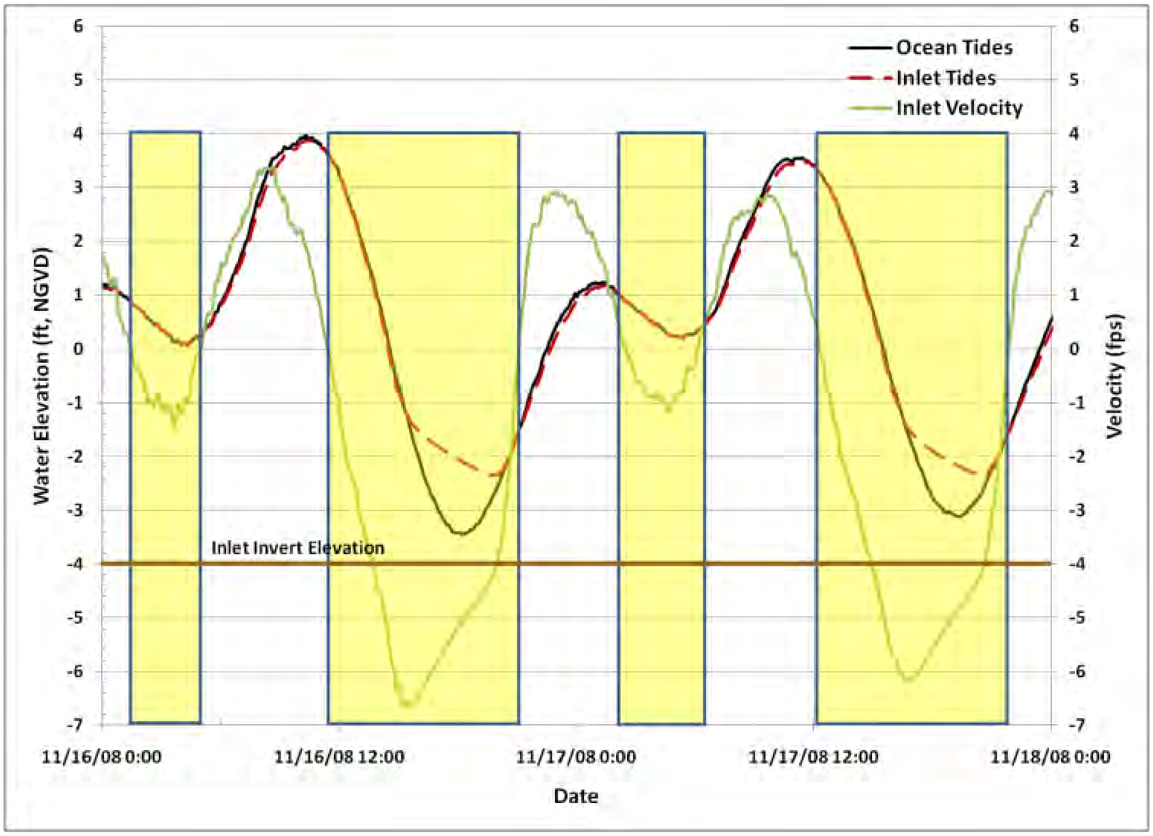


Figure 4-31: Alternative 1A Tidal Inlet Velocity and Tidal Elevations at 2015

Note: Yellow boxes represent periods of tidal ebbing.

4.4.3 Tidal Hydraulics in the Year 2065 with Sea Level Rise

4.4.3.1 Tidal Elevations

A sea level rise report was prepared as part of this project (Moffatt & Nichol, 2010). The report roughly estimated that the sea level would rise approximately 2.0 feet by the mid-term planning horizon of 2065, or 50 years after construction assumed for 2015. Therefore, a 2-foot sea level rise is added to the tidal series discussed in Section 4.2.4.2 to represent the new future tidal series for 2065. Although certain data suggest an expansion in the ocean tidal range over time with sea level rise, for purposes of this study it is assumed that the ocean tidal range would remain the same as existing over time, and wetland basins will be in the post-construction condition. Estimation of an increase in the future tidal range is too conjectural to apply to this study with any confidence.

Modeling is based on the assumption that Lagoon conditions in 2065 are maintained in the as-built construction condition of 2015, which is highly unlikely and this renders the results as the absolute best possible case that could ever occur. Much more likely is that some measure of shoaling will have occurred by 2065, even if diligent maintenance of the Lagoon shoals occurs, along with eposodic scour during significant storm flood events. Therefore the results for tide conditions presented herein are likely to be more promising than should be expected, and should only be used for relative comparisons between alternatives rather than absolute predictions of future water level conditions. A study on shoaling and tidal muting was completed that better clarifies future conditions (M&N 2011). Shoaling does not bear on storm flood elevations in the Lagoon during significant flood events, however, as discussed previously.

Virtual gage locations for extracting modeling results for the No Project and four alternative scenarios are shown in Figure 4-19 and Figure 4-20. Figure 4-32 through Figure 4-36 present the predicted tidal series in wetland basins in 2065. Table 4-9 summarizes tidal ranges under the future tidal condition. Hydraulic results at the start of the planning horizon in 2015 are also included in the table for comparison. The ocean tidal range is also included in the table.

Results show that tidal muting in wetland basins consistently decreases as sea level rises. This is to be expected because raising the water level produces a similar effect to deepening and widening the inlet. While the model shows this as a result, the actual magnitude of this effect in the future is uncertain because shoaling may occur to partially offset these effects to tides. This reduced muting effect over time has not been recorded at either Batiquitos Lagoon for the 10-year post-construction monitoring period, or the 2-year post-construction period at Bolsa Chica (Merkel & Associates, 2007 and 2009). In fact, the opposite condition has occurred at both sites as shoaling has compressed the tidal range since construction, as was predicted. The reduction of muting varies from alternative to alternative, and from location to location. Alternative 1B shows the most significant reduction in muting in 2065 as compared to 2015. Alternative 1A has the second largest reduction in tidal muting for the same period. No Project (existing conditions) may also have a larger tidal range in 2065 than in 2015. The tidal range differences are very small for Alternatives 2A and 2B since the basins under these two alternatives will already experience nearly full tidal range in 2015. Table 4-10 presents the predicted future spring high and low tides. This table provides additional information on muting and indicates whether the tidal muting is for high tides, low tides, or both. Both high and low tides will still be muted under existing conditions, and for Alternatives 1A and 1B. Alternatives 2A and 2B could potentially experience conditions closer to full ocean tides in 2065 if shoaling does notpose a restriction. Shoaling does not bear on storm flood elevations in the Lagoon during significant flood events, however, as discussed previously.

This analysis for year 2065 indicates that without shoaling, hydraulics for Alternatives 1A and 1B will become more similar to those of Alternatives 2A and 2B over time. Shoaling may occur and could affect tidal hydraulics (although not storm flooding), so this result should be considered in this context. The difference in tidal hydrology between alternatives with the existing tidal inlet location and those with a new tidal inlet location may progressively decline if sea level rise outpaces any shoaling. Tidal hydraulic and hydrologic conditions for the alternatives with the existing inlet location do not yet become equal to those with a new inlet by 2065, even without any shoaling. However, it is possible that if sea level rises by the amount predicted by some researchers (e.g., 5.5 feet) and this rate outpaces the rate of any shoaling, then alternatives with the existing inlet may experience more similar tidal conditions as those with a new inlet.

Table 4-9: Summary of Modeling Tidal Range at 2015 and 2065 Without Shoaling

Alternative	Ocean	HW101		WB1		CB2		I-5		EB4	
Year		2015	2065	2015	2065	2015	2065	2015	2065	2015	2065
Existing	7.97	4.56	5.41	3.99	4.41	3.85	4.19	3.78	4.01	3.76	3.97
1A	7.97	7.11	7.67	5.56	5.99	5.26	5.56	5.21	6.31	5.15	5.39
1B	7.97	6.58	7.39	5.44	5.74	5.42	5.70	5.42	5.71	5.43	5.72
2A	7.97	7.97	7.96	7.93	7.96	7.92	7.94	7.87	7.94	7.88	7.95
2B	7.97	7.97	7.97	7.88	7.93	7.88	7.95	7.88	7.95	7.88	7.96

Table 4-10: Summary of Spring High and Low Tides at 2065 Without Shoaling

Alternative (1)	High and Low Tidal Elevations (ft, NGVD29)											
	Ocean		HW101		WB1		CB2		I-5		EB4	
	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
Existing	6.38	-1.59	6.05	0.64	5.40	0.99	5.34	1.15	5.28	1.27	5.25	1.27
1A	6.38	-1.59	6.31	-1.36	5.83	-0.16	5.72	0.17	5.70	0.24	5.69	0.30
1B	6.38	-1.59	6.27	-1.12	5.89	0.15	5.89	0.19	5.90	0.18	5.90	0.18
2A	6.38	-1.59	6.37	-1.59	6.37	-1.59	6.38	-1.56	6.38	-1.56	6.39	-1.56
2B	6.38	-1.59	6.37	-1.59	6.37	-1.56	6.38	-1.57	6.38	-1.57	6.38	-1.58

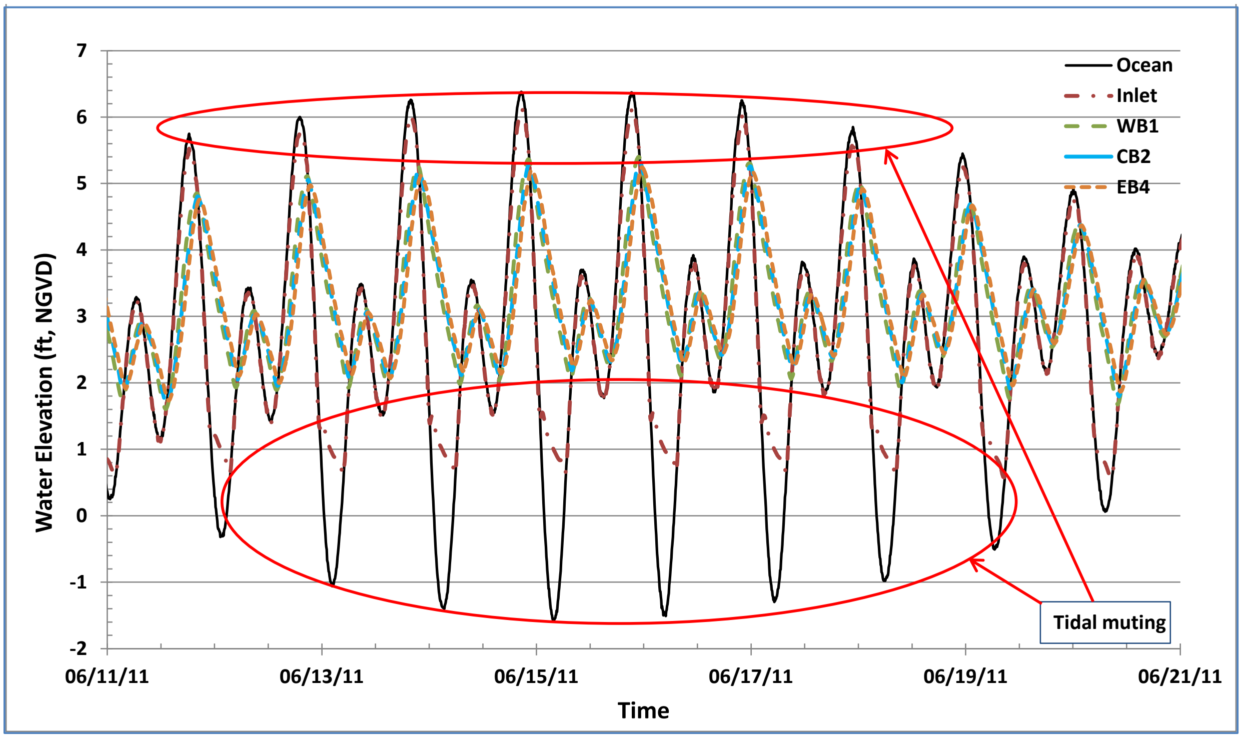


Figure 4-32: Predicted Tidal Elevations for No Project at 2065 Without Shoaling

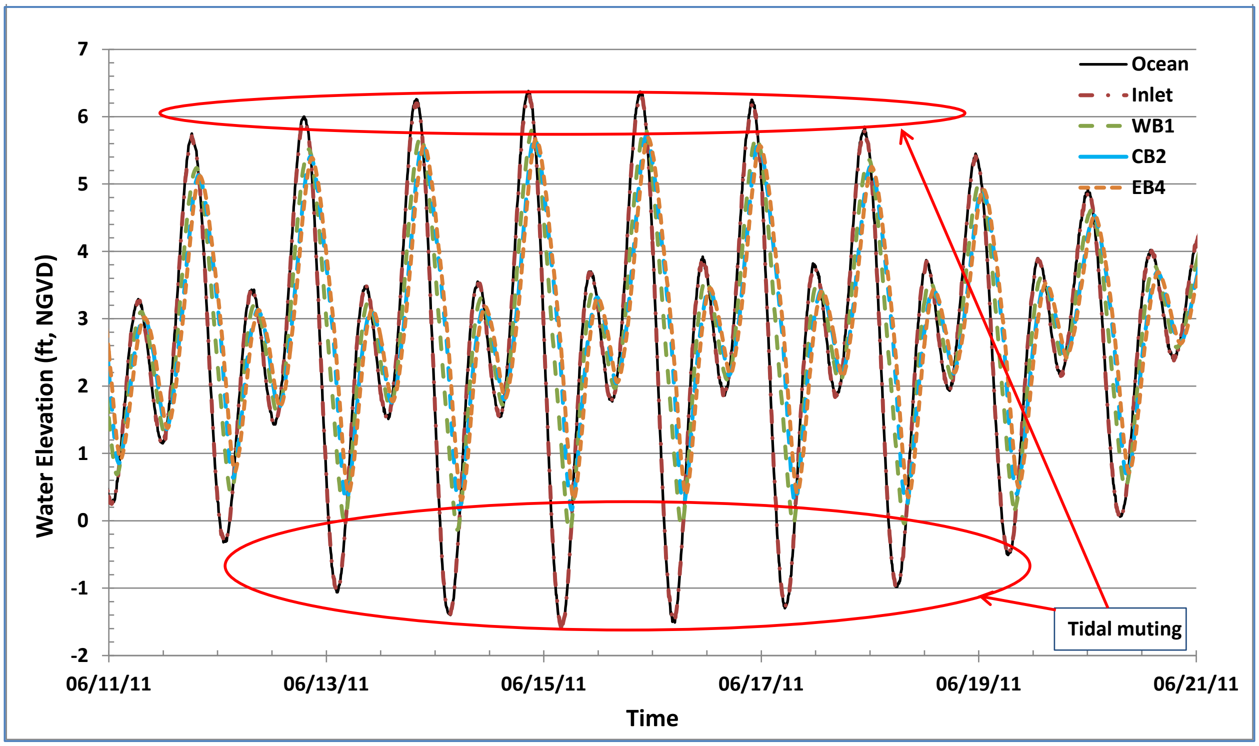


Figure 4-33: Predicted Tidal Elevations for Alternative 1A at 2065 Without Shoaling

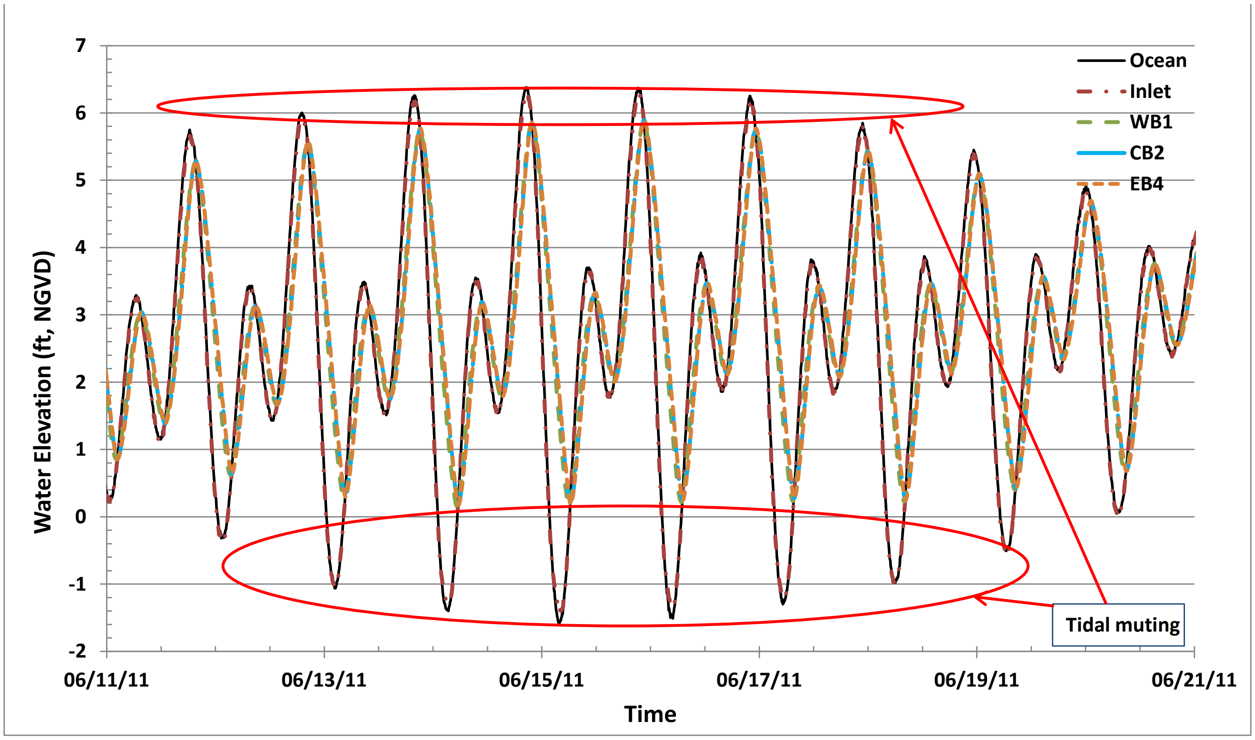


Figure 4-34: Predicted Tidal Elevations for Alternative1B at 2065 Without Shoaling

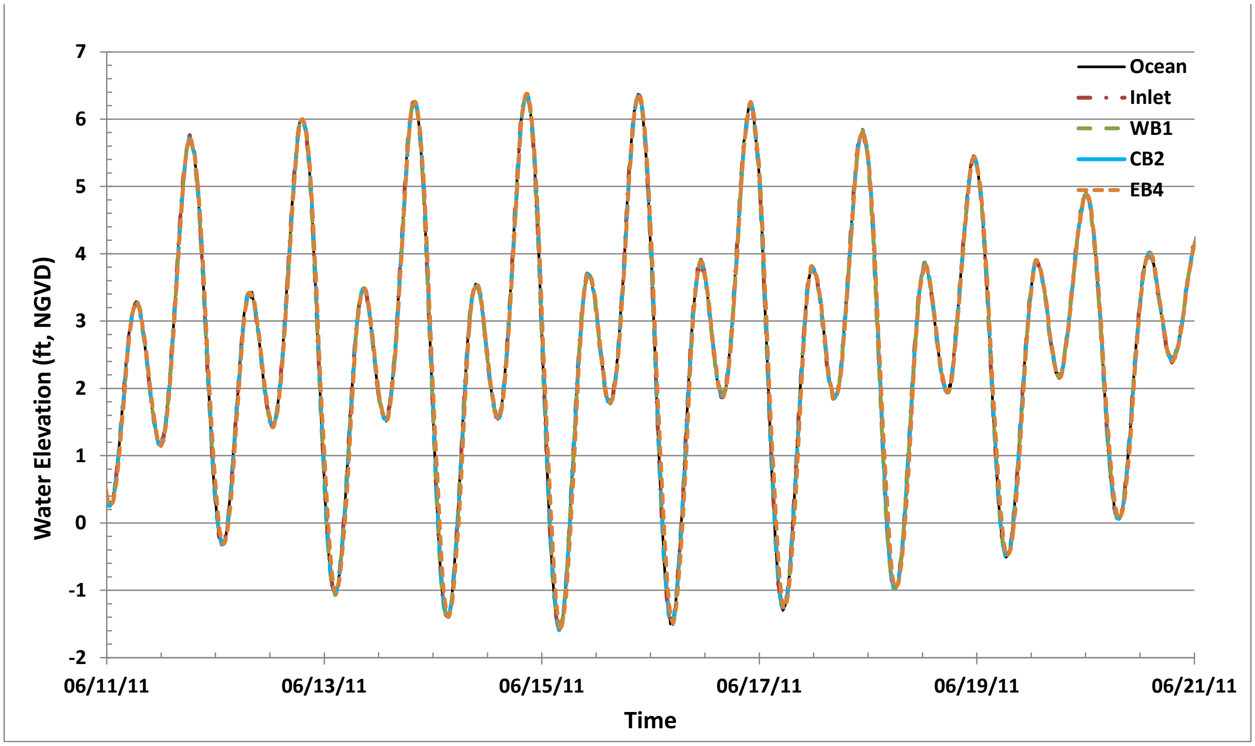


Figure 4-35: Predicted Tidal Elevations for Alternative 2A at 2065 Without Shoaling

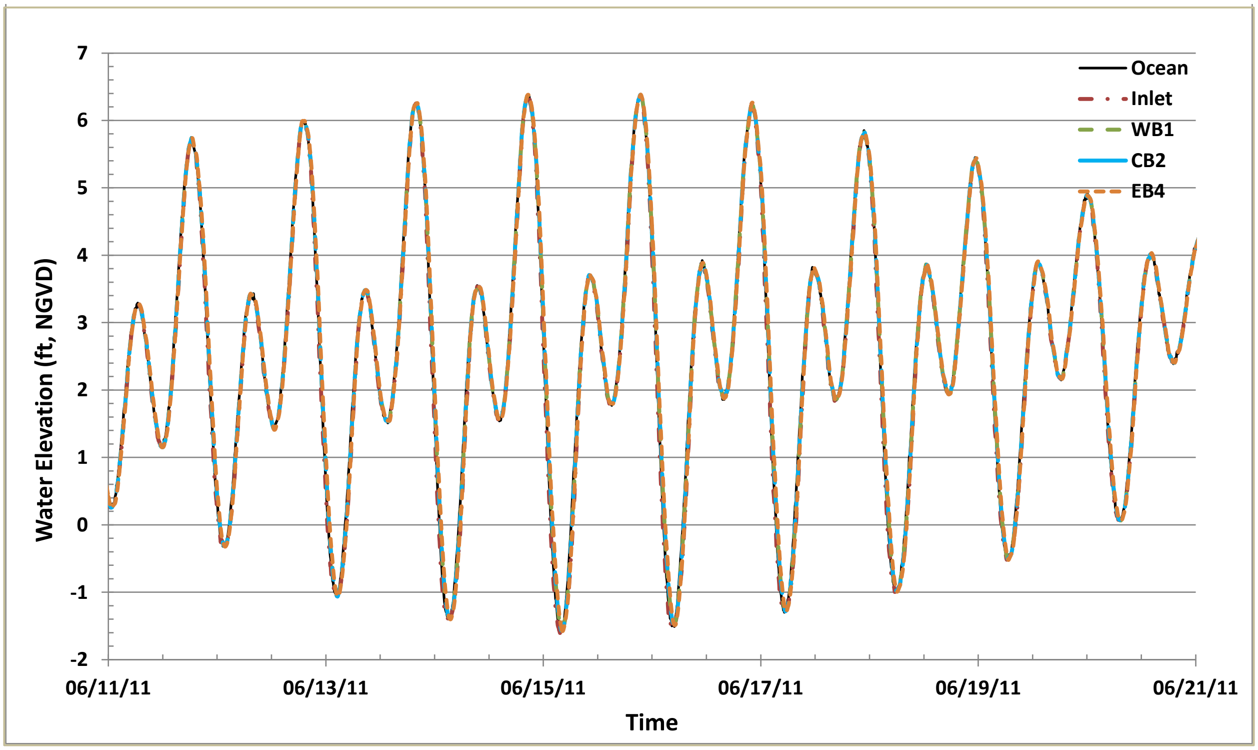


Figure 4-36: Predicted Tidal Elevations for Alternative 2B at 2065 Without Shoaling

4.4.3.2 Tidal Inundation Frequency

Figure 4-26 through Figure 4-30 present predicted tidal inundation frequency curves for No Project (existing conditions) and the four proposed scenarios in 2065. As is discussed above, modeling is based on the assumption that Lagoon conditions in 2065 are maintained in the as-built construction condition of 2015. Results presented herein should be used for relative comparisons between alternatives rather than absolute predictions of future water level conditions. The following can be concluded, with caution, from the tidal series and inundation frequency curve analyses:

- For No Project (existing conditions), both high and low tides would still be muted even with a 2-foot of sea level rise, however, to a less extent than for 2015 if no shoaling occurs. Conditions in 2015 show a vertical zonation of intertidal habitat of approximately 3 to 4 feet. By 2065, the vertical zonation of the intertidal habitat band increases by 0.4 feet in the West Basin, 0.3 feet in the Central Basin, and 0.2 feet in the East Basin with no shoaling. However, the vertical zonation (range of occurrence) of intertidal habitat is still relatively narrow compared to an un-muted, open-ocean condition). As with conditions is 2015, tidal inundation frequency in each basin varies due to effects of channel constriction caused by infrastructure, with a progressive decrease in the vertical range of possible intertidal habitat with distance to the east. A range of salt marsh habitats can occur on-site, but their areas will be constrained by the tidal range, and the habitat distribution on-site may be dominated by particular species more suited to the tidal elevations. These results indicate that for future conditions the inlet channel between HW101 and the Railroad bridge is too narrow to provide full tidal circulation, even with a 2-foot depth increase in the tidal inlet from sea level rise, assuming no shoaling. The tide range still decreases from the West Basin to the Central Basin and from the Central Basin to the East Basin, indicating that narrow and meandering channels in the Central Basin and I-5 Bridge will still restrict tidal circulation.

- For Alternative 1A with no changes proposed to existing infrastructure and no shoaling, both high and low tides are still muted, but to a lesser extent than they are in 2015. In 2015, the vertical zonation ranges from approximately 5.6 feet in the West Basin, to 5.3 feet in the Central Basin and 5.2 feet in the East Basin. By 2065, the intertidal habitat band increases by 0.4 foot in West Basin, 0.3 foot in Central basin and 0.2 foot in East Basin if shoaling does not occur. A greater range of salt marsh habitat can occur on-site in 2065 compared to existing conditions, and their areas will expand compared to conditions in 2015, but will still be somewhat constrained by the tidal range. Any tidal muting from shoaling would further constrain the elevations and distribution of salt marsh habitat, but may be offset by sea level rise.

- For Alternative 1B with proposed dredging of the tidal inlet and channel under the Railroad and the widening of I-5 channel, both high and low tides will still be muted, but to a lesser extent than in 2015 assuming no shoaling. Tidal muting in West Basin is reduced by 0.3 feet from 2015 to 2065, and the intertidal habitat band increases vertically from 5.4 feet to 5.7 feet if no shoaling occurs. A progressively larger range of salt marsh habitat can occur on-site for Alternative 1B compared to Alternative 1A, with a more modest constraint imposed by the tidal range. Shoaling near the inlet mouth could further constrain tidal range and should be addressed. Creating a greater range of elevations on-site by grading/dredging would be appropriate to provide greater habitat diversity. Proposed channel widening under the I-5 Bridge will eliminate tidal muting between the Central Basin and the East Basin.

- For Alternatives 2A and 2B, the inundation frequencies in the wetland basins closely mimic that in the ocean in 2065 as they also do in 2015, and the vertical zonation of intertidal habitats is maximized at approximately 8.0 feet in all basins if no shoaling occurs. There is a slight increase in the vertical range of intertidal habitats in the East Basin from 2015 to 2065. The tidal inlet design is sufficient in cross-sectional area and bed elevation to convey full tidal circulation in all wetland basins. The full range of salt marsh habitats should occur on-site once they become established. Tidal muting from shoaling could constrain the tidal range and distribution of habitats, indicating maintenance dredging could be important in preserving habitat areas. Sea level rise may offset the effects of shoaling in tidal muting. Alternative 2A shows tidal muting 0.1 feet in the East Basin in 2015. No muting occurs at any location for Alternatives 2A and 2B in 2065.

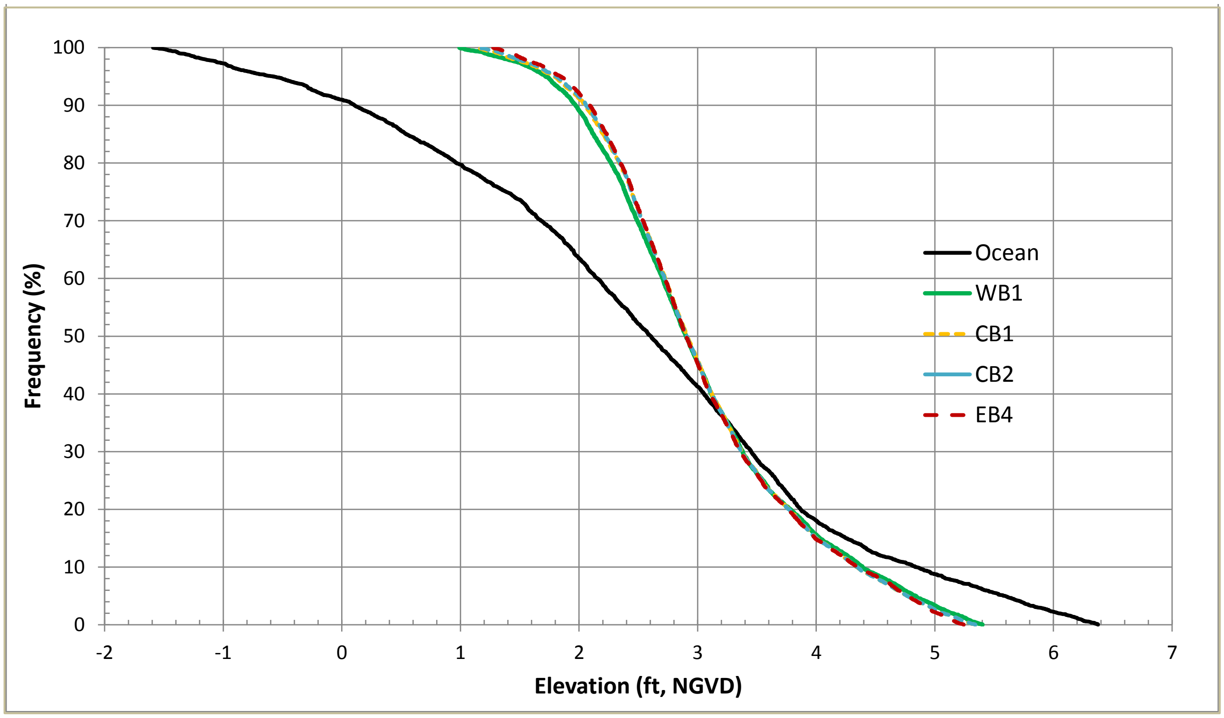


Figure 4-37: Inundation Frequency for No Project at 2065

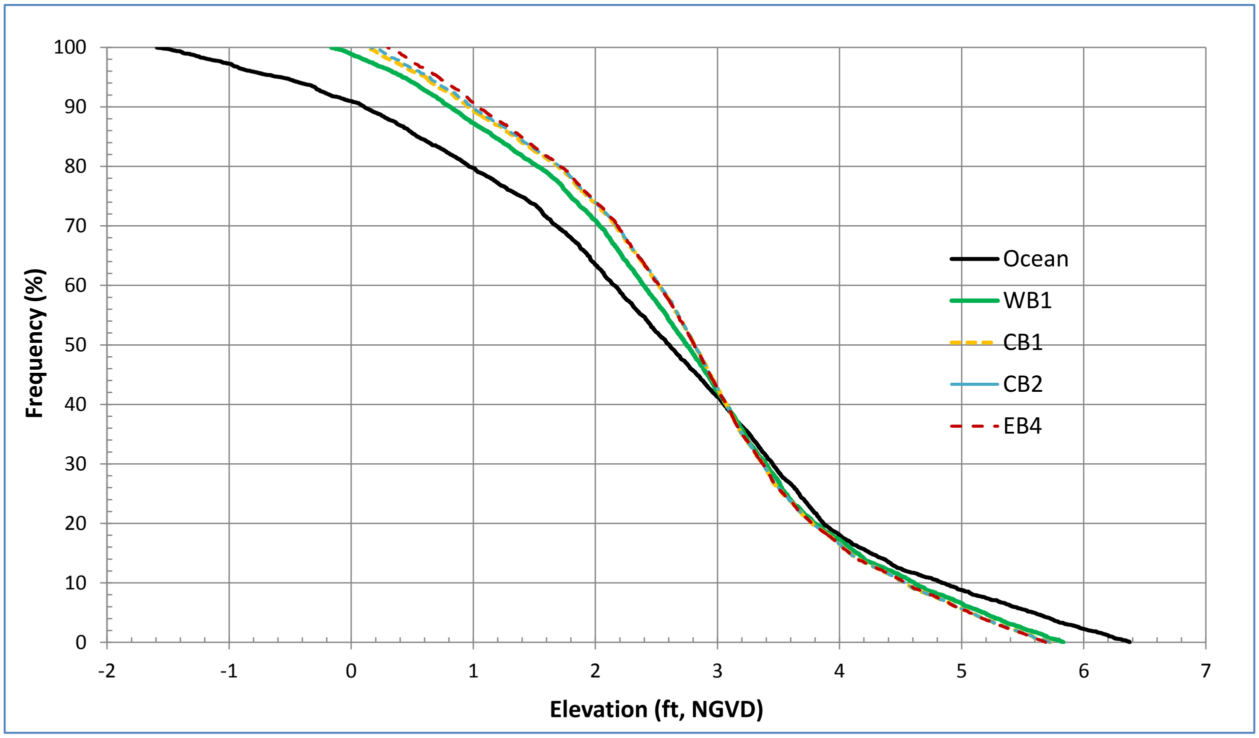


Figure 4-38: Inundation Frequency for Alternative 1A at 2065

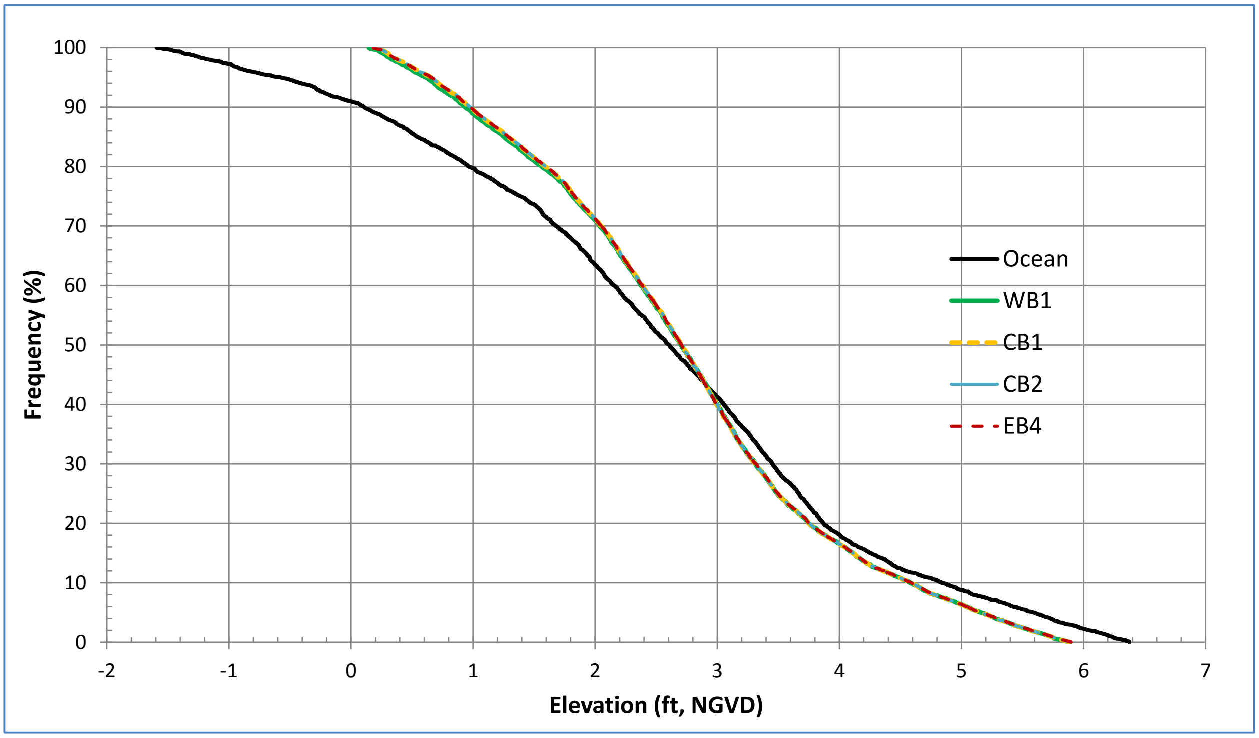


Figure 4-39: Inundation Frequency for Alternative 1B at 2065

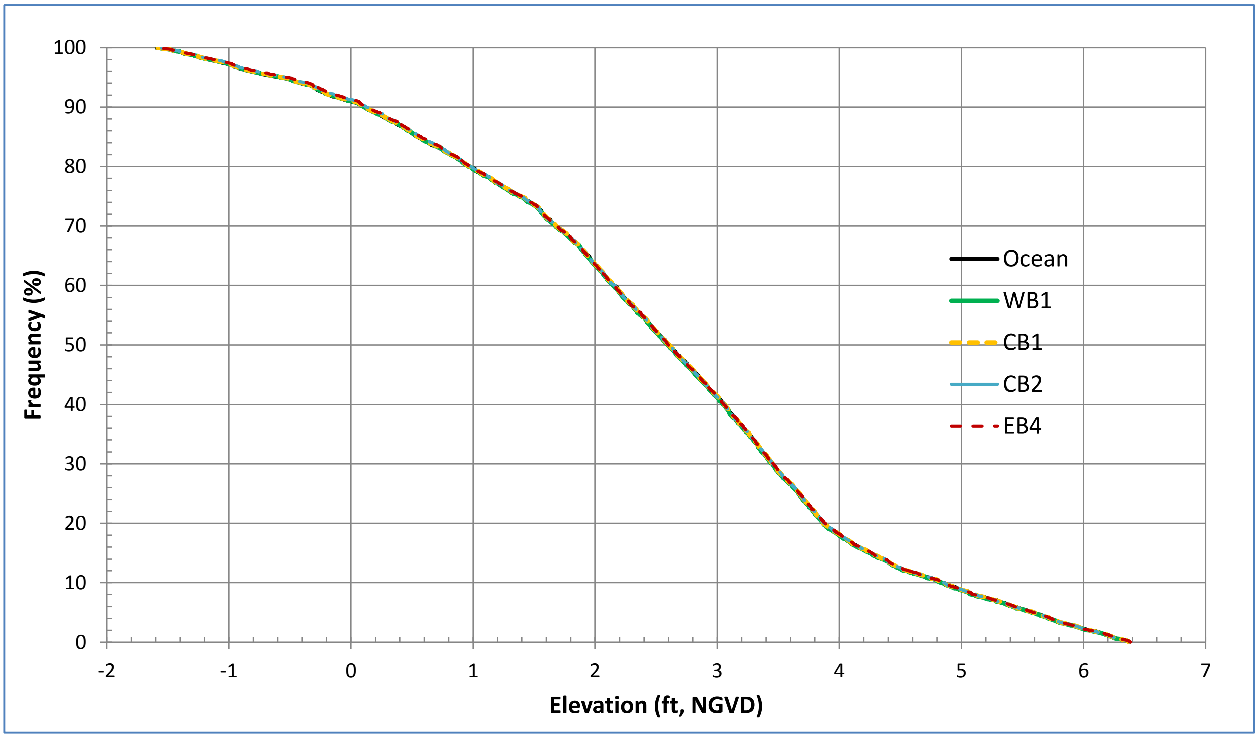


Figure 4-40: Inundation Frequency for Alternative 2A at 2065

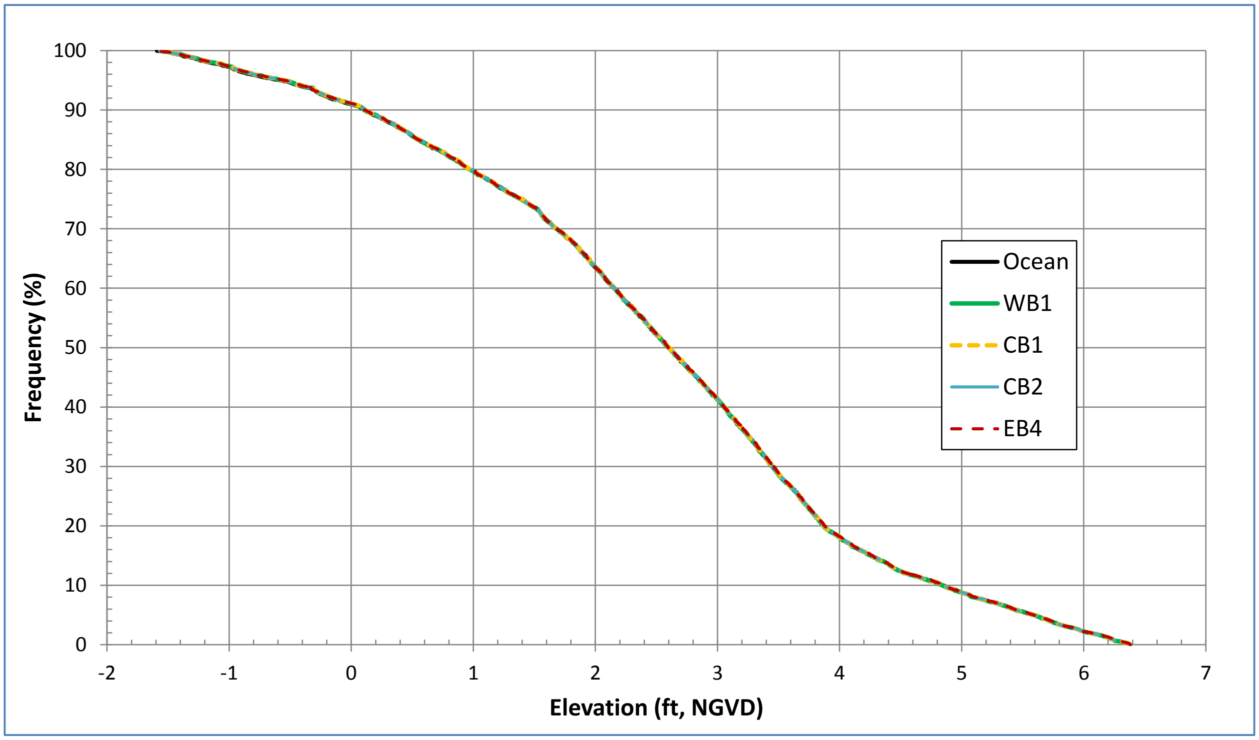


Figure 4-41: Inundation Frequency for Alternative 2B at 2065

4.4.3.3 Tidal Hydraulics at the Tidal Inlet

Tidal hydraulics at the tidal inlet for 2065 are analyzed in comparison to the analysis presented for immediate post-construction conditions in 2015, assuming no shoaling. The depth averaged tidal flow velocities at the center of the inlet for No Project and all alternatives are listed in Table 4-11 for both 2015 and 2065. Columns (5) and (6) show the percentage of time of tidal ebbing and flooding at the inlet. The duration in percentage of time that ebb and flood flow velocities are higher than 3 fps is shown in Columns (8) and (9) (a velocity of 3 fps is high enough to suspend the sand and to scour the inlet). The other factors influencing inlet stability are sediment delivery by currents and waves, so this scour parameter is not the only factor to consider and will be further addressed in the subsequent inlet stability study. Columns (8) and (9) serve to compare the duration of high flow velocity conditions between tidal floods and ebbs. The values are the percentage of time the velocity is higher than 3 fps over the total duration of ebbing/flooding.

Table 4-11: Summary of Tidal Inlet Hydraulic Results at 2065

Alternative (1)	**Year (2)**	**Maximum Velocity at Inlet (fps)**		**Overall Duration at Inlet (%)**		**Ratio of Overall Duration of Ebb versus Flood at Inlet (%) (7)**	**Duration of Velocity over 3 fps at Inlet (%)**	
		Ebb (3)	**Flood (4)**	**Ebbing (5)**	**Flooding (6)**		**Ebbing (8)**	**Flooding (9)**
Existing	2015	5.1	3.2	60	40	1.48	14.0	1.0
	2065	6.4	4.3	55	45	1.23	31.0	9.0
1A	2015	5.2	1.8	52	48	1.10	9.5	0.0
	2065	6.4	2.2	50	50	1.00	12.0	0.0
1B	2015	6.9	2.1	52	48	1.09	15.3	0.0
	2065	7.2	2.5	51	49	1.05	14.0	0.0
2A	2015	3.0	2.6	51	49	1.03	0.1	0.0
	2065	3.5	2.9	51	49	1.03	2.0	0.0
2B	2015	7.2	6.7	50	50	1.00	16.0	18.0
	2065	5.8	5.3	51	49	1.03	12.0	10.0

Tidal inlet flow velocity changes and potential impacts of sea level rise on tidal inlet flow velocity, assuming no shoaling, are summarized below.

- For No Project, with a relatively narrow and shallow existing inlet, the inlet tidal flow velocity increases as a result of the increased tidal prism from sea level rise. However, the tidal inlet depth is still a limiting factor due to the constraint imposed by the shallow bedrock and cobble sill in the nearshore. The inlet velocity increases about 25 percent in 2065 from 2015, which may lead to a more stable inlet than the current condition.
- For Alternative 1A, similar to No Project condition, the tidal inlet velocity also increases about 23% from 2015 to 2065.

- For Alternative 1B, the inlet velocity increases slightly in 2065 compared to 2015. However, the durations of inlet velocities exceeding 3 fps are reduced as a result of a deeper inlet from the effects of sea level rise. This may lead to increased inlet shoaling, which could then cause velocities to rise again as the cross-section is constricted leading to a new form of equilibrium.

- For Alternative 2A, both tidal ebbing and flooding flow velocities increase, and the duration of high velocity conditions (higher than 3 fps) is slightly lengthened as a result of reduced muting. Therefore, the tidal inlet will be relatively more stable under the sea level rise condition.
- For Alternative 2B, both tidal ebbing and flooding flow velocities are reduced, and durations of high velocity conditions (higher than 3 fps) are shortened. These effects are due to the increased depth of the tidal inlet from sea level rise, while the tidal prism remains constant. The inlet depth may increase to a point at which tidal flow velocities slow and shoaling occurs. Shoaling in the inlet could fill a portion the channel cross-section and cause tidal flow velocities to increase once again and lead to a new form of equilibrium.

5.0 SUMMARY AND CONCLUSIONS

Numerical modeling of the hydraulic characteristics of the San Elijo Lagoon under various storm and tide conditions was performed for conditions immediately following restoration (2015) and anticipated conditions in 50 years (2065). The RMA model previously used for this type of study by the USACE was updated to increase the range of analysis and reflect the present design alternatives.

The purpose of the modeling was to:

- Analyze the potential for increased flooding of adjacent areas from restoration;
- Predict the hydrology (inundation frequency) required to establish new wetland habitat areas;
- Confirm the sizes of the openings of a new tidal inlet, and channels under highway and railroad bridges;
- Provide flow velocity estimations to assist in evaluating the potential long-term sustainability of the tidal inlet (in a subsequent study); and
- Provide the hydraulics for water quality modeling (in a subsequent study).

Modeling was performed for existing conditions (No Project) and four alternatives consisting of:

- ➢ Alternative 1A – Minimum Changes;
- ➢ Alternative 1B – Maximum Habitat Diversity, Existing Inlet Location;
- ➢ Alternative 2A – Maximum Habitat Diversity, New Inlet Location; and
- ➢ Alternative 2B – Maximum Tidal Expression.

Modeling included the following scenarios:

- 100-Year return period stormflows coupled with highest measured high tides to determine maximum future water levels; and
- Tidal conditions in 2015 (immediate post-construction) and in 2065 (50 years after construction) to determine Lagoon hydraulics and hydrology. Conditions in 2065 are characterized by a two foot rise in sea level from conditions in 2015. Assumptions regarding shoaling, sedimentation and other causes of tidal muting were not considered in this portion of the analysis. These conditions will be addressed in subsequent studies.

Results consist of the following:

1. Storm flows combined with highest measured high tides will result in elevated water levels throughout the Lagoon. Specifically, in 2015:
    a. No Project conditions result in Manchester Avenue being flooded by several feet along the East Basin.
    b. Alternative 1A (with the inlet in the existing location) provides limited flood reduction potential, however Manchester Avenue will still flood along the East Basin although flood water levels will be lowered.
    c. Alternatives 1B, 2A and 2B reduce flood elevations to below Manchester Avenue all along its length due to expanded channel cross-sections under all bridges.
2. In 2065, Manchester Avenue will experience storm flow flooding along both the Central and East Basins for all alternatives due to adverse effects of sea level rise.
3. Tidal flows vary between alternatives as reflected by the following results for 2015:
    a. For No Project, tidal flows are restricted due to the narrow and meandering channel between Highway 101 and the Railroad, and the presence of a sill at the bed. Tidal ranges are significantly muted for both high and low tides, and muting increases progressively from the West Basin through the East Basin.
    b. For Alternatives 1A and 1B (with the inlet in the existing location) tidal muting is significantly reduced and circulation is improved in the wetland basins compared to existing conditions. This is due to expansion of the cross-sections under all bridges. A certain amount of muting still will exist, and is greater in the Central and East Basins than in the West Basin.
    c. For Alternatives 2A and 2B (with the new inlet location) tidal muting is further reduced and circulation is most improved in the wetland basins compared to alternatives using the existing inlet location. This is due to further expansion of the cross-sections under all bridges. Minimal to no muting will exist before sand shoals form within the Lagoon.
4. Tidal inundation frequency resulting from tidal hydrology significantly influences the habitat type and distribution on-site. Results for 2015 include:
    a. For No Project, the vertical zonation of intertidal habitat is relatively narrow at approximately 3 to 4 feet. A progressive decrease in the vertical range of intertidal habitat occurs with distance to the east. A range of salt marsh habitats can occur on-site, but their areas will be constrained by the tidal range, and the habitat distribution on-site may be dominated by fewer species more suited to the muted tidal elevations.
    b. For Alternatives 1A and 1B, the vertical zonation of intertidal habitat increases, ranging from 5.7 feet in the West Basin to 5.2 feet in the Central and East Basins. A

greater range of salt marsh habitat can occur on-site, but their areas will still be constrained by the tidal range. Creating a greater range of elevations on-site for Alternative 1B with grading/dredging would be appropriate to provide greater habitat diversity. Tidal muting from shoaling (addressed in a subsequent study) would constrain the tidal range and distribution of habitats, indicating maintenance dredging would be important in preserving habitat areas.

   c. For Alternatives 2A and 2B, the vertical zonation of intertidal habitats is 8.0 feet in the West Basin and 7.9 feet in the East Basin. The tidal inlet design is large enough to convey full tidal circulation in all wetland basins. The full range of salt marsh habitats should occur on-site once they become established. Grading and disturbance to create appropriate grades for habitat would be appropriate to provide greater habitat diversity. As with previous alternatives, muting would constrain the tidal range and distribution of habitats, indicating maintenance dredging would be important in preserving habitat areas.

5. Data of tidal inlet hydraulics are useful to help determine tidal inlet stability, to be fully addressed in a subsequent study. For 2015, the maximum ebb tidal velocity is greater than the flood tidal velocity for all scenarios (the existing condition, and all alternatives) suggesting possible expulsion of sediment, rather than sedimentation. However, the existing inlet is not stable, so the data need scrutiny in an inlet stability study. Also, the peak ebb tidal velocity at the inlet is higher than the peak flood tidal velocity for each scenario, indicating that the inlet is ebb-dominant and net sediment flow could be out of the Lagoon rather than into the Lagoon for all scenarios. Greater stability is expected for the new inlet location alternatives (2A and 2B) due to increased cross-sectional area and depth, and available area to manage sediment in the Lagoon.
6. For 2065, tidal flow modeling results assuming no shoaling show that tidal muting in wetland basins consistently decrease as sea level rises. However, the reduction in tidal muting varies from alternative to alternative, and from location to location. Tidal muting will still occur for No Project, and for Alternatives 1A and 1B. No tidal muting will occur for Alternatives 2A and 2B.

7. Tidal inundation frequency results for 2065 include:
   a. For No Project, the vertical zonation of the intertidal habitat band increases in all basins. However, the vertical zonation (range of occurrence) of intertidal habitat is still relatively narrow compared to an un-muted, open-ocean condition.
   b. For Alternative 1A, the intertidal habitat band increases in all basins, but any tidal muting from shoaling would further constrain the elevations and distribution of salt marsh habitat, but may be offset to some extent by sea level rise, and this applies to all site modification alternatives.
   c. For Alternative 1B, the intertidal habitat band increases vertically, and proposed channel widening under the I-5 Bridge will eliminate tidal muting between the Central Basin and the East Basin.

   d. For Alternatives 2A and 2B, inundation frequencies in the wetlands closely mimic that in the ocean in 2065, and the vertical zonation of intertidal habitats is maximized in all basins. The tidal inlet is sufficient in cross-sectional area and bed elevation to convey full tidal circulation in all wetland basins.

8. Tidal inlet hydraulics for 2065 assuming no shoaling consist of:
   a. For No Project and Alternative 1A, the inlet velocity may increase in 2065 from 2015, which may lead to more sand scour than the current condition; however, the duration is shorter;
   b. For Alternative 1B, the inlet velocity is slightly increased in 2065. The durations of inlet scour velocities may be lengthened as a result of increased tidal prism (from sea level rise) if no shoaling occurs. The inlet may be more stable with sea level rise. This is to be determined is a subsequent study for all alternatives.
   c. For Alternative 2A, both tidal ebbing and flooding flow velocities increased, and the duration of high velocity conditions (higher than 3 fps) is slightly lengthened as a result of reduced muting. Therefore, the tidal inlet will be relatively more stable under the sea level rise condition.
   d. For Alternative 2B, both tidal ebbing and flooding flow velocities are reduced, and durations of high velocity conditions (higher than 3 fps) are shortened. These effects are due to the increased depth of the tidal inlet from sea level rise, while the tidal prism remains constant. The inlet depth may increase to a point at which tidal flow velocities slow and shoaling occurs. Shoaling in the inlet could fill a portion the channel cross-section and cause tidal flow velocities to increase once again and lead to a new form of equilibrium.

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APPENDIX E

WATER QUALITY STUDY

San Elijo Lagoon Restoration Project

Water Quality Study

Final Report

June 2012

Prepared for:

The San Elijo Lagoon Conservancy

Prepared by:

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1.0 INTRODUCTION

This technical report is one of a series being prepared for the San Elijo Lagoon Restoration Project (SELRP). Water quality is the focus of this study as an extension of the modeling being done to analyze the entire system of hydrodynamics, water quality, sedimentation, and tidal muting at the lagoon. The vicinity of San Elijo Lagoon is shown in Figure 1-1.

1.1 Project Background

The SELRP has multiple objectives, but the overarching goal of the SELRP is to protect, restore, then maintain, via adaptive management, the San Elijo Lagoon ecosystem and the adjacent uplands to perpetuate native flora and fauna characteristics of Southern California, as well as to restore, then maintain estuarine and brackish marsh hydrology (EDAW 2009). A clear challenge of this project is a design that will protect and promote biodiversity by protecting habitat types over a very long period of time.

This project goal can be further refined into three categories of objectives:

- Physical restoration of lagoon estuarine hydrologic functions;
- Biological restoration of habitat and species within the lagoon; and
- Management and maintenance to ensure long-term viability of the restoration efforts.

San Elijo Lagoon is located in Carlsbad Hydrology Unit (CHU) and is 303d listed for indicator bacteria, nutrients, and sediment/siltation (Soil Conservation Service 1993). Lagoon restoration is intended to improve water quality for lagoon habitat and for beach recreation near the tidal inlet. Water quality standards for beach recreation are set by the state in AB411, a law that requires water testing and sets bacteria limits requiring posting or closing of beaches.

1.2 Study Purpose and Objectives

The purpose of this study is to evaluate water quality conditions in the lagoon, the tidal inlet, and the nearshore-ocean associated with the proposed alternatives during both dry and wet weather conditions. The objectives of this study are to satisfy requirements for planning of lagoon restoration, and to support subsequent environmental review and permitting. Work done for this study is based on results of the Hydrology/Hydraulic Study done for the SELRP (Moffatt &Nichol, or M&N, 2010). The project location is shown in Figure 1-2.

Figure 1-1 Project Vicinity Map

(Source: EDAW 2009)

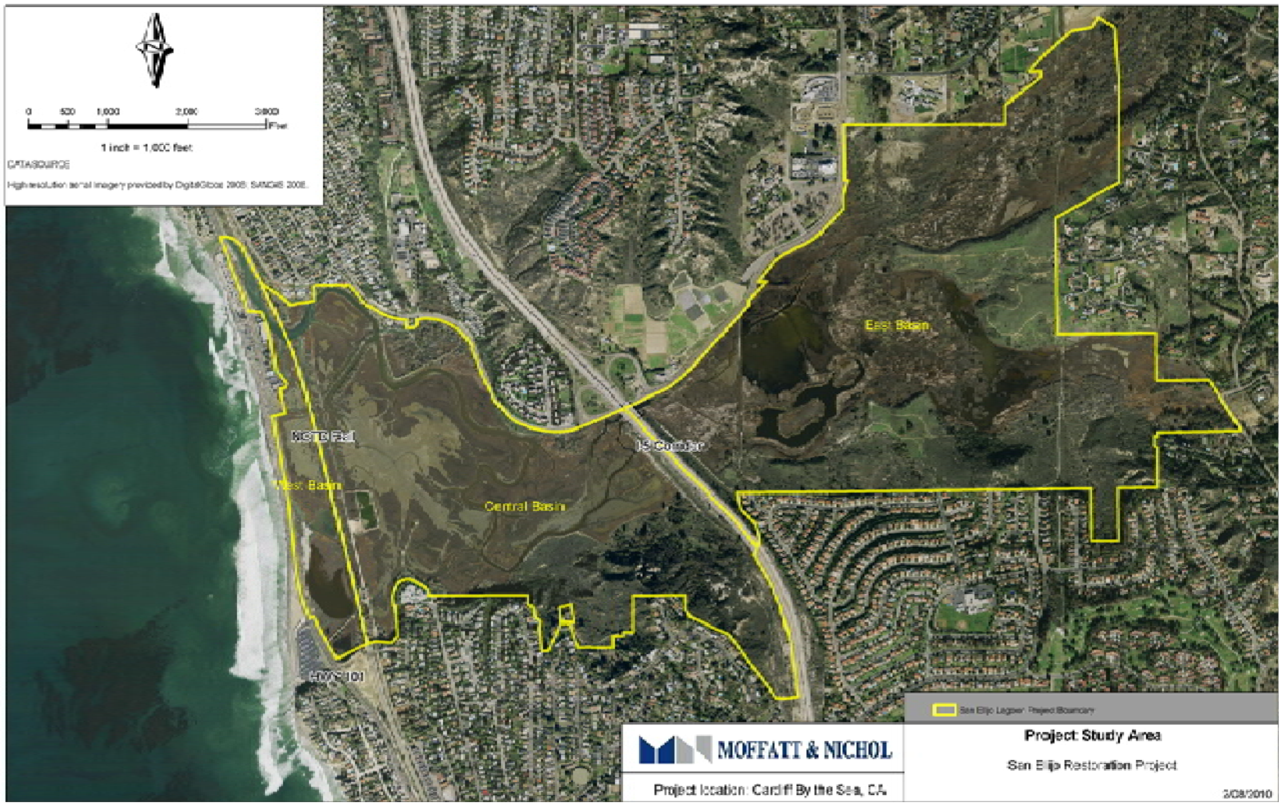

Figure 1-2 Project Study Area

2.0 SCOPE OF WORK

The contracted scope of work for this effort consists of analyzing the water quality of all restoration alternatives options with the RMA-4 numerical model. Results of the RMA-2 model (previously used for hydrodynamics) will be used as the basis for RMA-4 modeling. RMA-4 modeling will be used to evaluate:

1. Tidal circulation efficiency and seawater residence time within different areas of the lagoon. Daily water quality is dependent on tidal circulation and inputs of potential contaminants. A residence time analysis will demonstrate tidal flushing throughout the lagoon and show any areas with poor circulation and water quality.
2. Dispersion of bacteria and/or other potential pollutants of concern. Ocean water quality may be a concern to certain stakeholders if the ocean inlet is relocated. Assuming a certain level of bacteria input to the lagoon from upstream, modeling can show the patterns of dispersion and predict levels of bacteria in the ocean under both wet season and dry season conditions.
3. Dilution and dispersion of freshwater storm flows within the lagoon from upstream. Salinity levels vary during storms and may affect habitat. Model results will be useful to show potential stresses to habitat during the wet season.
4. Potential sedimentation within the lagoon from upstream sources based on projected sediment yield and predicted hydraulic conditions.

The wet weather condition is defined as a typical and frequent winter storm event with a return interval of 2 to 5 years. Water quality conditions under the existing lagoon and inlet condition are also evaluated as the project baseline condition.

3.0 EXISTING WATER QUALITY

Existing water quality of the lagoon is summarized herein from data presented by MACTEC (2009). Extensive lagoon monitoring data were collected to characterize existing water quality conditions in support the development of Total Maximum Daily Loads (TMDLs) for the lagoon (MACTEC, 2009). The monitoring sites within San Elijo Lagoon are shown in Figure 3-1, including Segment 1 located downstream of I-5 Bridge, Segment 2 located in the Central Basin near the Nature Center, and the inlet located at the North County Transit District (NCTD) Railroad crossing. Monitoring data were also collected in Escondido Creek at Camino del Norte Bridge at the mass emission station.

The monitoring program included three wet weather storm events and four dry weather index periods. The hydrology of the three wet weather events is shown in Figure 3-2, in which the width of the red boxes in the graphic shows the duration of each monitoring event. The four dry index periods are in each dry season. The following report sub-sections characterize existing water quality in San Elijo Lagoon and at the Camino del Norte Bridge mass emission site from analysis of monitoring results by MACTEC (2009).

Figure 3-1 Water Quality Monitoring Stations In the Lagoon

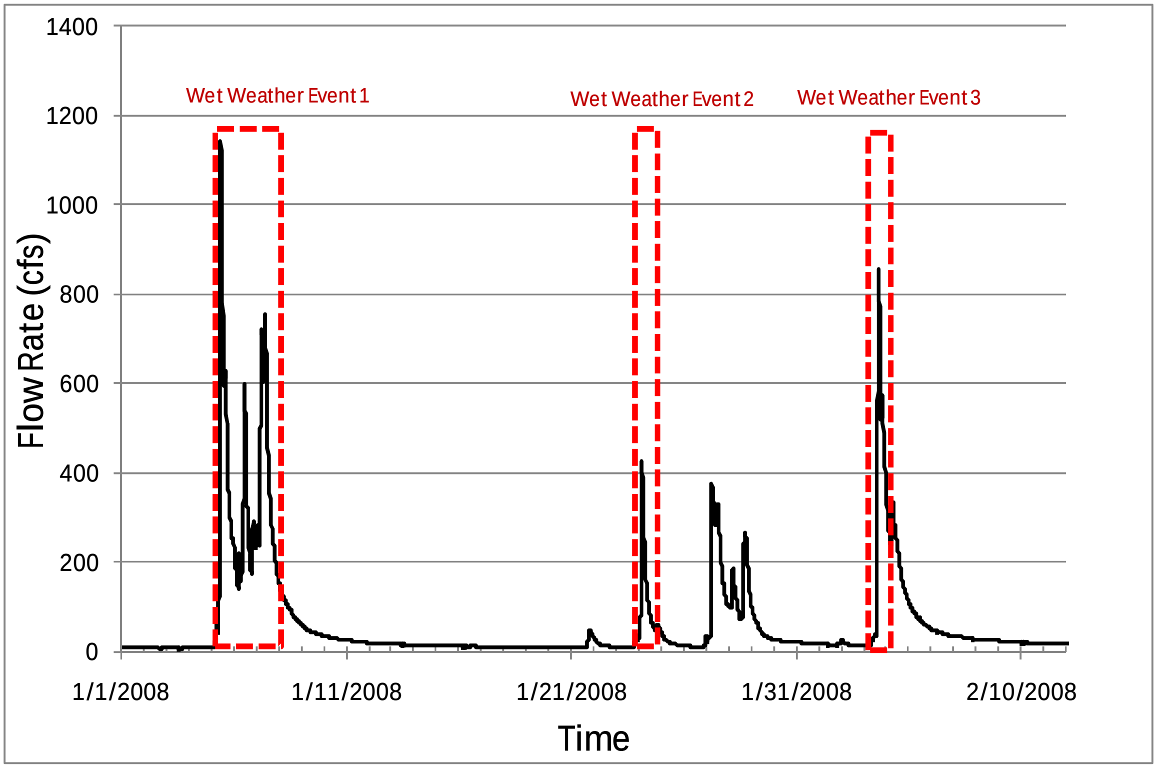

Figure 3-2 Lagoon Wet Weather Water Quality Sampling Events

3.1 Bacteria

Bacteria can be harmful to the health of organisms and humans. For indicator bacteria including coliform and enterococcus, monitoring results indicate:

- For wet weather conditions, all three indicator bacteria (fecal and total coliform and enterococcus) concentrations at the mass emission station (Camino del Norte Bridge) exceeded AB411 water quality standards for body contact. Bacteria results within the lagoon also exceeded the standard during the wet weather conditions, although the concentrations are lower than those at the mass emission site.
- For dry weather conditions, enterococcus concentrations exceeded the AB411 standard at both the mass emission site and lagoon sites, fecal coliform exceeded the standard at the mass emission site and Segment 1 downstream of I-5 Bridge, and there were no exceedances for total coliform. Dry weather periods do not generally appear to be associated with beneficial use impairments from bacteria for San Elijo Lagoon.

Wet weather water samples had higher concentrations than dry weather samples, suggesting that non-point sources are the primary contributors to elevated bacteria concentrations and annual loadings to the lagoon. Also, as wet weather flows contribute between 84 and 98 percent of the total annual flow volume, nearly all of the bacteria loadings into the lagoon are during wet weather storm events.

Within the lagoon, concentrations during the winter were the highest. The highest exceedance frequencies were associated with enterococcus and fecal coliform. Studies done by the U.S. Environmental Protection Agency (USEPA) have demonstrated that enterococcus is a better predictor of the presence of gastrointestinal illness-causing pathogens than fecal and total coliform (Regional Water Quality Control Board, or RWQCB, 2007). Therefore, enterococcus is selected as the indicator bacteria for the numerical modeling study.

3.2 Nutrients

Excessive concentrations of nutrients can lead to growth of aquatic plants that can occupy existing habitat area in high densities, and can lead to fluctuations in dissolved oxygen levels that can stress aquatic organisms. For nutrients, ammonia, Chlorophyll ‘a’, nitrite and nitrate (N+N), total nitrogen (TN) and total phosphorus (TP) were monitored. The Water Quality Objectives (WQOs) set by the Basin Plan (California RWQCB 2007) for ammonia and Chlorophyll ‘a’ are 0.025 milligrams per liter (mg/)L and 20 micrograms per liter (µg/L), respectively, and that for N+N, TN and TP is an allowable exceedance of 10 percent.

At the mass emission site, monitoring results for TN, TP, and ammonia for both dry and wet weather conditions exceeded their respective WQOs for nutrients/eutrophication. The samples of Chlorophyll ‘a’ were not analyzed during the wet events per the sampling work plan, and the mean concentration of 2.7 µg/L during the dry period events did not exceed the WQO. For N+N, zero percent of samples exceeded the WQO.

At the lagoon sites including Segment 1, Segment 2, and Inlet sites, monitoring results indicate that:

- The mean ammonia concentration exceeded the WQO under both wet and dry weather conditions;
- The mean concentration of Chlorophyll ‘a’ did not exceed the WQO, although about 17 percent of samples in total exceeded the WQO;
- Zero percent of N+N samples exceeded the WQO under both wet and dry weather conditions;
- Between13 to 83 percent of samples at three sampling stations under both wet and dry weather conditions exceeded the WQO for TN; and
- Between 27 to 100 percent of samples at each site under both weather conditions exceeded the WQO for TP.

The water concentrations of these constituents were, with some exceptions, only slightly greater than WQOs. In some instances, the mean concentration was lower than the WQO, but several samples that exceeded the WQO resulted in an exceedance rate that was slightly greater than the 10 percent allowable exceedance frequency. Additionally, concentrations for TN and TP in San Elijo Lagoon were below historical concentrations and site-specific criteria proposed by the RWQCB in 1985 (MACTEC 2009).

Nutrient levels affect the dissolved oxygen (DO) levels in the water column, and DO levels are an important parameter for sustaining life. The San Elijo Lagoon had a DO level that fell below the single sample minimum concentration (5 mg/L) between 30 and 50 percent of the time. Most of the DO concentrations that fell below the single-sample minimum occurred during the summer and fall.

High nutrient levels can also result in growth of algae in water bodies, given appropriate conditions. Algae can affect DO by releasing oxygen during the day, and by respiring and pulling DO out of the water column at night thus lowering DO levels before sunrise. Algae is also a sign of poor circulation and potentially compromised water quality for organisms. Algal growth was observed by field crews during the summer and spring at the San Elijo Lagoon. The extent of coverage was not recorded, but generally, it appeared to be less than 10 to 15 percent of the lagoon’s total surface area. During these periods, low DO concentrations (below the 5 mg/L single-sample minimum) occurred, which is a commonly observed symptom of eutrophic water bodies. Also during these periods, Chlorophyll ‘a’ concentrations (typically related to the overproduction of algae) and ammonia were generally above the WQOs of 20 µg/L and 0.025 mg/L, respectively.

3.3 Sediments

Sediment is another constituent that can degrade water quality if present in sufficient concentrations. Sediment in the water column is referred to as Total Suspended Solids (TSS), which can drop out of suspension and deposit within water bodies and adversely occupy habitat area. Total Suspended Solids (TSS) were measured during both wet and dry weather sampling events. At the mass emission site, TSS mean concentrations were highest during high flow conditions, thus reflecting the wet weather concentrations. However, during winter dry weather conditions, the mean concentrations were the lowest of all periods of the year. Spring season TSS mean concentrations were higher than TSS mean concentrations during other seasons.

Wet weather samples from the mass emission station were also analyzed for aqueous grain size distribution. The results of these samples indicate that greater than 80 percent of the sediment samples measured were of silt grain size range and smaller (less than 0.0625 mm, or clay). This has potential implications in the feasibility of implementing source and/or treatment control BMPs to remove sediment (and other constituents, depending on their associated particle size distributions). As smaller colloidal and suspended particles (< 10 microns, or um) will generally remain suspended and not settle out of water as opposed to larger suspended particles that settle fairly quickly.

At the lagoon sites, TSS concentrations did not appear to correlate to particular sample times during any of the three monitored events. TSS mean concentrations at the lagoon sites are greater than that of mass emission stations during dry weather conditions.

4.0 RMA4 MODEL CALIBRATION AND VERIFICATION

The RMA models, developed by the U.S. Army Corps of Engineers (USACE), were used in conducting hydrodynamic modeling (RMA2) (USACE WES, 1996b) as discussed in the project Hydrology/Hydraulic report (M&N 2010). Flow fields computed by the RMA2 model were then used in the RMA4 water quality model. The 2-D, vertically averaged RMA4 model used these flow fields as input and predicted the fate of constituents in the water body.

4.1 Model Calibration and Verification

Model calibration/verification provides reliable tools for predicting existing and future water quality for the study area. The present study focused on determining dispersion coefficients for the various channels, lagoons, and nearshore ocean. Dispersion coefficients vary with flow conditions. An accurate determination of a dispersion coefficient requires a detailed flow and tracer study. For purposes of the present study, dispersion coefficients were selected in order to reproduce measured concentration data. The estimated dispersion coefficients were considered to be representative of both average dry conditions and storm flood events.

Model bathymetry and the mesh system created for the RMA2 model for existing conditions were used for RMA4 modeling. The bathymetry and mesh system were presented in the project Hydrology/Hydraulic Report (M&N 2012).

Salinity is selected for dispersion coefficient calibration and verification, since salinity transport is similar to conservative tracers and there is no growth and/or decay process involved. Two sets of salinity data were selected for model calibration and verification. Calibration was done using a salinity data set measured by the San Elijo Lagoon Conservancy (SELC) in August 2002 while validation was done using a data set collected by MACTEC Engineering and Consulting Inc. (2009) in January 2008 for the development of TMDLs. This report section discusses the input data used in calibration and verification, and the results.

4.2 RMA4 Model Calibration

4.2.1 Calibration Input Data

Salinity: The SELC conducted a detailed 24-hour salinity study at 6 monitoring stations, shown in Figure 4-1, throughout the lagoon on August 6-7, 2002 with freshwater urban runoff input. Each station was sampled at a 2-hour interval beginning at the ocean surf zone and at the ocean tidal inlet (Station W1). Salinity was measured directly in the field with a temperature compensated YSI Model 85 Handheld Meter System (accurate to +/- 0.1 parts per thousand, or ppt). Two data points (surface and bottom) were collected for Stations W1 and W6, and multiple depth points were measured at Stations W2, W3, W4, and W5. Salinity is less stratified at stations near the ocean inlet and more stratified upstream at W5 near the I-5 Bridge. The salinity of the freshwater input to the lagoon East Basin through the culvert in the California Department of Fish and Game (CDFG) dike (south end, at Station W6) was consistently 1.2 ppt at both the surface and bottom of the water column. The upstream end of the numerical model boundary was defined to be at Station W6. Therefore, the concentration of 1.2 ppt was used as the model boundary input for model calibration. The measured average concentration in the lagoon is approximately 15 ppt, which was used in the model as the initial concentration for the lagoon area. For the offshore area and the ocean boundary, a salinity of 34 ppt was used in the model.

Figure 4-1 Salinity Monitoring Stations for RMA4 Model Calibration

<u>Fresh Water Inflow</u>: The City of Escondido monitored the flow rate quarterly in Escondido Creek at La Bajada Bridge. Data were available from November 1998 through August 2002. One flow data point is available in August 2002, coinciding with the SELC study, and the flow rate was approximately 1.25 cubic feet per second, or cfs (SELC, October 2002), which was applied at the upstream model boundary (Station W6) for model calibration.

<u>Offshore Tides</u>: Tides recorded at the nearest gage, at La Jolla (National Oceanic and Atmospheric Administration Station ID: 9410230), that coincide with the selected sampling period were used to represent the ocean tide at the model offshore boundary.

The tidal elevation time series is shown in Figure 4-2. Although the calibration period was from August 6 through August 7, 2002, the modeling run started a few days before the calibration period to eliminate any numerical effects from "model run-up."

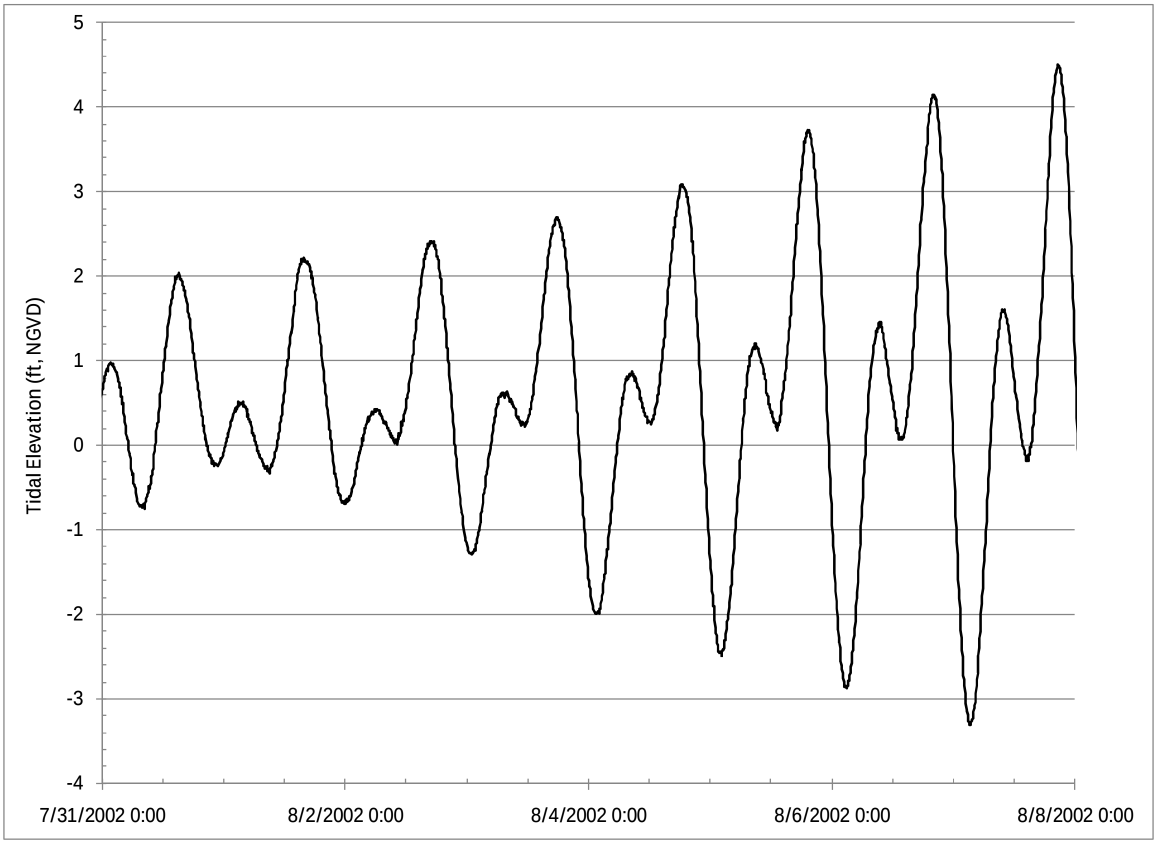

Figure 4-2 Tides for RMA4 Model Calibration

4.2.2 Calibration Results

The goal of RMA4 model calibration is to achieve the best overall fit between simulated salinity and measured salinity concentrations at five sampling locations from W1 through W5 by varying the dispersion coefficients for respective environmental conditions. The resulting dispersion coefficients are listed in Table 4-1. These calibrated dispersion coefficients are consistent with observed ranges in the literature (Fischer 1979).

Table 4-1 Calibrated Dispersion Coefficients

Model Area	Dispersion Coefficients (ft^2/s)
Offshore Area	1000
Tidal Inlet and Channels	12
Mudflat	5
Low Marsh	5
High Marsh	2.5
Riparian	0.4
Upland	0.25

Salinity comparisons between simulated and measured values at Stations W1 through W5 are shown in Figure 4-3 through Figure 4-7. For Stations W1 through W4, the measured salinity shown in the plots is the depth-averaged value, while that simulated by the numerical model is also depth-averaged, for a direct comparison between the two values. This represents reality well in the West and Central Basins of the lagoon as stratification that might affect salinity is relatively minor. However, at Station W5 (I-5 Bridge) the measured salinity values show stratification in the water column. The model predicted salinity levels that are closer to values in the surface measurements, with a fluctuation pattern as shown in all the measured data sets in Figure 4-7. This discrepancy may be caused by lack of accurate flow data at the model boundary, and possibly because Station W5 is too close to the model boundary. Regardless, the calibrated RMA4 model generally reproduces the spatial salinity distribution patterns within the lagoon waters, and provides salinity concentration values to within approximately 10 percent of the measured values at most locations with the exception of Station W5 near the upstream model boundary.

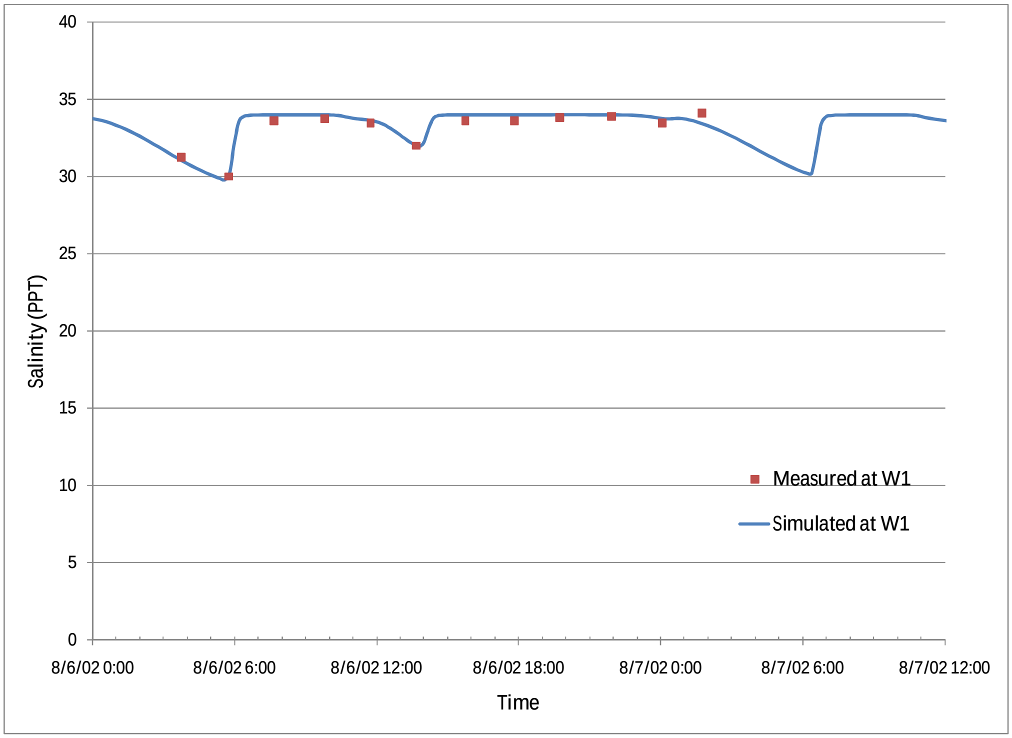

Figure 4-3 RMA4 Model Calibration Results at Station W1

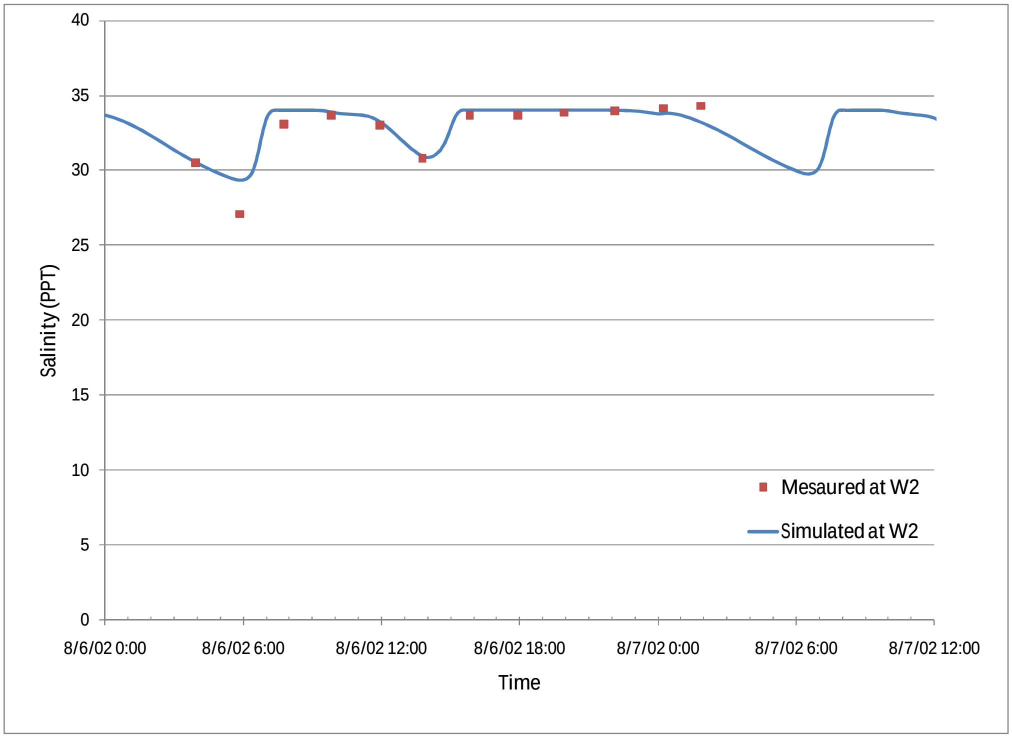

Figure 4-4 RMA4 Model Calibration Results at Station W2

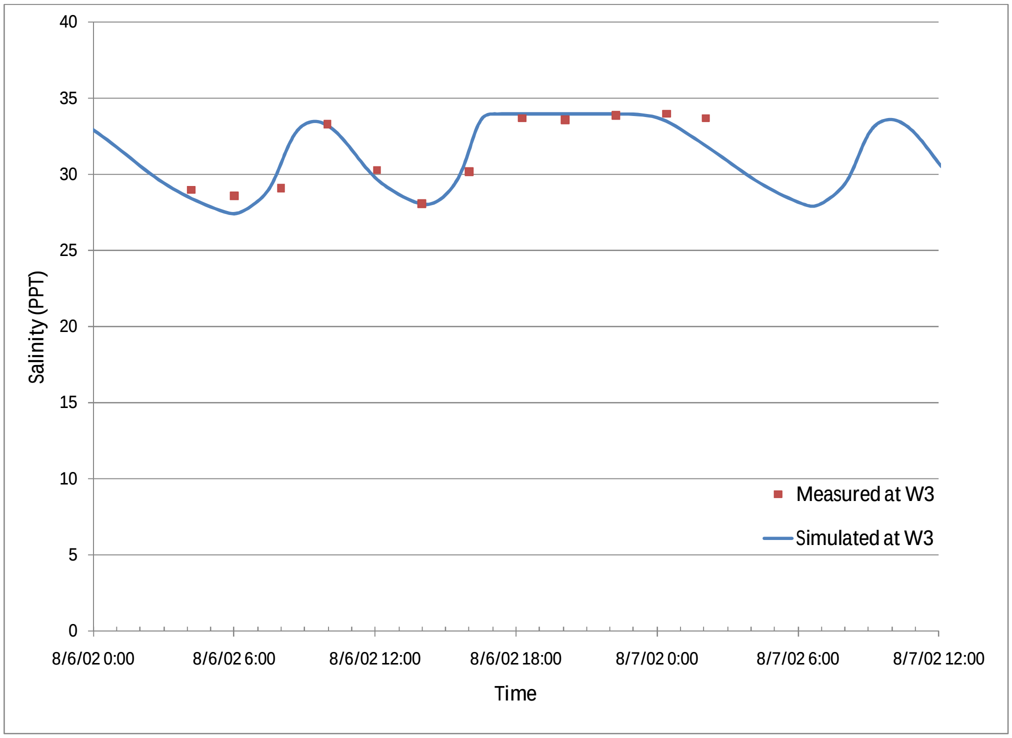

Figure 4-5 RMA4 Model Calibration Results at Station W3

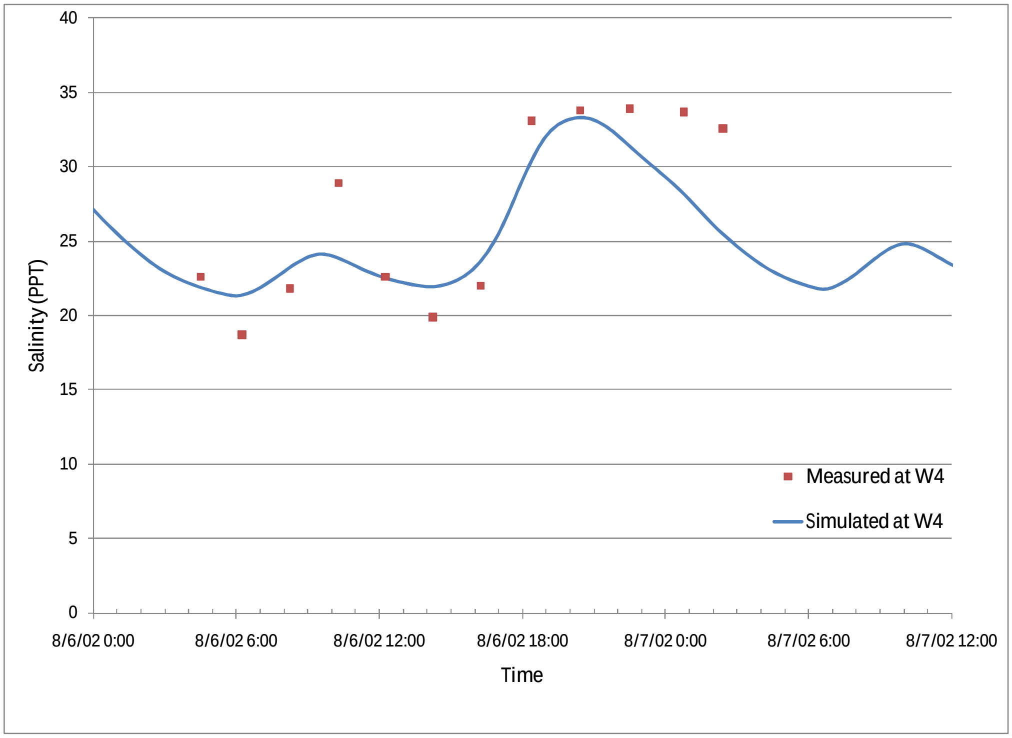

Figure 4-6 RMA4 Model Calibration Results at Station W4

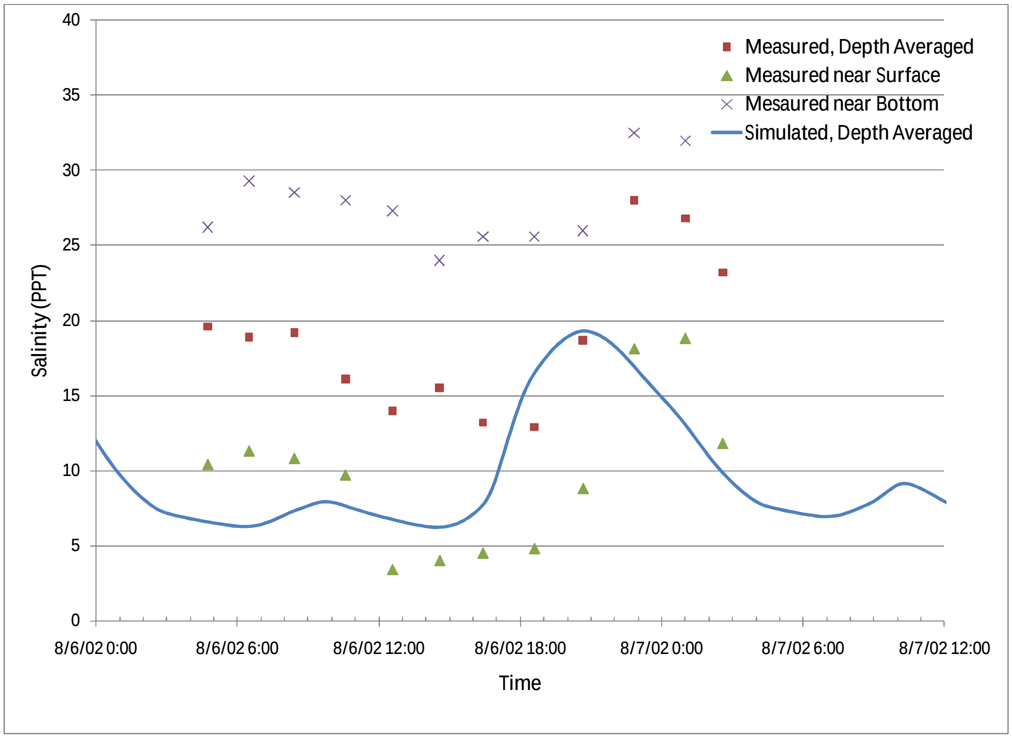

Figure 4-7 RMA4 Model Calibration Results at Station W5

4.3 RMA4 Model Verification

The calibrated RMA4 model was verified with a different set of model input data to determine how well the model matched measured concentrations over a different time period. As discussed earlier, the model verification period was from January 1 through January 3, 2008. The salinity data were collected by MACTEC Engineering and Consulting Inc. for the development of TMDLs.

4.3.1 Verification Input Data

Salinity: Salinity was recorded continuously at three locations: the Tidal Inlet (RR Bridge), Segment 2 (near the Nature Center) and Segment 1 (I-5 Bridge) as shown in Figure 4-1. The measured salinity at Segment 1 was consistently around 2.5 ppt, and there are no other salinity data available. Therefore, a constant concentration of 2.5 ppt is applied at the model upstream boundary. The measured average salinity in the lagoon is approximately 15 ppt, which is used as the model initial concentration in the lagoon. For the offshore area and the ocean boundary an initial salinity value of 34 ppt is used.

Fresh Water Inflow: A flow data set with a 15-minute interval monitored at Camino del Norte Bridge was provided by the SELC and applied at the model upstream boundary. The flow rate is around 8 cfs, which is a typical winter base flow.

Offshore Tides: Tides recorded at the nearest gage at La Jolla (National Oceanic and Atmospheric Administration Station ID: 9410230) that coincide with the selected sampling period were used to represent the ocean tide at the model offshore boundary. The tidal elevation time series is shown in Figure 4-8.

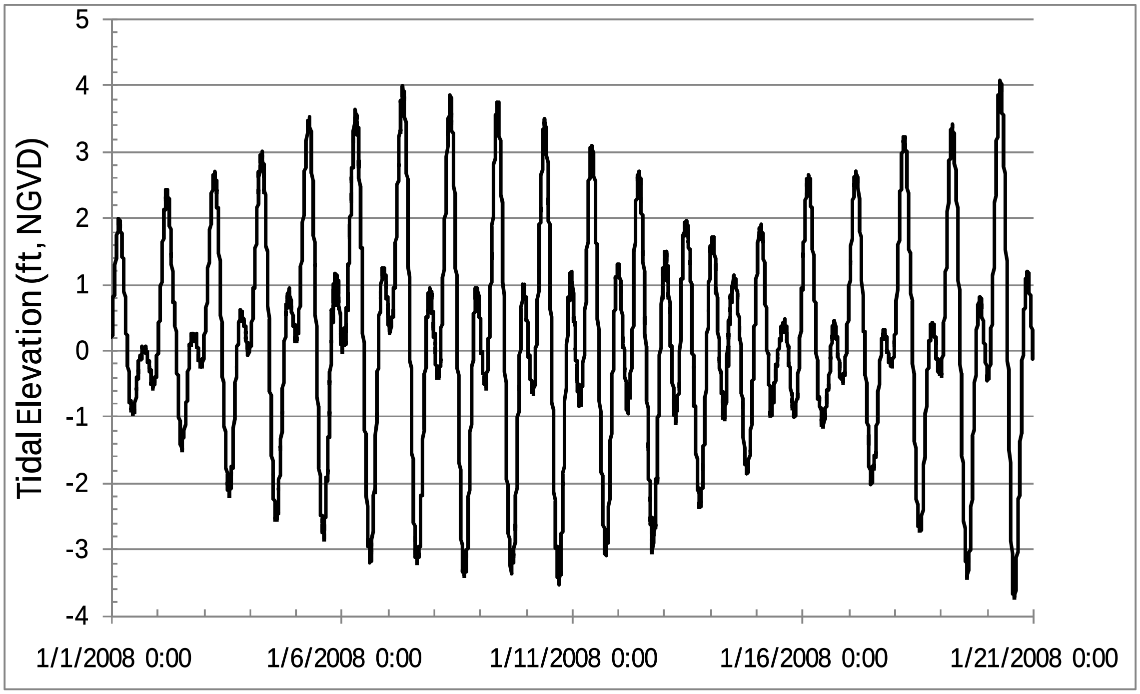

Figure 4-8 Tides for RMA4 Model Verification and Event Modeling

4.3.2 Verification Results

With dispersion coefficients determined during the model calibration period, the RMA4 model was applied over the very early January 2008 time period. The model-predicted salinity values were compared with those measured at two gage locations shown in Figure 4-1, and the results are shown in Figure 4-9 and Figure 4-10. The RMA4 model generally reproduced the salinity magnitude and temporal variations over the model verification period. On this basis, the calibrated and verified model is therefore considered adequate for use in alternative plan studies.

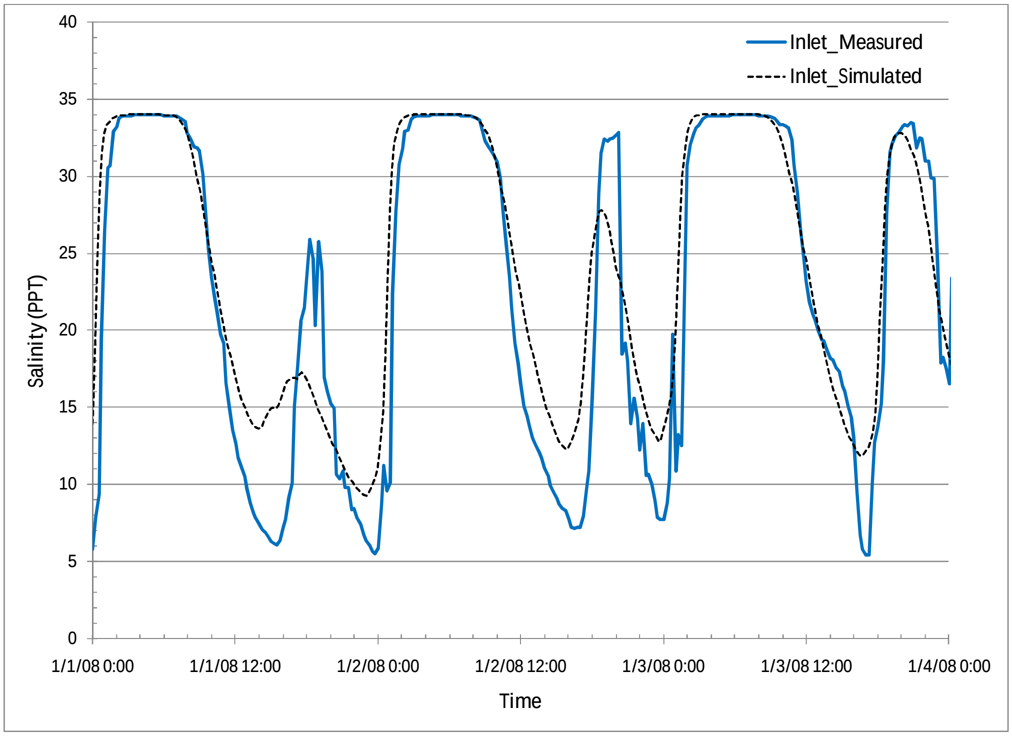

Figure 4-9 RMA4 Model Verification at the Inlet (RR Bridge)

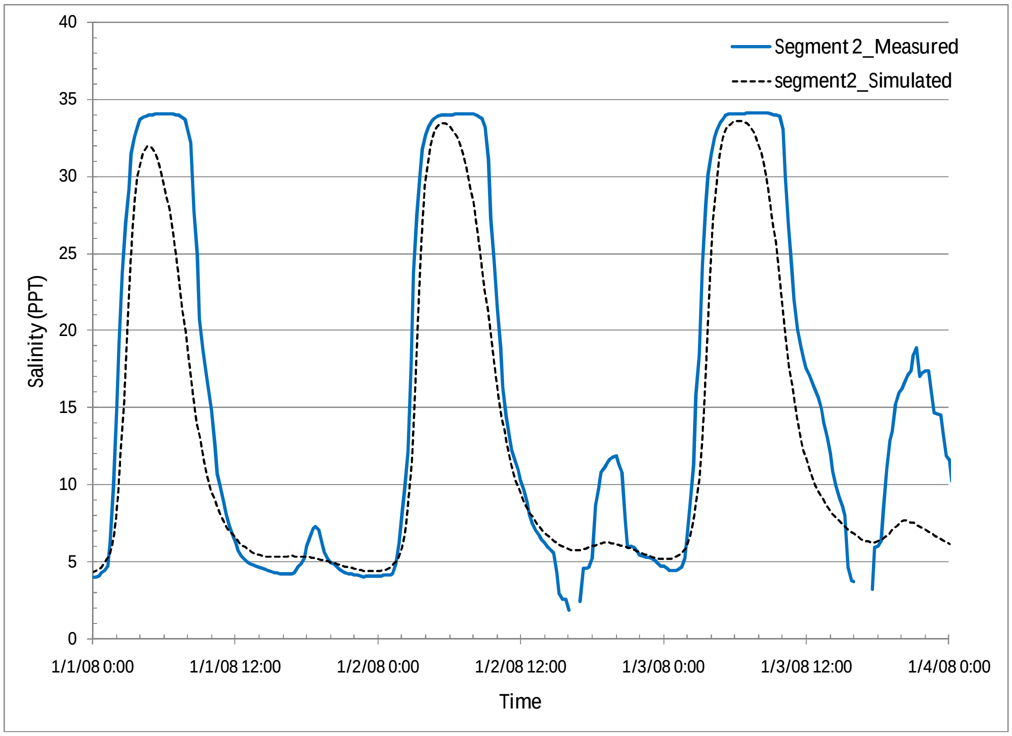

Figure 4-10 RMA4 Model Verification at Segment 2 (Nature Center)

5.0 MODEL SETUP AND SIMULATION CASES FOR RESTORATION ALTERNATIVES

5.1 Model Setup

The RMA4 models were set up for the proposed alternatives using the same bathymetry and grid system as those described for the RMA2 model in the Hydrology/Hydraulics Report (M&N 2010). Hydraulic and contaminant concentration inputs were selected based on hydraulic and water quality data provided by various agencies as described below. Dispersion coefficients used in RMA4 modeling for alternatives are specified in Table 5-1. Under the proposed project condition, circulation is more efficient than existing conditions. Therefore, dispersion coefficients used for wetland basins and channels are higher than those for existing conditions. These dispersion coefficients are based on RMA4 model calibration for existing conditions and a literature review for values applied to modeling of similar coastal water bodies.

Table 5-1 Dispersion Coefficients for Modeling Alternatives

Model Area	Alternative 1A	Alternative 1B	Alternatives 2A &2B
Offshore Area	1000	1000	1000
Tidal Inlet & Main Channels	80	150	150
Feeder Channels	25	30	50
Mudflat & Low Marsh	5	6	10
High Marsh	5	5	8
Riparian	2.5	5	5
Upland	0.5	1	1

5.2 Simulation Cases

Three RMA4 numerical model runs were performed for the existing condition and for each proposed alternative. The purpose of those modeling runs were to: (1) compute residence times under a typical spring and neap tide cycle condition; (2) predict salinity dilutions and recovery during and after a typical 2- to 5-year wet storm event; and (3) predict potential enterococcus bacteria levels at the tidal inlet and nearshore ocean during and after a typical storm event.

A wet season storm event in January 2008 was selected to represent the typical 2- to 5-year storm, as this event is one of the three wet weather events monitored for TMDL development (MACTEC 2009). Valuable water quality data were collected during the monitoring period and the hydrograph of the event is shown in Figure 5-1. The hydrograph has three peaks indicating a three day continuous rain event. To account for the travel time of flows from the stream gage location to the modeling boundary, the hydrograph was delayed by one-hour when applying the flow data at the model boundary at the East Basin.

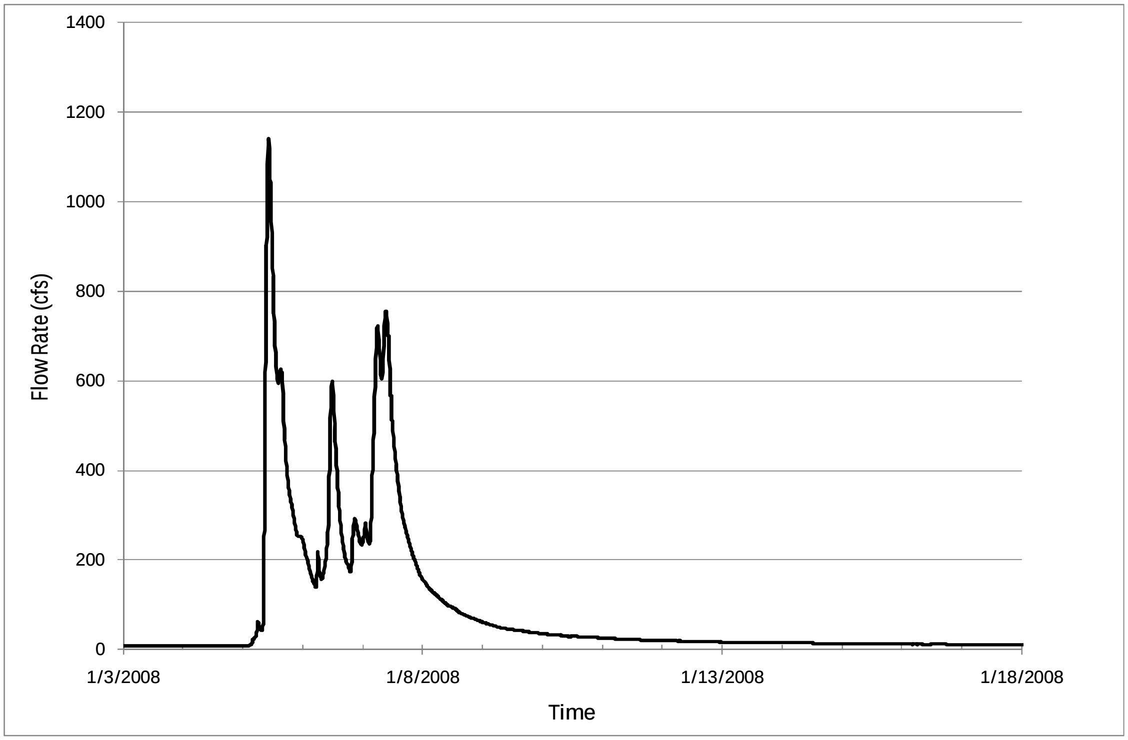

Figure 5-1 Hydrograph of the January 2008 Storm Event

Table 5-2 lists annual peak flow rates based on 15-minute interval flow measurements at Camino del Norte Bridge. Data start in 2004 when the stream gage was installed. The peak flow rates vary from 771 cfs to 3,421 cfs over the past six years. The selected wet event in January 2008 has a peak flow rate of 1,141 cfs, which is not high, but its three-day-duration results in more fresh water input into the lagoon than similar magnitude storm events with a single peak.

Table 5-2 Annual Peak Flow Rates at Camino del Norte Bridge

Hydrologic Year	Date	Peak Flow Rate (cfs)
October 1, 2004 to Sept 30, 2005	1/9/2005	3,421
October 1, 2005 to Sept 30, 2006	4/5/2006	771
October 1, 2006 to Sept 30, 2007	8/26/2007	1,162
October 1, 2007 to Sept 30, 2008	11/30/2007	1,308
October 1, 2008 to Sept 30, 2009	12/15/2008	1,688
October 1, 2009 to Sept 30, 2010	1/21/2010	3,210

6.0 RESIDENCE TIME ANALYSIS

6.1 Methodology

The RMA4 water quality model is used to simulate the tidal flushing efficiency of water quality constituents in the wetland basins. Constituent concentrations in a water body reflect a balance between the rate of constituent supply and the rate of constituent removal by tidal flushing. Residence time (i.e., average time a particle resides in a hydraulic system) provides a useful measure of the rate at which waters in the hydraulic system are renewed. Accordingly, residence time provides a means for assessing the water quality of the hydraulic system.

Consider the reduction of a tracer concentration in a tidal embayment due to flushing after being released (Fisher et al., 1979), in which C_0 is initial concentration, K is a reduction coefficient and C(t) is the concentration at time t.

$$C(t) = C_0 e^{-Kt} \tag{6.1}$$

The residence time of the tracer in the embayment is determined from

$$T_r = \frac{\int_0^\infty t\,C(t)\,dt}{\int_0^\infty C(t)\,dt} = \frac{1}{K}. \tag{6.2}$$

Since the concentration at $t = T_r$ is

$$C(T_r) = C_0 e^{-1} = \frac{C_0}{e} \tag{6.3}$$

T_r can be calculated from a regression analysis of the tracer concentration time series computed by the numerical model RMA4.

Based on the above methodology, the general procedure of computing the residence times for different parts of a tidal embayment is as follows:

- Assign an initial constituent concentration of one over the entire embayment element mesh (wetlands for this study) and a value of zero at the open water boundaries to simulate an instantaneous release of a new constituent into an embayment.
- Run the numerical model RMA4 for an adequate number of tidal cycles until substantial reduction of constituent concentrations have occurred due to tidal flushing at the locations of interest.
- Analyze the computed concentration results by regression analysis to obtain the constituent reduction distributions at the locations of interest.

- Find the residence times for the locations of interest from the distribution curves according to Equations 6.1 through 6.3.

Figure 6-1 shows an example of how the method works, where the zigzag solid blue line shows the direct results from RMA4 and the green dash line shows the daily moving average results. Arrows show the path of finding the residence time, which is approximately 173 hours for this case. This method was used in the project study for all scenarios.

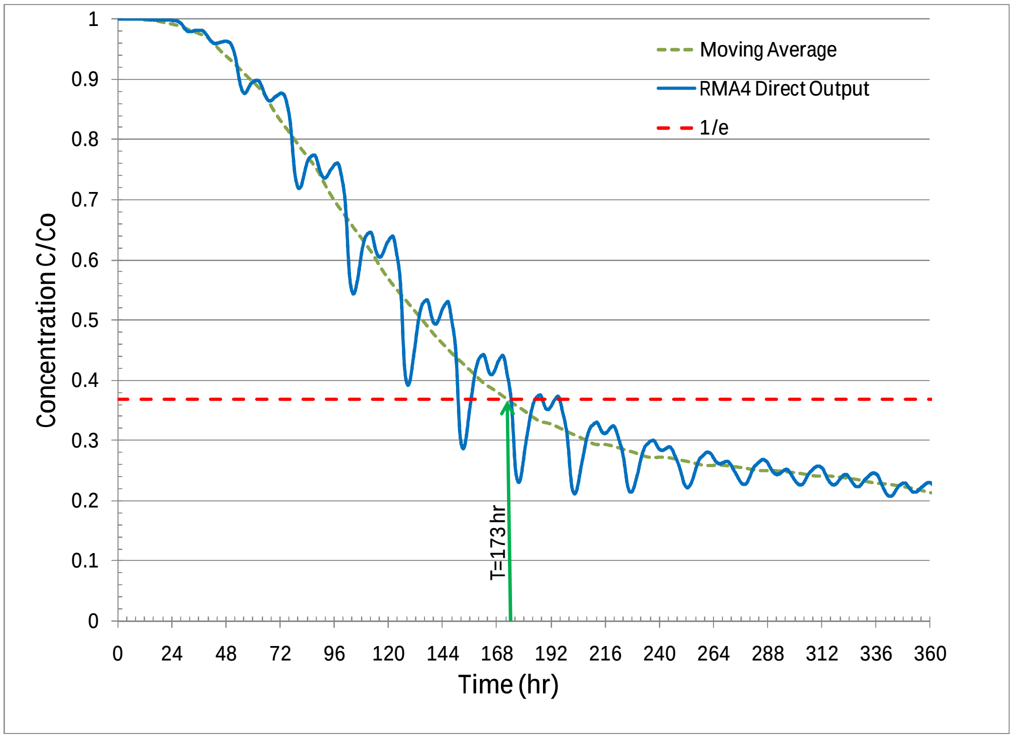

Figure 6-1 Example of a Residence Time Plot

6.2 Boundary Conditions

6.2.1 Hydraulic Input

The 15-day modeling tidal series, representing the average spring and neap tidal cycle, as described in Section 4.2 of the Hydrology/Hydraulic Report (M&N 2012) was taken as the offshore driving tide. No runoff from the fresh water boundary was considered, as the base flow of the creek is negligibly small.

6.2.2 Concentration Input

An initial constituent concentration of one was specified for the entire basin. No constituent concentration was assigned at the open water boundaries. Also, it is assumed that ocean water is clean and does not supply additional constituents, or “contaminants.”

6.3 Residence Time Results

The constituent concentration is predicted by the RMA4 model for every node point in the entire modeling domain over the entire modeling period. Modeling results (constituent concentrations) are extracted at representative gage locations throughout the modeling area and residence times are calculated in days using the method described in Section 6.1. The gage locations and their corresponding residence times are shown in Figure 6-2 through Figure 6-6 for each alternative. The residence times represent dry weather conditions. he East Basin (east of I-5) is bifurcated by the CDFG dike with no tidal flow upstream from that point. Therefore, residence times are not calculated for the area east of the CDFG dike under existing conditions. However, model predictions are made for areas east of the CDFG dike for various restoration alternatives that remove the dike.

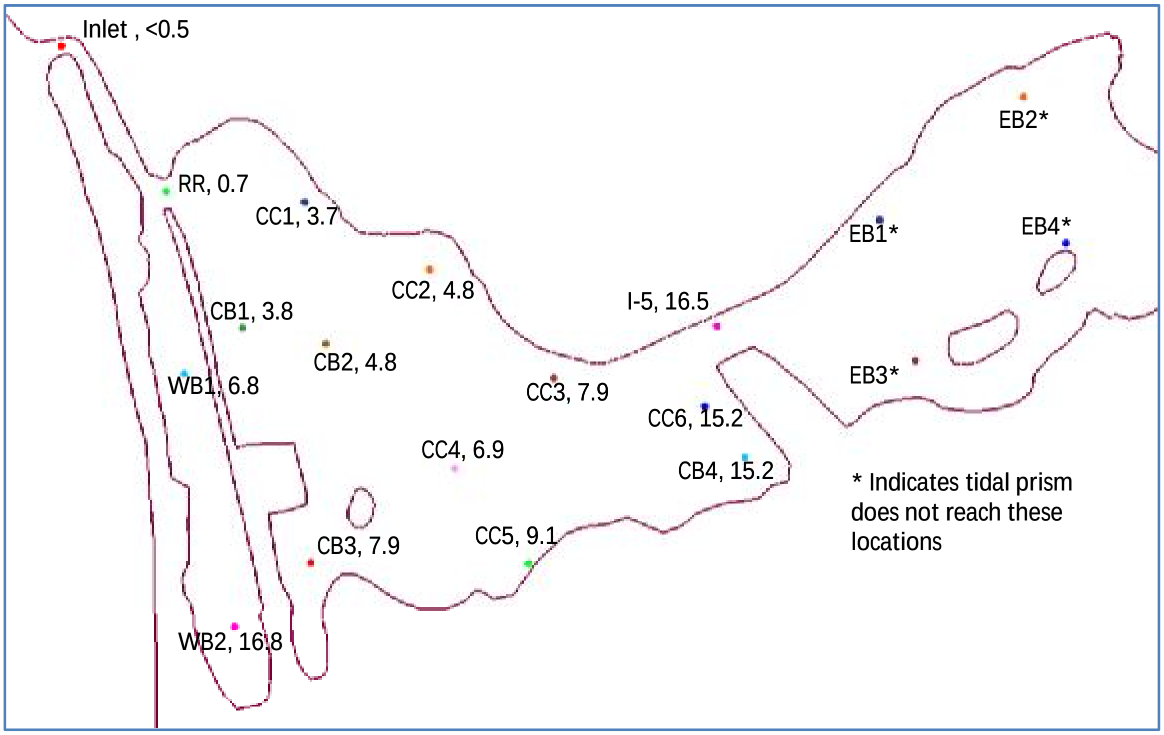

Figure 6-2 Residence Times (in Days) Under Existing Conditions

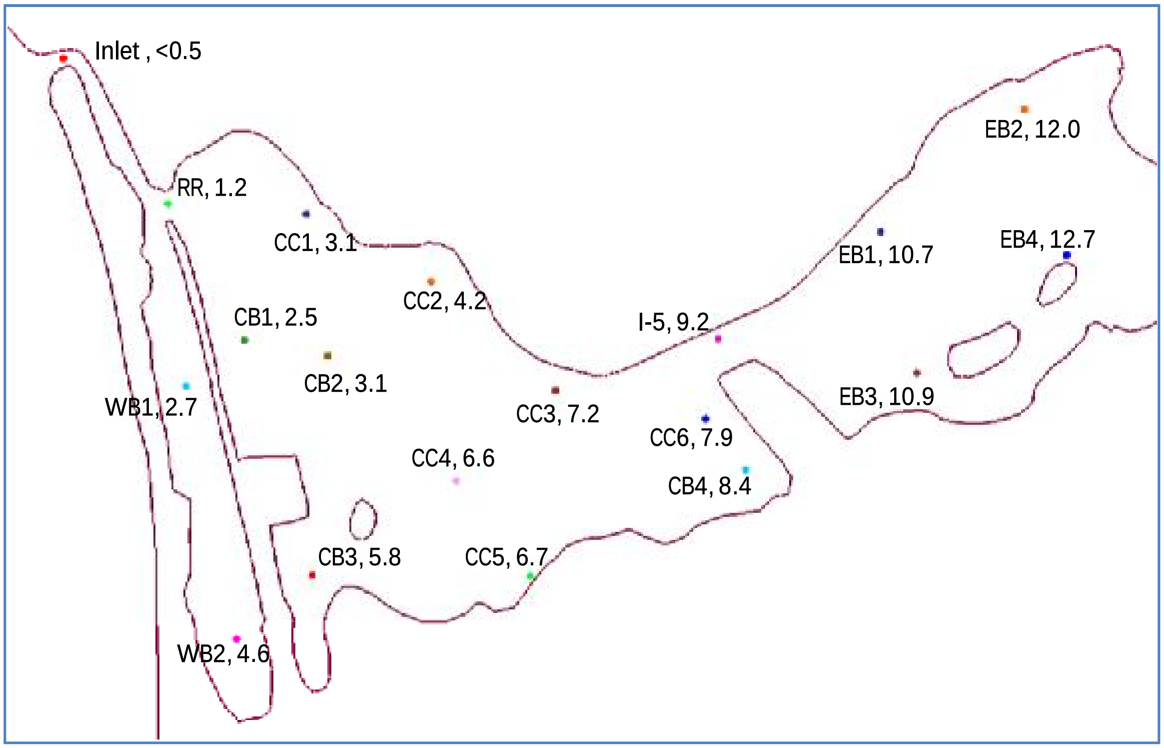

Figure 6-3 Residence Times (in Days) Under Alternative 1A

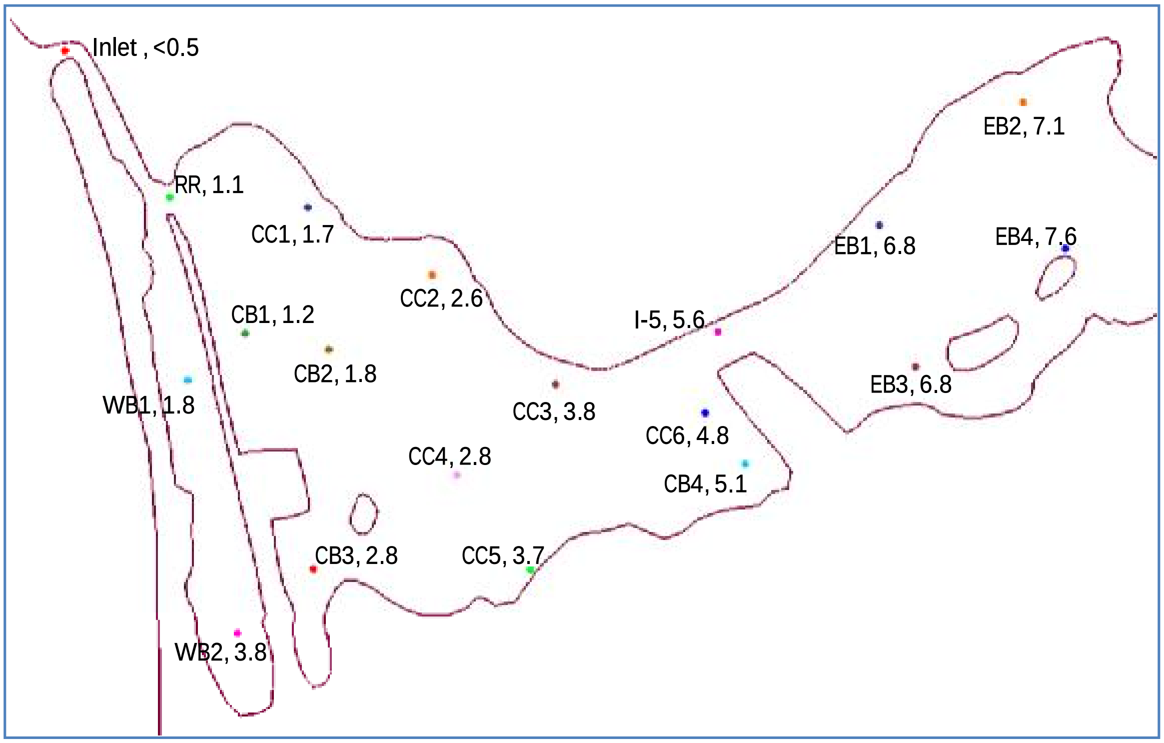

Figure 6-4 Residence Times (in Days) Under Alternative 1B

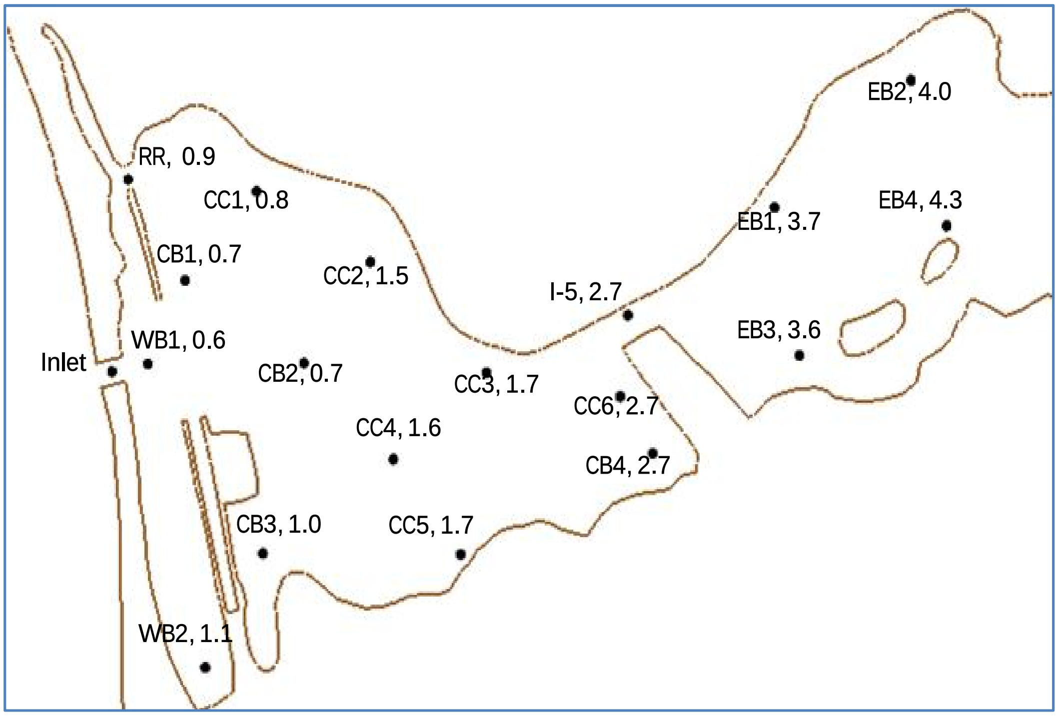

Figure 6-5 Residence Times (in Days) Under Alternative 2A

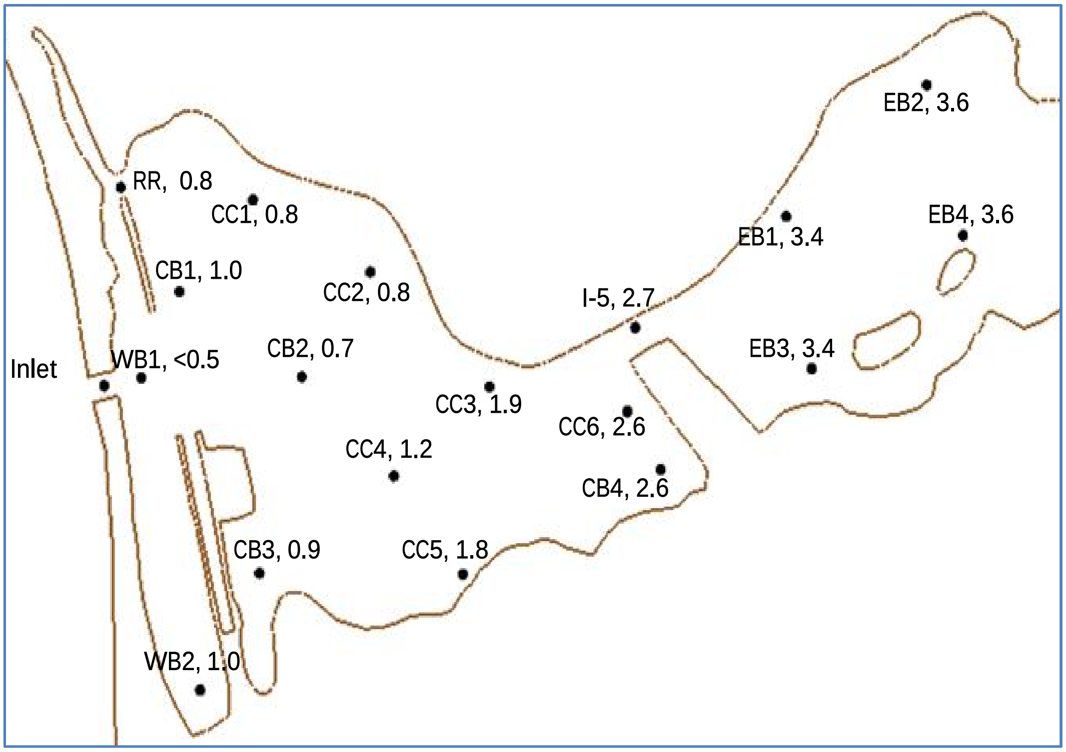

Figure 6-6 Residence Times (in Days) Under Alternative 2B

Results of residence time analyses are summarized below for each basin.

West Basin: The residence times are approximately 6 days south of the existing channel (near the proposed new tidal inlet location) and 17 days toward the south end under the existing conditions. Residence times reduce to 1 to 5 days under Alternative 1A at the same locations, to 1 to 4 days under Alternative 1B, and to approximately 1 day under both Alternatives 2A and 2B.

Central Basin: Residence times range from 1 day on the west end near the rail road bridge to 16 days near I-5 Bridge (CB4 and CC6) under existing conditions. The residence times at the same gage locations are reduced to 9 days under Alternative 1A, 6 days under Alternative 1B, 3 days under Alternatives 2A and 2B.

East Basin: The residence time at I-5 Bridge is 16 days under the existing condition and no residence time is simulated in the east of the CDFG dike due to lack of tidal influence. The residence time at I-5 Bridge is reduced to 9 days under Alternative 1A, 6 days under Alternative 1B, 3 days under Alternatives 2A and 2B. The longest residence time in the East Basin (EB4) is 13 days under Alternative 1A, 8 days under Alternative 1B, 4 days under Alternatives 2A and 2B.

Residence time is an indicator of tidal flushing efficiency. A short residence time means good flushing and circulation. With short residence times such as those created by conditions in Alternatives 2A and 2B, contaminant constituents such as nutrients and fine sediments can be quickly diluted and/or flushed out to the ocean. A long residence time often indicates stagnation and poor circulation and results in a poor water quality condition. In wetlands, a residence time shorter than 7 days is regarded as good circulation (County of Orange 1994). Residence times are shorter near the ocean entrance and longer in areas farther east from the entrance. The East Basin has the longest residence times under any scenario due to distance from the ocean. Overall, Alternative 2B has the best circulation, and Alternative 2A is similar but slightly inferior to Alternative 2B. For alternatives with the existing inlet location, Alternative 1B provides the best circulation due to its enlarged channel in the Central Basin and longer I-5 bridge, while Alternative 1A is superior to existing conditions with its increased tidal prism.

7.0 BACTERIA ANALYSIS

Bacteria concentrations are analyzed with regard to recreational water contact activities (surfing, swimming, and diving) in the ocean. Enterococcus was selected as the type of indicator bacteria for the numerical modeling study for the following reasons:

- Monitoring data indicate that enterococcus concentrations are the highest within the lagoon during the winter.
- The highest exceedance frequencies were also associated with enterococcus compared to other indicator bacteria.
- USEPA studies also have demonstrated that enterococcus is a better predictor of the presence of gastrointestinal illness-causing pathogens than fecal and total coliform (RWQCB 2007).

7.1 Boundary Conditions

7.1.1 Hydraulic Input

The rain event selected to represent a typical 2-5-year event was previously discussed in Section 5.2, and the fresh water inflow hydrograph is shown in Figure 5-1. The tide series applied at the offshore model boundary are shown in Figure 4-8.

7.1.2 Concentration Input

As discussed in Section 3.0, enterococcus concentrations are monitored at three locations within the lagoon and at the mass emission station at Camino del Norte Bridge. The mass emission station is approximately three miles upstream from the model boundary at the East Basin. It does not accurately represent the condition at the lagoon boundary. Therefore, enterococcus concentrations measured at the I-5 Bridge were used as model boundary input. Being conservative, the highest measured enterococcus concentration during the three day rain period of 8,400 Most Probable Number per 100 milliliters (MPN/100 ml) was selected to represent the rain event, and the highest concentration of 168 MPN/100 ml measured over a one week period after the rain event was applied as the pre- and post rain storm condition concentration input. Zero concentration is applied at the model offshore ocean boundary, assuming that seawater is uncontaminated.

7.2 Enterococcus Die-Off Rate

Bacteria inactivate and incubate under certain environments. Temperature and solar radiation have significant effects on the rate of inactivation. The availability of nutrients, turbidity, and sediments are other factors. Bacteria inactivation is also often expressed as the die-off rate. Determining the enterococcus die-off rate is beyond the scope of this study, so assumptions were made to address this uncertainty. Bacteria die-off is expressed as a T90 value, in which T90 is the time in which 90 percent of the bacteria is inactivated or dies off. According to the literature (Noble 2004, Kay, et al 2004), enterococcus consistently degrade slowest under low light (dark) conditions, with a T90 from 65 to 177 hours. However, the T90 can be as short as 6 hours in coastal water under solar radiation. The bacteria die-off rate in day^{-1} is the reciprocal of T90.

The intensity of solar radiation varies over time, and the numerical relationship between irradiation and bacteria die-off is difficult to determine. Therefore, this study assumed an average die-off rate of 24 hours. The RMA4 model uses a single die-off rate as the model input.

Model calibration under existing lagoon conditions was performed to determine the average die-off rate by comparing measured enterococcus concentrations (at the tidal inlet and Segment 2 shown in Figure 3-1) with those simulated while varying the die-off rate. The comparisons at the two gage locations are shown in Figure 7-1 and Figure 7-2. The model results indicate that the simulated concentrations match the measured concentrations well when the die-off rate equals 0.2 day^{-1} , or when the T90 is 120 hours. This die-off rate is used in alternative modeling to predict the potential water quality conditions at the tidal inlet and nearshore ocean.

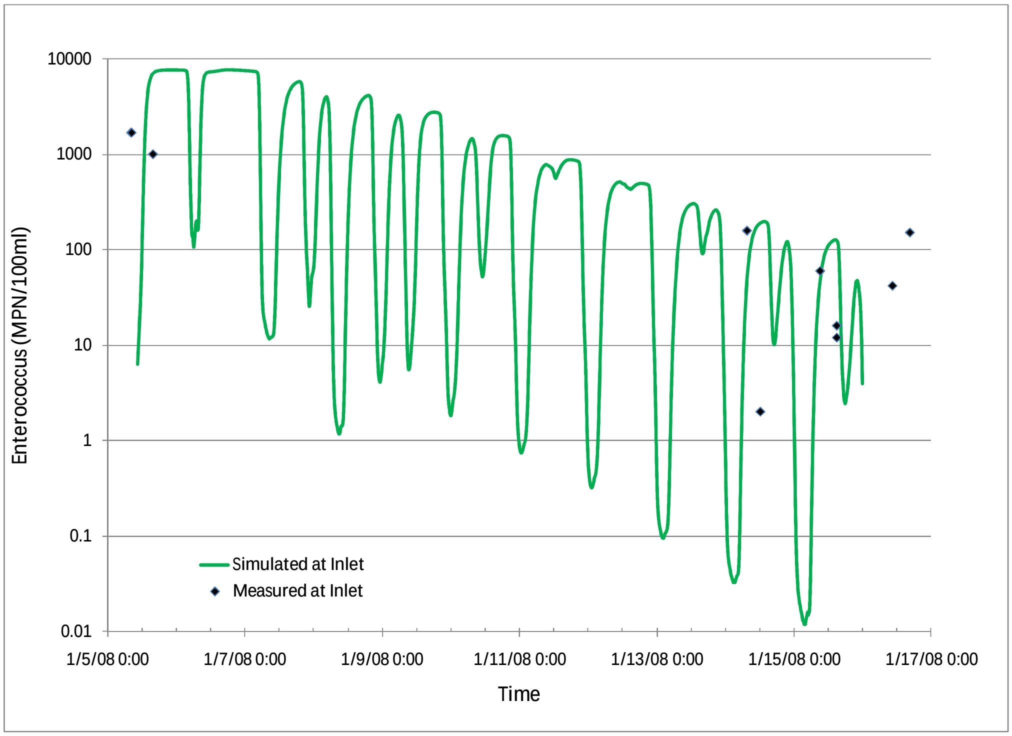

Figure 7-1 Die-Off Rate Calibration at the Inlet

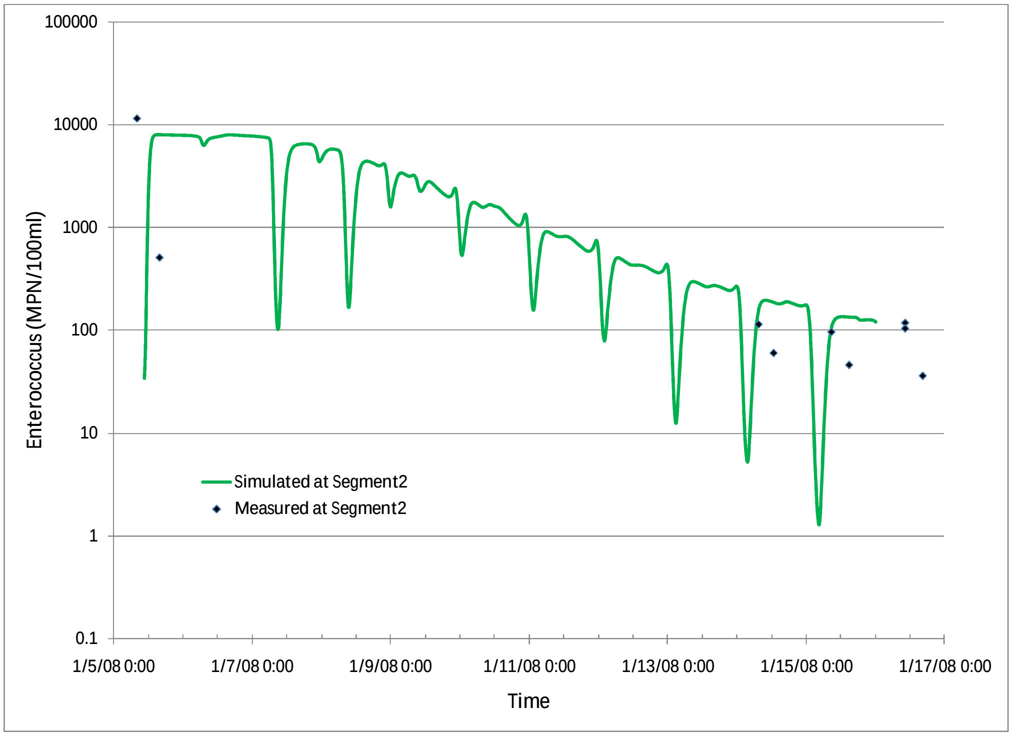

Figure 7-2 Die-Off Rate Calibration at Segment 2

7.3 Bacteria Modeling Results

RMA4 numerical model runs are performed for each alternative. The modeling results are extracted at the ocean inlet and the nearshore ocean where water quality samples were taken during the period modeled. Modeling results are then compared with measured enterococcus concentrations. Offshore sampling was performed by the San Diego County Department of Environmental Health and the San Elijo Lagoon Joint Powers Authority. The offshore sampling stations and locations are listed in Table 7-1 and shown in Figure 7-3.

Table 7-1 Nearshore Water Quality Sampling Locations

Station	Location	Position	Agency
SE- 030	Seaside	33.0026400 N, -117.2783500 E	San Diego Dept of Environmental Health
SE- 040	Las Olas (Georges)	33.0108200 N, -117.2796200 E	San Elijo JPA
SE- 050	Charthouse Parking (slight South)	33.0119100 N, -117.2798000 E	San Elijo JPA
SE- 060	SEL Outlet (Cardiff Reef)	33.0156300 N, -117.2812700 E	San Elijo JPA

Figure 7-3 Offshore Water Quality Sampling Locations

7.3.1 Existing Condition

Model-predicted enterococcus concentrations during the January 2008 storm event were compared to the measured concentrations for existing conditions. The results are presented in Figure 7-4 through Figure 7-7. The rain event started on January 5th and ended on January 8th, as shown in Figure 5-1, and water quality samples were taken after the rainstorm event on January 9th. This same timing is applied to modeling of all alternatives presented below. Enterococcus levels were below the detection limit of 2 MPN/100 ml at Stations SE-03, SE-04, and SE-05. At Station SE-06 (near the existing inlet), the measured enterococcus concentration exceeded the AB411 criterion as shown in Figure 7-7, and the model-predicted concentration matched the measurements very well. Based on the model prediction, the enterococcus concentrations exceed the AB 411 criterion during the storm event and the exceedance lasts about one week after the storm event. At the other three stations, exceedances only occur during the storm event.

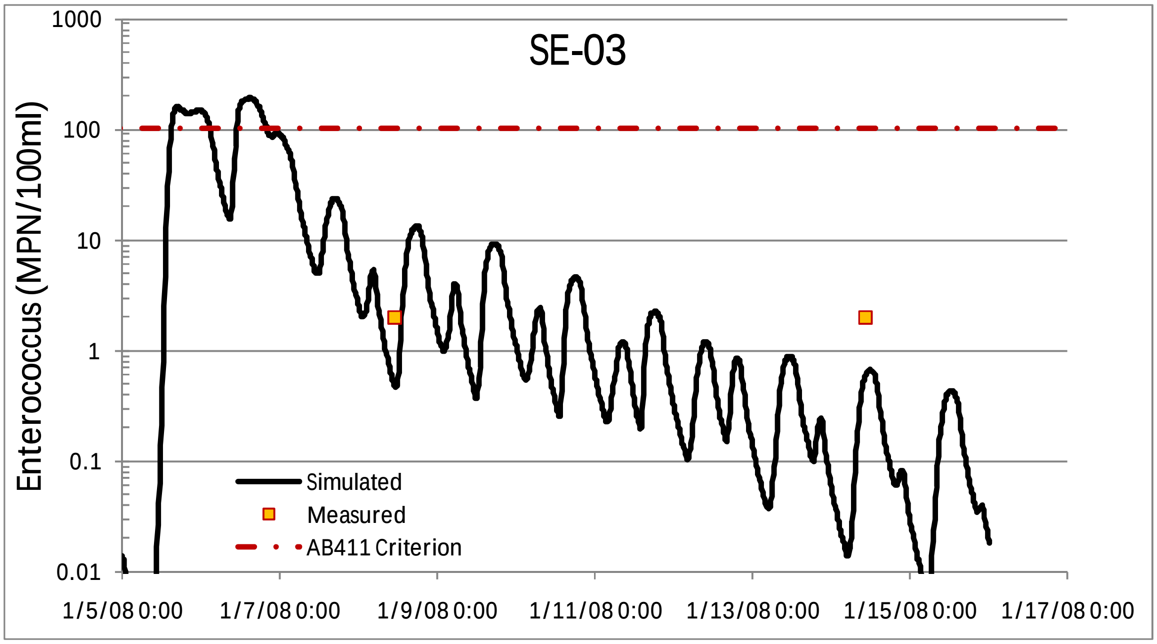

Figure 7-4 Enterococcus Concentrations at Station SE-03 Under Existing Conditions

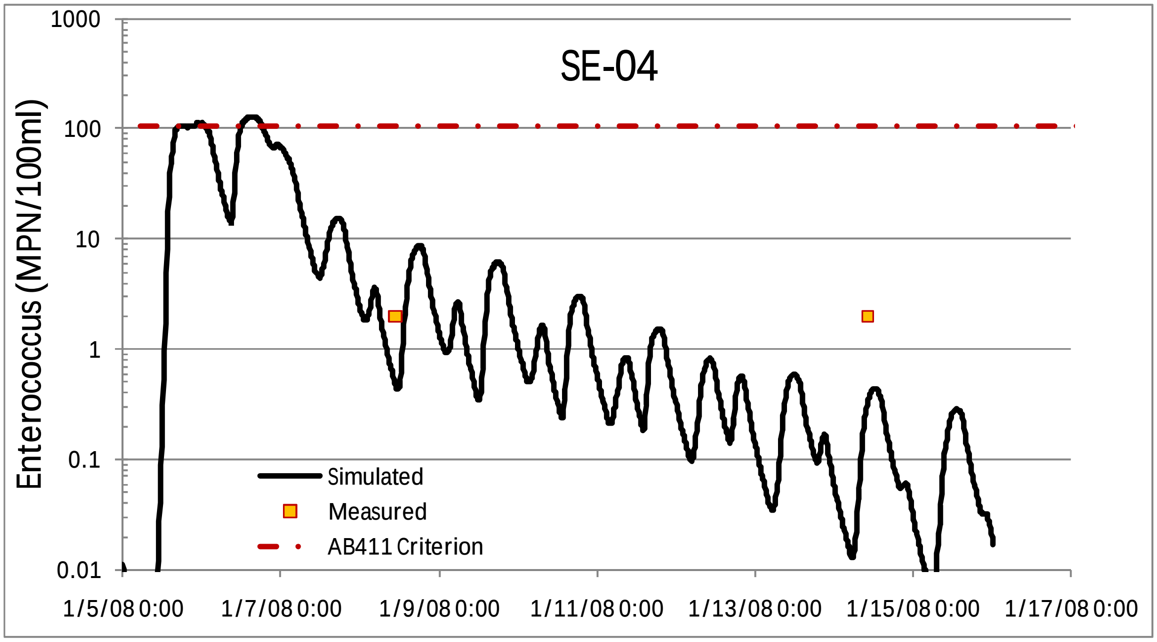

Figure 7-5 Enterococcus Concentrations at Station SE-04 Under Existing Conditions

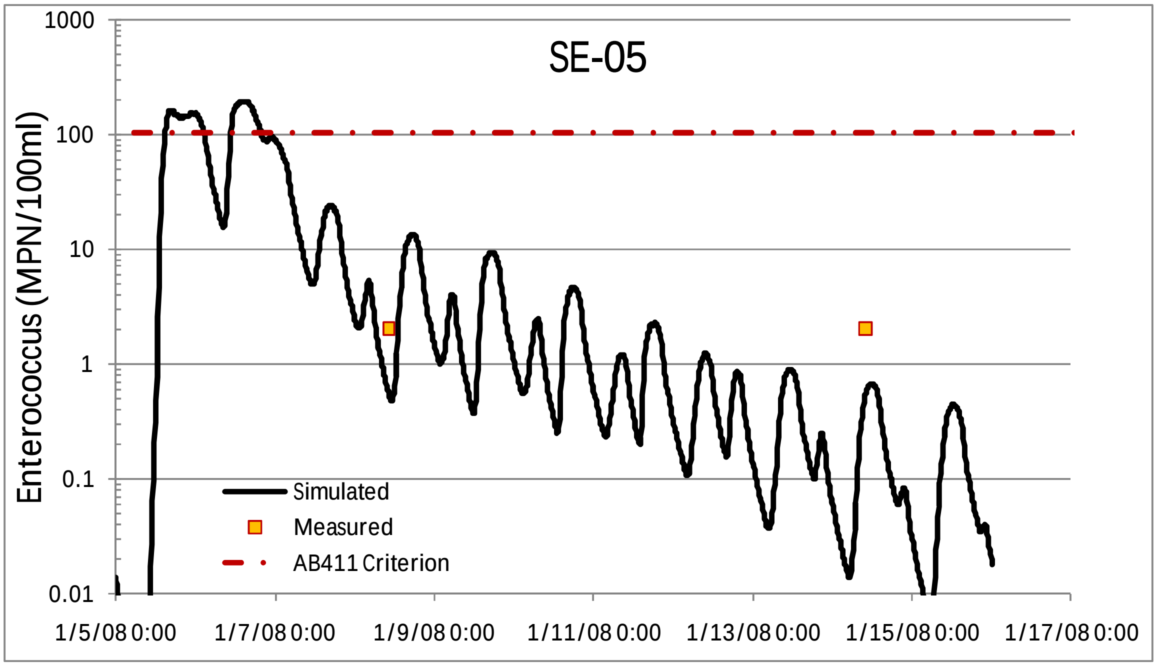

Figure 7-6 Enterococcus Concentrations at Station SE-05 Under Existing Conditions

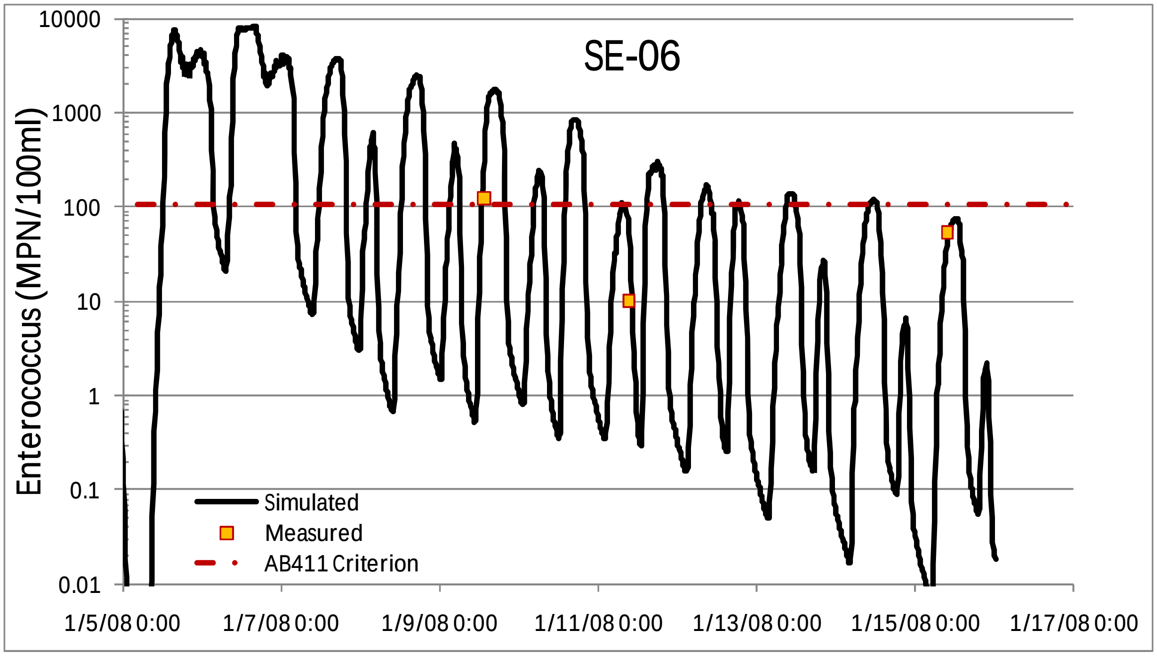

Figure 7-7 Enterococcus Concentrations at Station SE-06 Under Existing Conditions

7.3.2 Alternative 1A

Under the proposed Alternative 1A project condition, model-predicted enterococcus concentrations during the January 2008 storm event were compared to the measured concentrations. The results are presented in Figure 7-8 through Figure 7-11. Enterococcus sampling results were below the detection limit of 2 MPN/100 ml at Stations SE-03, SE-04 and SE-05. At Station SE-03, the predicted concentrations are also below the AB411 criterion. At Stations SE-04 and SE-05, model-predicted concentrations exceeded the criterion only briefly during the storm event. At Station SE-06 (near the existing inlet), the measured enterococcus concentration one day after the storm event exceeds the AB411 criterion as shown in Figure 7-11. Based on the model prediction, the enterococcus concentrations exceed the AB411 criterion during the storm event and the exceedance lasts about one week after the storm event. The results are very similar to that under the existing condition, except the duration of the exceedance is one day shorter.

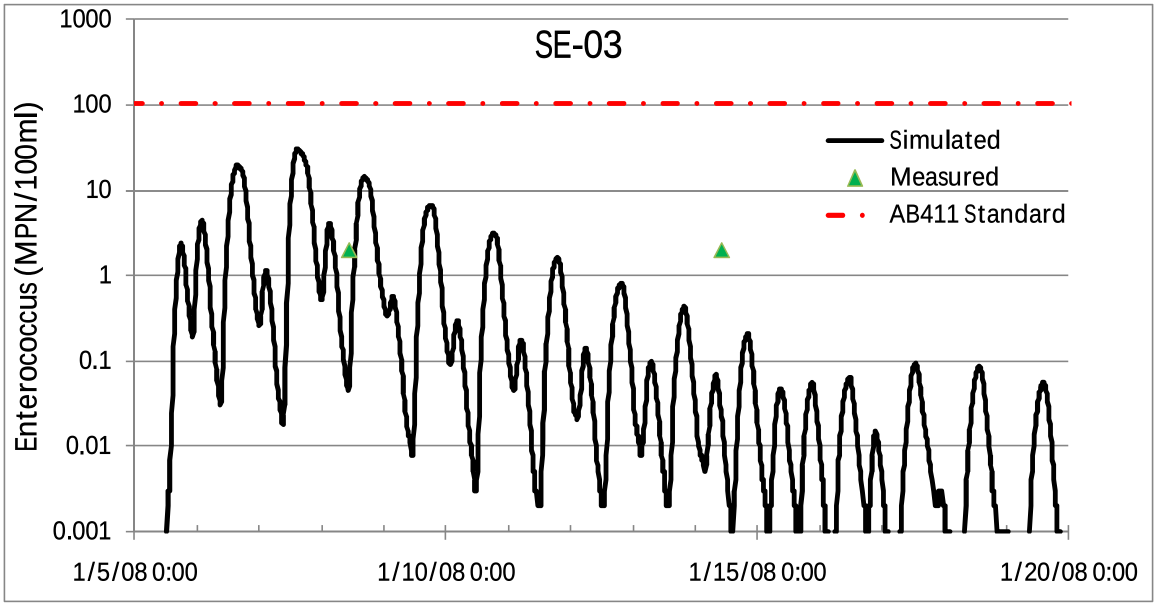

Figure 7-8 Enterococcus Concentrations at Station SE-03 Under Alternative 1A

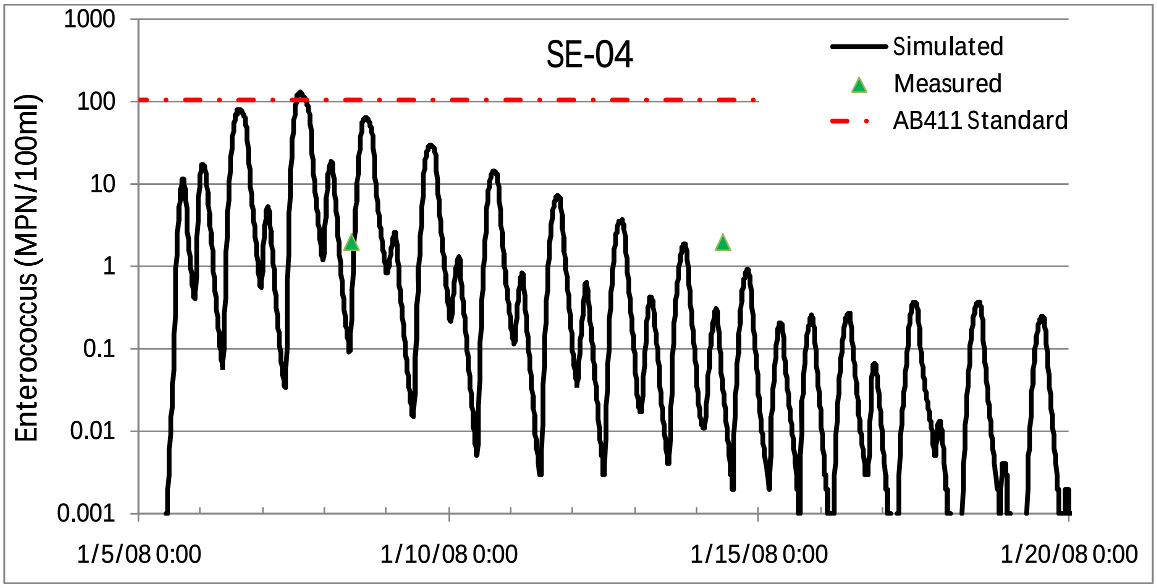

Figure 7-9 Enterococcus Concentrations at Station SE-04 Under Alternative 1A

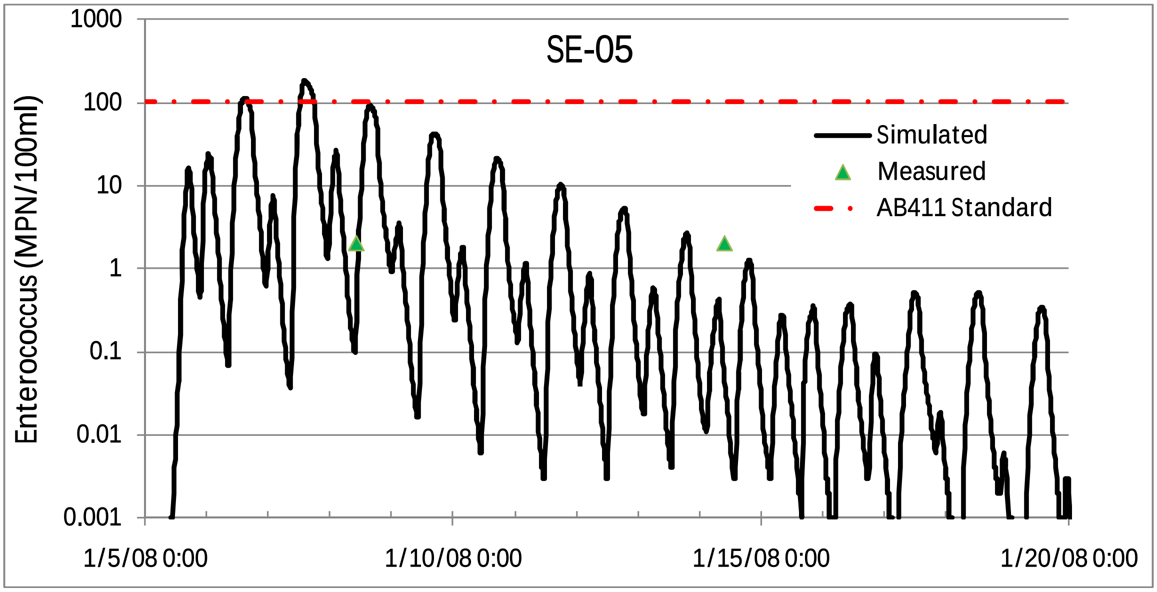

Figure 7-10 Enterococcus Concentrations at Station SE-05 Under Alternative 1A

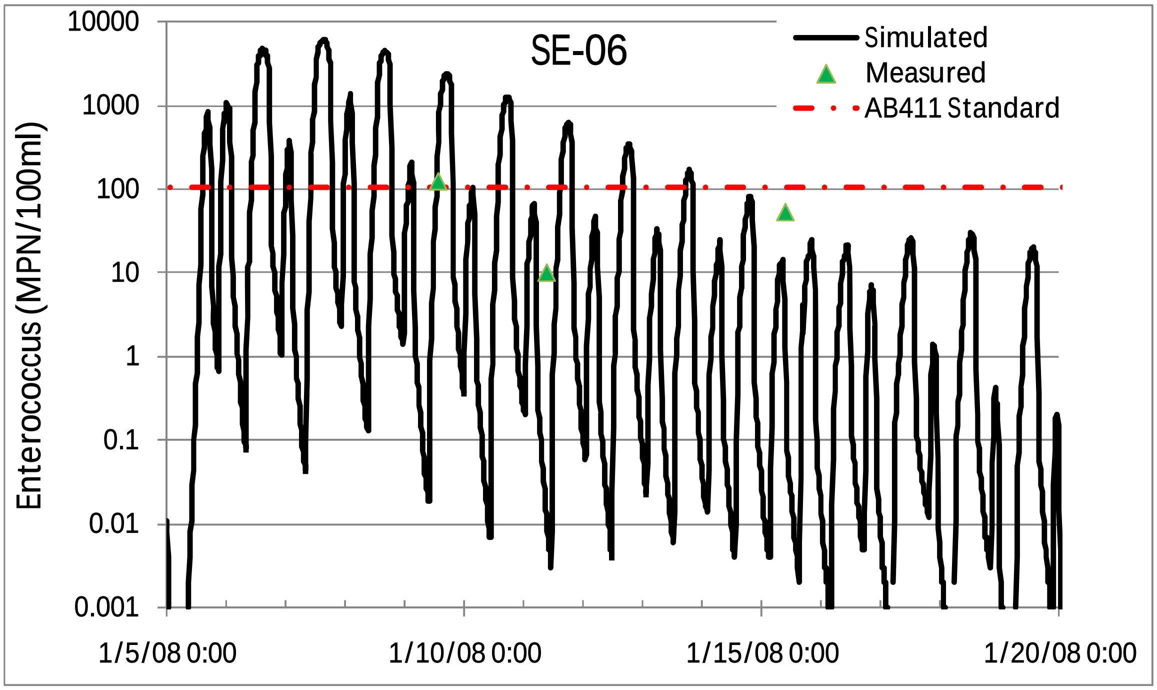

Figure 7-11 Enterococcus Concentration Comparison at Station SE-06 Under Alternative 1A

7.3.3 Alternative 1B

Under the proposed Alternative 1B project condition, model-predicted enterococcus concentrations during the January 2008 storm event were compared to the measured concentrations. The results are presented in Figure 7-12 through Figure 7-15.

Enterococcus sampling results were below the detection limit of 2 MPN/100 ml at Stations SE-03, SE-04 and SE-05. At Station SE-03, the predicted concentrations are also below the AB411 criterion. At Stations SE-04 and SE-05, model-predicted concentrations exceed the criterion only briefly during the storm event. At Station SE-06 (near the existing inlet), the measured enterococcus concentration one day after the storm event exceeds the AB411 criterion as shown in Figure 7-15. Based on the model prediction, the enterococcus concentrations exceed the AB411 criterion during the storm event and the exceedance lasts an additional 4 days after the storm event. The overall results are very similar to those under the Alternative 1A project condition; however, the duration of the exceedance is one day shorter than that under the Alternative 1A.

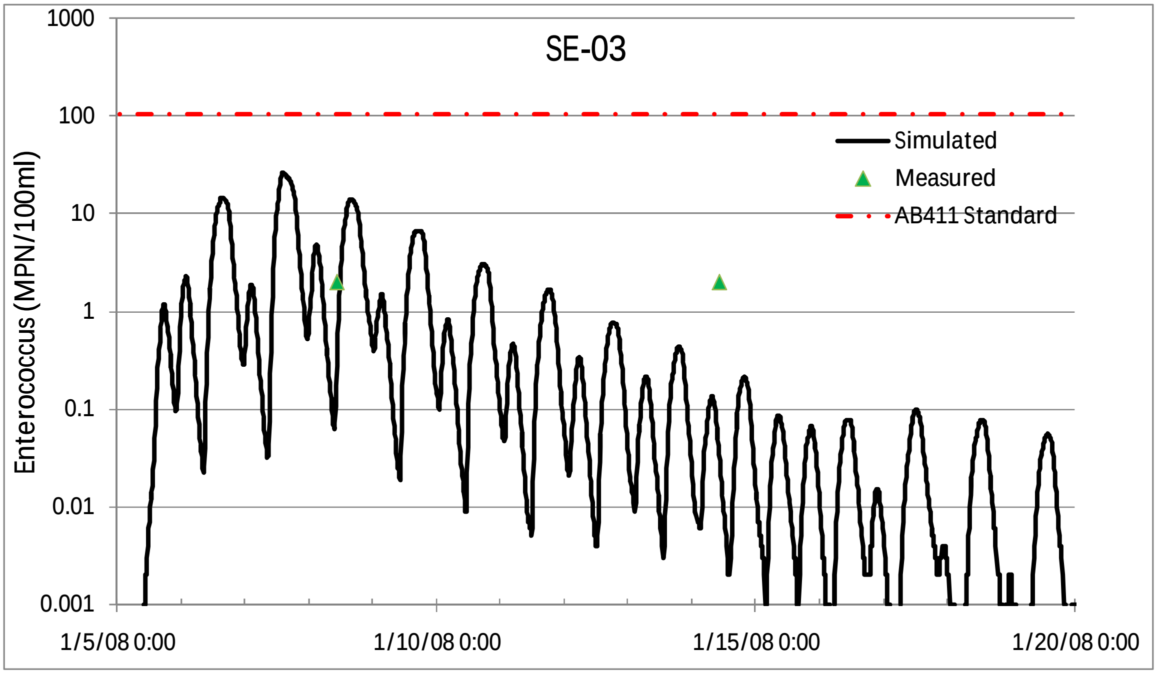

Figure 7-12 Enterococcus Concentrations at Station SE-03 Under Alternative 1B

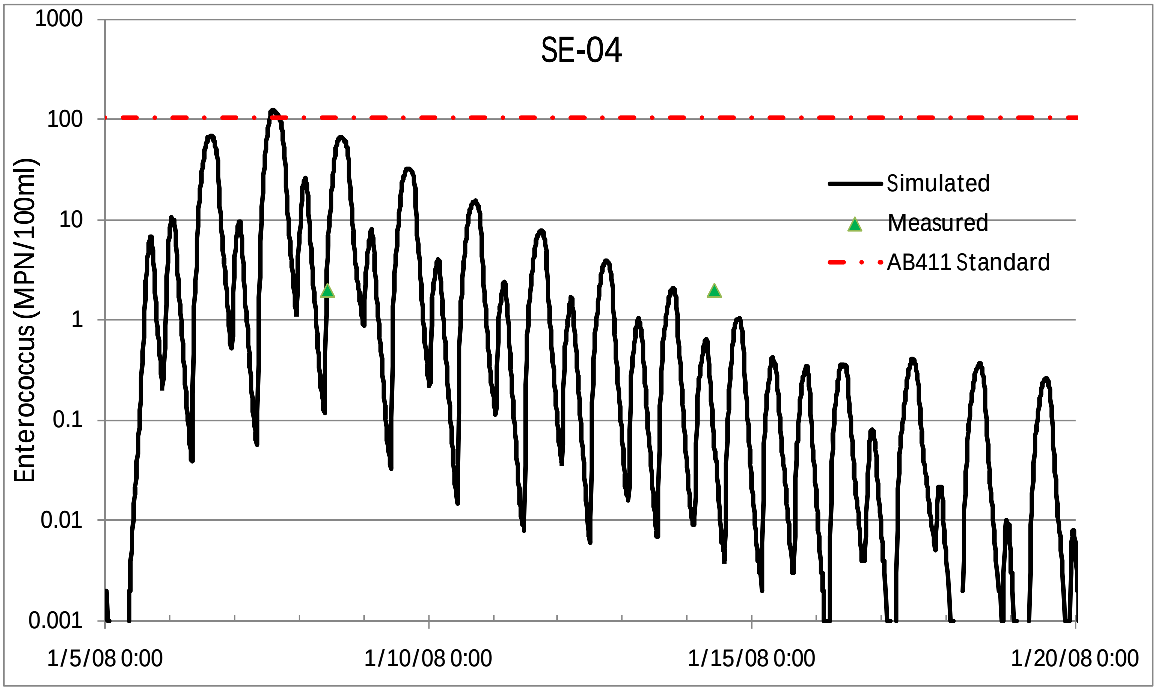

Figure 7-13 Enterococcus Concentrations at Station SE-04 Under Alternative 1B

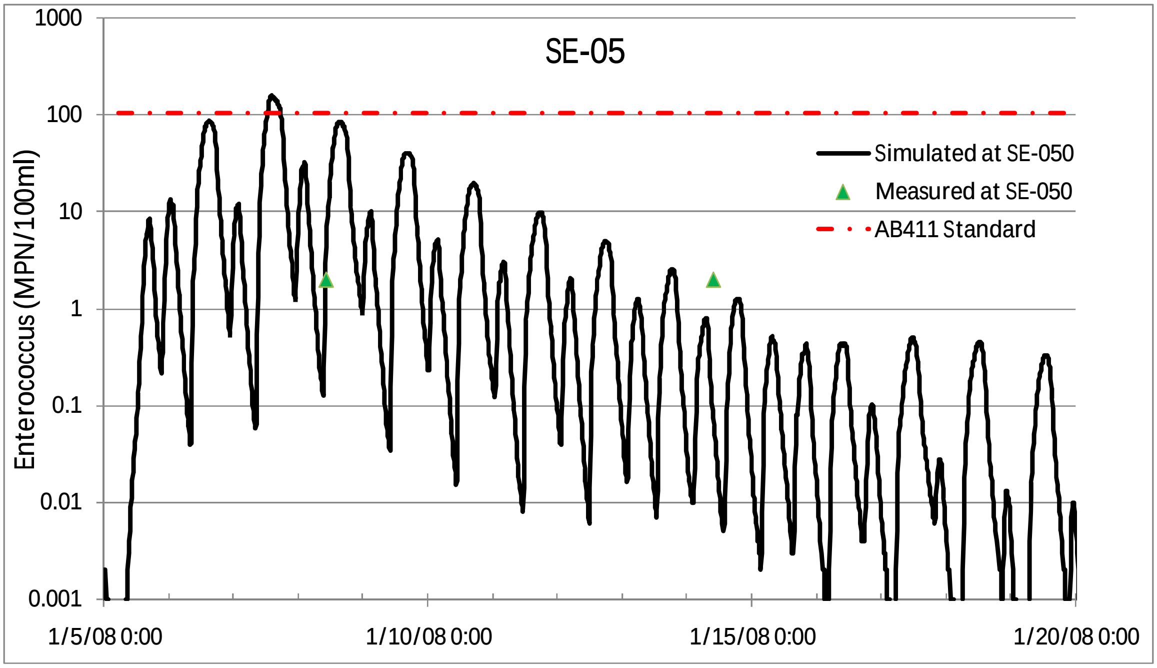

Figure 7-14 Enterococcus Concentration Comparison at Station SE-05 Under Alternative 1B

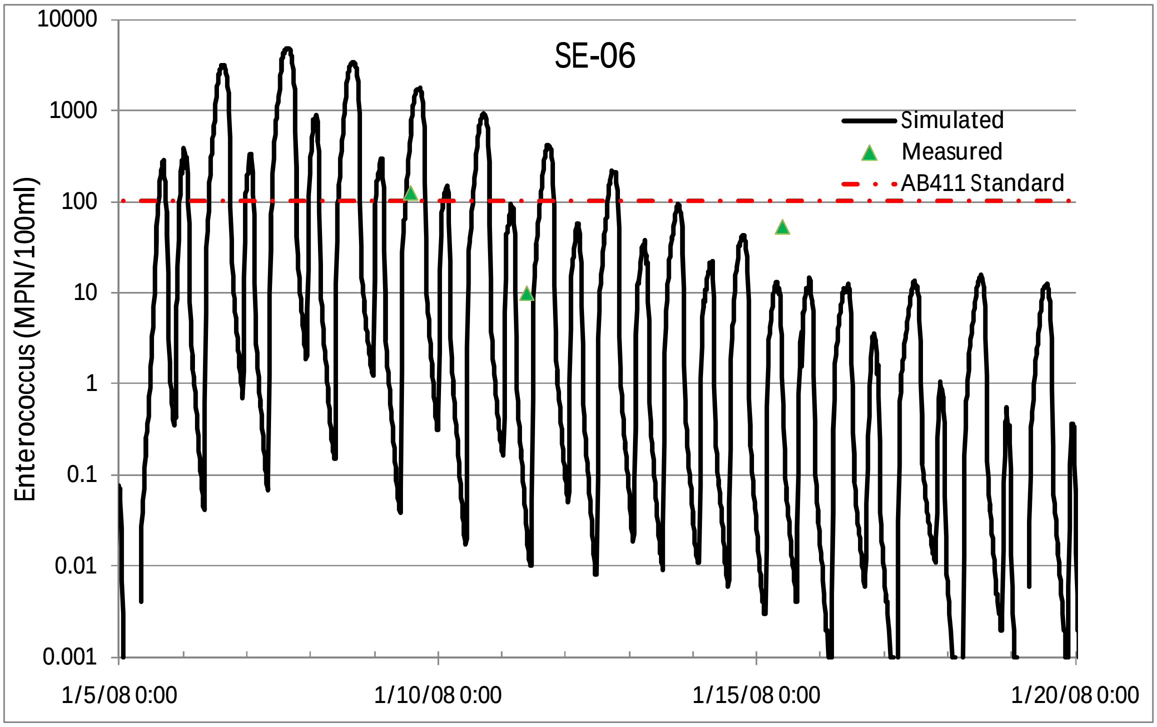

Figure 7-15 Enterococcus Concentrations at Station SE-06 Under Alternative 1B

7.3.4 Alternative 2A

Under the proposed Alternative 2A project condition, model-predicted enterococcus concentrations during the January 2008 storm event were compared to the measured concentrations. The results are presented in Figure 7-16 through Figure 7-19. Enterococcus sampling results were below the detection limit of 2 MPN/100 ml at Stations SE-03, SE-04 and SE-05. Under this proposed project condition, the new inlet is located between Stations SE-04 and SE-05. At Station SE-03, the predicted concentrations exceed the AB411 criterion briefly during the rain event similar to that under the existing condition. At Stations SE-04 and SE-05, model-predicted concentrations exceed the criterion only briefly during the storm event similar to the results for alternatives with the inlet at the existing location. At Station SE-06 (near the existing inlet), the enterococcus concentration only exceeds the criterion briefly, and the duration of the exceedance is significantly shorter than for alternatives with the existing inlet location. The overall water quality at nearshore-ocean is significantly better than alternatives with the inlet remaining at its current location.

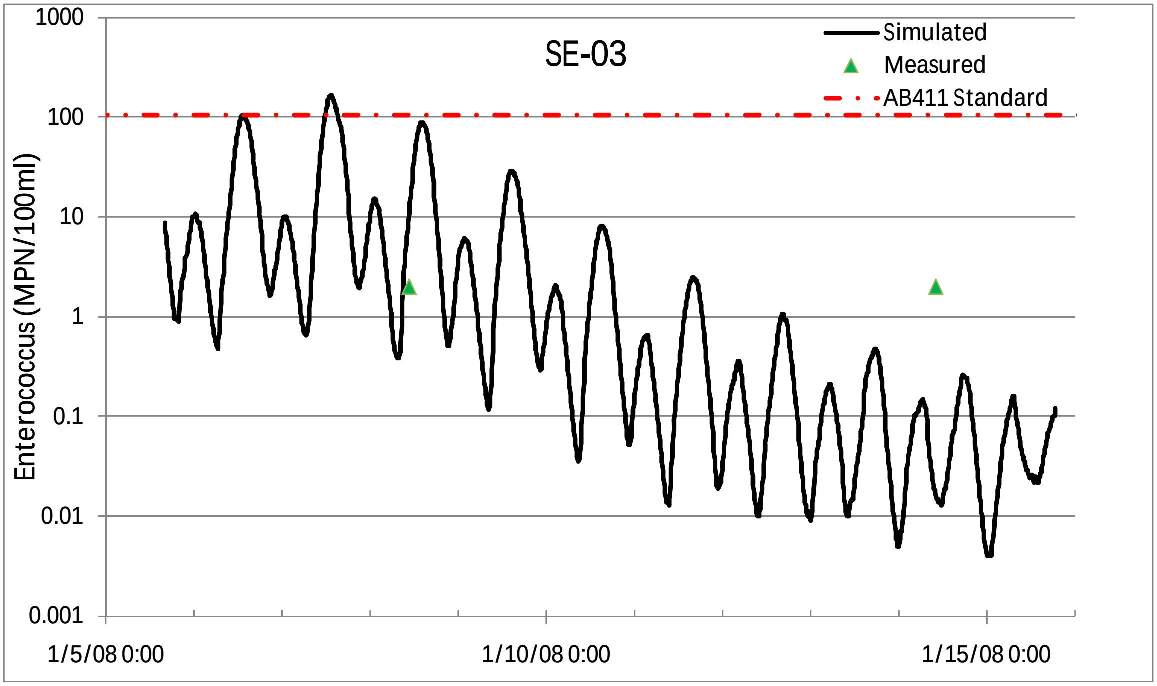

Figure 7-16 Enterococcus Concentrations at Station SE-03 Under Alternative 2A

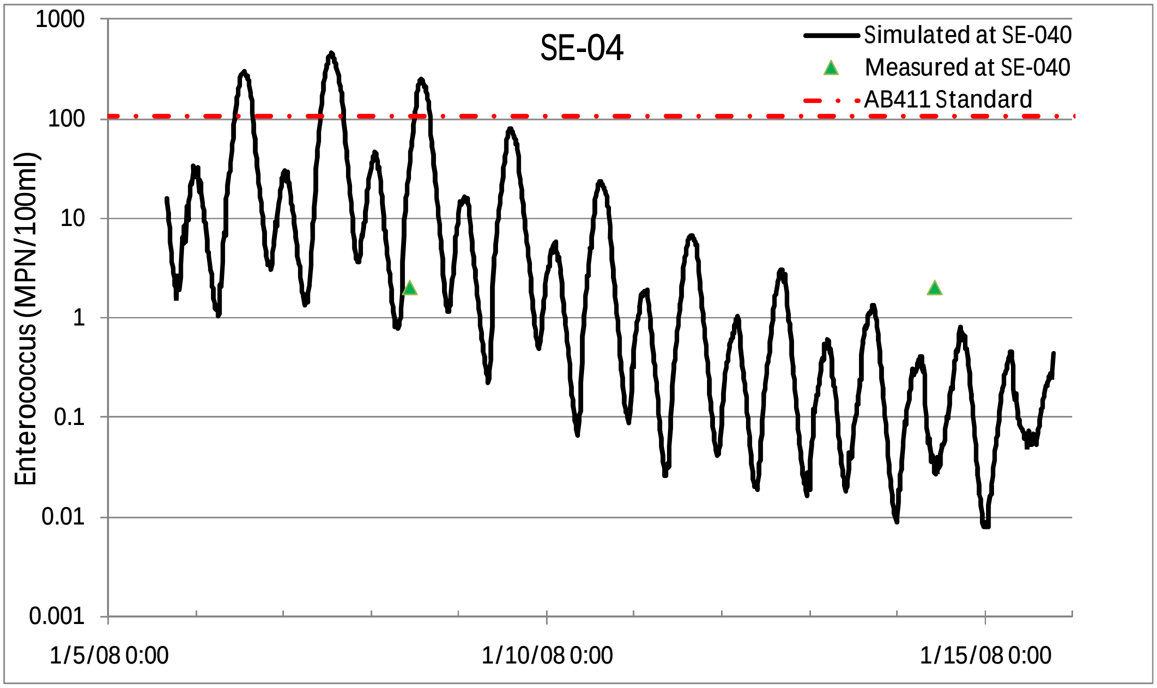

Figure 7-17 Enterococcus Concentrations at Station SE-04 Under Alternative 2A

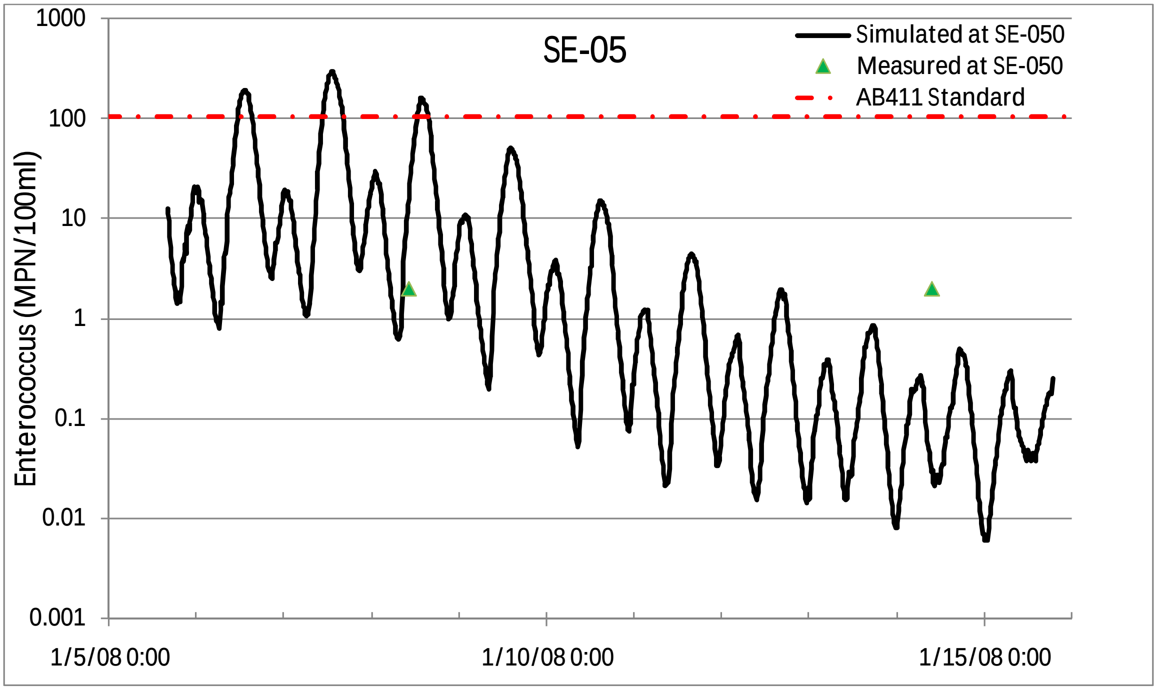

Figure 7-18 Enterococcus Concentrations at Station SE-05 Under Alternative 2A

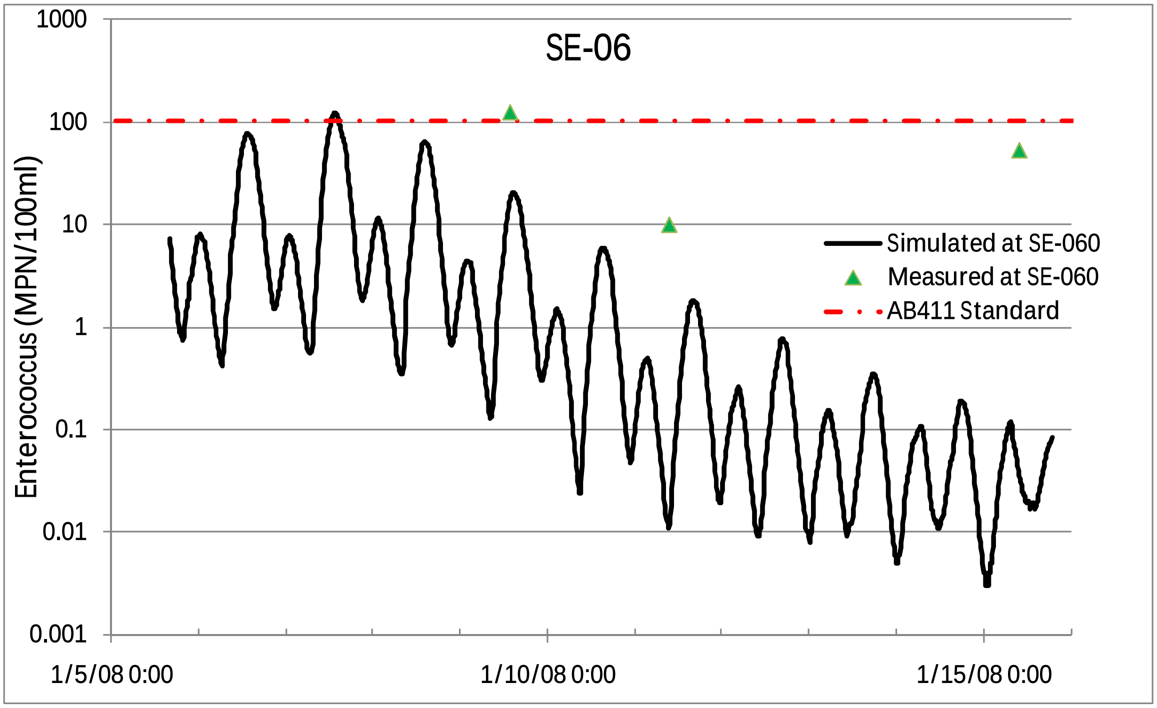

Figure 7-19 Enterococcus Concentrations at Station SE-06 Under Alternative 2A

7.3.5 Alternative 2B

Under the proposed Alternative 2B project condition, model-predicted enterococcus concentrations during the January 2008 storm event were compared to the measured concentrations. The results are presented in Figure 7-20 through Figure 7-23. Enterococcus sampling results were below the detection limit of 2 MPN/100 ml at Stations SE-03, SE-04 and SE-05. Under this proposed project condition, the new inlet is located between Stations SE-04 and SE-05. At Station SE-03, the predicted concentrations exceed the AB411 criterion briefly during the rain event similar to that under the existing condition. At Stations SE-04 and SE-05, model-predicted concentrations exceed the criterion only briefly during the storm event similar to the results for alternatives with the inlet at the existing location. At Station SE-06 (near the existing inlet), the enterococcus concentration is just below the criterion. The overall water quality at nearshore-ocean is similar to Alternative 2A, but significantly better than alternatives with the existing inlet location.

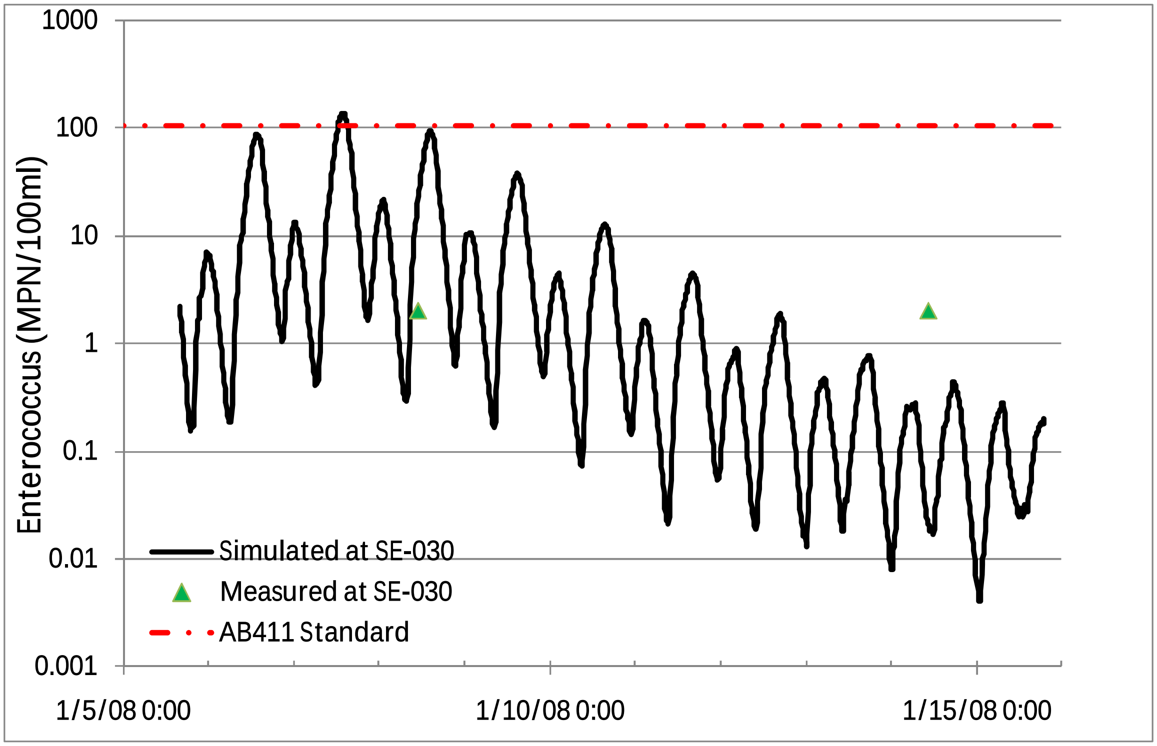

Figure 7-20 Enterococcus Concentrations at Station SE-03 Under Alternative 2B

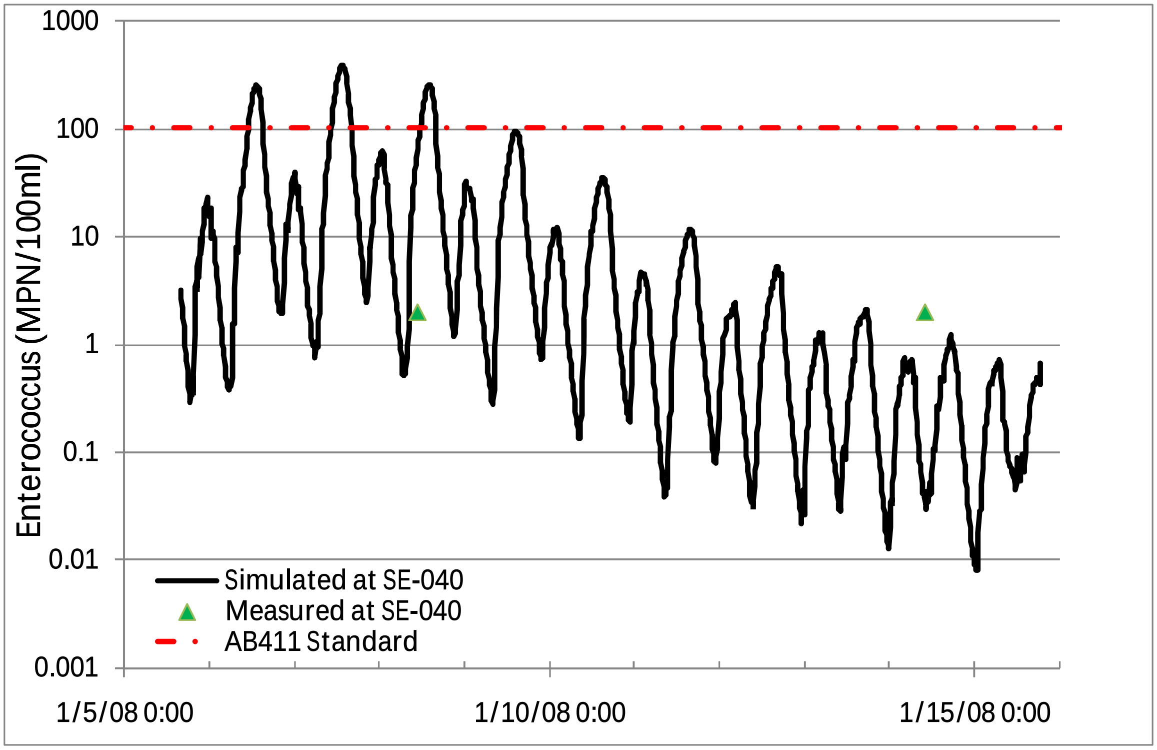

Figure 7-21 Enterococcus Concentrations at Station SE-04 Under Alternative 2B

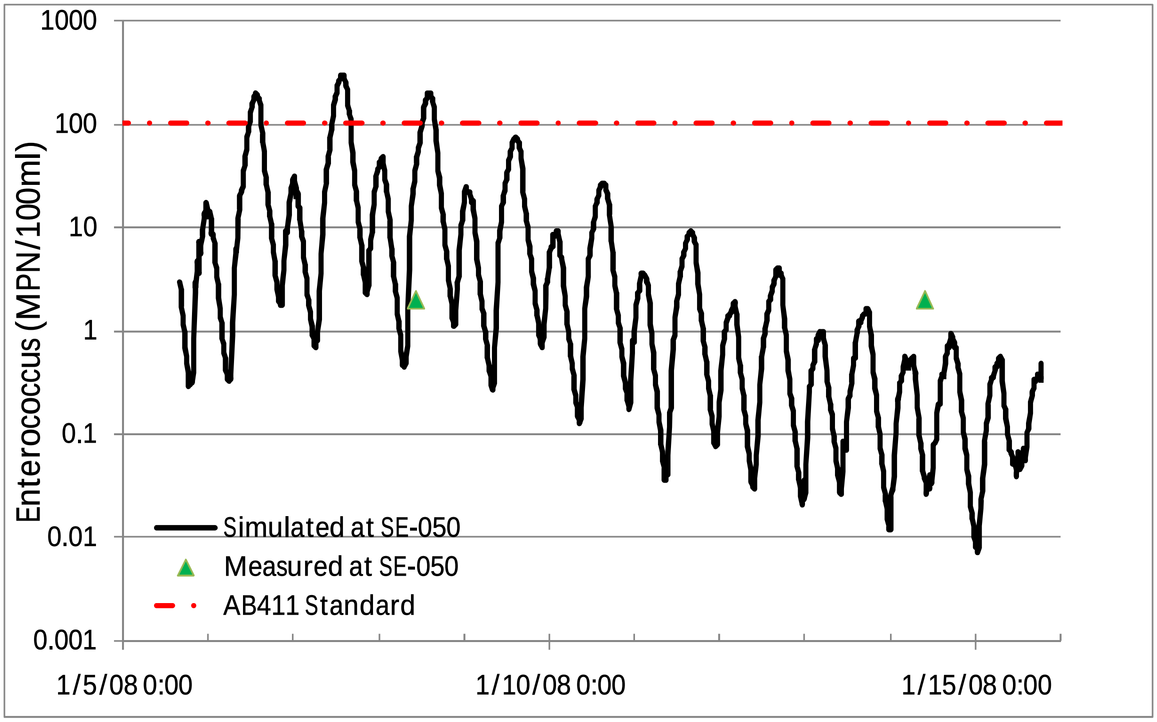

Figure 7-22 Enterococcus Concentrations at Station SE-05 Under Alternative 2B

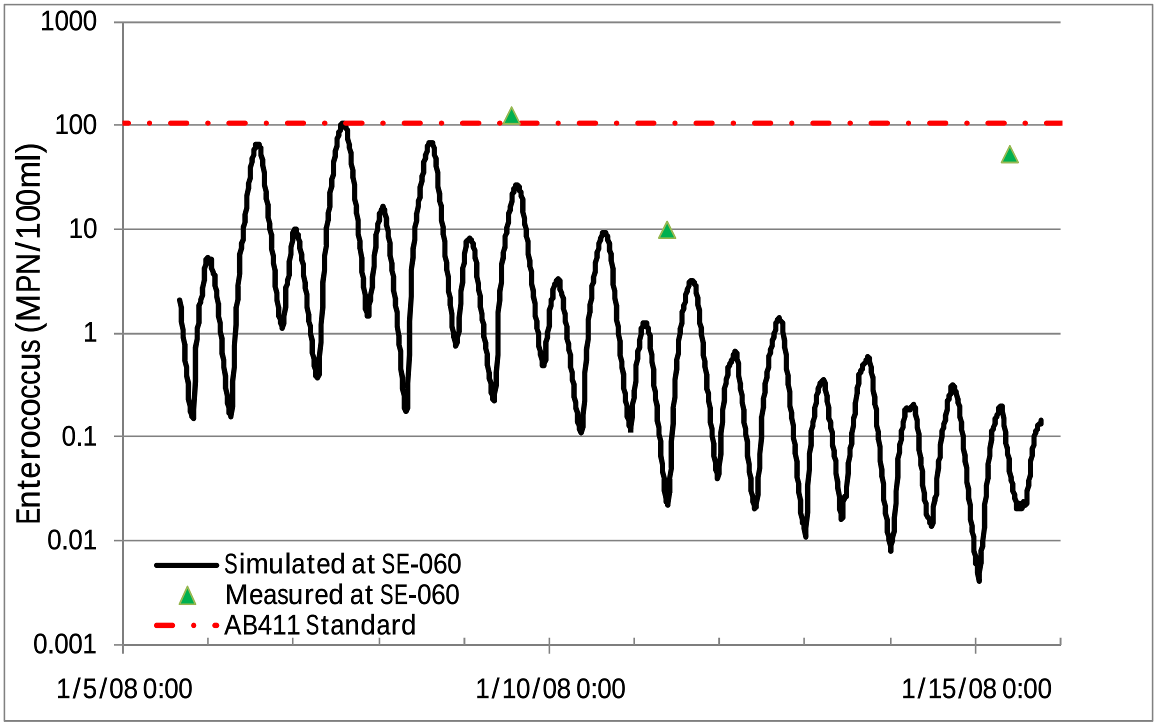

Figure 7-23 Enterococcus Concentrations at Station SE-06 Under Alternative 2B

7.3.6 Summary of Bacteria Modeling Results

Enterococcus was modeled with the RMA4 water quality model for existing and proposed alternatives during a rain event in January 2008. The modeling results at the ocean inlet and the nearshore-ocean, where water quality samplings were taken during the modeling period, are compared with AB411 water quality criterion. Days of Exceedance are summarized in Table 7-2. Due to the nearshore hydrodynamics, bacteria concentrations fluctuate throughout the day. Therefore, it is defined as one day exceedance as soon as the enterococcus concentration tips over the criterion over a 24-hour period. The results are primarily provided for the purpose of alternatives comparison. The days of exceedance are separated into two periods: during the three day rain event from January 5th to January 8th, 2008 and the post-rain period. Locations near the lagoon outlet exceed the criterion during the rain event, specifically, at SE-06 for existing conditions, and Alternatives 1A and 1B; and at SE-03 and SE-04 for Alternatives 2A and 2B. After the rain event, there are multiple days of exceedances for alternatives with the existing inlet location since the bacteria are trapped in the lagoon and being discharged slowly. However, there is no exceedance for alternatives with the new inlet location due to improved circulation. Overall, Alternatives 2A and 2B will result in fewer potential beach closures after storm events.

Table 7-2 Days of Enterococcus Bacteria Exceedance

Time	Location	Existing	Alt 1A	Alt 1B	Alt 2A	Alt 2B
During the 3-day Rain Event	SE-03, Seaside	2	0	0	1	1
	SE-04, Las Olas	2	1	1	3	3
	SE-05, Charthouse	2	2	1	3	3
	SE-06, SEL Outlet	3	3	3	1	1
Post Rain Event	SE-03, Seaside	0	0	0	0	0
	SE-04, Las Olas	0	0	1	0	0
	SE-05, Charthouse	0	0	1	0	0
	SE-06, SEL Outlet	6	5	4	0	0

8.0 SALINITY MODELING

Numerical modeling of salinity levels in the water column within the wetlands during a stormflow event was performed for existing and proposed alternatives using the RMA4 model. Wetlands fed by upstream tributaries typically experience a flush of freshwater to varying degrees during stormflow events. Salinity levels can fluctuate from an ocean salinity concentration of 34 ppt to freshwater conditions with salinity levels of less than 5 ppt. Conditions of low salinity can stress salt marsh habitat, and resource agencies want to know the extent to which San Elijo Lagoon experiences this situation. The purpose of the modeling is to show the duration of low salinity within the lagoon during a typical stormflow event, and to quantify how rapidly freshwater conditions are diluted with seawater and salinity levels return to typical ocean salinity. This information will enable a comparison between alternatives. The stormflow event used for the salinity modeling is the same January 5-8, 2008 rain event used for enterococcus bacteria modeling.

8.1 Boundary Input Conditions

The tides and flood flow boundary conditions are the same as those used for bacteria modeling. A typical salinity concentration of 34 ppt is applied at the model ocean boundary and a storm runoff water salinity concentration of 1.2 ppt is applied at the upstream flood flow boundary.

8.2 Salinity Modeling Results

Salinity modeling results are provided by the numerical model at specified locations for each project scenario. The locations specified for the results are shown in Figure 8-1 for existing conditions and for Alternatives 1A and 1B, and Figure 8-2, for Alternatives 2A and 2B. The modeling results are provided in Figure 8-3 through Figure 8-7. Each figure includes a salinity time series and the flood flow hydrograph. The salinity concentration is specified along the leftside vertical axis of the graphic and the storm flow rate is shown on the rightside vertical axis.

Under the existing condition, the East Basin (east of the I-5) is completely filled with fresh water during the stormflow event, and conditions remain as freshwater for one week after the storm. The extended duration of freshwater conditions is due to poor drainage out of the lagoon caused by constrictions to flow at the I-5 Bridge and the existing tidal inlet at Highway 101. The Central Basin (at gage CB-4 near the I-5 Bridge) is also completely filled with freshwater the stormflow, and the condition extends one week after the storm event. The western portion of the Central Basin closer to the sea experiences greater tidal influence. Although the basin is nearly filled with storm water during the stormflow event, it experiences regular oscillation between ocean saline water conditions during incoming tides and fresh stormflow water during outgoing tides after the storm event. The West Basin nearest the tidal inlet experiences the greatest tidal influence, with the area near the south end maintaining relatively high salinity during and after the stormflow event due to limited circulation.

Under Alternative 1A, the salinity levels reach values similar to existing conditions at each basin, but the recovery is quicker due to better flood drainage through the lagoon. In the East Basin near the I-5 Bridge, tidal signals can be seen immediately after the storm event. In the Central Basin, salinity recovers to between15 and26 ppt one week after the storm event. The salinity in the West Basin drops more than that under the existing condition, but it also recovers faster due to improved circulation.

Under Alternative 1B, salinity levels are very similar to those under Alternative 1A, however, they recover faster than that under the Alternative 1A due to a wider inlet and better circulation. The salinity recovers to 10 ppt in the East Basin, 20 to 28 ppt in the Central Basin, and nearly 32 ppt in the West Basin one week after the storm event.

Under Alternative 2A, overall salinity recovers faster than Alternative 1B due to improved circulation from the new tidal inlet. The East Basin is filled with fresh water during the storm event, but the salinity levels recover more rapidly after the storm event and reach 12 ppt within one week. The salinity in the Central Basin recovers to between 22 and 30 ppt one week after the storm event.

Under Alternative 2B, the salinity levels recover even faster than for Alternative 2A. In the East Basin, salinity never completely drops below 10 ppt over one entire day and it recovers to 20 ppt within one week after the storm event. In the Central Basin, salinity never drops below 20 ppt over one entire day, and recovers to approximately 30 ppt within one week after the storm event.

Overall, the salinity levels depend on tidal circulation efficiency, with the better circulation resulting in more rapid salinity recovery. Alternatives 2A and 2B with the new and wider inlet provide better circulation and faster salinity recovery than alternatives with a narrower inlet remaining at its current location.

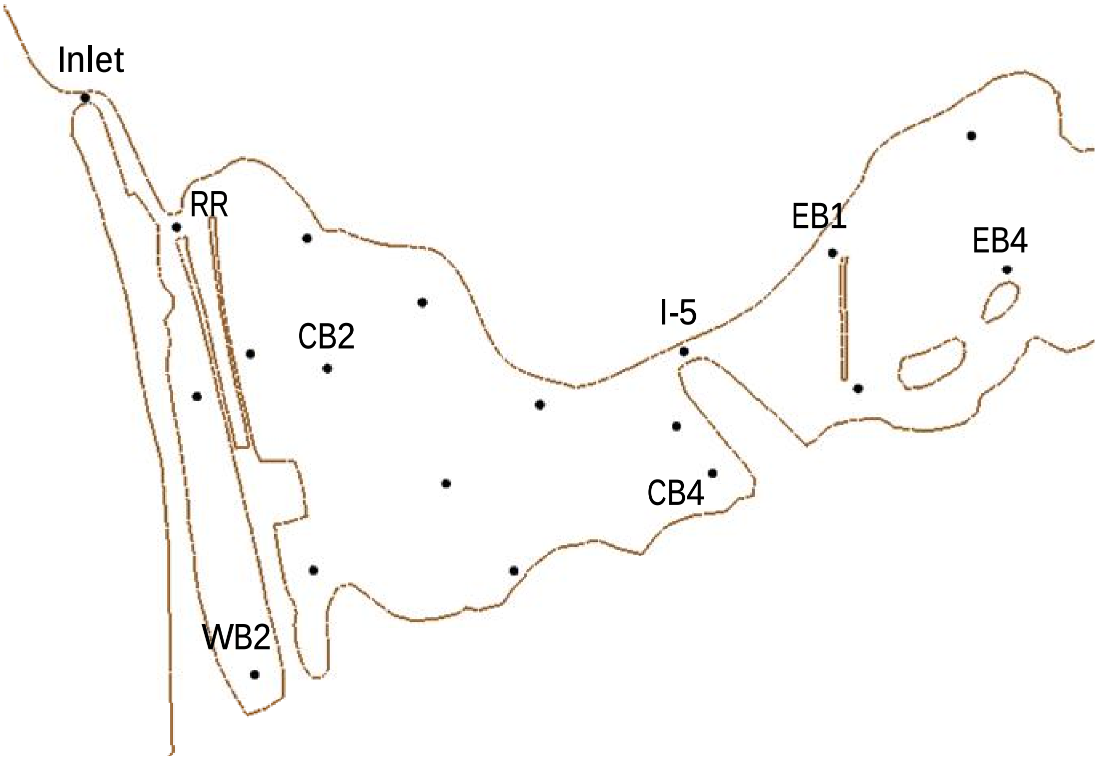

Figure 8-1 Salinity Gage Locations for Existing Conditions, Alternative 1A and 1B

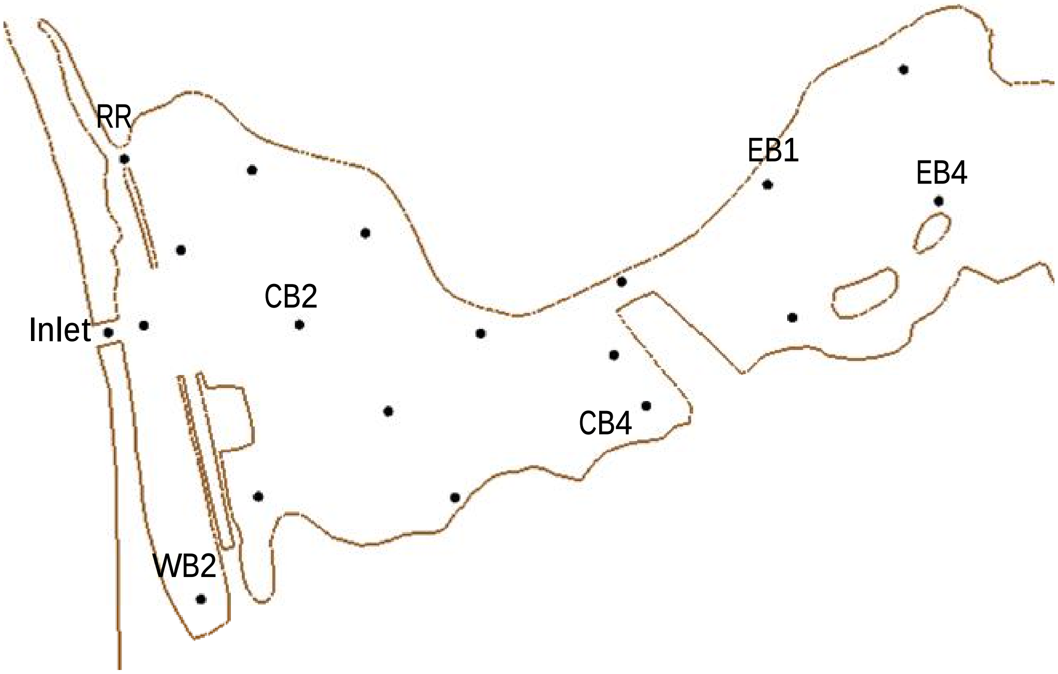

Figure 8-2 Salinity Gage Locations for Alternatives 2A and 2B

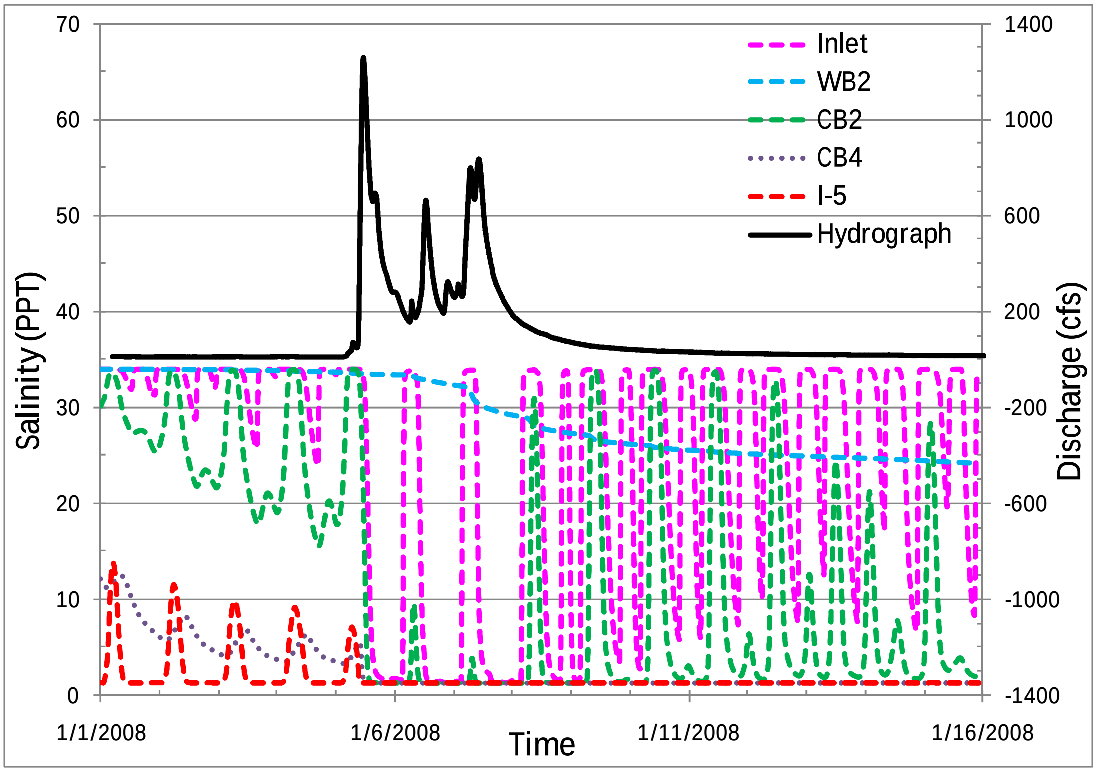

Figure 8-3 Salinity Results for Existing Conditions

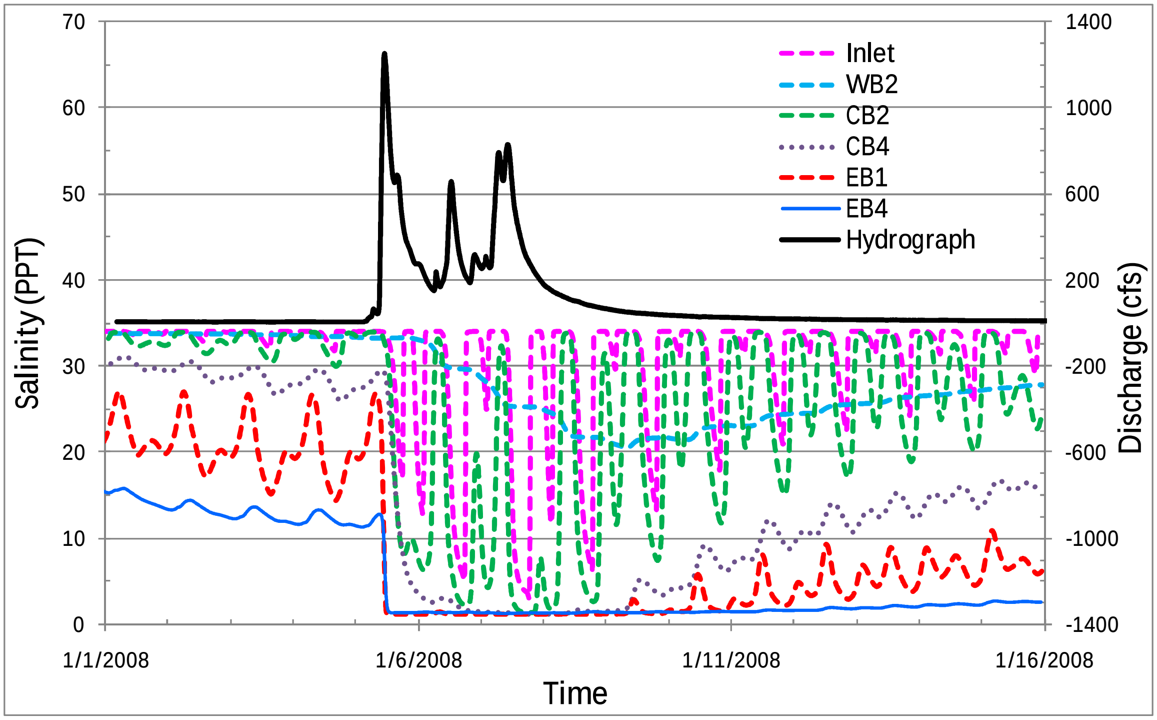

Figure 8-4 Salinity Results for Alternative 1A

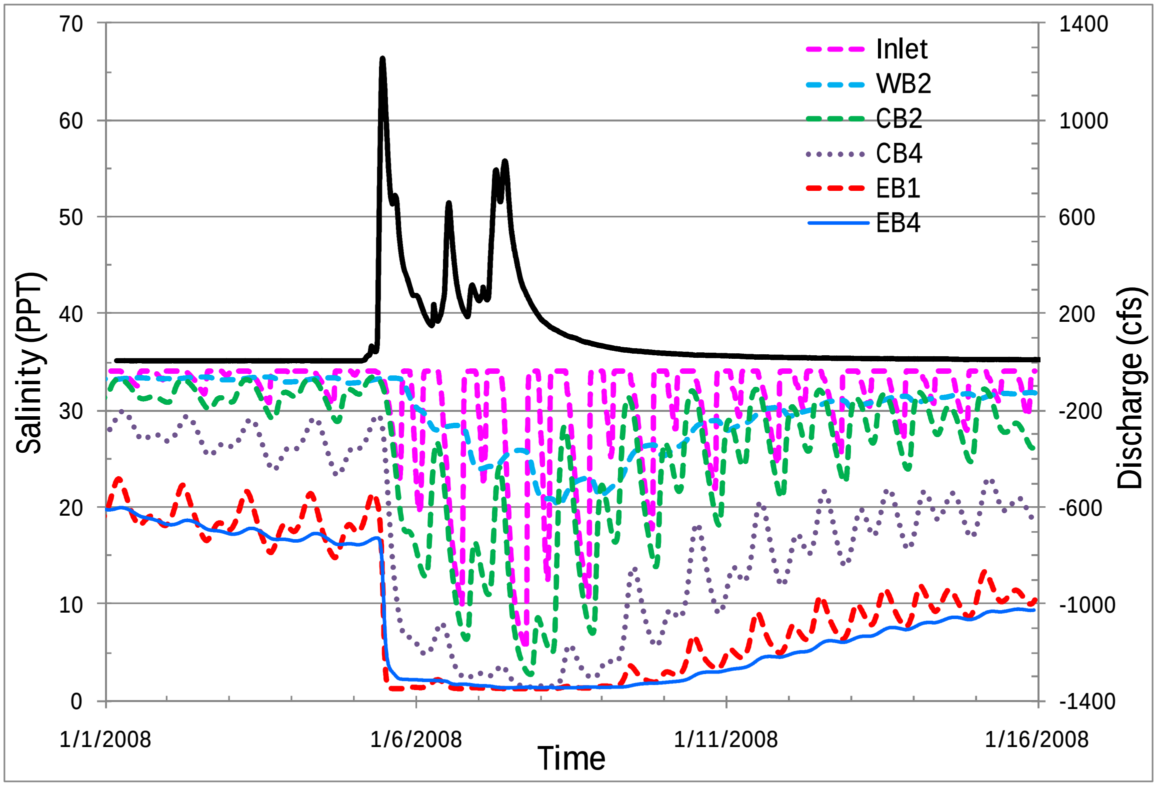

Figure 8-5 Salinity Results for Alternative 1B

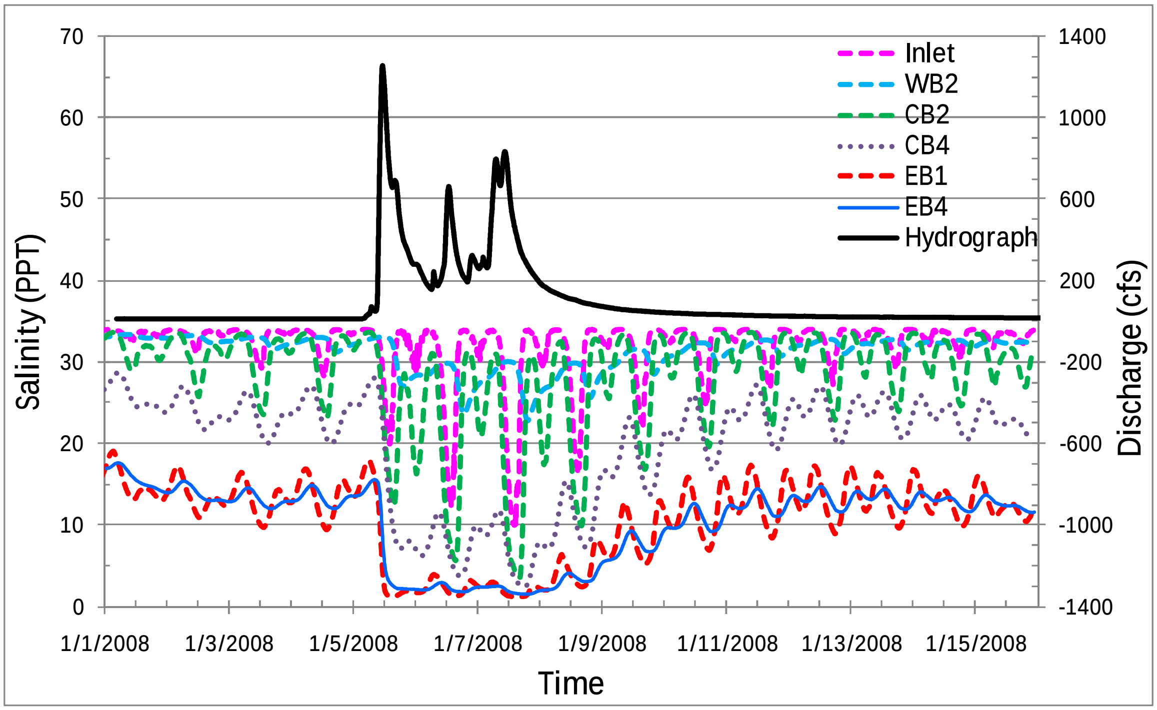

Figure 8-6 Salinity Results for Alternative 2A

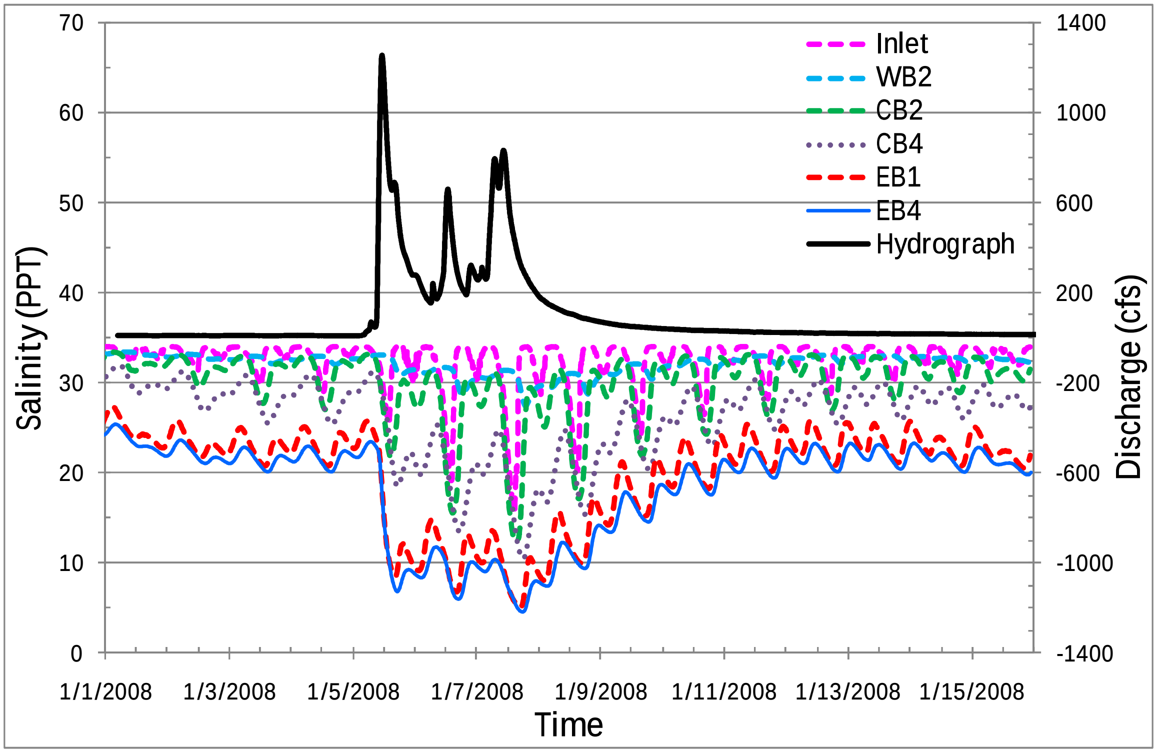

Figure 8-7 Salinity Results for Alternative 2B

9.0 SEDIMENTATION

As discussed previously in this report, San Elijo Lagoon is 303d listed for fine sediments. Stakeholders expressed concerns about potential future sedimentation at the lagoon under various scenarios. This effort is to analyze the potential for sedimentation from upstream sources. Analyses are based on estimating flow velocities through the lagoon and the resulting sediment transport and patterns of deposition during stormflows.

Total suspended solids were sampled during three wet weather events shown in Figure 3-2. Sampling data indicate that approximately 80 percent of fluvial sediment input during typical small stormflow events is silt sized material or smaller. These three events are relatively lower discharge stormflow events; the first event was selected to represent the 2- to 5-year storm event for bacteria and salinity modeling discussed in previous sections. The same event is the basis for this sediment transport and sedimentation modeling.

Hydrodynamic modeling results were used to analyze lagoon sedimentation during a typical low stormflow event. Hydrodynamic modeling runs were also performed for the 100-year storm flood as discussed in the Hydrology/Hydraulic Study (M&N 2010) and results were also used in analyzing lagoon sedimentation during the 100-year storm event. The numerical model predicts the spatial distribution of flow velocities as a time series over the storm event. As sediments are mainly transported during the highest velocity condition, peak velocity distributions during the storm are plotted over the entire lagoon for sedimentation analyses. This section discusses potential fluvial fine sediment transport in the lagoon during the typical small stormflow event and the 100-year storm event for existing conditions and proposed alternatives. All analyses use a threshold flow velocity of 0.6 feet per second (fps) to represent the velocity required to maintain sediment transport of sand-sized material and unconsolidated clay and silt materials (Hjulstrom 1935). Velocities below this threshold result in sedimentation. Typically the larger grain-sized material, such as sand, will settle out first, followed by the finer grain sizes such as silt and clay. While sand may settle out with flows under 0.6 fps, silts and clays may not settle out until flow velocities drop below approximately 0.3 fps.

9.1 Lagoon Sedimentation Under Existing Conditions

For existing conditions, the tidal inlet channel is relatively shallow at -0.87 ft NGVD and the channel under the I-5 Bridge is also shallow at +0.74 ft NGVD. These channels may periodically be scoured deeper during stormflow events. However, the inlet channel bed is assumed fixed for the current hydraulic analyses due to limitations of the model.

Under the typical relatively small stormflow event, flow velocity distributions in the East and Central Basins are shown in Figure 9-1 and Figure 9-2, respectively. Plots of flow velocity distribution are plotted separately for the East and Central Basins for existing conditions because the peak flows in each basin occur at separate times due to bridge constraints. Stormflows are “backed up” (a back-water effect) by the constraint imposed by the narrow channel under the I-5 Bridge. As a result, the flow velocity reaches its peak downstream in the Central Basin more than two hours after its peak occurs in the East Basin. The velocity in the East Basin drops below the threshold velocity for sediment transport of 0.6 fps, thereby causing sedimentation. Sand and finer materials carried by the flood will likely settle in the East Basin due to the back-water effect of the I-5 Bridge. The velocity in the channel under the I-5 Bridge is much higher than the threshold velocity due to channel constriction, and no settlement of fine material is expected in this area, but rather scour may occur. Downstream of the I-5 Bridge, the velocity drops farther below the threshold velocity, and fine materials carried by the flow through the I-5 Bridge will likely settle in the Central Basin.

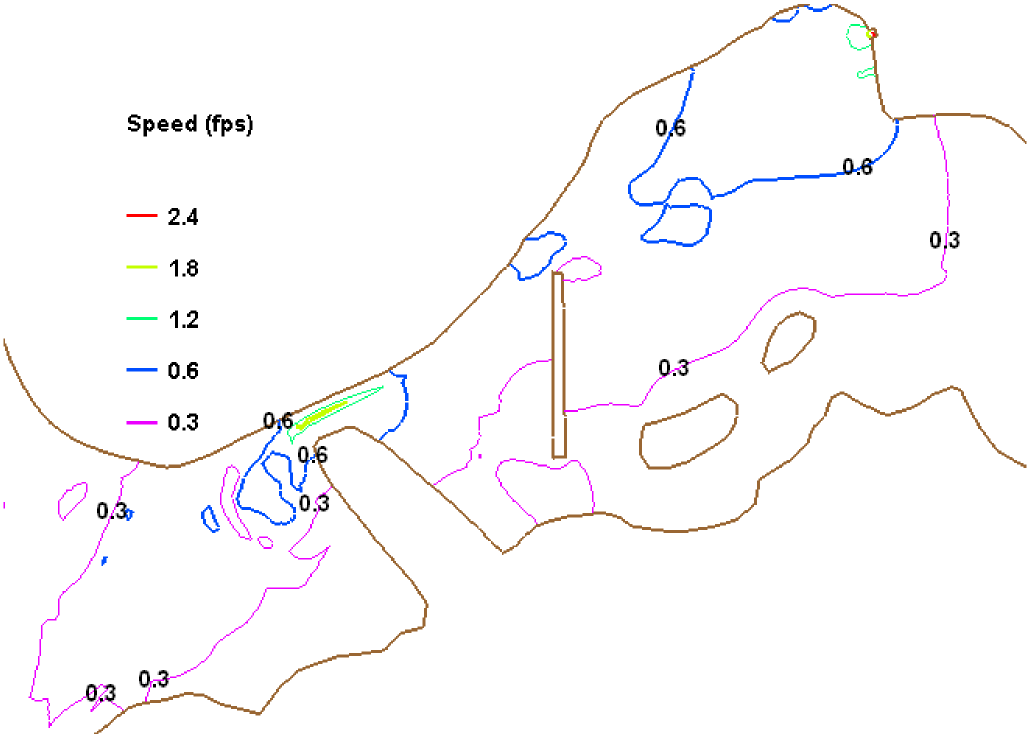

Figure 9-1 Peak Velocity Distribution in a Typical Storm Event in the East Basin for Existing Conditions

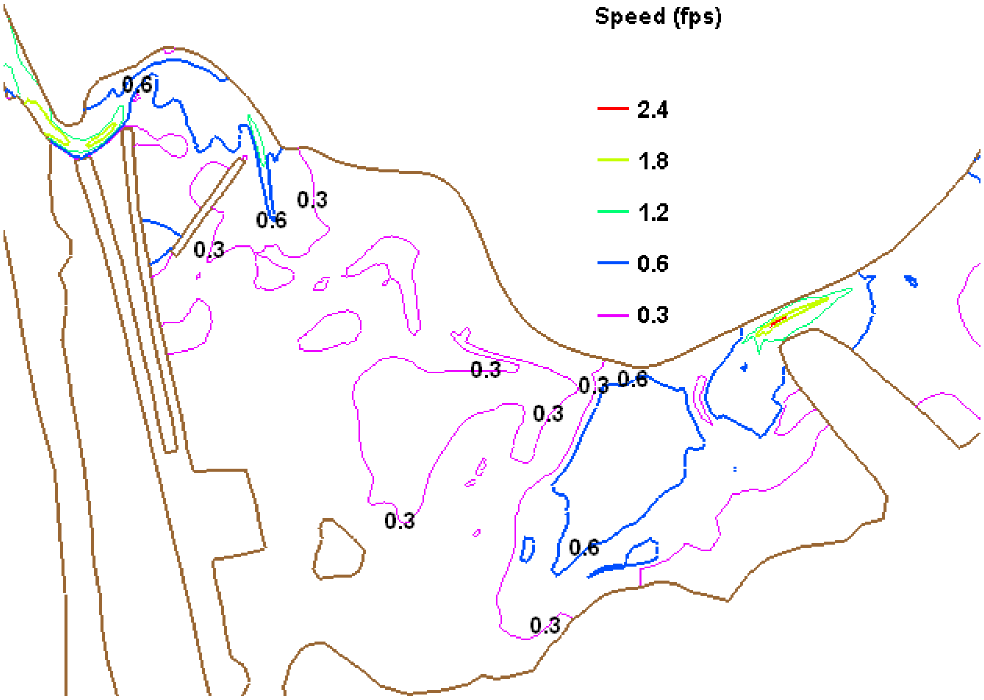

Figure 9-2 Peak Velocity Distribution in a Typical Storm Event in the Central Basin for Existing Conditions

Under the 100-year stormflow event, the flow is also backed up by constraints to flow imposed by the I-5 Bridge and the narrow channel underneath. The flow reaches its peak in the Central Basin approximately one hour after the peak occurs in the East Basin as shown in Figure 9-3 and Figure 9-4. Even with the continued impedance caused by the I-5 bridge, the discharge of the 100-year flood is high enough to maintain flow velocities in the East Basin that are above the threshold velocity (at 1.2 fps) as shown in Figure 9-3. Therefore, sand and finer sediment is not expected to settle in the East Basin during the 100-year storm event. However, in the Central Basin the velocity drops below the threshold velocity of 0.6 fps due to: 1) significant friction losses caused by the long, narrow, and meandering path of the tidal inlet channel, and 2) flow dispersion from effects of the wide and shallow basin geometry. Some amount of sand and finer sediment will likely settle in the Central Basin during the 100-year storm event.

Hydraulic modeling results for existing conditions indicate that sand and finer sediment likely settles in the East Basin during smaller stormflow events due to the reduced flow velocities caused by the channel constriction at the I-5 Bridge. However, during larger storm events such as the 100-year flood, finer sediment is more likely to be transported through the East Basin and may eventually settle within the Central Basin due to more significant flow constraint caused by the long, narrow, and meandering tidal inlet and small opening under Highway 1. Therefore, sand and finer sediment deposition will continue to be an issue in San Elijo Lagoon under existing conditions for all types of stormflow events.

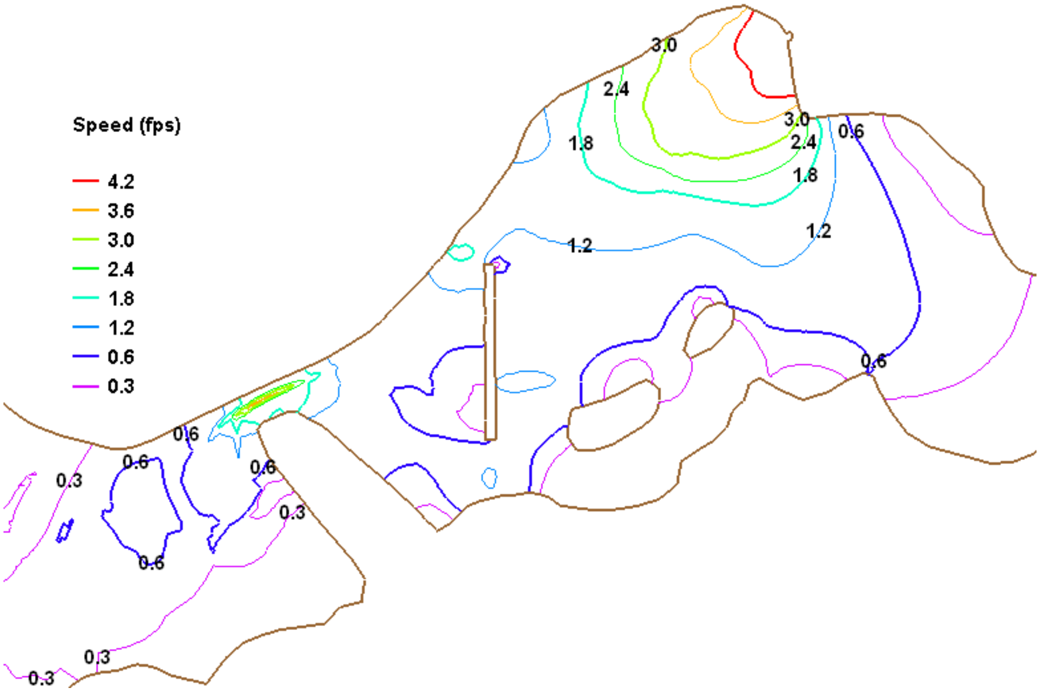

Figure 9-3 Peak Velocity Distribution under a 100-yr Storm Event in the East Basin for Existing Conditions

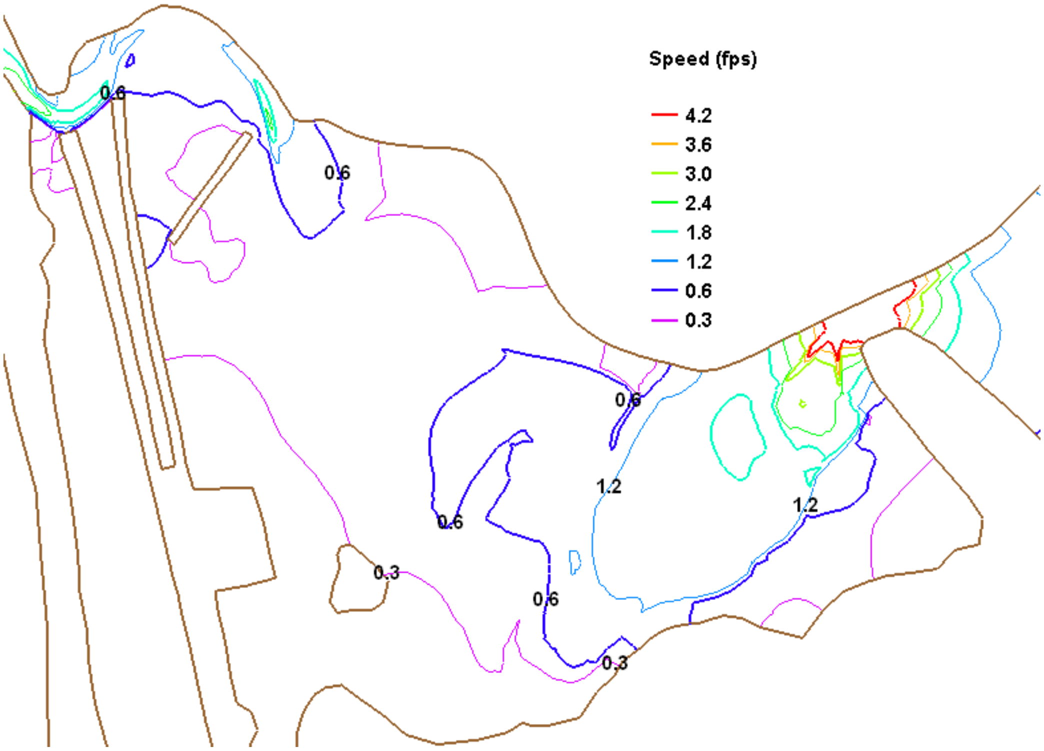

Figure 9-4 Peak Velocity Distribution Under a 100-yr Storm Event in the Central Basin Under Existing Conditions

9.2 Lagoon Sedimentation for Alternative 1A

For Alternative 1A, the tidal inlet channel and the main channel in the Central Basin are lowered to -4.0 ft NGVD, and the channel under the I-5 Bridge is lowered to -6.0 ft NGVD. The width of these channels remains the same as the existing condition.

Under the typical smaller stormflow event, the flow velocity distribution is shown in Figure 9-5. Similar to existing conditions, flow velocities are below the threshold velocity of 0.6 fps in both the Central and East Basins. In fact, the velocity drops below 0.3 fps in the center of both the East and Central Basins. Sand-sized material will likely settle in the East Basin where Escondido Creek enters the East Basin and the flow spreads. Finer materials will settle mostly in the center of the East Basin. Some finer materials may also settle in the Central Basin due to the flow constriction imposed by the tidal inlet and long, meandering inlet channel. The pattern of sedimentation is expected to be very similar to existing conditions.

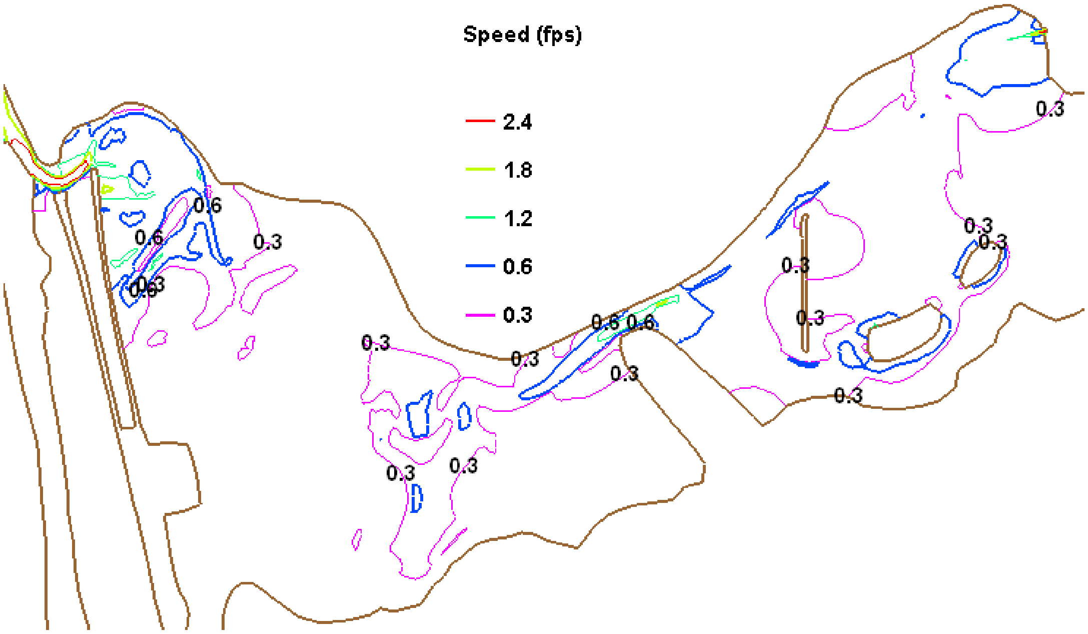

Figure 9-5 Peak Velocity Distribution in a Typical Storm Event for Alternative 1A

As shown in Figure 9-6, under the 100-year stormflow event, the flow velocity along the floodway in the East Basin is consistently higher than 1.2 fps, likely resulting in little or no deposition of sand or finer sediment in the East Basin. However, in the Central Basin the flow velocity drops below the threshold velocity of 0.6 fps which will likely cause some sand and finer sediment to settle out of the flow.

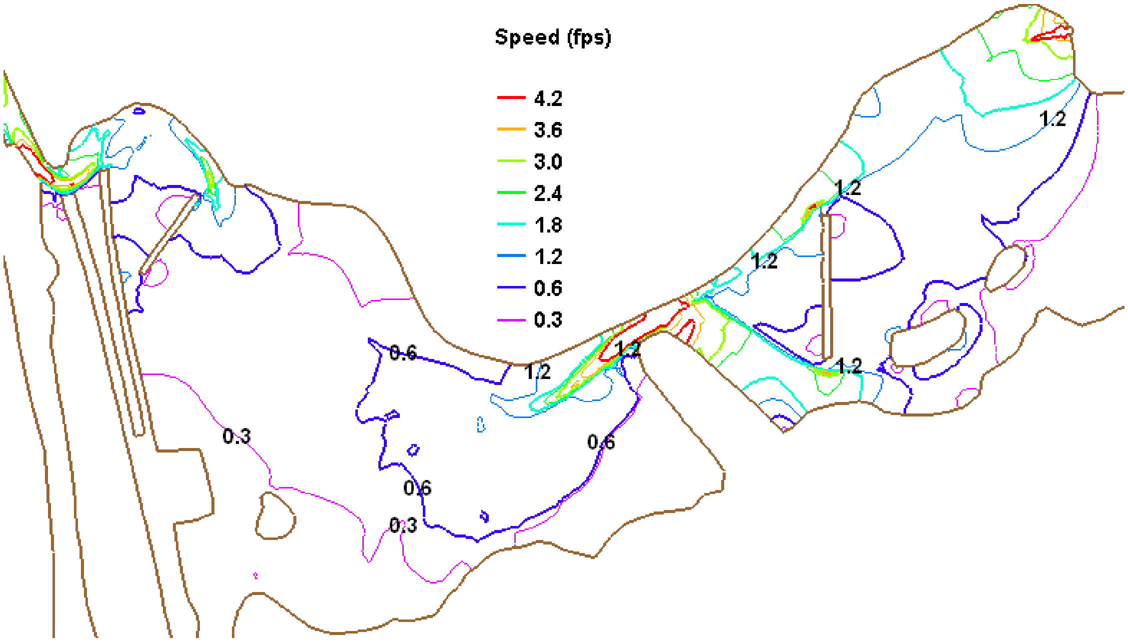

Figure 9-6 Peak Velocity Distribution in a 100-yr Storm Event for Alternative 1A

Modeling results indicate that sand and finer sediment likely settles in both the East and Central Basins during relatively small stormflow events due to the constriction on flows imposed by narrow channels under the I-5 Bridge and Highway 101, respectively. During larger storm events such as the 100-year flood, little to no sedimentation may occur in the East Basin. However, sand and finer sediment is expected to settle in the Central Basin due to the more significant constraints of the long, narrow, and meandering tidal inlet and the broad basin geometry. Therefore, similar to the existing condition, sedimentation will continue to be an issue at San Elijo Lagoon under Alternative 1A.

9.3 Lagoon Sedimentation for Alternative 1B

For Alternative 1B, the tidal inlet channel is lowered to -4.0 ft NGVD and it is widened to 130 ft from the existing condition of 110 ft. The channel under the I-5 Bridge is lowered to -6.0 ft NGVD and its width is doubled to 260 ft.

The flow velocity distribution under the typical small stormflow event is shown in Figure 9-7. Similar to existing conditions and Alternative 1A, flow velocities are below the threshold velocity of 0.6 fps in the East Basin, but are consistently above 0.3 fps. Sand-sized material will likely settle in the East Basin where Escondido Creek enters and the flow spreads. Finer materials may settle in the center of the East Basin where velocities are lowest, but deposition of fine sediment is expected to be less than under existing conditions and Alternative 1A. In the Central Basin, the velocity is above 0.6 fps along the floodway throughout the majority of the basin. Therefore, fine materials are less likely to settle in the Central Basin as compared to existing conditions and Alternative 1A.

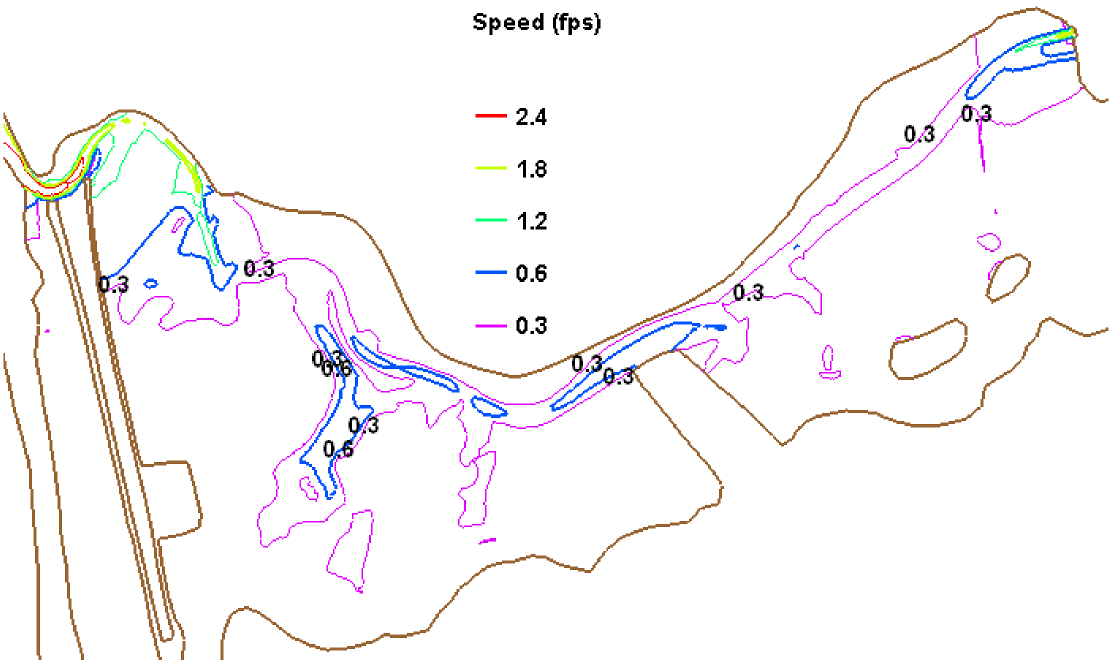

Figure 9-7 Peak Velocity Distribution in a Typical Storm Event for Alternative 1B

As shown in Figure 9-8, under the 100-year stormflow event, a back-water effect still exists upstream of the tidal inlet and the I-5 Bridge, although channel cross-sections are enlarged. However, flow velocities in the East Basin remain high enough to carry sand and finer sediments through the I-5 Bridge to the Central Basin. In the Central Basin the flow velocity within a small area drops to below the threshold velocity of 0.6 fps (similar to Alternative 1A) which will likely to result in some degree of sediment deposition.

Modeling results indicate that sand and finer sediment is still expected to settle in the East Basin during small stormflow events, and in the Central Basin during both smaller and larger storm events. However, overall rates of sedimentation will be lower than those under existing conditions and Alternative 1A project due to improved flow conveyance.

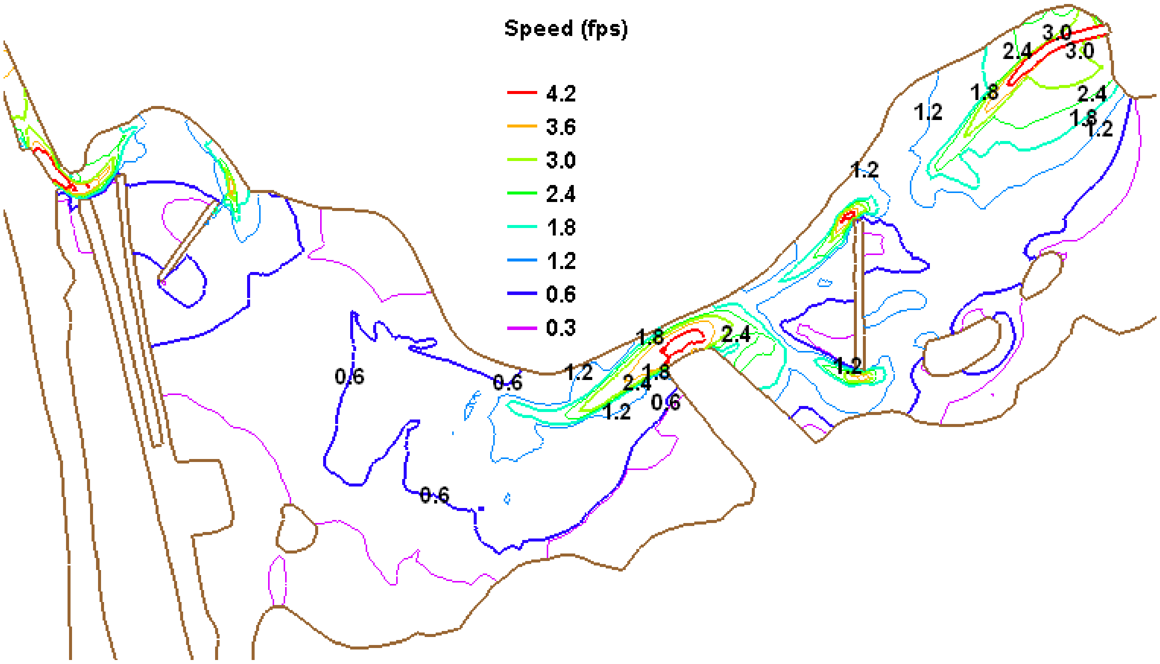

Figure 9-8 Velocity Distribution in a 100-yr Storm Event for Alternative 1B

9.4 Lagoon Sedimentation for Alternative 2A

For Alternative 2A, a new tidal inlet is proposed that is wider and deeper than the existing inlet. The flow path of the new inlet is also shorter and its planform is straighter than alternatives with the existing inlet, thereby providing for improved downstream hydraulics compared to existing inlet alternatives. Also, the channel under the I-5 Bridge is lowered to -6.0 ft NGVD and its width is doubled to 260 ft under this alternative, similar to Alternative 1B. Flood drainage from the lagoon occurs much more rapidly with the new inlet than with the existing inlet due to significantly improved hydraulics, and less time is available for sedimentation. The duration of stormflow drainage for Alternative 2A compared to existing conditions is shown in Table 9-1. Improved hydraulics with the new tidal inlet reduces drainage duration that leads to less opportunity for sedimentation.

Table 9-1 Duration of Stormflow Drainage

Alternative	From Upstream Lagoon Boundary to Highway 101	
	2- to 5-Year Storm	100-Year Storm
Existing Conditions	4 hours, 30 minutes	3 hours, 30 minutes
Alternative 2A	1 hour, 6 minutes	0 hours, 30 minutes

The flow velocity distribution under the typical small storm event is shown in Figure 9-9. The threshold velocity of 0.6 fps is maintained along the entire floodway throughout the East and Central Basins. Materials composed of larger than sand-sized grains may still settle in the East Basin where Escondido Creek enters the East Basin. However, sand-size and finer materials should be carried through the lagoon to the ocean for storms with recurrence intervals of 2- to 5-years and longer.

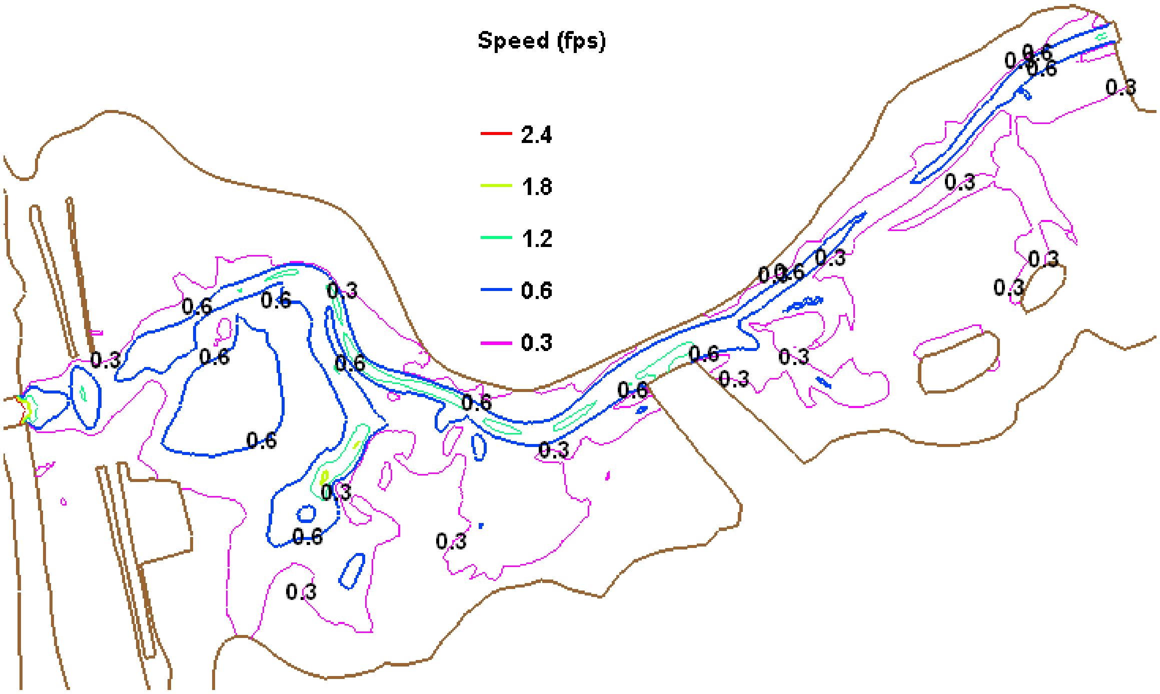

Figure 9-9 Peak Velocity Distribution in a Typical Storm Event for Alternative 2A

As shown in Figure 9-10, under the 100-year storm event, the modeling results indicate that flow velocities along the floodway reach up to 1.8 fps and are consistently above 1.2 fps, which significantly exceeds the threshold velocity of 0.6 fps. The flow should have sufficient capacity to carry sand and finer sediment through the entire lagoon system to the ocean. Flows may also erode some fine sediment in the lagoon and transport that to sea as well.

Modeling results indicate that sand and finer sediment should be transported through the lagoon and to the ocean under most storm conditions. Sedimentation from upstream will be significantly reduced under this alternative compared to existing conditions and Alternatives 1A and 1B.

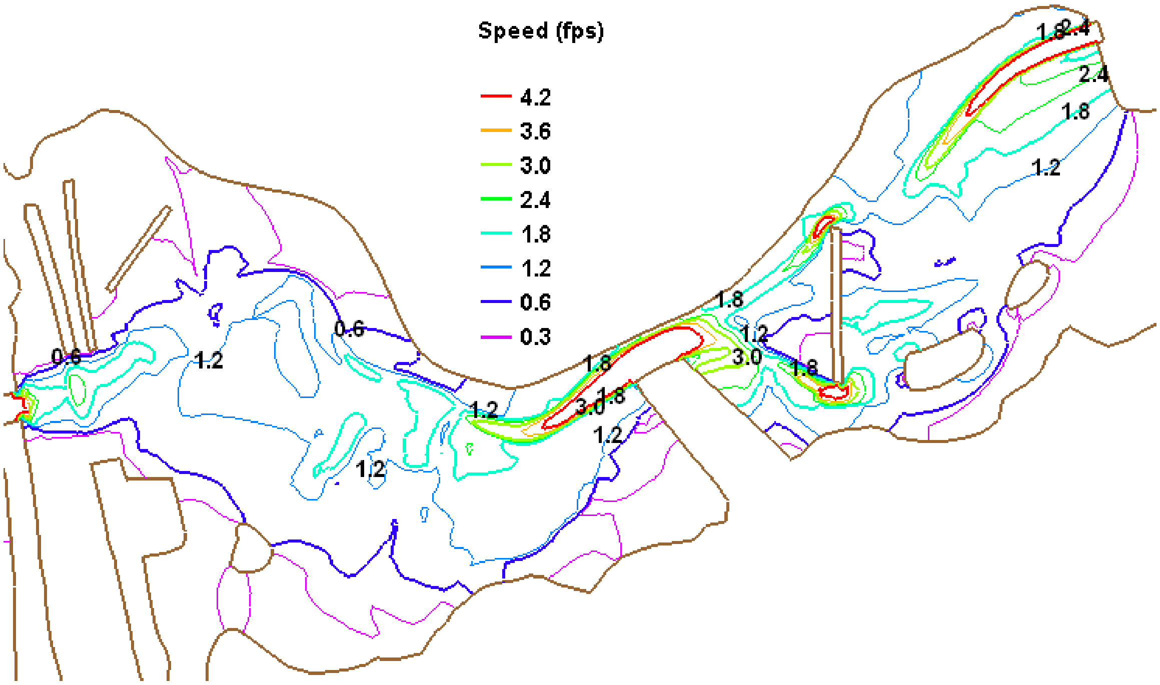

Figure 9-10 Velocity Distribution in a 100-yr Storm Event for Alternative 2A

9.5 Lagoon Sedimentation for Alternative 2B

For Alternative 2B, a new wider and deeper tidal inlet is proposed in the new location similar to the Alternative 2A, and extensive subtidal basins will exist in the West, Central, and East Basins of the Lagoon. The channel under the I-5 Bridge is lowered to -6.0 ft NGVD, and its width is doubled to 260 ft, similar to Alternatives 1B and 2A.

The velocity distribution under the typical stormflow event is shown in Figure 9-11. The velocity drops below 0.6 fps in the center of the East Basin and in areas of the Central Basin due to a much wider channel and deeper basins than in Alternative 2A. Some portion of sand may drop out of suspension and deposit where velocities drop below 0.6 fps. However, the velocity is consistently above 0.3 fps, so finer materials should not deposit in the system. As with other alternatives, materials coarser than sand will deposit in the East Basin at the mouth of Escondido Creek. Similar to alternative 2A, less sedimentation should occur within the Alternative 2B system compared to alternatives with the existing inlet location. Sedimentation is reduced for Alternative 2B because tidal inlet hydraulics are improved by the shorter tidal inlet flow path to the ocean, and the flood duration is shorter leaving less time for sediment to settle out of suspension. In general, sediment may settle in the East Basin for stormflow events smaller than the 2- to 5-year event (modeled). However, sand and finer materials are expected to be carried through the basin to the ocean under events equal to or larger than the 2- to 5-year event.

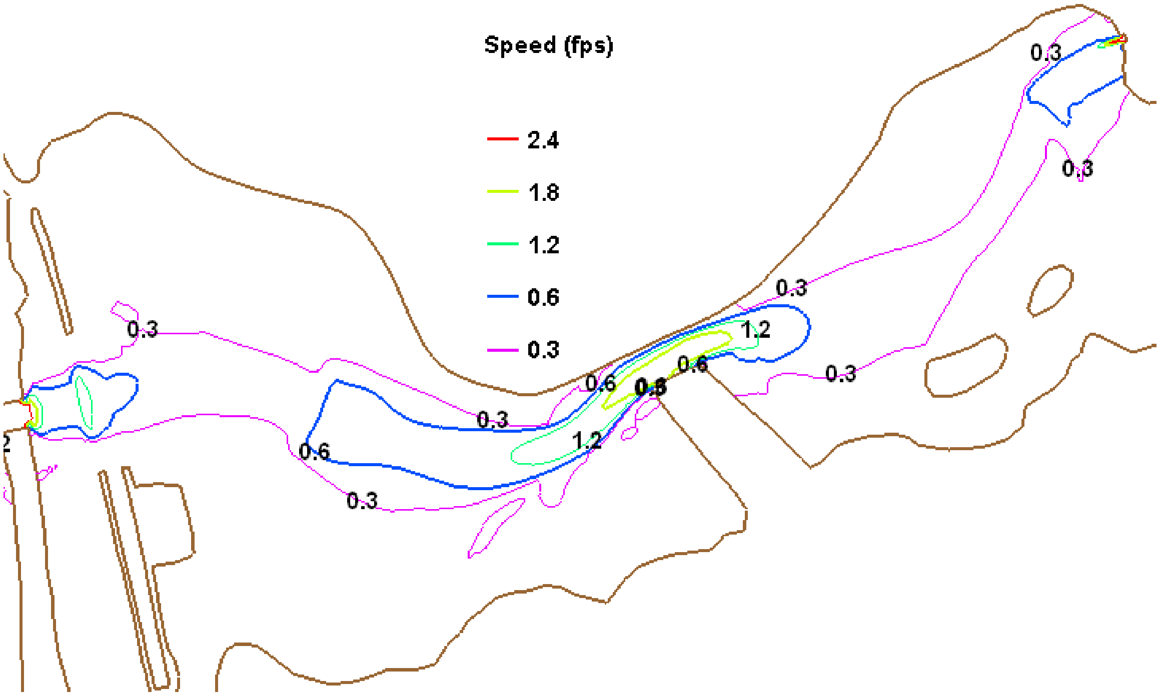

Figure 9-11 Peak Velocity Distribution in a Typical Storm Event for Alternative 2B

As shown in Figure 9-12, under the 100-year stormflow event for Alternative 2B, the flow velocity is consistently higher than 1.2 fps, exceeding the threshold velocity, and no sand or fine sediment from upstream is expected to settle in the lagoon.

Modeling results indicate that less sedimentation will occur under this alternative compared to those with existing tidal inlet location due to improved hydraulics. However, Alternative 2B will likely result in more sedimentation than Alternative 2A due to extensive subtidal basins in the East and Central Basins, which reduce the stormflow velocity.

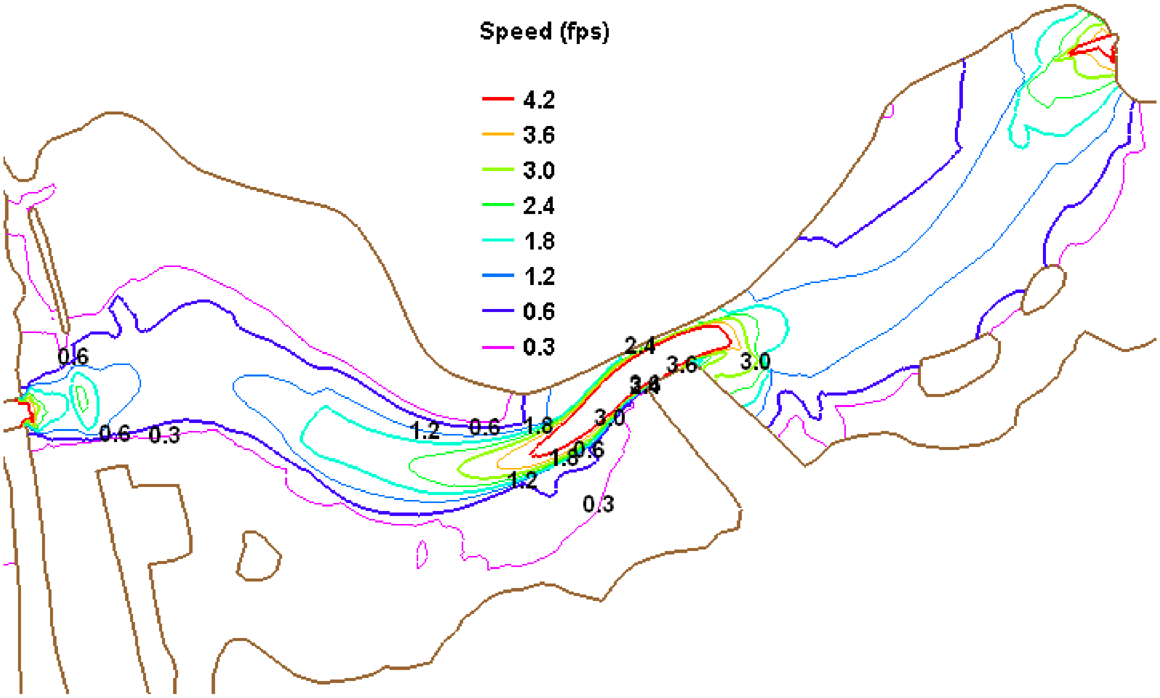

Figure 9-12 Velocity Distribution in a 100-yr Storm Event for Alternative 2B

10.0 CONCLUSIONS

San Elijo Lagoon is 303(d) listed by the Regional Water Quality Control Board for high nutrient levels, bacteria concentrations, and sedimentation based on conditions reported by various groups in the 1990's (USDA 1993). Great interest exists among stakeholders to improve water quality through restoration. Numerical modeling was performed using RMA4 to determine future conditions of water quality under various restoration project scenarios. Alternatives analyzed include:

- No Project – Existing Conditions;
- Alternative 1A – Minimum Changes;
- Alternative 1B – Maximum Habitat Diversity, Existing Inlet Location;
- Alternative 2A – Maximum Habitat Diversity, New Inlet Location; and
- Alternative 2B – Maximum Tidal Expression.

Each alternative was assessed for its effect on the following water quality parameters:

- seawater residence time;
- bacteria concentrations at the lagoon and nearshore ocean, with enteroccocus being the selected indicator of potentially harmful bacteria;
- salinity levels following storm flood events; and
- sedimentation within the lagoon from upstream sources.

These are basic water quality parameters representing future conditions, and they include those parameters of concern identified by the RWQCB in their 303d listing. Bacteria concentrations are analyzed with regard to recreational water contact activities (surfing, swimming, and diving) in the ocean.

The following conclusions were reached as a result of this study:

1. Wetland restoration significantly shortens seawater residence time and increases tidal flushing compared to existing conditions. Improved tidal flushing will reduce nutrient concentrations assuming inputs remain constant. Specific residence times for existing conditions range from 1 day near the tidal inlet to 15 days near I-5, to infinite (no flushing) in the East Basin. Alternatives result in residence times as follows:
    a. Alternative 1A: less than 1 day near the inlet, 9 days near I-5, and 13 days in the East Basin;
    b. Alternative 1B: less than 1 day near the inlet, 6 days near I-5, and 8 days in the East Basin;
    c. Alternative 2A: less than 1 day near the inlet, 3 days near I-5, and 4 days in the East Basin; and
    d. Alternative 2B: less than 1 day near the inlet, 3 days near I-5, and 4 days in the East Basin.

2. Bacteria concentrations and salinity levels were quantified based on analyzing an actual stormflow event that occurred on January 5-8, 2008 with a discharge of 1,300 cfs. Stormflow discharge persisted for three days and experienced three different peaks, with the estimated recurrence interval of the event being approximately 2 to 5 years. Salinity results show that the lagoon experiences freshwater conditions for several days that may stress habitat, regardless of the alternative, as summarized below:
    a. Alternatives 1A and 1B require up to approximately 10 days for marsh salinity to return to dry season values;
    b. Alternative 1B results in slightly more rapid recovery of salinity levels than Alternative 1A, and
    c. Alternatives 2A and 2B require up to approximately 6 days for marsh salinity to return to dry season values.
3. Bacteria concentrations in the lagoon at the nearshore ocean during and after stormflow conditions vary according to the following patterns:
    a. For existing conditions, concentrations are dependent on tidal cycle, with high concentrations occurring during ebbing tides when upstream stormflows are draining, and low concentrations during flooding tides when new seawater is being supplied to the lagoon from the ocean; maximum concentrations remain elevated for 8-9 days in the nearshore ocean near the inlet;
    b. Alternative 1A is similar to existing conditions and the period of elevated concentrations is 8-9 days in the nearshore ocean near the inlet;
    c. Alternative 1B is also similar to existing conditions and results in elevated concentrations for 8-9 days in the nearshore ocean near the inlet;
    d. Alternative 2A results in reduced durations of high bacteria concentrations, with a 3-day period of elevated concentrations in the nearshore ocean near the new inlet; and
    e. Alternative 2B also results in reduced durations of high bacteria concentrations with a 3-day period of elevated concentrations in the nearshore ocean near the new inlet.
4. Potential sedimentation was analyzed at the request of the City of Encinitas. The City is concerned about sedimentation from upstream and its effect on flood conveyance. The following conclusions resulted from this analysis:
    a. All bridges choke and slow flood flows, thereby causing sedimentation during the 2-5 year storm (referred to as a “typical” storm event) from upstream mainly in the Central and East Basins.
    b. Existing typical stormflow velocities are insufficient to keep sediment suspended and it deposits, and the duration of existing stormflow drainage is relatively long and allows more time for sedimentation to occur. The 100-year flood event results in sedimentation mainly in the Central Basin due to high flow velocities through the East Basin.

c. Alternative 1A is similar to existing conditions and sedimentation will occur in the Central and East Basins during a typical storm flood event. The 100-year flood will result in sedimentation mainly in the Central Basin.
d. Alternative 1B results in slightly improved flood hydraulics than Alternative 1A, with correspondingly less sedimentation predicted to occur under the typical and 100-year flood scenarios.
e. Alternative 2A with the new tidal inlet location results in significantly improved flood hydraulics compared to alternatives with the existing inlet, and should cause sufficiently high storm flood velocities to maintain sediment transport to the ocean under typical and 100-year flood events. The duration of flood drainage is shortened to approximately 20% of the duration for existing inlet alternatives.
f. Flood hydraulics of Alternative 2B are similar to Alternative 2A, but result in reduced typical flood velocities due to the large Central and East subtidal basins, and may result in slightly greater sedimentation; however flood hydraulics for the 100-year event are sufficient to minimize sedimentation.

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APPENDIX F

BIOLOGICAL RESOURCES TECHNICAL REPORT

BIOLOGICAL RESOURCES TECHNICAL REPORT
FOR THE SAN ELIJO LAGOON RESTORATION PROJECT
SAN DIEGO COUNTY, CALIFORNIA

Prepared for:

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January 2016

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LIST OF ACRONYMS AND ABBREVIATIONS

AOU	American Ornithologists' Union
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BSA	Biological Study Area
CCA	California Coastal Act of 1976
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
cm	centimeter(s)
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
County Parks	County of San Diego Parks and Recreation Department
CWA	Clean Water Act
dBA	A-weighted decibel(s)
EFH	essential fish habitat
EIR	environmental impact report
EIS	environmental impact statement
ESA	Endangered Species Act
FR	Federal Register
HCP	habitat conservation plan
Highway 101	Pacific Coast Highway 101
I-5	Interstate 5
JDR	Jurisdictional Delineation Report
m	meter(s)
MBTA	Migratory Bird Treaty Act
MHCP	Multiple Habitat Conservation Plan
MHHT	mean high high tide
MHHTL	mean high high tide line
MLLT	mean low low tide
mm	millimeters(s)
MSCP	Multiple Species Conservation Program
North County MSCP	North County Multiple Species Conservation Program

NCTD	North County Transit District
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NPPA	Native Plant Protection Act
PCE	primary constituent element
Reserve	San Elijo Lagoon Ecological Reserve
RWQCB	Regional Water Quality Control Board
SDNHM	San Diego Natural History Museum
SELC	San Elijo Lagoon Conservancy
SELRP	San Elijo Lagoon Restoration Project
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

CHAPTER 1.0
INTRODUCTION

1.1 PURPOSE OF STUDY

San Elijo Lagoon represents a valuable coastal wetland with significant biological and ecological resources within the San Diego region. Over time, development and infrastructure within the lagoon and upstream in the watershed have restricted the natural movement of water flowing in and out of the lagoon (tidal prism) and modified freshwater flows and inputs sedimentation has increased. As a result, ecological functions of the lagoon have been compromised, leading to degraded water quality and elevated bacteria levels. Because of physiological and hydrological changes in circulation patterns, lagoon habitat has experienced substantial transformation, including conversion of historical mudflat areas to low-marsh. If no action is taken to restore the lagoon, it would continue to transition from a lagoon with a mosaic of habitats, including open water/mudflats, to a less diverse lagoon dominated by salt marsh. Eventually, based on sea level use predictions, even that marsh would be substantially inundated.

The San Elijo Lagoon Conservancy (SELC) proposes to restore lagoon functions as a part of a larger goal to protect a diverse assemblage of self-sustaining coastal habitats important to the region. The proposed San Elijo Lagoon Restoration Project (SELRP) aims to enhance the tidal prism of the lagoon by proposing modifications to some existing infrastructure that contribute to hydraulic constraints, such as Pacific Coast Highway 101 (Highway 101), and benefiting from proposed improvements to other infrastructure including the North County Transit District (NCTD) railroad, and Interstate 5 (I-5).

The purpose of this Biological Resources Technical Report (report) is to summarize the biological resources known to occur, or with the potential to occur, in San Elijo Lagoon, as well as to analyze the short-term and long-term impacts (both positive and negative) of the SELRP. San Elijo Lagoon has been a focus of many biological studies, including annual wildlife species surveys, fish and invertebrate surveys, and single survey efforts (e.g., BioBlitz). 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 but the consistency across the lagoon varies. In addition, a number of focused studies have been conducted as part of the preliminary planning process for SELRP. This report represents a compilation of both existing characterization information and specific focused studies conducted for the SELRP.

1.2 LIMITS AND PURPOSE OF PROJECT

1.2.1 Limits of the Project

The San Elijo Lagoon Ecological Reserve (Reserve) is located at the southern boundary of the City of Encinitas adjacent to Solana Beach (Figure 1-1). The lagoon is owned and managed by the State of California (California Department of Fish and Wildlife [CDFW], formerly California Department of Fish and Game [CDFG]); the County of San Diego Department of Parks and Recreation; and the SELC. The lagoon provides habitat for sensitive, threatened, and endangered plants and animals, as well as migratory wildlife. In addition, San Elijo Lagoon provides recreational opportunities, including over 5 miles of public hiking trails. The lagoon is traversed generally north to south by Highway 101, the NCTD railroad, and I-5. For the purposes of this report, the Biological Study Area (BSA) generally includes the Reserve, as well as an adjacent beach that could be affected by the project.

1.2.2 Purpose of the Project

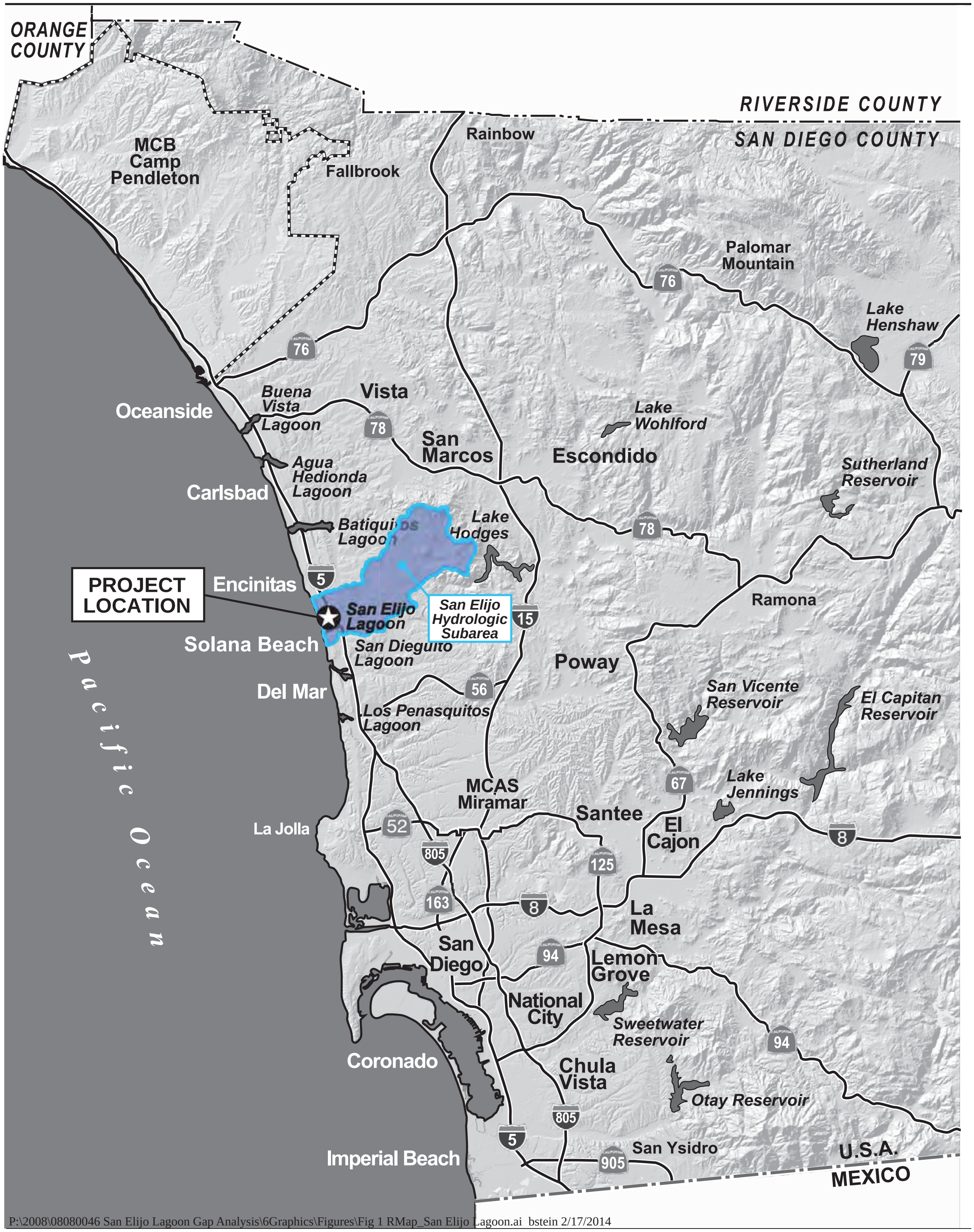
The overarching goal of the SELRP is to protect, restore, and then maintain, via adaptive management, the San Elijo Lagoon ecosystem and the adjacent uplands to perpetuate native flora and fauna characteristics of southern California, as well as to restore and then maintain estuarine and brackish marsh hydrology. This project goal can be further refined into three categories of objectives:

1. Physical restoration of lagoon estuarine hydrologic functions
2. Biological restoration of habitat and species within the lagoon
3. Management and maintenance to ensure long-term viability of the restoration efforts

The objectives below have been identified within these three larger categories.

1. Physical Objectives

A. Open the lagoon mouth regularly, or create a permanently open mouth, to enhance the health and ecological value of the lagoon.
B. Enlarge the tidal prism to increase area of tidal expression within the lagoon and manage freshwater inputs.
C. Improve water quality through restored tidal circulation thereby reducing impacts to the public from beach closures due to high bacteria counts and the potential for mosquito-borne disease.
D. Ensure no adverse change to current flood protection, specifically to existing infrastructure and adjacent development.



P:\2008\08080046 San Elijo Lagoon Gap Analysis\6Graphics\Figures\Fig 1 RMap_San Elijo Lagoon.ai bstein 2/17/2014

Figure 1-1
Regional Map

E. Minimize the disturbance of cultural resources.

2. *Biological Objectives*

A. Provide a natural gradient of habitats that considers climate change, anticipated sea level rise, heterogeneity of habitats, and tidal channels of various orders.
B. Enhance habitats for native species, including rare and endangered species, to maintain species diversity appropriate to habitat distribution and regional needs.
C. Maintain lagoon public access and educational opportunities consistent with resource protection needs and requirements.

3. *Management and Maintenance Objectives*

A. Develop a cost-effective management and maintenance plan for supporting the proposed habitat enhancements, curtailing growth and expansion of exotic species, and maintaining regular tidal flow.
B. Design and implement a biological and hydrological monitoring program on which to assess the success of restoration efforts and base adaptive management decisions.

The SELRP intends to restore the biological and hydrologic functions of the lagoon and adjacent uplands with a balance of habitat types, taking into account regional historic losses and current constraints. The project aims to enhance the tidal prism of the lagoon by dredging material from the lagoon, possibly modifying infrastructure that results in hydraulic constraints (Highway 101), as well as reaping the benefits of changes to other infrastructure (the NCTD railroad and I-5) also causing hydraulic constraints. Modifications to the NCTD railroad and I-5 are being implemented by other project proponents as part of more regionwide infrastructure improvements, but planned bridge improvements are incorporated into selected restoration project alternatives. The approximate target construction start date of the SELRP is the year 2016.

1.2.3 Project Description

Four project alternatives have been identified for the SELRP:

- Alternative 2A – Maximum Habitat Diversity, New Inlet Location
- Alternative 1B – Maximum Habitat Diversity, Existing Inlet Location
- Alternative 1A – Minimum Changes
- No Project/No Federal Action – Existing Conditions

Brief descriptions of the SELRP alternatives are provided below.

1.2.3.1 Alternative 2A – Maximum Habitat Diversity, New Inlet Location

Alternative 2A would also provide changes to the existing site to create a greater diversity of habitats than presently exists. Seawater would enter the lagoon via a new (and wider) tidal inlet located south of the existing inlet and a new subtidal basin would be created just landward of the new inlet in the West and Central Basins. The main tidal channel would extend throughout the lagoon and be redirected just west of I-5, and extend into the East Basin. Infrastructure improvements are assumed at the NCTD railroad trestle, including the portion of the railroad directly parallel to the new inlet, and the bridge under I-5 is assumed to be widened. The channel in the East Basin would be identical to that for Alternative 1B. The tidal prism of Alternative 2A would increase compared to Alternative 1B. Nontidal habitat areas remain in the East Basin. Transitional habitat areas above tidal elevations would also be included in the Central Basin as with Alternative 1B. Figure 1-2 illustrates the conceptual plan under Alternative 2A–proposed project.

A proposed habitat distribution plan was developed for Alternative 2A–proposed project, to provide a diversity of habitats that would remain relatively stable through time, assuming consistent maintenance. Table 1-1 identifies the habitat distribution that is projected under Alternative 2A–proposed project.

Table 1-1
Alternative 2A – Applicant's Proposed Project Habitat Distribution

Habitat Type	Habitat Distribution (acres)		Habitat Type	Habitat Distribution (acres)	
	Existing[1]	Proposed		Existing[1]	Proposed
Avian Islands	0	2	Open Water/Tidal Channels and Basins	40	74
Mudflat	63[2]	102	Riparian	72	67
Low-Marsh	13	23	Coastal Strand	5	5
Mid-Marsh	141	124	Upland & Others	299	292
High-Marsh	120	107	Beach	15	14
Saltpan	37	17	Berms and Roads	23	24
Freshwater/Brackish Marsh	132	96	Transitional (man-made)	0	12

[1] Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.
[2] Current functioning mudflat is an artifact of past freshwater impoundment and is converting to low- and mid-marsh because it is not at a natural elevation for self-sustainable mudflat.
Source: Nordby and M&N 2012

1.2.3.2 Alternative 1B – Maximum Habitat Diversity, Existing Inlet Location

Alternative 1B would provide a more substantial change to the existing site to create a greater diversity of habitats than currently exists. The existing tidal inlet would remain the source of seawater. The main tidal channel would include extended matrices of mudflats. d Secondary channels would be created south of the main channel in the central basin. Existing emergent low-marsh would be retained to the extent possible to create a diverse habitat distribution in the basin. The main feeder channel would be redirected just west of I-5 and extended farther into the East Basin. No infrastructure improvements are assumed at the NCTD railroad trestle, but the bridge under I-5 is assumed to be widened. Thus, the channel in the East Basin would be significantly enlarged in cross-sectional area to promote more tidal exchange east of I-5. The tidal prism of Alternative 1B would be significantly increased compared to Alternative 1A. Nontidal habitat areas would still exist in the East Basin. Several areas of transitional habitat above tidal elevations would be placed in the western portion of the Central Basin. Figure 1-3 illustrates the conceptual plan under Alternative 1B.

A proposed habitat distribution plan was developed for Alternative 1B to provide a diversity of habitats that remains relatively stable through time, assuming consistent maintenance. Table 1-2 identifies the habitat distribution projected under Alternative 1B.

Table 1-2
Alternative 1B Habitat Distribution

Habitat Type	Habitat Distribution (acres)		Habitat Type	Habitat Distribution (acres)	
	Existing[1]	Proposed		Existing[1]	Proposed
Avian Islands	0	2	Open Water/Tidal Channels and Basins	40	67
Mudflat	63[2]	71	Riparian	72	67
Low-Marsh	13	51	Coastal Strand	5	5
Mid-Marsh	141	98	Upland & Others	299	295
High-Marsh	120	124	Beach	15	15
Saltpan	37	30	Berms and Roads	23	24
Freshwater/Brackish Marsh	132	99	Transitional (man-made)	0	12

[1] Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.

[2] Current functioning mudflat is an artifact of past freshwater impoundment and is converting to low- and mid-marsh because it is not at a natural elevation for self-sustainable mudflat.

Source: Nordby and M&N 2012

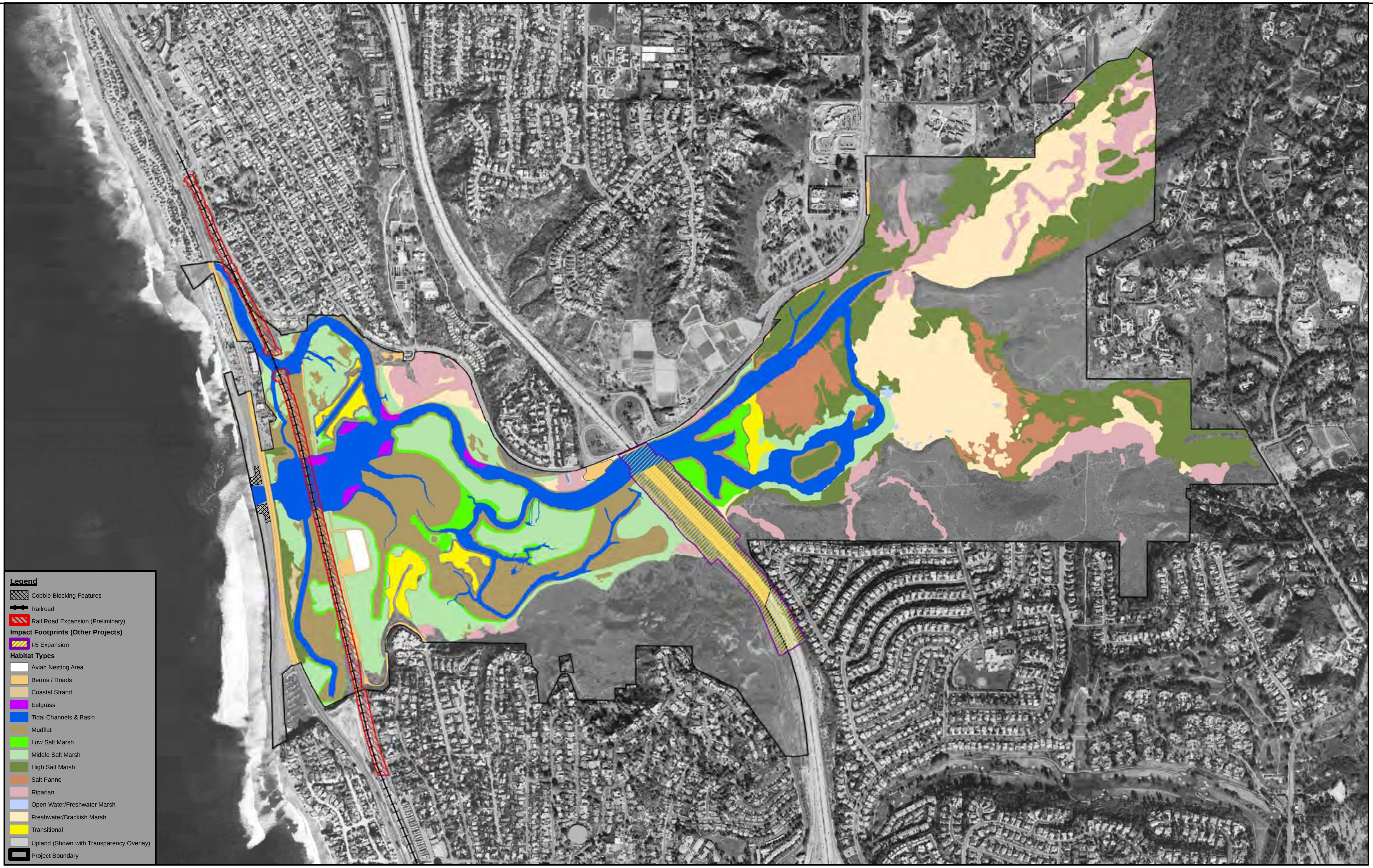


Figure 1-2
Alternative 2a

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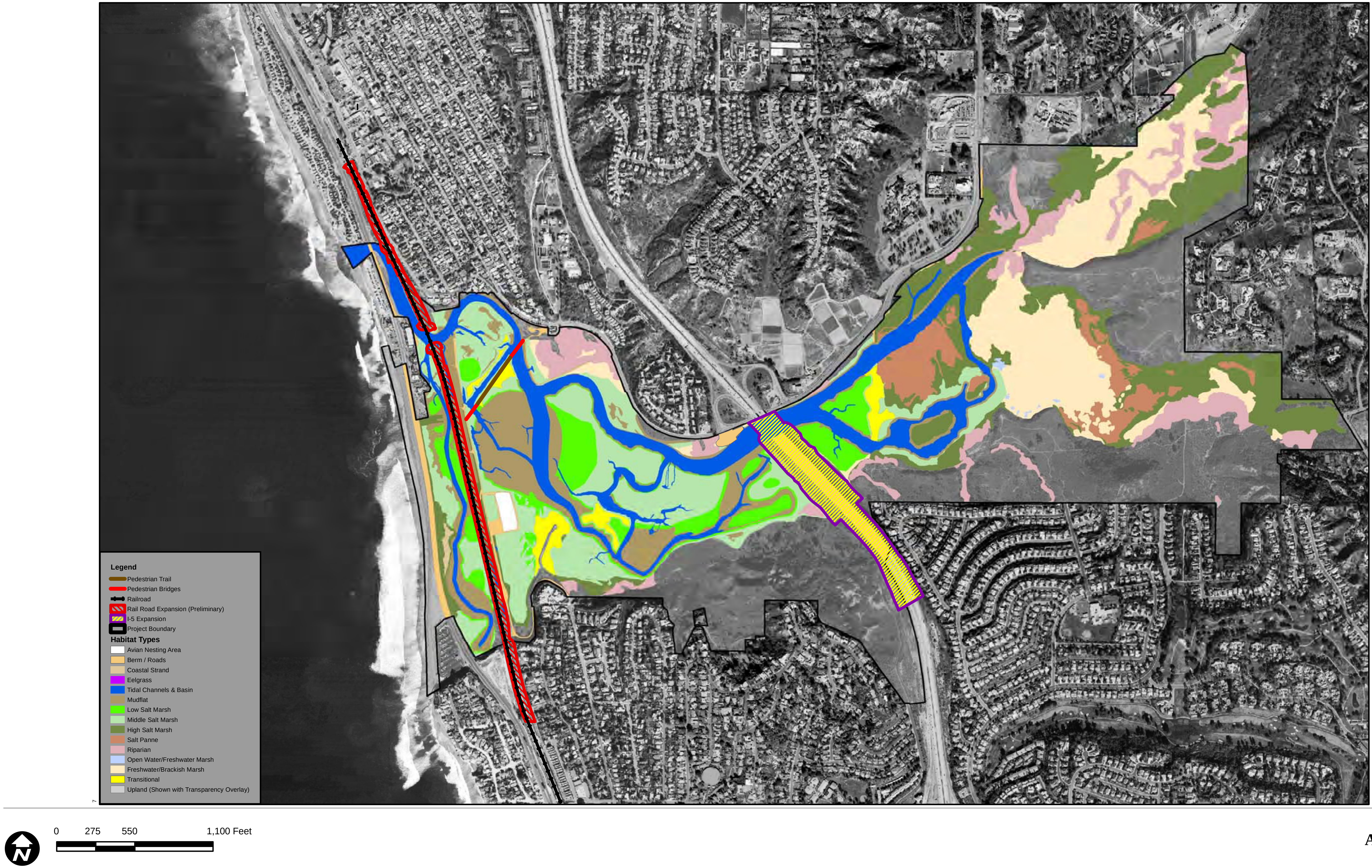

Figure 1-3
Alternative 1b

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1.2.3.3 Alternative 1A – Minimum Changes

Alternative 1A would provide minimal physical changes to the site, with the exception of enlarging the main feeder channel throughout the site and redirecting its course just west of I-5. The main tidal channel would also be extended farther into the East Basin and existing constricted channel connections would be cleared and enlarged. The inlet/undercrossing at Highway 101 would remain in the current location. No other infrastructure improvements are assumed to be made at the NCTD railroad trestle or at I-5. Existing habitat areas would essentially remain intact. The tidal prism of Alternative 1A would be slightly increased compared to existing conditions. A relatively small area of transitional habitat above tidal elevations would be placed in the northwest portion of the Central Basin. Figure 1-4 illustrates the conceptual plan under Alternative 1A.

The proposed habitat distribution for Alternative 1A from dredging and grading activities is summarized in Table 1-3. This assumes consistent maintenance.

Table 1-3
Alternative 1A Proposed Habitat Distribution

Habitat Type	Habitat Distribution (acres)		Habitat Type	Habitat Distribution (acres)	
	Existing[1]	Proposed		Existing[1]	Proposed
Avian Islands	0	2	Open Water/Tidal Channels and Basins	40	34
Mudflat	63[2]	25	Riparian	72	70
Low-Marsh	13	44	Coastal Strand	5	5
Mid-Marsh	141	140	Upland & Others	299	299
High-Marsh	120	145	Beach	15	15
Saltpan	37	35	Berms and Roads	23	24
Freshwater/Brackish Marsh	132	121	Transitional (man-made)	0	2

[1] Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.
[2] Current functioning mudflat is an artifact of past freshwater impoundment and is converting to low- and mid-marsh because it is not at a natural elevation for self-sustainable mudflat.
Source: Nordby and M&N 2012

1.2.3.4 No Project/No Federal Action Alternative – Existing Conditions

The No Project/No Federal Action alternative assumes no changes would be made to the project site and existing conditions (including the continued transition from tidal mudflat and cordgrass marsh to high-saltmarsh and freshwater marsh) may remain into perpetuity. The lagoon currently experiences mouth constriction and manual reopening annually, and sometimes more frequently. Tidal flushing is restricted, and water quality conditions are impaired for nutrients, bacteria, and sediment (SCCWRP 2007). Habitat is distributed at elevations and locations that are related to relic closed mouth conditions and that are progressively transitioning to distributions more reflective of managed mouth conditions. For example, mudflat habitat is located too high for a full tidal lagoon because it formed when the mouth was closed and lagoon water levels were higher from impoundment. Now that the mouth is managed to be open, the mudflat is converting to vegetated marsh because hydrologic conditions are favorable for salt marsh plant growth.

Historically, high water elevations resulting from frequent mouth closures and water impoundment in the lagoon have resulted in mudflat and open water/tidal channels habitats. Over the last decade, active management of an open lagoon mouth has been implemented, which has resulted in rapid habitat conversion. Specifically, the existing mudflat is converting to low-marsh habitat and portions of mid-marsh are anticipated to convert to high-marsh. The rapid conversion of mudflat was observed between 2010 and 2012, with a gain of 13 acres of low-marsh (cordgrass dominated) habitat and a direct loss of mudflat. Ultimately, the conversion of another 34 acres of mudflat is anticipated as the lagoon moves toward a state of equilibrium with current water levels and inundation frequencies.

The practice of active management at the lagoon mouth is expected to continue under this alternative to maintain tidal exchange with the ocean and allow fluvial flows to exit the lagoon. This exchange, although limited by the existing hydraulic constraints in the lagoon, maintains more acceptable water quality levels in the lagoon. When the inlet closes to tidal flushing, the lagoon water quality rapidly deteriorates due to the nutrient load stored in the existing sediments and the impoundment of freshwater from the watershed.

Therefore, under this alternative, open water/tidal channels would continue to decrease as would mudflats and mid-saltmarsh habitat (Table 1-4). Low-and high-saltmarsh habitat would continue to increase. Currently, no tidally influenced high-saltmarsh is on the site as the existing high-saltmarsh is located upstream of the current extent of tidal influence due to historic water impoundment behind the CDFW dike. Maintaining existing tidal influence would increase tidally influenced high-marsh and preserve brackish and freshwater high-marsh.

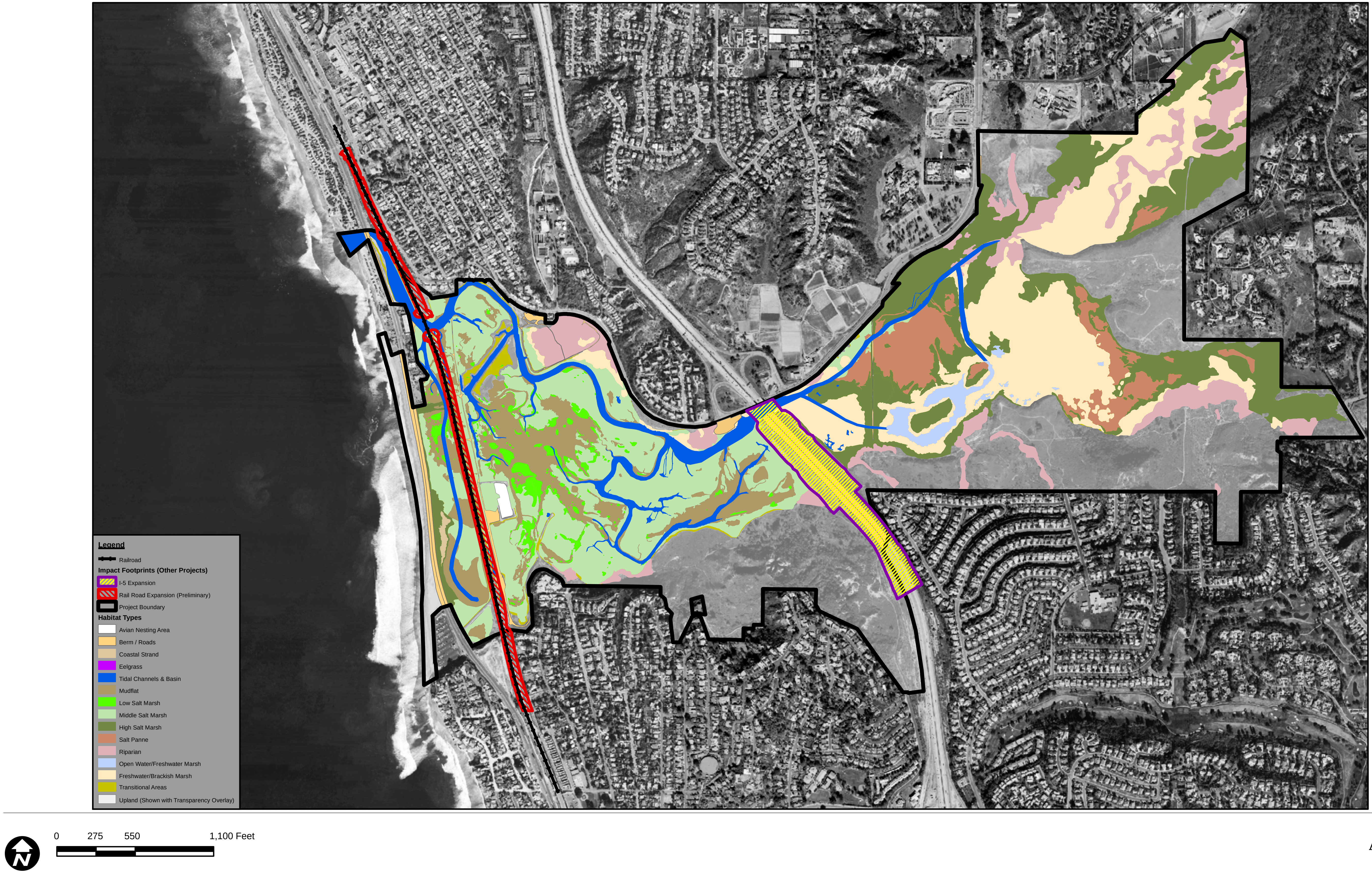

Figure 1-4
Alternative 1a

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Table 1-4
No Project/No Federal Action Alternative Habitat Distribution

Habitat Type	Habitat Distribution (acres)		Habitat Type	Habitat Distribution (acres)	
	Existing[1]	Predicted		Existing[1]	Predicted
Avian Islands	0	0	Open Water/Tidal Channels and Basins	40	24
Mudflat	63[2]	29	Riparian	72	71
Low-Marsh	13	51	Coastal Strand	5	5
Mid-Marsh	141	107	Upland & Others	299	299
High-Marsh	120	167	Beach	15	15
Saltpan	37	37	Berms and Roads	23	23
Freshwater/Brackish Marsh	132	131	Transitional (man-made)	0	0

[1] Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.
[2] Current functioning mudflat is an artifact of past freshwater impoundment and is converting to low- and mid-marsh because it is not at a natural elevation for self-sustainable mudflat. The decrease in mudflat reflects the remaining mudflat in the equilibrium condition (after predicted conversion has occurred).
Source: Nordby and M&N 2012

1.2.3.5 Project Design Features and Long-term Monitoring Program

The SELRP is a restoration project designed to enhance the lagoon system as a whole. Due to the nature of the project, an effort has been made to proactively incorporate measures into each of the alternatives to minimize and avoid, where possible, impacts to resources. These "design features" represent a commitment by the SELC to construct the project in an environmentally sensitive way. Some design features are incorporated to avoid or minimize a potential significant impact proactively through design, but others are additional measures that support the overall restoration objectives of the project without being tied to a specific potential impact. These features are committed to by the project applicant and would be implemented by the contractor or other parties before, during, and after construction. These features are summarized in Table 1-5, which identifies not only the measure, but also the purpose, timing, and responsibility for implementation of each project design feature.

In addition to project design features, the project would include long-term monitoring, maintenance, and adaptive management. Implementation of the SELRP would require a comprehensive monitoring program to ensure compliance with regulatory requirements, track project success, and identify adaptive management strategies into the future.

A comprehensive restoration construction plan would be prepared once the final alternative is selected. Regardless of the alternative, the restoration plan would include requirements for pre-

Table 1-5
Summary of Design Features/Monitoring Commitments and Minimization Measures

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
		General				
PDF-1	PDF-1	Implement a public information program to assist nearby residents in understanding the purpose of the project and disseminate pertinent project information.	Reduce impacts related to land use incompatibilities.	Prior to and during construction	SELC	All
PDF-2	PDF-2	Maintain project website with current construction schedule.	Ensure timely public notification; minimize land use conflicts.	During construction	SELC	All
PDF-3	PDF-3	Conduct fueling and/or maintenance activities at designated staging areas and designated fueling areas, and prepare a Spill Prevention, Control, and Countermeasure plan for hazardous spill containment.	Minimize safety hazards associated with release of hazardous materials.	During construction/ Maintenance	Contractor	All
PDF-4	PDF-4	Stake construction areas and no construction zones. Limit construction equipment and vehicles to within these limits of disturbance.	Protect sensitive habitat areas; reduce public safety hazards.	During construction/ Maintenance	Contractor	All
PDF-5	PDF-5	Restrict access to portions of lagoon trails and beaches to maintain public safety.	Reduce risks to public health and safety.	During construction/ Maintenance	Contractor	All
PDF-6	PDF-6	Maintain alternative access to beaches adjacent to placement sites, portions of trails not under active construction, and the Nature Center.	Minimize impact on public access.	During construction	Contractor	All
PDF-7	PDF-7	Shield and direct night lighting toward nonsensitive lagoon areas or the ocean and away from residences and habitat.	Minimize effects on residents and sensitive species.	During construction/ Maintenance	Contractor	All
PDF-8	PDF-8	Equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers.	Minimize noise impacts.	During construction/ Maintenance	Contractor	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
PDF-9	PDF-9	House exposed engines on dredging equipment to the greatest extent possible.	Minimize noise impacts.	During construction/ Maintenance	Contractor	All
PDF-10	PDF-10	Contractors will maintain equipment and vehicle engines in good condition and properly tuned per manufacturers' specifications. Idling time for construction equipment will be minimized, as appropriate.	Minimize air quality impacts and greenhouse gas (GHG) emissions.	During construction/ Maintenance	Contractor	All
PDF-11	PDF-11	All storage, handling, transport, emission, and disposal of hazardous materials will be in full compliance with local, state, and federal regulations (Health and Safety Code, Division 20, Chapter 6.95, Article 2, Section 25500-25520)	Avoid impacts associated with hazardous materials.	During construction/ Maintenance	Contractor	All
		Lagoon Restoration				
PDF-12	PDF-12	Utilize continuous construction, with internal phases to (1) restrict vegetation clearing and grubbing to outside the breeding season (February 15–September 15) (2) limit active construction to two basins at a time (excludes construction of Coast Highway 101).	Minimize impacts to sensitive wildlife species and their habitats.	During construction	Contractor	All
PDF-13	PDF-13	Have Biological Monitor, experienced with each of the listed species, on-site during construction; frequency may vary depending upon activity but could be daily during breeding season. If.If California gnatcatcher nests are found and need to be inspected, or if California gnatcatcher calls are required for survey efforts, a Biological Monitor with section 10a1a certification will be used. While clearing and grubbing activities are occurring, walk along the impacted habitat ahead of machinery in an effort to flush the birds and other wildlife.	Confirm implementation of biological permit conditions, design features, mitigation measures, and applicable construction specifications.	During construction	Qualified biologist	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
PDF-14	PDF-13	Remove sources of impounded water resulting from construction equipment (if any) and confirm compliance with construction specifications regarding no ponding. At the discretion of the Biological Monitor, release water controls during construction as needed to enable tidal exchange and circulation.	Minimize vector breeding opportunity during construction.	During construction	Qualified biologist/Contractor	All
PDF-15	PDF-13	Ensure no encroachment into sensitive "no construction" zones. Visually inspect construction equipment prior to use for evidence of soils or other material that might contain invasive species. Examine equipment history to ascertain if the equipment has been involved in work within areas known to contain invasive species.	Minimize the potential to introduce aquatic invasive species into the site.	During construction	Qualified biologist	All
PDF-16	PDF-14	Prior to initiating construction, identify sensitive "no construction zones" and fence or flag those areas	Minimize impacts to sensitive habitat areas.	Prior to construction/ Maintenance	Qualified biologist/Contractor	All
PDF-17	PDF-16	Initiate flooding of habitat areas outside of the breeding season. If flooding is reduced and required again within the same year, reinitiation of flooding will occur outside the breeding season as well.	Minimize impacts to breeding bird nests and nesting activity.	During construction	Contractor	Alternatives 2A and 1B
PDF-18	PDF-17	Clear and grub activities will occur in sensitive habitats in flooded areas. If clear and grub is required in dry conditions, a qualified biological monitor will walk ahead of the impact area to flush birds and other wildlife if conditions are appropriate and safe.	Minimize impacts to resident bird species and sensitive wildlife species.	During construction	Contractor/Qualified biologist	All
PDF-19	PDF-18	Controlled inundation will be used prior to clearing and grubbing in low- and mid-marsh habitat to actively encourage wildlife to relocate from vegetation to be cleared to adjacent nonimpacted habitat. After at least 24 hours of consistent inundation, grubbing of vegetation within the grading footprint will	Minimize impacts to resident marsh bird species.	During construction	Contractor	Alternatives 2A and 1B

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
		occur while still inundated to minimize the likelihood of contacting marsh birds.				
PDF-20	PDF-19	Site staging areas and access roads at existing access points and previously disturbed areas, where feasible.	Minimize impacts to intact habitat and reduce site preparation requirements.	Final design	Engineer	All
PDF-21	PDF-20	Prepare a targeted habitat enhancement plan for light-footed Ridgway's rail and Belding's savannah sparrow. Enhancement activities will be identified to minimize impacts to these species during construction. Activities will 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 other techniques to minimize predation and encourage nesting of the species. The plan will be finalized in conjunction with the permitting and approval process for the project in order to incorporate agency and permit conditions. Due to these timing constraints, final plans will not be completed prior to issuance of the Final EIR/EIS, but will be completed prior to project implementation.	Minimize impacts to light-footed Ridgway's rail and Belding's savannah sparrow.	Final design;	Qualified biologist, with approval of the Corps and County.	All
PDF-22	PDF-20	Implement targeted habitat enhancement plan for light-footed Ridgway's rail and Belding's savannah sparrow, specifically within designated refugia areas and other suitable habitat not directly impacted by construction activities.	Provide refugia and promote nesting by light-footed Ridgway's rail and Belding's savannah sparrow during construction in areas not directly impacted by construction activities.	During construction, prior to impacting suitable habitat areas	Qualified biologist	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
PDF-23		Consult with resource agencies, including USFWS, on final nesting area design during the permitting process.	Encourage nesting of special-status species.	Prior to construction	Qualified biologist	
PDF-24		Where practicable, invasive species will be removed by hand or hand tools rather than chemical means. When necessary, herbicide application will be conducted by personnel with a California Department of Pesticide Qualified Applicators Certificate (QAC) or by personnel under the supervision of a person with a California Department of Pesticide Qualified Applicators License (QAL). All herbicide applied will be consistent with the label, as well as state and local regulations. Any herbicide used will be approved for use in an aquatic environment (i.e., AquaNeat®) as the entire restoration area is within the confines of the lagoon. Herbicide application will be conducted using backpack sprayers and will consist of spot spraying nonnative plant species. Herbicide application will be conducted using methods that limit overspray to adjacent native plant species and will be discontinued when wind speeds are higher than the designated label standard or above 10 miles per hour.	Reduce overspray and drift of herbicides to nontargeted species and areas.	During and after construction	Contractor	All
PDF-25	PDF-21	Prepare a Storm Water Pollution Prevention Plan (SWPPP). Prepare a Storm Water Management Plan (SWMP), a Hydromodification Management Plan (HMP), and Low Impact Development (LID) best management practices in compliance with the County MS4 Permit. The SWPPP and SWMP must be approved by the County and City of Encinitas as appropriate prior to approval of associated grading plans to confirm that the	Prevent pollutant discharge.	Prior to construction	Prepared by QSD certified Contractor	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
		limits of disturbance will be maintained within the identified footprint.				
PDF-26		Implement best management practices in compliance with SWPPP, SWMP, HMP and LID.	Prevent pollutant discharge.	During construction and future maintenance activities	QSP certified Contractor on-site	All
PDF-27	PDF-22	Actively manage turbidity by using a cutterhead dredge and/or temporarily closing the lagoon inlet.	Minimize release of disturbed sediment to the coast.	During construction	Contractor	Alternatives 2A and 1B
PDF-28		Cap overdredge pit with sand material to encapsulate material and prevent it from being introduced into the water column or released into the environment.	Minimize sedimentation, turbidity, and potential release of contaminants.	During construction	Contractor	Alternatives 2A and 1B
PDF-29	PDF-23	Coordinate with the utility service provider for relocating and/or avoiding utilities infrastructure.	Reduce and/or avoid impacts to existing utilities infrastructure.	Prior to construction	SELC and Contractor	All
PDF-30	PDF-24	Coordinate with affected utility service provider in the event relocation is required or if maintenance needs for agency-owned structures are identified during SELRP monitoring activities.	Minimize utility service disruptions.	During construction/ Maintenance	Contractor	Alternative 2A
PDF-31	PDF-25	Near Solana Beach sewer pipe or other utilities to be left in place, require dredging and excavation activities to stay above the minimum cover required by the utilities' owner.	Avoid impacts to existing utilities and infrastructure.	Prior to and during construction	Contractor	Alternatives 2A and 1B
PDF-32		Coordinate with NCTD regarding phasing and timing to minimize impacts to the railroad during construction.	Avoid impacts to existing utilities and infrastructure.	Prior to and during construction	Contractor	Alternatives 2A and 1B
PDF-33	PDF-26	Equipment fueling and maintenance will occur at the designated staging areas and designated fueling areas away from publicly accessible areas.	Ensure public safety.	During construction/ Maintenance	Contractor	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
PDF-34	PDF-27	During off working hours, secure heavy equipment and vehicles in staging area.	Ensure public safety.	During construction/ Maintenance	Contractor	All
PDF-35	PDF-28	Provide fire suppression equipment on board equipment and at the worksite.	Reduce fire hazard risks.	During construction/ Maintenance	Contractor	All
PDF-36	PDF-29	Require heavy equipment operators to be trained in appropriate responses to accidental fires.	Reduce fire hazard risks.	During construction/ Maintenance	Contractor	All
PDF-37	PDF-30	Design recommendations from the San Diego Association of Governments (SANDAG) Sea Level Rise Study (SANDAG 2013) will be incorporated into pile foundation and abutment protection engineering for bridgework.	Ensure structural integrity of proposed structures.	Prior to construction	Engineer	Alternative 2A
PDF-38	PDF-31	The new bridges at the railroad and at Coast Highway 101 under Alternative 2A will possess deep pile foundations and well-protected abutments as engineered per appropriate regulatory safety requirements. Structures will be designed in accordance with applicable local and state engineering and design standards.	Ensure structural integrity of proposed structures.	Prior to and during construction	Engineer, Contractor, and SELC	Alternative 2A
PDF-39		Channel bank and bridge abutment protection will be installed along the inlet channel and at bridge crossings (Coast Highway 101, NCTD railroad, and I-5) to protect channels and structures from erosion during severe storm flow events. Rock armoring will be placed directly along the toe of bridge abutments and will “wrap” around the end of the earthen berms supporting each bridge. Bridge protection will be designed in accordance with design standards of bridge owners (and placed as part of new bridge structures, as applicable).	Minimize erosion and undermining of channels and structures.	During and post-construction	Engineer and SELC	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
PDF-40		Monitor shoal development semi-annually and remove during regular maintenance or as-needed.	Maintain tidal exchange.	Maintenance	SELC	All
PDF-41	PDF-32	The Coast Highway 101 alignment and bridge approach will conform to California Department of Transportation (Caltrans) standards for sight distance and vertical clearance.	Ensure public safety.	Prior to construction	Engineer	Alternative 2A
PDF-42	PDF-33	Temporary speed limit reduction for the traffic detour approaches and exits will conform to safe highway design speeds.	Ensure public safety.	Prior to construction	Contractor	All
PDF-43	PDF-34	Maintain two-way circulation on public roadways and access to neighboring commercial establishments during project construction.	Minimize traffic conflicts and access issues.	During construction	Contractor	All
PDF-44		Restore roadway capacity upon completion of the new Coast Highway 101 bridge.	Minimize traffic conflicts and access issues.	Post-construction	Contractor	Alternative 2A
:PDF-45	PDF-35	Create a temporary pedestrian walkway/bicycle path on the west side of open lanes of Coast Highway 101 to allow beach users to continue to access the beach to the north and south.	Minimize land use conflicts and access issues.	During construction	Contractor	Alternative 2A
PDF-46	PDF-36	All temporary facilities used for contractor activities will be returned to either original or enhanced conditions upon completion of the project to the greatest extent possible, if not needed for future maintenance activities.	Minimize land use conflicts and access issues.	Post-construction	Contractor	All
PDF-47	PDF-37	Restore North Rios, Solana Hills, and Santa Inez trails and access to them to pre-project conditions after completion of construction use.	Minimize recreational conflicts and access issues.	Post-construction	Contractor	All
PDF-48	PDF-38	Design cobble blocking features (CBFs) to maximize burial and minimize exposed surface; treat with faux finishes to provide a more “naturalized” appearance.	Minimize contrast of new inlet and CBFs with existing beach environment.	Final design	Engineer	Alternative 2A

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
PDF-49	PDF-39	Complete Letter of Map Revision (LOMR) to formally modify the Flood Insurance Rate Map (FIRM) and/or Flood Boundary and Floodway map (FBFM), as required by City of Encinitas and FEMA.	Document revised floodway/floodplain boundaries.	Post-construction	Engineer and Contractor	All
PDF-50	PDF-40	Channels and infrastructure improvements (Coast Highway 101/inlet or I-5 bridge)will be reviewed by the County, Caltrans, City of Solana Beach, and City of Encinitas as appropriate prior to approval of associated grading plans.	Ensure structural integrity of proposed structures.	Prior to and during construction	Engineer and Contractor	All
		Materials Disposal/Reuse				
PDF-51	PDF-41	Construct longitudinal training dikes at sand placement sites.	Reduce nearshore turbidity.	During construction	Contractor	Alternatives 2A and 1B
PDF-52	PDF-42	Release material at offshore stockpile and nearshore sites close to the ocean floor (e.g., directly from a subsurface pipe or via a vertical pipe extending from the barge downward toward the ocean floor).	Reduce drop height, settling time (and potential sand drift and loss), and surface turbidity at offshore (SO-5 and SO-6) and nearshore (off Cardiff) sites.	During construction	Contractor	Alternatives 2A and 1B
PDF-53	PDF-43	Monitor water quality per RWQCB 401 Certification; if outside parameters then implement operational controls or halt materials placement, as necessary.	Verify permit compliance.	During construction as per RWQCB 401 Certification	Qualified biologist	All
PDF-54	PDF-44	Place material around storm drain outlets to allow continuation of proper drainage.	Continue proper drainage.	During construction	Contractor, in coordination with City Engineer	Alternatives 2A and 1B
PDF-55	PDF-45	Conduct underwater survey of proposed anchoring, monobuoy, and routes of sinker discharge pipeline to verify absence of sensitive hard-bottom habitat; if found, relocate to avoid impacts.	Avoid direct impacts to sensitive hard-bottom habitats.	Prior to and during construction	Qualified biologist	Alternatives 2A and 1B

Updated Project Design Feature ID	**Previous Project Design Feature ID**	**Design Features**	**Purpose**	**Timing**	**Implementation Responsibility**	**Alternative(s) Project Design Feature Applies to**
PDF-56	PDF-46	Design offshore and nearshore placement sites to avoid artificial reefs, kelp, and other hard-bottom features to the satisfaction of the Corps. Provide a minimum 500-foot buffer zone from kelp beds and potential kelp habitat.	Avoid direct impacts to kelp and sensitive hard bottom habitats.	Final engineering and during materials placement	Engineering contractor and construction contractor	Alternatives 2A and 1B
PDF-57	PDF-47	Assess habitat suitability for grunion spawning prior to construction, if construction is to occur during the spawning season. During the grunion spawning period of March through August, all proposed sand disposal sites will be monitored for grunion runs concurrently, unless the beach consists of 100% cobble (i.e., there is not sand on the beach). Grunion monitoring will be conducted by qualified biologists for 30 minutes prior to and 2 hours following the predicted start of each spawning event. If a grunion run consisting of more than 100 fish is reported, the biologist will coordinate with the resource agencies to determine appropriate avoidance and minimization measures (e.g. relocation/rescheduling of work/equipment or specification of acceptable vehicle routes).	Minimize impacts to grunion.	March through August and per CDFW annual pamphlet *Expected Grunion Runs* (CDFG 2010a)	Qualified biologist	Alternatives 2A and 1B
PDF-58	PDF-48	A Marine Mammal and Turtle Contingency Plan will be prepared prior to construction approved by National Marine Fisheries Service. A pre-construction contractor training will be conducted by a qualified biologist to educate workers with respect to protected marine species and avoidance measures required by the contingency plan. Monitoring during construction will include marine mammal observers on project vessels who will notify the vessel operator if a protected marine species is in the vicinity.	Reduce interactions between vessels and protected marine species.	Prior to initiation of construction and during construction	Qualified biological	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
PDF-59	PDF-49	Coordinate barge operations with the U.S. Coast Guard (USCG).	Minimize restricted areas/durations to maximize fishing opportunities.	Prior to initiation of construction and during construction	Contractor	All
PDF-60	PDF-50	Clearly mark pipelines used during materials transport (including offshore stockpiling efforts), including both floating and submerged, as “navigational hazards.”	Warn recreational users of water-based activities to ensure safety and avoidance.	Before and during activities in the ocean	USCG (via construction contractor)	All
PDF-61	PDF-51	Issue Notice to Mariners and maintain 300-foot buffer around monobuoy.	Warn recreational users of water-based activities to ensure safety and avoidance.	Before and during activities in the ocean	USCG (via construction contractor)	All
PDF-62	PDF-52	Designate a 300-foot buffer around the lane designated for barges to use to reach disposal/reuse sites and track actual routes. Employ Global Positioning System (GPS) tracking on barges to track disposal activity.	Minimize gear loss and fishing conflicts.	During construction	Contractor	All
PDF-63	PDF-53	Restrict public access at sand placement sites, both on the beach and in the nearshore ocean adjacent to the pipeline and monobuoy	Public safety during construction.	During construction	Contractor, in coordination with local lifeguards	Alternatives 2A and 1B
PDF-64	PDF-54	Temporarily relocate mobile lifeguard towers, if necessary	Ensure public safety during construction.	During construction	Contractor, in coordination with local lifeguards	Alternatives 2A and 1B
PDF-65	PDF-55	Place sand to avoid blocking line-of-sight at permanent lifeguard towers. All sight lines from the viewing platforms of the lifeguard towers will be maintained and there will be no interference with views for the lifeguards.	Ensure public safety during construction.	During construction	Contractor, in coordination with local lifeguards	Alternatives 2A and 1B
PDF-66	PDF-56	Post signs advising the public of the presence of steep sand slopes (e.g., scarps) should they develop on beaches where sand is being placed.	Reduce risks to public health and safety.	During construction	SELC in coordination with Marine Safety departments in the cities of Encinitas, Solana Beach, and San Diego	Alternatives 2A and 1B

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
PDF-67	PDF-57	Prior to opening areas of beach with placed materials, spread the material and check it for potential hazards (e.g., foreign objects in the sand).	Reduce risks to public health and safety.	During construction	Contractor	Alternatives 2A and 1B
PDF-68	PDF-58	Coordinate the schedule at individual materials placement site to the extent possible to avoid major holidays and special events.	Minimize land use and recreation conflicts.	During construction	SELC	Alternatives 2A and 1B
PDF-69	PDF-59[A1]	Dedicated parking lots will be identified for employee parking during peak beach attendance to minimize effects to public parking availability, as necessary. A shuttle will likely be necessary for some of the more distant lots.	Maintain public beach access.	During construction	Contractor	Alternatives 2A and 1B
PDF-70	PDF-60	Maintain horizontal access along the back beach where adjacent vertical access is not available. Where horizontal access is limited, (e.g., where a wet beach directly abuts bluffs), vertical access will remain to allow public access on either side of the active sand placement area as long as public safety is not compromised.	Maintain public beach access.	During construction	Contractor	Alternatives 2A and 1B
PDF-71	PDF-61	Cover discharge pipeline with sand at consistent intervals to facilitate access from the back beach to the water.	Maintain public beach access.	During construction	Contractor	Alternatives 2A and 1B
PDF-72	PDF-62	Notify residents at least 1 week in advance of nighttime construction work within 100 feet of residences; Restrict construction work to no longer than 3 consecutive nights within 100 feet of a specific residence where sleep disturbance may occur.	Notify residents of nighttime noise.	During construction	Contractor	Alternatives 2A and 1B
PDF-73	PDF-63	Conduct surf condition monitoring in areas with higher placement volumes than historic placement to verify the modeling results and document the anticipated lack of change in coastal conditions.	Ensure no adverse changes to coastal conditions.	Prior to, during, and following construction activities	SELC and Engineer	Alternatives 2A and 1B

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies to
PDF-74	PDF-64	Conduct sand placement at the Torrey Pines placement site outside of the bird breeding season (April 1 through September 15, or after August 1 with confirmation of cessation of nesting). Sand placement at Cardiff placement site may happen year round. However, at both placement sites, monitoring shall be conducted during sand placement to avoid impacts to foraging snowy plover. Should foraging plover be present, the monitor will direct sand placement away from the foraging plover to allow time for the bird(s) to leave the site. In addition, night lighting shall be shielded and directed away from the back beaches. Should nesting plover be detected, a buffer around the nest would be established in consultation with the wildlife agencies and sand placement directed away from the nest.	Minimize impacts to snowy plover at placement sites.	During materials placement.	Qualified biologist	Alternatives 2A and 1B

construction local plant salvage and/or seed collection (particular focus would be given to existing rare and sensitive plants), planting plans, weed abatement, and remedial measures, as well as established annual success criteria.

Monitoring for the lagoon restoration component of the SELRP would be primarily focused on the lagoon itself and would include pre- and post-construction monitoring, as well as monitoring for longer-term maintenance and an adaptive management program that would begin following completion of the post-construction monitoring program.

General processes to be monitored are identified in Table 1-6 and are intended to educate maintenance and adaptive management efforts in addition to documenting success of the project goals and objectives. Specific monitoring protocols would be developed as part of the permitting process in consultation with the resource and permitting agencies. A project monitoring plan would be developed as part of this consultation process to identify the monitoring methods, success criteria, and remediation required, if any, of the program to be implemented as part of the SELRP.

Table 1-6
Anticipated Biological Survey Framework for Informing Restoration Success

Type of Survey	Purpose
Benthic Macroinvertebrates	Evaluate the health and functioning of the restored lagoon, due to importance in estuarine food webs. Benthic invertebrates can affect, and be affected by, physical processes, such as erosion, sedimentation, and nutrient cycling. Monitoring would include sampling of both epifauna and infauna.
Fish	Reflect suitability of subtidal habitat as essential fish habitat. As fish are expected to colonize the newly created channels almost immediately, post-construction monitoring for fish in shallow subtidal and intertidal channels would begin immediately following construction.
Ridgway’s rail	Ridgway’s rail utilize many of the habitat types within the lagoon (low and brackish marsh for nesting, in addition to mid- and high-marsh and mudflat for foraging), and the project would affect each of these to different extents. Surveys for this species would inform continued habitat availability for Ridgway’s rail within the restored lagoon.
Belding’s Savannah Sparrow	Belding’s savannah sparrows currently inhabit all three lagoon basins. Post-construction surveys would be designed to provide information on resiliency and recovery of this species.
Secretive Marsh Bird Surveys	Post-construction surveys are anticipated to demonstrate use of newly constructed low marsh habitat as well as resiliency and recovery of secretive marsh bird populations.
General Avian Use of the Restored Lagoon	Monitoring of use of the lagoon by water-dependent birds, including shorebirds, waterfowl, gulls, terns, and others, is anticipated to be conducted monthly for a period of 5 years to assist in determining if the project has met its goals and objectives for improving habitats for bird species.
Habitat/Species Coverage	The development of planted areas, i.e., salt marsh and transition habitats, as well as any sensitive species being tracked, would be monitored post-construction for 5 years in order to document the success of the restoration project’s planting plan and inform adaptive management actions.

Monitoring the physical parameters of the lagoon following construction is designed to guide short- and long-term management activities such as inlet maintenance dredging or removal of sediment deposition. Monitoring would include developing protocols for the following lagoon components. Additional requirements may be identified as part of the permitting and final design process.

The restoration plan would include both the anticipated maintenance regime and an adaptive management plan. The maintenance plan would identify those areas of the lagoon that are anticipated to require periodic maintenance, such as inlet or subtidal basin maintenance and/or dredging, or less frequent channel maintenance in other areas of the lagoon. The adaptive management plan would identify remedial measures that may be implemented if success criteria put in place as part of the project or permit conditions are not met or if conditions change during long-term monitoring and need to be addressed. Some of these actions may include, but are not limited to, experimental planting of certain areas, additional dredging, replanting of saltmarsh and transitional habitats, and amendment of soils. Detailed plans would be developed as part of consultation with permitting and natural resource agencies during the permitting approval process; however, it is anticipated that the long-term management plan would be a living document and would be updated on a 10-year interval or more regularly as necessary. General components associated with the adaptive management would include replacement planting, weed abatement, trash removal, bank protection/repair, biological monitoring and maintenance, nesting area management, species-specific monitoring for threatened and endangered species, and inlet and channel maintenance.

1.3 REGULATORY FRAMEWORK

Because of both federal and state discretionary actions, the project requires evaluation pursuant to National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). Under both NEPA and CEQA, a lead agency is any public agency that is principally responsible for carrying out or approving a project. The U.S. Army Corps of Engineers (Corps) is the federal lead agency responsible for compliance with NEPA. County of San Diego Parks and Recreation Department (County Parks) is the lead agency responsible for compliance with CEQA. The Project will comply with applicable federal, state, and local laws, ordinances, and regulations throughout Project construction and operation. Laws, ordinances, and regulations applicable to biological resources in the Project area are discussed below.

1.3.1 Federal Laws and Regulations

Endangered Species Act

The federal Endangered Species Act (ESA) of 1973 (16 United States Code [U.S.C.] §§ 1531 et seq.) directs the U.S. Fish and Wildlife Service (USFWS) to identify and protect endangered and threatened species and their critical habitat, and to provide a means to conserve their ecosystems. Section 9 of the ESA makes it unlawful for a person to take a listed animal without a permit. “Take” is defined by the ESA as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct” (16 U.S.C. § 1532(19). Through regulations, the term “harm” is interpreted to include actions that modify or degrade habitats to a degree that significantly impairs essential behavioral patterns, including breeding, feeding, or sheltering.

Section 7 of the ESA directs USFWS to use its existing authority to conserve threatened and endangered species and, in consultation with federal agencies, ensure that any action authorized, funded, or carried out by such agency does not jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but will be needed for its recovery.

Section 7(a)(2) requires federal agencies to consult with USFWS to ensure that the agencies are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species. In consultation for those species with critical habitat, federal actions must also ensure that activities do not adversely modify critical habitat to the point that it will no longer aid in the species’ recovery.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703_712) makes it unlawful to take or possess migratory birds, except as permitted by USFWS. The MBTA protects all migratory bird, their eggs, their body parts, or their nests. Essentially, all avian species native to the United States are protected under the provisions of the MBTA; introduced species and nonmigratory upland game birds are not protected by the MBTA. “Take” under the MBTA is defined “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect” protected birds (50 Code of Federal Regulations [C.F.R.] 10.12). The current list of species protected by the MBTA includes several hundred species. Nearly all native birds in the San Diego region are considered migratory. Permits for take of nongame migratory birds can be issued only for specific activities, such as scientific collecting, rehabilitation, propagation, education, taxidermy, or protection of human health or safety and personal property.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. §§ 668–668d) prohibits the take of bald and golden eagles unless pursuant to regulations. “Take” under the BGEPA is defined to include a broad range of actions, including "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb." The term "disturb" is defined in regulations as to agitate or bother a bald or golden eagle to a degree that causes or is likely to cause, based on the best scientific information available: (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior (50 C.F.R. 22.3). In response to public comment regarding the removal of large trees that may occasionally be used by roosting or perching eagles, USFWS stated that such an action may constitute take "if the loss of the trees kills an eagle, or agitates or bothers a bald or golden eagle to the degree that results in injury or interferes with breeding, feeding, or sheltering habits substantially enough to cause a decrease in productivity or nest abandonment, or create the likelihood of such outcomes" (72 Federal Register [FR] 31132–31140). This suggests that habitat modifications may constitute take if it is substantial enough to cause, or create the likelihood for, a decrease in productivity or nest abandonment.

Magnuson-Stevens Fishery Management and Conservation Act, as amended 1996 (Public Law 104-267)

Federal agencies must consult with National Oceanic and Atmospheric Administration (NOAA) Fisheries on actions that may adversely affect essential fish habitat (EFH). EFH is defined as those "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." NOAA Fisheries encourages streamlining the consultation process using review procedures under NEPA, Fish and Wildlife Coordination Act, the Clean Water Act (CWA), and/or the federal ESA provided that documents meet requirements for EFH assessments under Section 600.920(g). EFH assessments must include (1) a description of the proposed action, (2) an analysis of effects, including cumulative effects, (3) the federal agency's views regarding the effects of the action on EFH, and (4) proposed mitigation, if applicable.

Clean Water Act

Section 404 of the CWA requires project proponents to obtain a permit from the Corps before performing any activity that involves any discharge of dredged or fill material into "waters of the U.S.," including wetlands. Waters of the U.S. include navigable waters of the U.S., interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries (33 CFR 328.3(a)). Many surface waters and wetlands in California meet the criteria for waters of the U.S. In accordance with Section 401 of the CWA, projects that apply for a Corps permit for discharge of dredged or fill material must obtain water quality certification from the appropriate Regional

Water Quality Control Board (RWQCB), in this case the San Diego RWQCB, indicating that the project will not violate California water quality standards.

National Environmental Policy Act

NEPA establishes a national policy for promoting environmental protection that includes a multidisciplinary approach to considering environmental effects in decision making intended to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man…"

NEPA requires federal agencies to analyze and publicly disclose the environmental impacts of a proposed project. To do so, federal agencies are required to prepare either an Environmental Assessment or, where an action may significantly affect the quality of the human environment, an environmental impact statement (EIS). These documents explore project alternatives and identify the likely environmental consequences of each action. These documents contain statements of the environmental impacts and include mitigation measures to lessen the effects of a proposed project to the extent practicable. The significance of an impact is determined by both its context and its intensity. "Context" includes society as a whole, the affected region, the affected interests, and the locality. "Intensity" refers to the severity of impact, including "the degree to which the action may adversely affect an endangered or threatened species or habitat that has been determined to be critical under ESA."

Executive Order 11988, Floodplain Management

EO 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. To meet this objective "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities." This EO provides an eight-step process that agencies should carry out as part of their decision-making process on projects that have potential impacts to or within the floodplain.

Executive Order 11990, Protection of Wetlands

EO 11990 is an overall wetlands policy for all agencies managing federal lands, sponsoring federal projects, or providing federal funds to state or local projects. The purpose of this EO is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." The EO requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. It requires the determination of whether a proposed project will be in or will affect wetlands. If so, a wetlands assessment must be prepared that describes the alternatives considered. The evaluation process follows the same eight steps as for EO 11988, Floodplain Management. Importantly, this EO applies to all wetlands, not just those falling under jurisdiction of the CWA.

Executive Order 13112, Invasive Species

EO 13112 requires federal agencies to "prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health effects that invasive species cause." An invasive species is defined by the EO as "an alien species [a species not native to the region or area] whose introduction does or is likely to cause economic or environmental harm or harm to human health."

1.3.2 State Laws and Regulations

California Environmental Quality Act

CEQA (Public Resources Code Section 15000 et seq.) requires identification of significant environmental effects of proposed projects (including impacts on biological resources) and avoidance (where feasible) or mitigation of the significant effects. CEQA applies to "projects" proposed to be undertaken or requiring approval by state and/or local governmental agencies. "Projects" are activities that have the potential to have a physical impact on the environment. The California Energy Commission licensing process, under the Warren-Alquist Act, is a CEQA-equivalent process.

California Endangered Species Act

The California Endangered Species Act (CESA) (Fish and Game Code Section 2050 et seq.) prohibits the "take" (defined as "to hunt, pursue, catch, capture, or kill") of state-listed species except as otherwise provided in state law. CESA, administered by CDFW, is similar to the federal ESA although, unlike the federal law, CESA applies incidental take prohibitions to species currently petitioned for state-listing status (i.e., candidate species). State lead agencies are required to consult with CDFW to ensure that their authorized actions are not likely to jeopardize the continued existence of any state-listed species or result in the degradation of occupied habitat.

Under Section 2081, CDFW authorizes “take” of state-listed endangered, threatened, or candidate species through incidental take permits or memoranda of understanding if (1) the take is incidental to otherwise lawful activities, (2) impacts of the take are minimized and fully mitigated, (3) the permit is consistent with regulations adopted in accordance with any recovery plan for the species in questions, and (4) the applicant ensures suitable funding to implement the measures required by CDFW.

California Fish and Game Code Section 1602 – Streambed Alteration

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by CDFW under Fish and Game Code Section 1602. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying CDFW:

- substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake; or
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The Fish and Game Commission defines “stream” as a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. CDFW’s jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. In practice, CDFW typically extends its jurisdictional limit to the top of a stream, the bank of a lake, or outer edge of the riparian vegetation, whichever is wider. Riparian habitats do not always have identifiable hydric soils, or clear evidence of wetland hydrology as defined by the Corps. Therefore, CDFW wetland boundaries often include, but extend beyond, Corps wetland boundaries. Jurisdictional boundaries under Fish and Game Code Sections 1600–1616 (CDFW’s Lake and Streambed Alteration Program) may encompass an area greater than that under the jurisdiction of CWA Section 404. Therefore, jurisdictional waters of the state include jurisdictional waters of the U.S. Federal and state jurisdictions do overlap, but would remain distinct for regulatory administration and permitting purposes. A CDFW Streambed Alteration Agreement must be obtained for any project that would result in an impact on a river, stream, or lake.

California Fish and Game Code Section 3503 and 3503.5 – Protection of Birds, Nests, and Raptors

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for the issuance of any type of incidental take permit.

Fully Protected Species under the California Fish and Game Code

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species and do not provide for authorization of incidental take of fully protected species.

California Native Plant Protection Act

The Native Plant Protection Act (NPPA) of 1977 (Fish and Game Code Sections 1900–1913) directed CDFG to carry out the Legislature’s intent to “preserve, protect and enhance rare and endangered plants in this State.” The NPPA gave the California Fish and Game Commission the power to designate native plants as “endangered” or “rare” and to protect endangered and rare plants from take.

Porter-Cologne Water Quality Control Act – California Water Code Section 13000 et seq.

Under the Porter-Cologne Water Quality Control Act, waters of the state fall under the jurisdiction of the appropriate RWQCB. The RWQCB must prepare and periodically update water quality control plans (basin plans). Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Projects that affect wetlands or waters of the state may require waste discharge requirements from the RWQCB, which may be issued in addition to a water quality certification or waiver under Section 401 of the CWA.

California Coastal Act

Pursuant to California Public Resources Code (CPRC) Section 30000 et seq. the California Coastal Commission (CCC) regulates coastal resources within the Coastal Zone under jurisdiction of the California Coastal Act of 1976 (CCA) (as amended). The Coastal Zone means that land and water area of the State of California extending seaward to the state's outer limit of jurisdiction (3 miles offshore) including all offshore islands, and extending inland generally 1,000 yards from the mean high tide line of the sea. In significant coastal estuarine, habitat, and recreational areas, it extends inland to the first major ridgeline paralleling the sea or 5 miles from the mean high tide line of the sea, whichever is less, and in developed urban areas the zone generally extends inland less than 1,000 yards. If development is proposed within these areas (e.g., the Coastal Zone), a Coastal Development Permit issued by CCC or a local agency to which the CCC has granted permit authority is required (CCC 1994).

1.3.3 Local Plans and Policies

Natural Community Conservation Plans and Habitat Conservation Plans

Over the past two decades, regional planners have focused considerable effort on preparation of four habitat conservation plans (HCPs): the Multiple Species Conservation Program (MSCP) South, finalized in 1998 (SANDAG 1998); the Multiple Habitat Conservation Program (MHCP), finalized in 2003; the draft North County Multiple Species Conservation Program (North County MSCP),; and the East County MSCP, which is expected to begin after the North County MSCP is adopted.

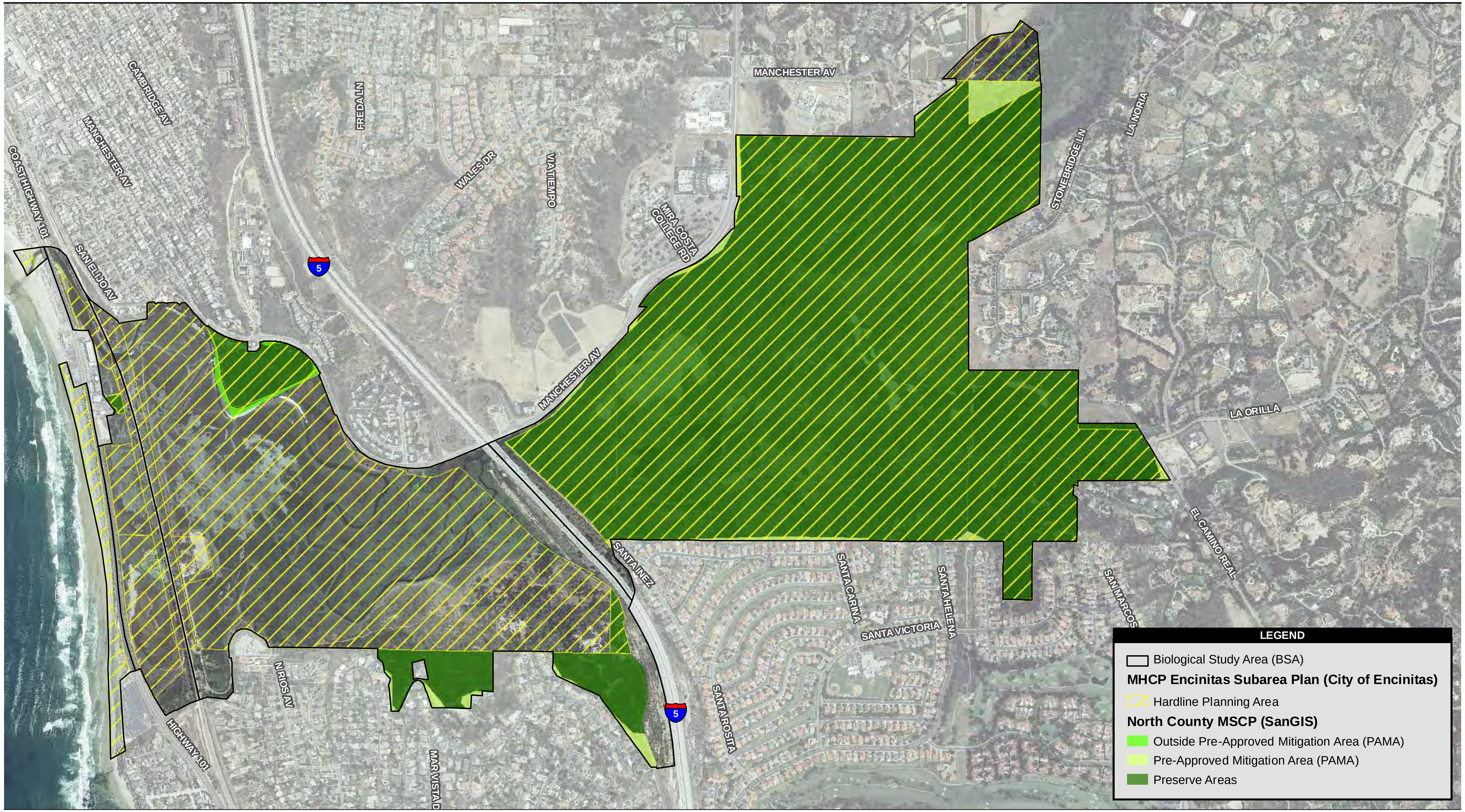
Six jurisdictions (the cities of Carlsbad, Chula Vista, La Mesa, Poway, San Diego, and the southern portion of the County of San Diego), have approved HCPs and signed implementing agreements that collectively cover 20 percent of the San Diego region. Seven jurisdictions (the cities of Encinitas, Escondido, Oceanside, San Marcos, Santee, Vista, and the northern portion of the County of San Diego) are working on agreements that cover another 73 percent of the region. Seven jurisdictions (the cities of Coronado, Del Mar, El Cajon, Imperial Beach, Lemon Grove, National City, and Solana Beach), which collectively cover slightly more than 1 percent of the region, are not pursuing agreements because they have limited natural habitats within their boundaries. The remaining 6 percent of the San Diego region is on military land conserved by Integrated Natural Resource Management Plans, which are developed under voluntary, cooperative agreements among a Department of Defense installation, USFWS, and CDFW.

The regional habitat conservation plans in the San Diego region are designed to provide an umbrella of protection for multiple species by conserving their habitats and the linkages that allow them to travel between habitats. The HCPs were designed under the California's Natural Communities Conservation Planning program.

Two regional planning documents cover the BSA, the North County MSCP (2009) and the MHCP (AMEC et al. 2003) (Figure 1-5). The North County MSCP expands the County MSCP into the northwestern unincorporated areas of San Diego County. The portions of the lagoon owned by the County of San Diego are within the NCMSCP. Portions of the BSA are within conservation areas referred to as the Preserve Area and Pre-Approved Mitigation Area under the draft North County MSCP (County of San Diego 2009).

The MHCP plan serves as an umbrella document to guide the preparation of subarea plans by each participating city and does not itself receive any permits (AMEC et al. 2003). To be approved, subarea plans must be consistent with the conservation and policy guidelines of the MHCP plan (AMEC et al. 2003). The Encinitas Subarea Plan is the MHCP implementing document within the Project Area (Ogden et al. 2001). The Encinitas Subarea Plan includes lands under the ownership of the SELC and State of California as well as some lands within the MHCP that are owned by the County. The Encinitas Subarea Plan designates the planned land use for the lagoon as parks/open space. The lagoon is considered a part of the Hardline Focused Planning Area within the Subarea Plan.

Both the North County MSCP and Encinitas Subarea Plan are currently in draft form; however, lands in both plans will eventually need to be reconciled in one plan or the other. Activities within these areas will need to be consistent with the North County MSCP or MHCP.



Source: SANDAG 2012; SanGIS; AECOM 2014

Figure 1-5

North County MHCP and MSCP in the Biological Study Area

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CHAPTER 2.0
METHODS

2.1 BIOLOGICAL STUDY AREA

The BSA for the SELRP primarily includes the Reserve, as well as adjacent beach areas that could be affected by the project (Figure 2-1). The western extent of the BSA includes the beach area west of the lagoon (excluding the parking lot at Cardiff State Park) and extends into the water at the potential inlet location sites. The southern extent of the BSA includes the public right-of-way owned by the California Department of Transportation adjacent to I-5, but it does not include the private lands located on nearby slopes and uplands west of I-5. The northern boundary essentially coincides with Manchester Avenue and the Reserve boundary. The eastern boundary of the BSA does not extend as far east as the Reserve boundaries in certain areas since the focus of the restoration effort is wetland, not upland, habitats.

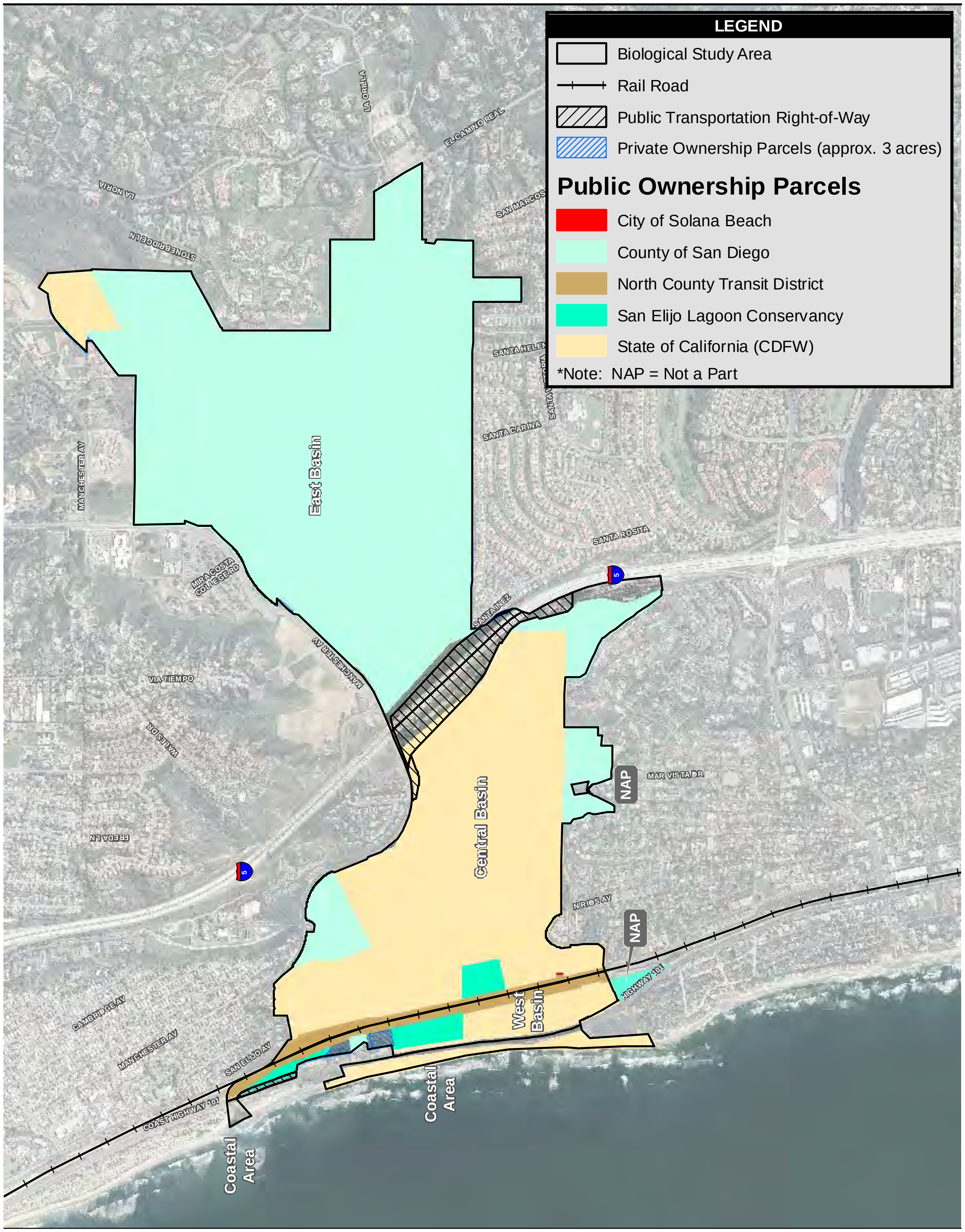
The BSA is divided into four distinct areas referenced as the east basin, central basin, west basin, and coastal area as shown in Figure 2-1. Each of these areas, general location, and approximate acreage are included in Table 2-1:

Table 2-1
San Elijo Lagoon Basin Acreages

Basin or Area Name	General Location	Acreage
East Basin	East of I-5	532
Central Basin	Between I-5 and NCTD rail line	356
West Basin	Between Highway 101 and NCTD railroad	53
Coastal Area	West of Highway 101	20
	TOTAL	**961**

2.2 BIOLOGICAL FIELD SURVEYS AND DATA SOURCES

Biological field surveys completed on-site by AECOM include vegetation mapping, rare plant surveys, and a jurisdictional delineation survey. Prior to initiating flora surveys, AECOM biologists consulted the CDFW California Natural Diversity Database (CNDDB) (RareFind Version 3.1.0; CDFG 2009), California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2010), Natural Resources Conservation Service Web Soil Survey (USDA 2009), and information collected during the San Elijo Lagoon BioBlitz (BioBlitz 2009) to assess the potential for special-status plant species to occur within the BSA.



Source: Landiscor 2010; SanElijoConservancy; SanGIS; AECOM 2012

2,000 1,000 0 2,000 Feet

Scale: 1:24,000; 1 inch = 2,000 feet

Figure 2-1
Biological Study Area and Land Ownership

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 ESA or the California Endangered Species Act (CESA) (CDFW 2014b and 2014c);
- CDFG Species of Special Concern (CDFG 2009);
- CDFG fully protected species (CDFG 2009);
- Listed as sensitive by CNPS (2010);
- Covered under the draft North County MSCP (County of San Diego 2009); or
- Covered under the draft Encinitas Subarea Plan (Ogden et al. 2001)

AECOM did not conduct wildlife surveys or focused surveys for special-status wildlife species within the BSA. The lagoon is the focus of a number of ongoing annual and past wildlife survey efforts by various individuals and/or agencies including SELC, USFWS, Corps, and noted species experts like Richard Zembal. That information is incorporated into this report. Studies have included fish and invertebrate studies, wildlife inventories, and special-status wildlife studies. In addition, existing literature was reviewed to determine the potential for special-status wildlife species to occur within the BSA. The San Diego Natural History Museum (SDNHM) was also consulted to provide information on potential for bat species that might occur in the BSA.

2.2.1 Vegetation Mapping

Vegetation community mapping was conducted within the BSA between February 5 and February 25, 2010, by biologists Jonathan Dunn, 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.

Habitats 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). Field biologists used orthotopographic maps at a scale of 1 inch equals 500 feet for vegetation mapping and the minimum mapping unit was 0.5 acre. Rare plants observed were documented during vegetation mapping.

2.2.2 Jurisdictional Waters and Wetlands Delineation Surveys

Delineation of jurisdictional wetlands and an evaluation of waters potentially under the jurisdiction of Corps, CDFW, and/or RWQCB were performed within the BSA. The formal jurisdictional delineation applied both a presurvey investigation and field reconnaissance to determine the presence (type, area, and extent) or absence of potential jurisdictional waters of the U.S. and state. A comprehensive description of the formal delineation methodologies (e.g., federal and state) is provided in the Draft Jurisdictional Delineation Report for Waters of the U.S. and State of California for the SELRP (AECOM 2012). Summary descriptions of the federal and state delineation methodologies are provided below.

Prior to conducting the field investigation for a formal jurisdictional delineation, an AECOM ecologist reviewed and identified areas with topographical configurations, vegetative signatures, previously mapped vegetation communities and riparian areas, wetlands, waters, and/or hydric soils that may suggest the potential or presence of wetlands at the time of the study. A general field reconnaissance within the survey area was then conducted to determine the focus of the field studies._After the prefield analysis and initial field reconnaissance were completed, a formal delineation of jurisdictional waters (including wetlands) occurring within the survey area was conducted by two AECOM ecologists at high tide and low tide. The dates and type of fieldwork conducted are listed in Table 2-2.

Table 2-2
Survey Dates and Personnel Conducting the Formal Field Delineation at the Reserve

Dates	Personnel	Activity
January 20, 2010	Joshua Zinn	Prefield analysis and survey
January 21, 2010	Joshua Zinn	General reconnaissance of Reserve at low tide
January 22, 2010	Joshua Zinn	General reconnaissance of Reserve at high tide
January 26, 2010	Lindsay Teunis and Joshua Zinn	Field survey and formal delineation fieldwork
January 27, 2010	Lindsay Teunis and Joshua Zinn	Field survey and formal delineation fieldwork
January 28, 2010	Lindsay Teunis and Joshua Zinn	Field survey and formal delineation fieldwork
February 02, 2010	Joshua Zinn	Groundtruthing formal delineation fieldwork

Delineation of Federal Waters

Jurisdictional waters of the U.S. (including wetlands) include those waters listed in 33 CFR 328 (Definitions of Waters of the United States). All waters of the U.S. were delineated to their jurisdictional limits as defined by 33 CFR 328.4 (Limits of Jurisdiction). The survey area that was formally delineated has the potential for the presence of, at a minimum, three types of federally regulated waters (wetlands, “other waters,” and tidal waters)(AECOM 2012.

Delineation of State Waters

California Department of Fish and Wildlife

Jurisdictional waters of the state include those waters listed in the California Fish and Game Code Section 1600 et seq. Section 1601(a) is based on Title 14 California Code of Regulations 720, which designates waters of the state regulated by CDFW to be:

> "…all rivers, streams, lakes, and streambeds in the State of California, including all rivers, streams, and streambeds which may have intermittent flows of water."

However, in practice, CDFW usually extends its jurisdictional limit and assertion to the top of a bank of a stream, the bank of a lake, or outer edge of the riparian vegetation, whichever is wider.

Formal delineations for jurisdictional waters of the state as regulated by CDFW included all aquatic features occurring within the BSA, including any isolated aquatic features and the furthest riparian lateral extent.

Regional Water Quality Control Board

In practice, RWQCB usually extends its jurisdictional limit to waters of the state (as defined by California Water Code Section 13050[e]) that support or present beneficial uses, once beneficial uses are designated within a regional Basin Plan. Formal delineations for jurisdictional waters of the state as regulated by RWQCB included all aquatic features occurring within the BSA, including any isolated aquatic features, swale features, and the farthest riparian lateral extent.

California Coastal Commission

Jurisdictional waters of the state have been delineated pursuant to the guidance outlined within *Procedural Guidance for the Review of Wetland Projects in California's Coastal Zone*, Chapter 1, Section IV (Wetland Identification and Delineation); Chapter 3, Section IIB (Definition and Classification of Wetlands by California State Agencies) (CCC 1994). Sections 30121 and 13577(b) of the CCA provide the definition for a jurisdictional wetland occurring within the coastal zone.

In the coastal zone, the CCC, with the assistance of CDFW, is responsible for determining the presence of wetlands subject to regulation under the CCA. The CCC and CDFW only require the presence of one wetland parameter (e.g., wetland hydrology, hydric soils, or hydrophytic vegetation) for an area to qualify as a wetland within the coastal zone. As the primary wetland consultant to the CCC, CDFW essentially relies on the USFWS wetland definition and classification system, which is based upon *Classification of Wetland and Deepwater Habitats of the United States* (Cowardin et al. 1979). Jurisdictional wetland delineations within the coastal zone were conducted based upon the one-parameter method outlined in CDFW and USFWS guidance documents and classification manual(s) to define their presence and jurisdictional extent.

2.2.3 Special-Status Plant Surveys

Rare plant surveys were conducted within the BSA between March 26 and June 4, 2010, by AECOM botanists Jonathan Dunn, Fred Sproul, and Lance Woolley. Other rare plant observations were provided by County Park Ranger Susan Welken from various dates in 2010.

A list of potentially occurring sensitive plant species was compiled through searches of the CDFG CNDDB (CDFG 2010) and Jepson Online Interchange (2010), and from the San Elijo Lagoon BioBlitz conducted May 15 and 16, 2009 (BioBlitz 2009).

Rare plant surveys followed survey guidelines from *Guidelines for Conducting and Reporting Botanical Inventories for Federally 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) and distinctive leafy parts were present and easily identifiable. Several 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 did not conduct wildlife surveys for this project; however, San Elijo Lagoon has been studied extensively for decades by a variety of individuals and/or agencies. Wildlife surveys have been consistently conducted for various species. This existing knowledge makes up the baseline describing wildlife species known to occur, or with the potential to occur, within the BSA. Wildlife surveys conducted at San Elijo Lagoon that were reviewed for this report are listed in Table 2-3 and provided in Appendices C through M of this report. As noted, these

Table 2-3
Wildlife Surveys Conducted at San Elijo Lagoon within the Last 5 Years

Survey Information	Data Collection Date	Source
General Wildlife Survey		
San Elijo Lagoon BioBlitz	May 15 through 16, 2009	Multiple Participants Listed
Monthly Bird Count Data San Elijo Lagoon	2010, 2011	Robert Patton (ebird database)
Fish and Benthic Invertebrate Surveys		
San Elijo Lagoon Fish and Invertebrate Master, 2009	1989–1994 (summer/winter); 1995 –1999 (summer, fall, winter, spring); 2000–2009 (summer/winter)	San Elijo Lagoon Conservancy (SELC)
San Elijo Lagoon Spring Invertebrate Sampling: Inlet and Nature Center	2007–2009	U.S. Army Corps of Engineers (Corps)/SELC
San Elijo Lagoon Fish Sampling – Spring Surveys: Inlet and Nature Center	2007–2009	SELC
Fish and Invertebrate Data Collection Methods	2006	Corps/SELC
Butterfly Surveys		
Wandering (Salt Marsh) Skipper Presence/Absence Surveys: Correspondence and Info	July and August 2010	SELC/San Diego Association of Governments
Avian Surveys		
California Gnatcatcher Sightings from San Elijo Lagoon Monthly Bird Counts	2006–2011	Robert Patton
California Least Tern and Western Snowy Plover Survey Summary: San Elijo Lagoon & Cardiff State Beach	2006–2009	Robert Patton, Shauna Wolf
California Least Tern and Western Snowy Plover Site and Project Summaries	2010, 2011	Robert Patton
Western Snowy Plover and California Least Tern status at California Department of Parks and Recreation Sites in San Diego County	2010, 2011	Shauna Wolf
Belding’s Savannah Sparrow Survey, San Elijo Lagoon Ecological Reserve	2006, 2009	Robert Patton. Maryanne Bache, Monica Alfaro
Belding’s Savannah Sparrow Sightings from San Elijo Lagoon Monthly Bird Counts	2010, 2011	Robert Patton

Survey Information	Data Collection Date	Source
Ridgway's Rail l Sightings from San Elijo Lagoon Monthly Bird Counts	2006–2011	Robert Patton
Ridgway's Rail Management, Study, and Propagation in California	2009, 2011, 2012, and 2013	Richard Zembal, Susan Hoffman, John Konecny, Laurie Conrad, Charles Gailband, Michael Mace
Ridgway's Rail and Distribution in California	2010	Richard Zembal, Susan Hoffman, John Konecny
Least Bell's Vireo Sightings from San Elijo Lagoon Monthly Bird Counts	2010, 2011	Robert Patton
Southwestern Willow Flycatcher Sightings from San Elijo Lagoon Monthly Bird Counts	2010, 2011	Robert Patton
Mammal Surveys		
Pacific Pocket Mouse (PPM) Habitat Assessment – data polygons	May 2010	U.S. Fish and Wildlife Service

surveys were conducted by various individuals and/or agencies, and varying methodology and level of detail are available for each survey. Wildlife surveys completed within the last 5 years include general wildlife surveys; general fish and benthic invertebrate surveys; butterfly surveys; and species-specific surveys conducted for western snowy plover (*Charadrius alexandrines nivosus*), California least tern (*Sternula antillarum browni*), Belding's savannah sparrow (*Passerculus sandwichensis beldingi*), and pacific pocket mouse (*Perognathus longimembris pacificus*). Methods for each survey conducted at San Elijo Lagoon are described below.

Other Background Data

The data summarized in this report are primarily from recent sources. However, there was a prior data collection effort for a previously considered lagoon restoration project in 2001–2002 performed by MEC Analytical. For summary tables listing the broad range of animals detected or possibly in the study area, (Section 3 of this report), those MEC data are noted. However, because it is 10 years old or possibly older, those data are not utilized to make a current determination about "detection."

General Wildlife Surveys

General wildlife information has been provided by the SELC through their ongoing efforts to produce a thorough inventory of the species within the Reserve. General wildlife surveys facilitated by the SELC were conducted May 15–16, 2009, and are referred to as the BioBlitz. The BioBlitz consisted of a 24-hour inventory of species of plants and animals found in a given area. Surveyors included local species experts and members of the general public.

Fish and Benthic Invertebrate Surveys

Fish and invertebrate monitoring and analyses have been conducted within the BSA by the SELC since 1989. Currently, fish and invertebrate monitoring is occurring at two of the existing SELC water quality sampling sites, as shown in Figure 2-2. This allows for the comparison of water quality to the biodiversity of each sampling location. The monitoring is being conducted to determine baseline conditions over time, and to document trends and fish and invertebrate population densities. The National Marine Fisheries Service has confirmed that, for the purposes of this project, 3 years of data is sufficient for analysis. Accordingly, data collected from 2007 through 2009 are summarized for this report.

Fish were monitored within the BSA using two 50-meter (m) blocking nets (3-millimeter [mm] mesh) that span the entire channel length and were set approximately 10 m apart (creating a rectangle with the channel banks). A 15-m (3- mm mesh) seine was attached to two brails and passed between the blocking nets. Each fish pass was logged as a pass and species were recorded. The first 100 individuals of each species were measured and the remaining individuals were counted. This process was repeated until the fish numbers were depleted (or close to depletion). Upon depletion, the blocking nets were closed in on each other, representing the last pass for the site.

Benthic invertebrates were also monitored at the two water quality sites. Two steps were taken when sampling for benthic invertebrates. First, nine shallow cores were taken to estimate the abundances of the small, shallow-dwelling invertebrates. Cores were collected by pushing a cylindrical “clam gun” (15 centimeters [cm] in diameter) 5 cm into the sediment. These nine cores were split into thirds where three were high channel, three were mid-channel, and three were middle channel (thalweg). Samples were sieved through a 1-mm screen in the field. All large, easily identified animals were counted and released; others were preserved and sorted, and then identified and counted under a dissecting microscope in the lab. With the second step, another nine cores were taken to estimate abundances of large, deep-dwelling invertebrates (mainly bivalves). The sampling method was the same except the “clam gun” was pushed 20 cm into the sediment and was sieved through a 3-millimeter screen.

Butterfly Surveys

A butterfly survey was conducted on July 9, 2010, by the SELC. Presence-absence surveys were conducted to confirm optimal habitat for the wandering (salt marsh) skipper (*Panoquina errans*). Surveys were conducted by walking meandering transects in areas of potential habitat. All sightings were recorded and mapped. A second survey was conducted by SANDAG on August 12, 2010. The first survey on August 12, 2010, was conducted between 10:53 a.m. and 1:45 p.m.

in transitional marsh habitat starting along the western slope of I-5 and continuing along the Rios Avenue path south of the marsh. The second survey on August 12, 2010, was conducted between 2:44 p.m. to 3:27 p.m., following an elevated walkway loop at the San Elijo Lagoon Visitor Center. Butterflies were detected using a Pollard walk (Pollard 1977) with two observers moving along a meandering line through potential habitat.

Avian Surveys

Monthly bird count surveys have been organized by Robert Patton, consulting wildlife biologist, since 2006. 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 2011 were reviewed.

Specific surveys conducted for western snowy plover, California least tern, and Belding’s savannah sparrow involve presence/absence surveys conducted annually by Robert Patton from 2006 to 2011 specifically when the timing was optimal for detections (Patton 2010). No species-specific surveys for Belding’s savannah sparrow were conducted during 2010 or 2011. This species was noted during monthly bird counts for this period. 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.

Mammal Surveys

The USFWS has identified potential Pacific pocket mouse habitat within the East Basin of San Elijo Lagoon, as shown in Figure 2-3. No trapping was performed.

Source: SANDAG 2012; SanGIS 2014; CityofEncinitas 2011; AECOM 2014

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 2-2
Water Quality Sample Locations

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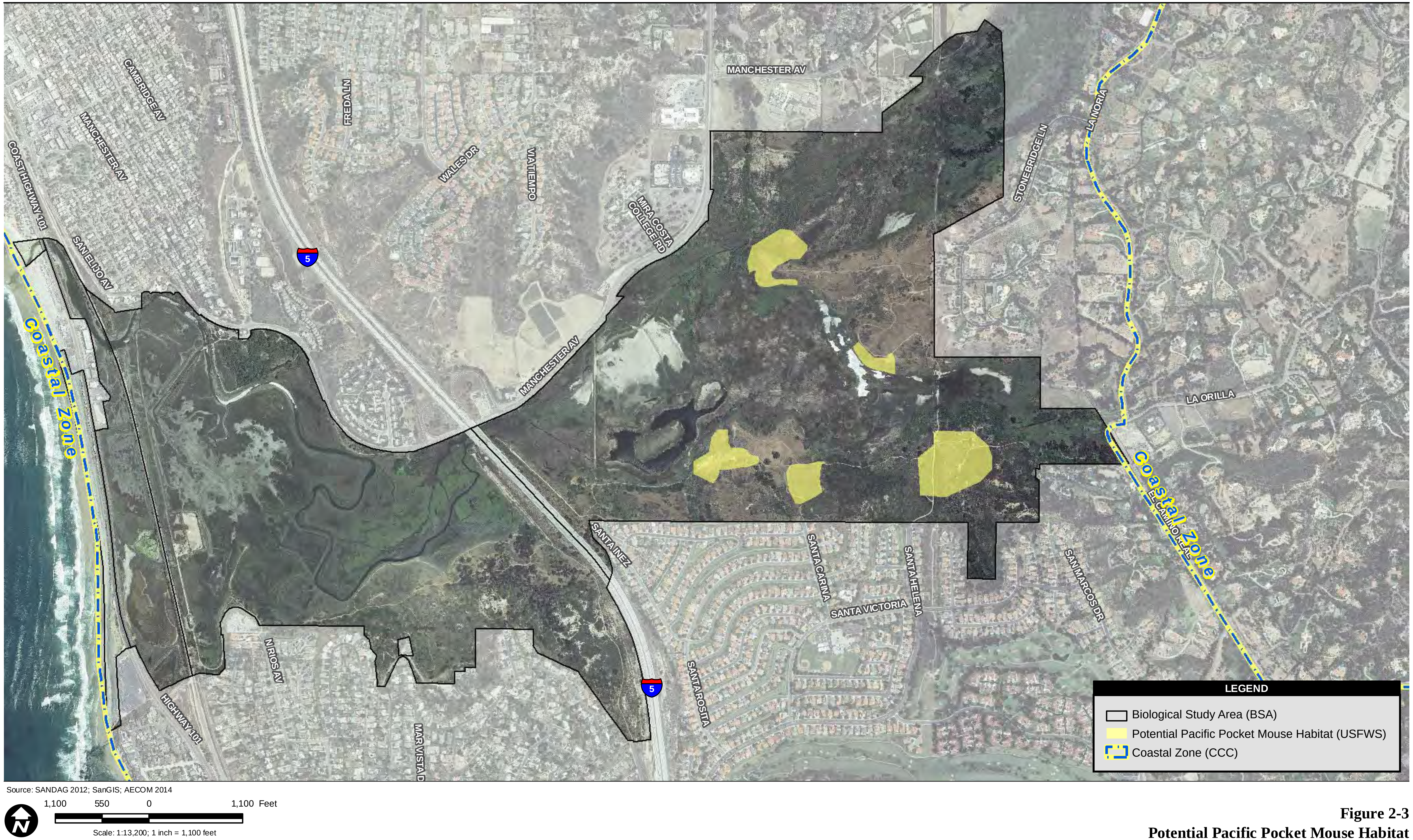

Source: SANDAG 2012; SanGIS; AECOM 2014

Figure 2-3
Potential Pacific Pocket Mouse Habitat

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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 upon results of AECOM surveys conducted in 2010 and 2012, review of existing studies, and literature research. Detailed information relevant to each section is provided as an appendix, where appropriate.

3.1 VEGETATION COMMUNITIES

Vegetation communities are assemblages of plant species that usually coexist in the same area. These vegetation communities also 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, 10 riparian and wetland communities, six upland communities, and three cover types were delineated during the spring 2010 and 2012 field surveys (Figure 3-1). The acreages of each vegetation community and cover type within the BSA are provided in Table 3-1.

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 (CWA), 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.

Table 3-1
Vegetation Communities and Other Cover Types within the Survey Area (Acres)

Vegetation Communities and Other Cover Types	Coastal Area	West Basin	Central Basin	East Basin	Total
Riparian and Wetlands					
Coastal Brackish Marsh			6.1	125.4	131.5
Coastal Salt Marsh – High Littoral Zone		0.8	0.7	118.5	120.0
Coastal Salt Marsh – Mid Littoral Zone		16.7	121.3	3.4	141.4
Coastal Salt Marsh – Low Littoral Zone		1.5	11.8		13.3
Disturbed Wetland [1]				1.1	1.1
Open Water (Tidal Channels & Basin)	1.5	4.3	23.7	10.6	40.1
Saltpan/Open Water			1.5	35.4	36.9
Sandbar Willow Scrub[1]				9.0	9.0
Southern Willow Scrub[1]			14.4	47.0	61.4
Tidal Mudflat/Open Water		13.8	49.25		63.1
Subtotal Riparian and Wetlands	***1.5***	***37.1***	***228.8***	***350.4***	***617.8***
Uplands					
Coyote Bush Scrub				7.5	7.5
Diegan Coastal Sage Scrub		3.1	67.0	108.0	178.1
Diegan Coastal Sage Scrub / Chaparral			27.7	21.6	49.3
Eucalyptus Woodland			15.7	3.4	19.1
Nonnative Grassland				33.0	33.0
Subtotal Uplands	***0***	***3.1***	***110.4***	***173.5***	***287.0***
Other Cover Types					
Beach	15.0				15.0
Coastal Strand		5.0			5.0
Developed (Berm Roads)	3.0	5.2	10.4	4.9	23.5
Disturbed Habitat		2.5	6.7	2.6	11.8
Subtotal Other Cover Types	***18.0***	***12.7***	***17.1***	***7.5***	***55.3***
TOTAL	**19.5**	**52.9**	**356.3**	**531.4**	**960.1**

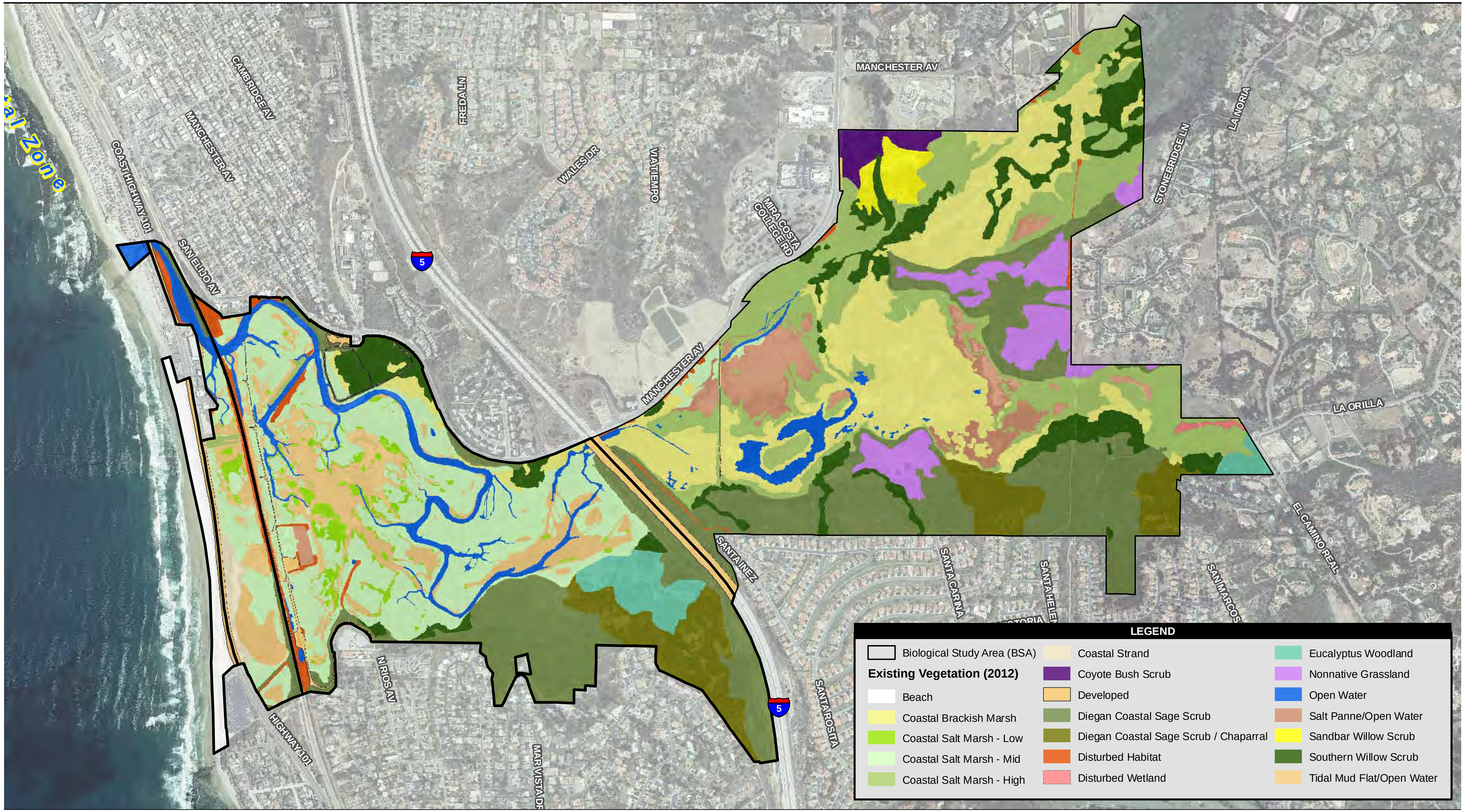
Disturbed wetland, sandbar willow scrub, and southern willow scrub are combined into a riparian vegetation community when discussing impacts and alternatives.

3.1.1 Riparian and Wetland Vegetation Communities

Open water, marsh, and riparian scrub are considered sensitive by the County (2009). All riparian and wetland habitats are considered sensitive due to extensive historical 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.

Coastal Brackish Marsh

Coastal brackish marsh is dominated by perennial, emergent, herbaceous monocots to 2 m tall (6 feet). Coastal brackish marsh is similar to both freshwater marsh and salt marsh, with some



Source: SANDAG 2012; AECOM 2014

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 3-1
Vegetation Communities within the Survey Area

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plants characteristic of each. Salinity may vary considerably and may increase at high tide or during seasons of low freshwater runoff or both (Holland 1986).

Coastal brackish marsh is most extensive in the eastern half of the BSA. Dominant plants within this community include California bulrush (*Schoenoplectus californicus*) and Olney's bulrush (*Schoenoplectus americanus*), with these species forming pure stands more characteristic of freshwater marsh in some areas. However, salt marsh species, such as Pacific pickleweed (*Sarcocornia pacifica*), alkali-heath (*Frankenia salina*), Parish's pickleweed (*Arthrocnemum subterminale*), and salty susan (*Jaumea carnosa*) are dispersed throughout the coastal brackish marsh in varying degrees of abundance.

In the eastern half of the BSA, this community appears to be converting to freshwater marsh due to the greater input of freshwater from Escondido creek and the restricted tidal influence.

Coastal Salt Marsh

Southern coastal salt marsh is an association of herbaceous and suffrutescent, salt-tolerant hydrophytes that form a moderate to dense cover and can reach a height of 1 m (3 feet). Most species are active in summer and dormant in winter (Holland 1986). Coastal salt marsh plants are distributed along distinct zones depending upon such environmental factors as frequency and length of tidal inundation, salinity levels, and nutrient status (MacDonald 1977). In the higher littoral zone, there is much less tidal inflow, resulting in lower salinity levels, while soil salinity in the lower littoral zone is fairly constant due to everyday annual tidal flow (Adam 1990).

Within the different littoral zones, species can be segregated with California cordgrass (*Spartina foliosa*) nearest the open water in the low-littoral zone; Pacific pickleweed and saltwort (*Batis maritima*) in the mid-littoral zones; and a richer mixture of species, including alkali-heath and Parish's pickleweed, in the higher littoral zone (Holland 1986). Other characteristic species include coastal saltgrass (*Distichlis spicata*), alkali weed (*Cressa truxillensis*), and salty susan.

Within the western portion of the BSA, mid-littoral coastal salt marsh is most expansive, with small islands of California cordgrass (low-littoral salt marsh) dispersed throughout. High-littoral salt marsh is most prevalent in the eastern portion of the BSA.

Disturbed Wetland

Disturbed wetlands are communities dominated by exotic wetland species. These species have invaded sites that had been previously disturbed or are periodically disturbed. Disturbed wetland is restricted to a small area in the far southeastern corner of the BSA and is dominated by the nonnative species, mousehole tree (*Myoporum laetum*).

Open Water

This habitat type consists of any open water body including lakes, reservoirs, bays, flowing water within a river channel, and small ponds along stream courses. Open water bodies provide important habitat for a variety of aquatic organisms and water fowl.

Open water is dispersed throughout the BSA in the form of tidal channels and small basins.

Saltpan/Open Water

Saltpans are unvegetated to sparsely vegetated flat, alkaline areas near the coast that are subject to tidal influence. In coastal areas, saltpans are most often associated with salt marsh habitat. While saltpans can cover relatively large areas, they often occur in a mosaic pattern with more densely vegetated areas within the salt marsh. The paucity of vegetation on saltpans is apparently due to seasonally high soil salinity levels that prevent colonization by perennial salt marsh species. However, the open substrate associated with saltpans is available for colonization by short-lived annual species after winter rains temporarily reduce salinity levels (Ferren et al. 1987).

The saltpan habitat is most expansive in the eastern half of the BSA, dispersed between southern coastal salt marsh and coastal brackish marsh.

Sandbar Willow Scrub

One area in the northeastern portion of the BSA appears to have been graded in the past and is now being colonized by sandbar (= thin-leaved) willow (*Salix exigua*) and arroyo willow (*Salix lasiolepis*). Left unaltered, this community may eventually mature into southern willow scrub.

Southern Willow Scrub

Southern willow scrub is a densely vegetated riparian thicket, dominated by several willow species (*Salix* spp.), with scattered emergent western cottonwood (*Populus fremontii* ssp. *fremontii*) and western sycamore (*Platanus racemosa*). This community is generally greater than 6 m (20 feet) high and occupies drainages and floodplains supporting perennially wet streams. Understory species such as mulefat (*Baccharis salicifolia*), Douglas mugwort (*Artemisia* *douglasiana*), and hoary nettle (*Urtica dioica* ssp. *holosericea*), may also be present (Holland 1986).

Southern willow scrub is encountered throughout the BSA. Dominant species include arroyo willow, red willow (*Salix laevigata*), and Goodding's black willow (*Salix gooddingii*). Common understory species include mulefat, tarragon (*Artemisia dracunculus*), and coyote brush (*Baccharis pilularis*).

Tidal Mudflat/Open Water

Tidal mudflats are coastal wetlands that form when mud is deposited by tides or rivers. Most of the sediment within a mudflat is within the intertidal zone, and thus the flat is submerged and exposed approximately twice daily. Mudflats are typically important regions for wildlife, including invertebrates and migratory birds.

The tidal mudflats are mostly surrounded by mid-littoral coastal salt marsh and restricted to the western portion of the BSA. The tidal mudflats are completely submerged during high tide.

3.1.2 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 (2009).

Coastal Strand

Coastal strand is an area of loose to partially stabilized sand that forms near the shore above the high tide line. The plants found in this community are able to tolerate harsh conditions, such as high winds, salt, and a low nutrient supply. Many of the plants in this community have deep taproots and/or a prostrate growth form to help stabilize them in the loose sand.

The coastal strand community is found in the western portion of the BSA just east of Highway 101. Dominant plants within the coastal strand community include arrow weed (*Pluchea sericea*), beach evening-primrose (*Camissonia cheiranthifolia* ssp. *suffruticosa*), beach sand-verbena (*Abronia umbellata* var. *umbellata*), Nuttall's lotus (*Lotus nuttallianus*), and coast woolly-heads (*Nemacaulis denudata* var. *denudata*).

Coyote Brush Scrub

Coyote brush scrub is typically found on disturbed sites or those with nutrient-poor soils (Oberbauer 2008).

Coyote brush scrub is only found in the northeastern portion of the BSA and is heavily dominated by coyote brush.

Diegan Coastal Sage Scrub-Coastal Form

Diegan coastal sage scrub may be dominated by a variety of different species depending upon site-specific topographic, geographic, and edaphic conditions. California sagebrush (*Artemisia californica*) is more dominant in coastal forms (Oberbauer 2008), but it often occurs with various codominant species. There are several recognized subassociations of Diegan coastal sage scrub based upon the dominant species. Typical Diegan coastal sage scrub dominants include California sagebrush, California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), black sage (*Salvia mellifera*), lemonadeberry (*Rhus integrifolia*), and California encelia (*Encelia californica*).

Within the BSA, Diegan coastal sage scrub is the dominant upland plant community and is most prevalent along the southern boundary of the BSA.

Diegan Coastal Sage Scrub/Chaparral

Diegan coastal sage scrub/chaparral is a mix of chaparral and sage scrub species. Chamise (*Adenostoma fasciculata*) and coastal sagebrush are dominant and relatively equal in cover. Generally, laurel sumac, black sage, and lemonadeberry are more common in coastal sage scrub, while lilac (*Ceanothus* spp.), scrub oak (*Quercus* spp.), and mission manzanita (*Xylococcus bicolor*) are more common in chaparrals (Oberbauer 2008).

The Diegan coastal sage scrub/chaparral community within the BSA occurs along the southern border on both sides of I-5.

Eucalyptus Woodland

This community is dominated by several species of eucalyptus (*Eucalyptus* spp.). 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. Generally, these species were planted for aesthetic and horticultural purposes, but many species of eucalyptus have become naturalized and have been quite successful in invading riparian areas.

The eucalyptus woodland communities within the BSA are found along the southern border and are dominated by river red gum (*Eucalyptus camaldulensis*) and blue gum (*Eucalyptus globulus*).

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. It is characterized by a dense to sparse cover of annual grasses, often with native and nonnative annual forbs (Holland 1986). Typical grasses within the region include ripgut grass (*Bromus diandrus*), red brome (*Bromus madritensis* ssp. *rubens*), soft chess (*Bromus hordeaceus*), wild oats (*Avena* spp.), and fescue (*Vulpia myuros*). Nonnative disturbance-related annuals, such as red stem filaree (*Erodium cicutarium*) and horseweed (*Conyza canadensis*), are common to this community. Though named as a nonnative community, nonnative grassland often has significant biological value since it typically supports native grassland species, such as tarweed (*Deinandra* spp.), common goldfields (*Lasthenia gracilis*), blue dicks (*Dichelostemma capitatum* ssp. *capitatum*), and purple owl’s-clover (*Castilleja exserta* ssp. *exserta*); provides foraging habitat for raptors; and often supports sensitive wildlife species.

Nonnative grassland occurs in the eastern portion of the BSA.

3.1.3 Other Cover Types

Beach

Beach habitat is the flat, sandy area along the immediate coastline that occurs between mean tide and the foredune, or to the farthest inland reach of storm waves. This habitat is characterized by high exposure to salt spray and sand blast, and sandy substrate with a low organic content and water-holding capacity (Barbour and Major 1977). The lower portions of beaches are unvegetated, while the upper beach sometimes supports a sparse herbaceous cover, especially in areas where foredunes are present.

Within the BSA, the beach habitat is largely unvegetated due to high recreational use. The beach habitat is found in the far western portion of the BSA.

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. Disturbed land is typically characterized by more than 50 percent bare ground and an absence of remnant native vegetation. Furthermore, the previous disturbance was severe enough to eliminate future potential biological value of the land without active restoration.

Within the BSA, the disturbed habitat consists of dirt roads, berms, and areas of bare ground, which can be found throughout the BSA.

Developed

Within the BSA, developed areas consist of buildings, paved roads, and parking lots, which are located in the western and central portions of the BSA. These areas tend not to support native vegetation; however, areas of native landscaping are located near the Visitor Center.

3.2 JURISDICTIONAL WATERS AND WETLANDS

This section summarizes the information in the Jurisdictional Delineation Report (JDR) for the project (AECOM 2012). A total of 619.97 acres of potential jurisdictional waters and wetlands occurs within the BSA. Of these 619.97 acres, 618.03 acres is considered potential waters of the U.S. and state and an additional 1.94 acres is considered potential waters of the state only.

Total jurisdictional waters of the U.S. and state are listed for each wetland habitat and other waters of the U.S. (in the form of wetlands, tidal waters, or nonwetland waters/ordinary high water mark) in Table 3-2. In addition to using the latest San Diego Regional Holland Code Classification System, riparian and wetland habitats have been classified according to *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). This classification system incorporates a hierarchical structure of systems, subsystems, and classes to identify wetland and habitat types. Hydrophytic vegetation was dominant within the wetland areas. The hydrophytic vegetation occurring within the survey area is vegetation typically associated with waters, wetlands, and riparian habitat occurring within this vicinity of California. A summary of the jurisdictional waters of the U.S. and state, with the corresponding regulatory authority, occurring within the survey area, is provided in Table 3-3.

Table 3-2
Potential Waters of the U.S. and State Occurring within the BSA[a]

Type of Jurisdictional Waters of the U.S.[b] and State	Type of Habitat (Holland et al. 1986 Oberbauer 1996, 2005, and Oberbauer et al. 2008)[c]	Type of Habitat (Cowardin et al. 1979)	Area of Aquatic Resource (acres)[d]
Jurisdictional Waters of the U.S.			
Wetland	Southern Coastal Brackish Marsh (52200)	Estuarine; Intertidal; Emergent, Persistent, Regularly Flooded, Mesosaline	131.37
Wetland	Southern Coastal Salt Marsh (52120)	Estuarine; Intertidal; Emergent, Persistent, Regularly Flooded, Mixohaline	262.11[e]
Wetland	Disturbed Wetland (11200)	Palustrine; Scrub/Shrub Broad-leaved, Deciduous, Seasonally Flooded, Fresh	1.15
Wetland	Sandbar Willow Scrub (63000)	Palustrine; Scrub/Shrub Broad-leaved, Deciduous, Seasonally Flooded, Fresh	8.94
Wetland	Southern Willow Scrub (63320)	Palustrine; Scrub/Shrub Broad-leaved, Deciduous, Seasonally Flooded, Fresh	60.99
Other Waters	Drainage Features/ Nonvegetated Channel (64200)	Riverine; Unconsolidated Bottom, Sand, Intermittently Flooded, Fresh	0.6 (3,640 linear feet)
Tidal Waters	Open Water/Subtidal Estuary (64131)	Estuarine; Subtidal; Unconsolidated Bottom, Mud, Mixohaline	40.2
Other Waters	Open Water/Saltpan (64300)	Palustrine; Unconsolidated Bottom; Mud, Temporarily Flooded Saturated, Hyperhaline	37.0
Tidal Waters	Open Water/Tidal Mudflat (64200)	Estuarine; Subtidal; Unconsolidated Bottom, Mud, Regularly Flooded, Mixohaline	75.8
Subtotal Jurisdictional Waters of the U.S.			*618.2*
Jurisdictional Waters of the State			
Rip-Rapped Banks (Tidal Inlet Banks)	Disturbed Wetland (11200)	Riverine; Tidal; Artificial Substrate Irregularly Exposed, Mixohaline	1.9
Subtotal Jurisdictional Waters of the State			*1.9*
Grand Total Jurisdictional Waters			**620.1**

[a] Based on the total area of potential waters of the U.S. (including wetlands) delineated within the Reserve. Potential jurisdictional waters occurring within the Biological Study Area are relevant to California Coastal Commission, California Department of Fish and Wildlife, Regional Water Quality Control Board, and U.S. Army Corps of Engineers (Corps) regulatory administration (i.e., will require permitting and authorization of a proposed regulated activity to occur within jurisdictional aquatic features).

[b] Final acreages for jurisdictional waters of the U.S. will be based on the Jurisdictional Determination (JD) process per the March 30, 2007, U.S. Army Corps of Engineers Jurisdictional Determination Form Guidebook (Corps 2007); the June 5, 2007, Approved JD Form; the June 5, 2007, Joint Guidance Memorandum; and Regulatory Guidance Letter (RGL) 08-02 and December 2, 2008, Guidance Memorandum. At the time of writing the formal Jurisdictional Delineation Report, no formal JD process (of a significant nexus [SNX] to a traditional navigable waterway [TNW]) for these delineated waters has been undertaken by Corps. A JD will need to be performed for this jurisdictional delineation to confirm that Corps will assert jurisdiction over potential jurisdictional waters delineated in this report. For this jurisdictional delineation, per RGL 08-02 (4)(a), the applicant (e.g., San Elijo Lagoon Conservancy) has elected to use a Preliminary JD in the interest of expeditiously obtaining Section 404 permit authorization (see below).

[c] The *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986) does not provide classifications for abiotic features. These habitat codes are based on Holland's descriptions suggested by Oberbauer et al. (2008). Disturbed habitats are included as jurisdictional aquatic features.

[d] Jurisdictional waters acreage of the survey area was determined by utilizing ArcGIS. All acreages are rounded to the nearest hundredth (which may account for minor rounding error).

[e] The 262.1 acres of southern coastal saltmarsh is composed of three components or saltmarsh zones: low coastal saltmarsh (4.7 acres), middle coastal saltmarsh (137.4 acres), and high coastal saltmarsh (120.0 acres).

Table 3-3
Summary of Jurisdictional Waters of the U.S. and State Occurring within the Reserve

Type of Jurisdictional Waters of the U.S. and State	Regulatory Authority	Area (acres)
Jurisdictional Waters of the U.S.[a]		
Other Waters	CCC, CDFW, RWQCB, and Corps	37.6
Tidal Waters	CCC, CDFW, RWQCB, and Corps	116.0
Wetland	CCC. CDFW, RWQCB, and Corps	464.6
Subtotal Jurisdictional Waters of the U.S.		*618.2*
Jurisdictional Waters of the State		
Tidal Inlet Bank	CCC, CDFW, and RWQCB	1.9
Subtotal Jurisdictional Waters of the State Only		*1.9*
Grand Total Jurisdictional Waters		**620.1**

CCC = California Coastal Commission; CDFW = California Department of Fish and Wildlife; RWQCB = Regional Water Quality Control Board; Corps = U.S. Army Corps of Engineers

[a] Jurisdictional waters of the U.S. include jurisdictional waters of the state and are under the purview of Corps and CDFW.

3.3 FLORA

This section discusses plant species detected within the BSA or with potential to occur within the BSA. Approximately 411 plant species occur within San Elijo Lagoon; of these species, 113 are nonnative. This list is compiled from three different sources: AECOM 2010 rare plant surveys, BioBlitz (2009), and Tom Chester (2003). A comprehensive list of plant species occurring within San Elijo Lagoon is included in Appendix A. Appendix C also includes background information from BioBlitz.

Sensitive plant species are species that are either legally protected under the federal ESA or CESA or other regulations. Plant species that are not legally protected under the CESA and/or ESA 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 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, Jepson Online Interchange (2010), and input from SELC staff, 32 sensitive plant species were determined to have some potential to occur in the BSA based on habitat conditions and regional location (Table 3-4). It should be noted that 22 of the 32 sensitive plant species were detected within the BSA during the 2010 botanical surveys. These 22 sensitive plant species are shown in Table 3-4 and their locations are mapped in Figure 3-2.

The 22 sensitive plant species found to be present in the BSA are discussed in detail below, organized by federally listed, state-listed, and nonlisted plant species.

3.3.1 Federally Listed Plant Species

Of the 32 sensitive plant species determined to have potential to occur in the BSA, three are listed as federally endangered; Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), coastal dunes milkvetch (*Astragalus tener* var. *titi*), and salt marsh bird's-beak (*Cordylanthus maritimus* ssp. *maritimus*).

Of these three, only Del Mar manzanita was found present within the BSA.

Del Mar Manzanita

Within San Diego County, this evergreen shrub is only found from Torrey Pines State Reserve north to Encinitas. Del Mar manzanita occurs in chaparral, often with chamise and wart-stemmed ceanothus (*Ceanothus verrucosus*) on eroding sandstone. Del Mar manzanita is found in the Diegan coastal sage scrub/chaparral community in the southern central portion of the BSA, just west of I-5.

3.3.2 State-Listed Plant Species

Of the 32 sensitive plant species determined to have potential to occur in the BSA, three are listed as state endangered: coastal dunes milkvetch, Orcutt's goldenbush (*Hazardia orcuttii*), and salt marsh bird's-beak. Of these three, only Orcutt's goldenbush was found within the BSA.

Orcutt's Goldenbush

Orcutt's goldenbush is found from San Diego County south to Baja California, Mexico. Open chaparral with chamise and Diegan coastal sage scrub is the preferred habitat of this species (Reiser 2001). Approximately 25 Orcutt's goldenbush individuals were detected in nonnative grassland Diegan coastal sage scrub in the eastern portion of the BSA.

Table 3-4
Sensitive Plant Species Detected or with Potential to Occur within the BSA

Common Name Scientific Name	**Sensitivity Status[1]**	**General Habitat Description (CNPS 2010)**	**Plant Habit Flowering Period**	**Detected (D) or Not Detected (ND)[2]**	**Probability of Occurrence**
spineshrub[2] *Adolphia californica*	CNPS: List 2.1	Chaparral, coastal scrub, and valley and foothill grassland/clay soils. Elevation 147–2,430 feet.	Deciduous shrub, blooms December–May.	D	Present. Approximately 200 individuals are present in an area of nonnative grassland in the far eastern portion of the BSA.
aphanisma *Aphanisma blitoides*	CNPS: List 1B.2 MSCP: Covered	Coastal bluff scrub, coastal dunes, and coastal scrub/sandy. Elevation 3–920 feet.	Annual herb, blooms March – June.	ND	High potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 2 miles south of the BSA.
Del Mar manzanita[3] *Arctostaphylos glandulosa* ssp. *Crassifolia*	ESA: Endangered CNPS: List 1B.1 MSCP: Covered	Chaparral/maritime, sandy. Elevation 0–1,200 feet.	Evergreen shrub, blooms December–June.	D	Present. This species is present within the Diegan coastal sage scrub/chaparral community in the southern portion of the BSA.
San Diego sagewort[2] *Artemisia palmeri*	CNPS: List 4.2	Chaparral, coastal scrub, riparian forest, riparian scrub, and riparian woodland. Elevation 50–3,000 feet.	Deciduous shrub, blooms May–September.	D	Present. Several hundred individuals are present in southern willow scrub and coastal salt marsh habitat types in the southwestern portion of the BSA.
coastal dunes milkvetch *Astragalus tener* var. *titi*	ESA: Endangered CESA: Endangered CNPS: List 1B.1	Coastal bluff scrub, coastal dunes, coastal prairie. Elevation 0–150 feet.	Annual herb, blooms March–May.	ND	Moderate potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 25 miles south of the BSA.
Coulter's saltbush *Atriplex coulteri*	CNPS: List 1B.2	Coastal bluff scrub, coastal dunes, and coastal scrub, valley and foothill grassland. Elevation 3–1,300 feet.	Perennial herb, blooms March–October.	ND	Moderate potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 6.5 miles east of the BSA.

Common Name **Scientific Name**	**Sensitivity Status[1]**	**General Habitat Description (CNPS 2010)**	**Plant Habit Flowering Period**	**Detected (D) or Not Detected (ND)[2]**	**Probability of Occurrence**
south coast saltscale *Atriplex pacifica*	CNPS: List 1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, and playas. Elevation 0–450 feet.	Annual herb, blooms March–October.	ND	Moderate potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 15 miles north of the BSA.
Davidson's saltscale *Atriplex serenana* var. *davidsonii*	CNPS: List 1B.2	Coastal bluff scrub and coastal scrub. Elevation 30–600 feet.	Annual herb, blooms April–October.	ND	Moderate potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 18 miles south of the BSA.
Lewis's evening-primrose[3] *Camissonia lewisii*	CNPS: List 3	Coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, and valley and foothill grassland. Elevation 0–900 feet.	Annual herb, blooms March–May.	D	Present. This species is present within the Diegan coastal sage scrub/chaparral community.
wart-stemmed ceanothus[2] *Ceanothus verrucosus*	CNPS: List 2.2 MSCP: Covered	Chaparral. Elevation 3–1,200 feet.	Evergreen shrub, blooms December–May.	D	Present. Several hundred individuals are present in the Diegan coastal sage scrub/chaparral community in the southwestern portion of the BSA.
southern tarplant *Centromadia parryi* ssp. *australis*	CNPS: List 1B.1	Marshes and swamps, valley and foothill grassland, and vernal pools. Elevation 0–1,300 feet.	Annual herb, blooms May–November.	ND	High potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 2.1 miles south of the BSA.
smooth tarplant *Centromadia pungens* ssp. *laevis*	CNPS: List 1B.1	Chenopod scrub, meadows and seeps, playas, riparian woodland, and valley and foothill grassland. Elevation 0–2,500 feet.	Annual herb, blooms April–September.	ND	Moderate potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 18 miles north of the BSA.

Common Name Scientific Name	**Sensitivity Status**[1]	**General Habitat Description (CNPS 2010)**	**Plant Habit Flowering Period**	**Detected (D) or Not Detected (ND)**[2]	**Probability of Occurrence**
Orcutt's pincushion[2] *Chaenactis glabriuscula* var. *orcuttiana*	CNPS: List 1B.1	Coastal bluff scrub and coastal dunes. Elevation 9–300 feet.	Annual herb, blooms January–August.	D	Present. Approximately 1,000 individuals were detected within the coastal strand community in the western portion of the BSA.
summer holly[3] *Comarostaphylis diversifolia* ssp. *diversifolia*	CNPS: List 1B.2	Chaparral and cismontane woodland. Elevation 90–1,700 feet.	Evergreen shrub, blooms April–June.	D	Present. This species is present within the Diegan coastal sage scrub/chaparral community.
salt marsh bird's-beak *Cordylanthus maritimus* ssp. *maritimus*	ESA: Endangered CESA: Endangered CNPS: List 1B.2 MSCP: Covered	Coastal dunes and marshes and swamps. Elevation 0–100 feet.	Annual, hemiparasitic herb, blooms May–October.	ND	Moderate potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 26 miles south of the BSA.
sea dahlia[2] *Coreopsis maritima*	CNPS: List 2.2	Coastal bluff and coastal scrub. Elevation 20–500 feet.	Perennial herb, blooms March–May.	D	Present. Approximately 900 individuals are present in the Diegan coastal sage scrub community in the southwestern portion of the BSA.
Del Mar Mesa sand aster *Corethrogyne filaginifolia* var. *filaginifolia* (*Corethrogyne filaginifolia* var. *linifolia*)	Formerly CNPS List 1B.1	Coastal bluff and coastal scrub. Elevation 20–500 feet.	Perennial herb, blooms May–September	D	Present. This species is present within the Diegan coastal sage scrub/chaparral community. Due to recent taxonomic changes, the variety *C. filaginifolia* var. *linifolia* has been lumped with *C. filaginifolia* var. *filaginifolia*. Thus, *C. filaginifolia* var. *linifolia* is no longer considered a valid taxon. *C. filaginifolia* var. *filaginifolia* is not considered sensitive by the CNPS.
western dichondra[3] *Dichondra occidentalis*	CNPS: List 4.2	Chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland. Elevation 150–1,500 feet.	Rhizomatous herb, blooms March–July.	D	Present. This species is present within the Diegan coastal sage scrub/chaparral community in the southeastern portion of the BSA.
coast wallflower[2] *Erysimum ammophilum*	CNPS: List 1B.2 MSCP: Covered	Chaparral, coastal dunes, and coastal scrub. Elevation 0–250 feet.	Perennial herb, blooms February–June.	D	Present. Approximately 250 individuals are present in the Diegan coastal sage scrub community in the southwestern portion of the BSA.

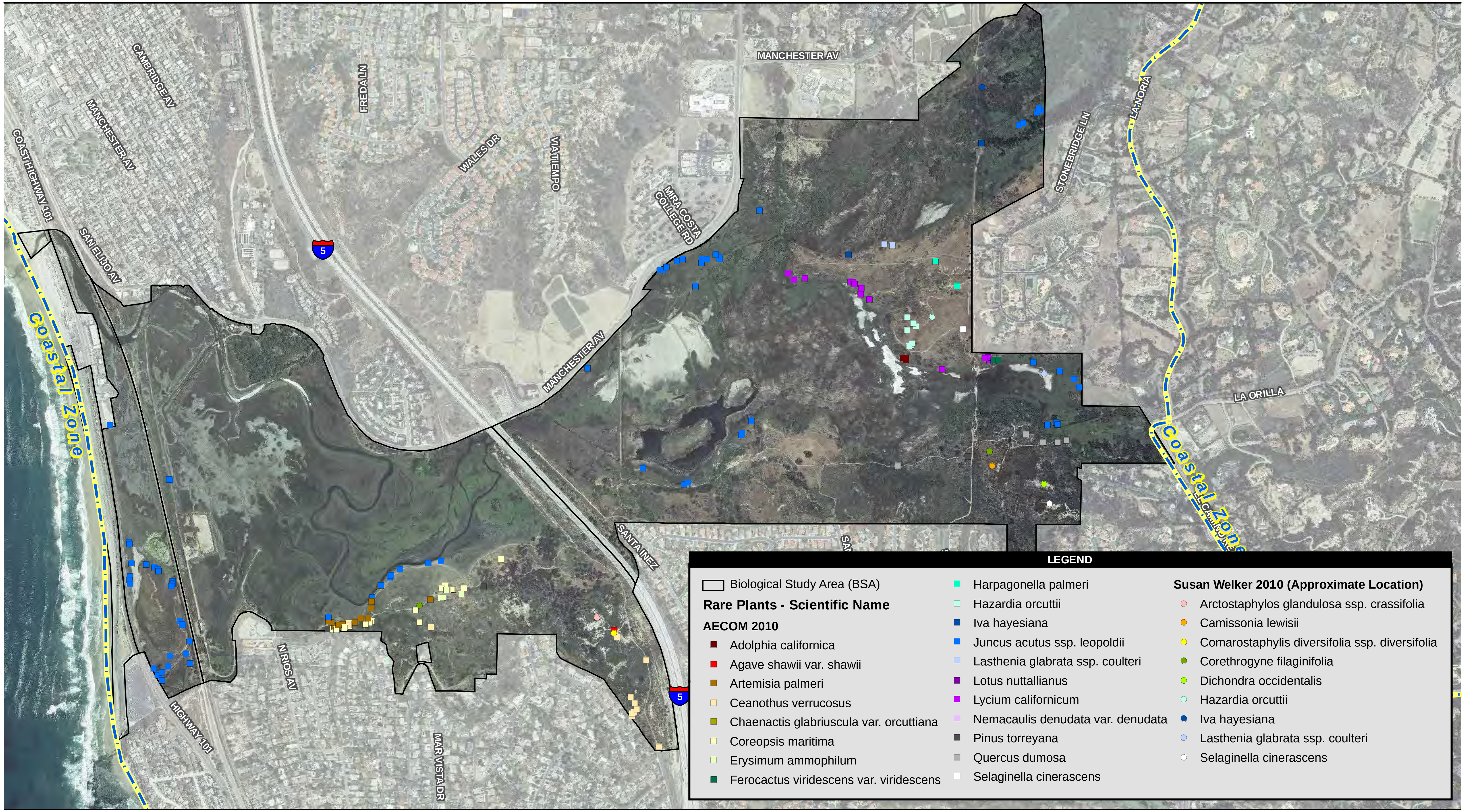
Common Name **Scientific Name**	**Sensitivity Status[1]**	**General Habitat Description (CNPS 2010)**	**Plant Habit Flowering Period**	**Detected (D) or Not Detected (ND)[2]**	**Probability of Occurrence**
coast barrel cactus[2] *Ferocactus viridescens* var. *viridescens*	CNPS: List 2.1 MSCP: Covered	Chaparral, coastal scrub, valley and foothill grassland, and vernal pools. Elevation 9–1,400 feet.	Stem succulent, blooms May–June.	D	Present. Approximately 30 individuals are present in the Diegan coastal sage scrub community in the eastern portion of the BSA.
Palmer's grapplinghook[2] *Harpagonella palmeri*	CNPS: List 4.2	Chaparral, coastal scrub, and valley and foothill grassland. Elevation 60–3,000 feet.	Annual herb, blooms March–May.	D	Present. Several hundred individuals are present within the nonnative grassland community in the eastern portion of the BSA.
Orcutt's goldenbush[2] *Hazardia orcuttii*	CESA: Threatened CNPS: List 1B.1	Chaparral and coastal scrub. Elevation 250–300 feet.	Evergreen shrub, blooms August–October.	D	Present. This species is present within the nonnative grassland community in the eastern portion of the BSA.
San Diego marsh-elder[2,3] *Iva hayesiana*	CNPS: List 2.2 MHCP	Marshes, swamps, and playas. Elevation 30–1,600 feet.	Perennial herb, blooms April–October.	D	Present. Approximately 150 individuals are present within the brackish marsh and salt marsh communities in the northeastern portion of the BSA.
southwestern spiny rush[2] *Juncus acutus* ssp. *leopoldii*	CNPS: List 4.2	Coastal dunes, meadows and seeps, and marshes and swamps. Elevation 9–3,000 feet.	Perennial herb, blooms, May–June.	D	Present. Several hundred individuals are scattered throughout the brackish marsh and salt marsh communities.
Coulter's goldfields[2,3] *Lasthenia glabrata* ssp. *coulteri*	CNPS List 1B.1	Marshes and swamps, playas, and vernal pools Elevation 3–4,000 feet.	Annual herb, blooms February–June.	D	Present. Approximately 10,000 individuals are present within coastal salt marsh/saltpan communities in the eastern portion of the BSA.
Nuttall's lotus[2] *Lotus nuttallianus*	CNPS: List 1B.1 MSCP: Covered	Coastal dunes and coastal scrub Elevation 0–40 feet.	Annual herb, blooms March–June.	D	Present. Several hundred individuals are present within the coastal strand community in the western portion of the BSA.
California desert thorn[2] *Lycium californicum*	CNPS: List 4.2	Coastal bluff scrub and coastal scrub. Elevation 20–500 feet.	Shrub, blooms March–August.	D	Present. Approximately 100 individuals are present within the Diegan coastal sage scrub community in the eastern portion of the BSA.
Coast woolly-heads[2] *Nemacaulis denudata* var. *denudata*	CNPS: List 1B.1	Coastal Dunes. Elevation 0–300 feet.	Annual herb, blooms April–September.	D	Present. Several hundred individuals are present within the coastal strand community in the western portion of the BSA.

Common Name Scientific Name	Sensitivity Status[1]	General Habitat Description (CNPS 2010)	Plant Habit Flowering Period	Detected (D) or Not Detected (ND)[2]	Probability of Occurrence
Torrey pine[2] *Pinus torreyana* var. *torreyana*	CNPS: List 1B.2 MSCP: Covered	Closed-cone coniferous forest and chaparral/sandstone. Elevation 300–700 feet.	Evergreen coniferous tree	D	Present. Approximately 20 individuals are scattered throughout the BSA.
Brand's star phacelia *Phacelia stellaris*	CNPS: List 1B.1	Coastal dunes and coastal scrub. Elevation 3–1,200 meters.	Annual herb, blooms March–June.	ND	Moderate potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 17 miles north of the BSA.
Nuttall's scrub oak[2] *Quercus dumosa*	CNPS: List 1B.1	Closed-cone coniferous forest, chaparral, and coastal scrub. Elevation 50–1,200 feet.	Evergreen shrub, blooms February–April.	D	Present. Several individuals are present within the Diegan coastal sage scrub/chaparral community in the southeastern portion of the BSA.
mesa spike-moss[2,3] *Selaginella cinerascens*	CNPS: List 4.1	Chaparral and coastal scrub Elevation 60–2,000 feet.	Rhizomatous herb.	D	Present. Several colonies are present within the nonnative grassland and Diegan coastal sage scrub communities in the eastern portion of the BSA.
estuary seablite *Suaeda esteroa*	CNPS: List 1B.2	Marshes and swamps. Elevation 0–20 feet.	Perennial herb, blooms May–October.	ND	High potential of occurrence within the BSA due to presence of potential habitat; however, this species was not detected during project surveys. The closest known occurrence of this species is 2.5 miles south of the BSA.

[1] **Sensitivity Status Key**
ESA: Federal Endangered Species Act (ESA) Endangered
CESA: California Endangered Species Act (CESA) Endangered
CNPS: California Native Plant Society Lists:
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] AECOM 2010 Rare Plant Survey data

[3] Susan Welker 2010 Rare Plant Survey data



Source: SANDAG 2012; SanGIS; AECOM 2014

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 3-2
Rare Plants within the Survey Area

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3.3.3 Nonlisted Special-Status Plant Species

Twenty-eight special-status plant species determined to have potential to occur in the BSA are considered sensitive by the CNPS (List 1, 2, 3, or 4). Of these 28 nonlisted sensitive plant species, 20 were found within the BSA, as shown in Figure 3-2, and are discussed below.

Spineshrub

Spineshrub (*Adolphia californica*) is often intermixed with Diegan coastal sage scrub habitat but sometimes occurs on the periphery of chaparral habitat (Reiser 2001). Associates often include California buckwheat (*Eriogonum fasciculatum*) and coastal sagebrush. Spinebrush is found on a south-facing hillside, in an area of moderately dense Diegan coastal sage scrub in the eastern portion of the BSA.

San Diego Sagewort

San Diego sagewort (*Artemisia palmeri*) is found from coastal southern California south to Baja California, Mexico. San Diego sagewort is usually found near the coast growing in the shaded understory of willow, western sycamore, and western cottonwood. San Diego sagewort is found in the southwestern portion of the BSA among willow and western cottonwood, but also in more open areas on the periphery of the southern coastal salt marsh habitat. Due to dense shrub cover, polygons could not be delineated around entire populations of San Diego sagewort; therefore, points indicating this species represent several individuals in Figure 3-2.

Lewis's Evening-Primrose

Lewis's evening-primrose (*Camissonia lewisii*) is found from coastal southern California south to Baja California, Mexico. This small annual herb is frequently found in very sandy substrates near the coast, typically on coastal bluffs (Reiser 2001). This species is found within an open, sandy area of Diegan coastal sage scrub in the southeastern portion of the BSA.

Wart-Stemmed Ceanothus

Wart-stemmed ceanothus (*Ceanothus verrucosus*) is found from coastal southern California south to Baja California, Mexico. This species is usually found in coastal chaparral with chamise and mission manzanita and can become dominant where it occurs, especially on north-facing slopes (Reiser 2001). Wart-stemmed ceanothus is found in open to dense patches, scattered throughout the Diegan coastal sage scrub habitat in the southwestern portion of the BSA. Due to steep terrain, polygons around entire populations could not be delineated; therefore, points in Figure 3-2 may represent several individuals.

Orcutt's Pincushion

Orcutt's pincushion (*Chaenactis glabriuscula* var. *orcuttiana*) is endemic to southern California, limited to sandy areas in coastal dunes and bluffs. This species is restricted to the coastal strand community in the far western portion of the BSA (east of West Highway 101 only). Recent road repair activities have removed many plants in this population.

Summer Holly

Summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*) is found from southern California south to Baja California, Mexico. Its preferred habitat is in chaparral on north-facing slopes, often with toyon (*Heteromeles arbutifolia*) and chamise. The majority of occurrences of summer holly occur west of I-15 (Reiser 2001). Summer holly is found in the Diegan coastal sage scrub/chaparral habitat in the far southeastern corner of the BSA.

Sea Dahlia

Sea dahlia (*Coreopsis maritima*) is found from southern California south to Baja California, Mexico. This species is found near the ocean on highly eroding sandstone cliffs. Herbivory pressure is believed to play a role in the utilization of the cliff habitat (Reiser 2001). Sea dahlia is restricted to the eroding cliff sides within the Diegan coastal sage scrub habitat in the southwestern portion of the BSA. Due to steep terrain, polygons could not be delineated around entire populations of sea dahlia; therefore, points in Figure 3-2 may represent several individuals.

Western Dichondra

Western dichondra (*Dichondra occidentalis*) is found along the coast from Santa Barbara County south to Baja California, Mexico. Chaparral, Diegan coastal sage scrub, grasslands, and post-burn habitat can all be utilized by western dichondra (Reiser 2001). This species is found in the southeastern portion of the BSA in Diegan coastal sage scrub/chaparral habitat.

Coast Wallflower

Coast wallflower (*Erysimum ammophilum*) is endemic to California and is found near the coast from Monterey to San Diego County. Old eroded dunes, now well back of the existing beachline, and sandy locales in chaparral openings are the preferred habitat of this species (Reiser 2001).

Coast wallflower is found on the eroding hillsides within the Diegan coastal sage scrub community in the southwestern portion of the BSA. Due to steep terrain, polygons could not be delineated around entire populations; therefore, points in Figure 3-2 may represent several individuals.

Coast Barrel Cactus

Coast barrel cactus (*Ferocactus viridescens* var. *viridescens*) occurs from San Diego County south to Baja California, Mexico. This species typically occurs on hillsides within Diegan coastal sage scrub and can also occasionally be found on the edge of vernal pools (Reiser 2001). Coast barrel cactus is found at the transition point between Diegan coastal sage scrub and coastal salt marsh in the eastern portion of the BSA.

Palmer's Grapplinghook

Palmer's grapplinghook (*Harpagonella palmeri*) ranges from southern California south to Baja California, Mexico. Open grassy slopes or open Diegan coastal sage scrub on clay soils is the preferred habitat of this species (Reiser 2001). Several hundred individuals of Palmer's grapplinghook are found in an open area of nonnative grassland in the eastern portion of the BSA.

San Diego Marsh-Elder

San Diego marsh-elder (*Iva hayesiana*) is found from San Diego County south to Baja California, Mexico. This species occurs on sandy to cobbly embankments in creeks and streambeds with a semi-open canopy (Reiser 2001. San Diego marsh-elder is present within the southern willow scrub and coastal brackish marsh communities in the eastern portion of the BSA. Due to dense shrub cover, polygons could not be delineated around entire populations. Points in Figure 3-2 may represent several individuals.

Southwestern Spiny Rush

Southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*) 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 scattered throughout the BSA in southern coastal salt marsh and brackish marsh habitats.

Coulter’s Goldfields

Coulter’s goldfields (*Lasthenia glabrata* ssp. *coulteri*) ranges from southern California south to Baja California, Mexico. This species occurs in coastal marshes at the upper end of tidal influence (Reiser 2001). Coulter’s goldfields is found in southern coastal salt marsh along the periphery of the saltpan in the northeastern portion of the BSA and in the southeastern portion of the BSA along both sides of a utility access road. Coulter’s goldfields was not present at the point indicated by Susan Welker (2010); however, this area is highly suitable habitat and this species may have previously occurred at this location.

Nuttall’s Lotus

Nuttall’s lotus (*Lotus nuttallianus*) is found from San Diego County south to Baja California, Mexico. This species prefers coastal dunes, especially well-protected dunes with minimal human disturbance. Nuttall’s lotus is close to extinction in the United States and is a candidate for federal endangered status (Reiser 2001). Nuttall’s lotus is found within the coastal strand habitat in the far western portion of the BSA, but east of Highway 101.

California Desert Thorn

California desert thorn (*Lycium californicum*) occurs along the coast from southern California south to Baja California, Mexico. This species prefers coastal bluff scrub and Diegan coastal sage scrub. California desert thorn occurs in Diegan coastal sage scrub just upslope from southern coastal salt marsh in the eastern portion of the BSA.

Coast Woolly-Heads

Coast woolly-heads (*Nemacaulis denudata* var. *denudata*) occurs along the coast from southern California south to Baja California, Mexico. This species prefers coastal dunes, especially well-protected dunes with minimal human disturbance. This species is almost extirpated in San Diego County due to heavy beach recreation (Reiser 2001). Coast woolly-heads is found within the coastal strand habitat in the far western portion of the BSA.

Torrey Pine

Torrey pine (*Pinus torreyana* var. *torreyana*) is endemic to California and is found in San Diego County and Santa Rosa Island. Closed-cone coniferous forest along the coast near Del Mar intermixed with chaparral is the mainland habitat of the Torrey pine (Reiser 2001). This species is found in small numbers scattered throughout the BSA in upland habitat.

Nuttall’s Scrub Oak

Nuttall’s scrub oak (*Quercus dumosa*) occurs along the coast from southern California south to Baja California, Mexico. This species prefers coastal chaparral with a relatively open canopy (Reiser 2001). Nuttall’s scrub oak is found within the Diegan coastal sage scrub/chaparral community in the southeastern portion of the BSA.

Mesa Spike-Moss

Mesa spike-moss (*Selaginella cinerascens*) occurs from southern California south to Baja California, Mexico. This species prefers open chaparral and Diegan coastal sage scrub on undisturbed soils (Reiser 2001). Large colonies of mesa spike-moss are found within the Diegan coastal sage scrub community in the southeastern portion of the BSA.

3.4 FAUNA

This section discusses wildlife species detected, or with potential to occur, within the BSA. A review of the wildlife studies outlined in Chapter 2.0 found that over 500 wildlife species (including invertebrates) have been detected at San Elijo Lagoon. This includes 213 insect species, 28 spider species, 24 aquatic invertebrates, 23 fish species, over 20 reptile and amphibian species, over 295 avian species (including 65 nesting), and 24 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.

3.4.1 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. During the 2009 BioBlitz, 213 species of insects and 28 spider species were detected. The complete list of species identified during the BioBlitz is not available at this time.

Marine invertebrate species detected during sampling from 2007 through 2009 include *Palaemon macrodactylus*, *Neotrypaea* sp., *Hemigrapsus oregonensis*, *Uca* sp., *Majidae* sp., *Pachygrapsus crassipes*, *Cancer* sp., *Polydora nuchalis*, *Polydora* sp., *Capitella capitata*, *Spiophanes missionensis*, *Lacuna* sp., *Cylichna culcitella*, *Tagelus californianus*, *Certhidea californica*, *Tellina* sp., *Protothaca staminea*, *Chione californiensis*, *Ostrea sp*, *Lottia* sp., *Mytilus californianus*, *Tellina carpenteri*, *Aplysia californica*, *Aplysia vaccaria*, and *Navanax intermis*.

Fish

The open water habitat in the lagoon supports many marine fish and several freshwater or brackish water fish species. Marine fish detected within the BSA include California killifish (*Fundulus parvipinnis*), arrow goby (*Clevelandia ios*), cheekspot goby (*Ilypnus gilberti*), shadow goby (*Quietula ycauda*), yellowfin goby (*Acanthogobius flavimanus*), longjaw mudsucker (*Gillichthys mirabilis*), California halibut (*Paralichthys californicus*), diamond turbot (*Hypsopsetta guttulata*), topsmelt (*Atherinops affinis*), jacksmelt (*Atherinops californiensis*), northern anchovy (*Engraulis mordax*), deepbody anchovy (*Anchoa compressa*), striped mullet (*Mugil cephalus*), California butterfly ray (*Gymnura marmorata*), bat ray (*Myliobatis californica*), spotted sand bass (*Paralabrax maculatofasciatus*), opaleye (*Girella nigricans*), staghorn sculpin (*Leptocottus armatus*), gray smoothhound (*Mustelus californicus*), bay pipefish (*Sygnathus leptorhynchus*), and barred pipefish (*Sygnathus auliscus*). Freshwater or brackish water species detected include carp (*Cyprinus carpio*) and black bullhead (*Ictalurus melas*).

Reptiles and Amphibians

The riparian and upland vegetation communities present on-site 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 California legless lizard (*Anniella pulchra*), western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), southern alligator lizard (*Elgaria multicarinata*), tiger whiptail (*Aspidoscelis tigris*), and western rattlesnake (*Crotalus oreganus*).

Birds

The high diversity of bird species at the lagoon is a result of upland, riparian, open water, and coastal interface within the BSA. Riparian areas typically have a higher diversity of bird species than other habitats in coastal southern California due to the increased structural diversity of the habitat in comparison to surrounding more arid scrub habitat. The riparian habitat at San Elijo Lagoon is unique in that it borders with the coastal zone and has large areas of open water. This provides habitat for coastal bird species and bird species that are typically found along freshwater riparian areas. Many upland bird species also use the adjacent riparian habitat for resources. Coastal sage scrub habitat also supports a rich diversity of birds. In addition, the large block of riparian, open water, and upland habitats provide a stopover for many migratory bird species.

Avian species commonly detected within the BSA include snowy egret (*Egretta thula*), house finch (*Carpodacus mexicanus*), mallard (*Anas platyrhynchos*), great egret (*Ardea alba*), Anna's hummingbird (*Calypte anna*), double-crested cormorant (*Phalacrocorax auritus*), willet (*Catoptrophorus semipalmatus*), song sparrow (*Melospiza melodia*), gadwall (*Anas strepera*), black phoebe (*Sayornis nigricans*), California towhee (*Pipilo crissalis*), American wigeon (*Anas americana*), mourning dove (*Zenaida macroura*), bushtit (*Psaltriparus minimus*), great blue heron (*Ardea herodias*), savannah sparrow (*Passerculus sandwichensis*), American crow (*Corvus brachyrhynchos*), whimbrel (*Numenius phaeopus*), western scrub-jay (*Aphelocoma californica*), American coot (*Fulica americana*), northern mockingbird (*Mimus polyglottos*), pied-billed grebe (*Podilymbus podiceps*), marbled godwit (*Limosa fedoa*), common yellowthroat (*Geothlypis trichas*), white-crowned sparrow (*Zonotrichia leucophrys*), northern shoveler (*Anas clypeata*), spotted towhee (*Pipilo maculatus*), yellow-rumped warbler (*Dendroica coronata*), lesser goldfinch (*Carduelis psaltria*), house sparrow (*Passer domesticus*), and red-tailed hawk (*Buteo jamaicensis*). A complete list of avian species detected during monthly bird counts and the BioBlitz is included in Appendix B.

Mammals

Several species of mammals use the upland habitat surrounding the lagoon. Additionally, numerous flying insects around the lagoon provide foraging opportunities for several bat species. Mammal species detected within the BSA include red bat (*Lasiurus borealis*), Yuma myotis (*Myotis yumanensis*), western mastiff bat (*Eumops perotis*), Mexican free-tailed bat (*Tadarida brasiliensis*), coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), southern mule deer (*Odocoileus hemionus fulginata*), California ground squirrel (*Spermophilus beecheyi*), pocket gopher (*Thomomys bottae*), dusky-footed woodrat (*Neotoma fuscipes*), and desert cottontail (*Sylvivlagus audubonii*).

3.4.2 Special-Status Species

Based on a CNDDB search and literature review, 98 special-status wildlife species have potential to occur within the BSA (CDFG 2011; BioBlitz 2009; Patton 2010; SELC 2011; MEC 2002). Table 3-5 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 Figures 3-3 through 3-6. 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 2.2.4 and considered resident/breeding within the BSA are provided below and summarized in Table 3-5. Those special-status species with potential to occur but would be considered migrants/nonbreeding season residents (no suitable breeding habitat is present on-site), are only discussed in Table 3-5; they are not discussed further in the text. Note that species are considered present (detected) within the BSA if they were detected during the studies outlined in Section 2.2.4 Table 2-3.

Table 3-5
Special-Status Species Potentially Occurring or Known to Occur in the BSA

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
Invertebrates					
western beach tiger beetle *Cicindela latesignata latesignata*	City MHCP: Covered	Coastal salt marshes and mudflats.	ND	Yes	Moderate – Closest documented locations are from 1984 on Coronado Island (CDFG 2011).
globose dune beetle *Coelus globosus*	City MHCP: Covered	Coastal dune habitat and sand hummocks immediately along the coast. Burrows in the sand and is often found under dune vegetation.	ND	Yes	Moderate – Populations are reported in the Tijuana Estuary and San Onofre State Beach (SBMNH 2011).
sandy beach tiger beetle *Cicindela hirticollis gravid*	City MHCP: Covered	Dune habitat near the ocean with moist sand.	ND	Yes	Moderate – Closest CNDDB location is from Del Mar in 1979 and this location is considered extirpated (CDFG 2011). Other locations are south in Mission Bay and north in Santa Barbara (CDFG 2011; SBMNH 2011).
wandering (=saltmarsh) skipper *Panoquina errans*	City MHCP: Covered	Restricted to estuarine and tideland habitats where adults are often associated with salt grass (*Distichlis spicata*).	D	Yes	Known to occur – Suitable habitat within the BSA. Thirteen individuals were detected during surveys in July 2010.
Reptiles and Amphibians					
western spadefoot toad *Spea* (*Sacphiopus*) *hammondii*	CDFW: Species of Special Concern North County MSCP: Covered City MHCP: 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.	ND	Yes	High – Detected adjacent to the East Basin in December 2001 (MEC 2002).

Common Name Scientific Name	**Sensitivity Status[1]**	**Habitat Requirements**	**Detected (D) or Not Detected (ND)[2]**	**Potential to Breed within BSA**	**Probability of Occurrence**
southwestern pond turtle *Actinemys marmorata pallid*	CDFW: Species of Special Concern North County MSCP: 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.	ND	Yes	Moderate – Suitable habitat for this species occurs within the BSA; however, this species has an extremely limited range distribution. Closest documented location is at Lake Hodges approximately 8 miles east (CDFG 2011).
green sea turtle (*Chelonia mydas*)	USFWS: Endangered and Threatened	Often found from July through September off the coast of California. A population is known to occur within South San Diego Bay year-round. Prefers eelgrass beds as forage and influx of warmer waters.	ND	No	Low potential occur. Resident population in San Diego Bay and occurrences documented in Mission Bay to the south. Rooted submerged aquatic plants are present such as surfgrass and widgeongrass that sea turtles may forage on.
loggerhead sea turtle (*Caretta caretta*)	USFWS: Endangered and Threatened	The California coast is part of the migratory range of the North Pacific population segment of loggerheads. As an omnivore, prefers hard-shelled benthic invertebrates, foraging in nearshore habitats.	ND	No	Very low potential to occur within the BSA during high tide. Potential prey items such as striped shore crabs (*Pachygrapsus crassipes*) and California horn snails (*Cerithidea californica*) have been observed within the BSA, which loggerheads may forage within.
San Diego coast horned lizard *Phrynosoma coronatum* (*blainvillei*)	CDFW: Species of Special Concern North County MSCP: Covered City MHCP: Covered	A variety of habitats including sage scrub, chaparral, and coniferous and broadleaf woodlands (Stebbins 2003). Found on sandy or friable soils with open scrub. Requires open areas, bushes, and fine loose soil.	ND	Yes	High – Suitable habitat is present within the upland scrub habitat within the BSA. Individuals were detected prior to 2002 south of the lagoon east and west of Interstate 5 (MEC 2002).
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 (CDFG 1988).	ND	Yes	High – Suitable habitat is present within the nonnative grassland and coastal sage scrub habitat in the BSA. Individuals were detected prior to 2002 south of the lagoon (MEC 2002).

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
orange-throated whiptail *Aspidoscelis hyperythra beldingi*	CDFW: Species of Special Concern North County MSCP: Covered City MHCP: Covered	A variety of habitats including sage scrub, chaparral, and coniferous and broadleaf woodlands (Stebbins 2003). Found on sandy or friable soils with open scrub. Requires open areas, bushes, and fine loose soil.	D	Yes	Known to Occur – This species was detected within the BSA during the BioBlitz (2009).
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.	D	Yes	Known to Occur – This species was detected within the BSA during the BioBlitz (2009).
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 (CDFG 1988). Prefers open habitats with friable or sandy soils, burrowing rodents for food, and enough cover to escape predation.	ND	Yes	Moderate – Suitable habitat present; however, this species is sensitive to fragmentation and edge effects from urban habitat. The closest documented location is at Del Dios Open Space Reserve approximately 9 miles to the northeast (CDFG 2011).
two-striped gartersnake *Thamnophis hammondii*	CDFW: Species of Special Concern North County MSCP: Covered	Aquatic habitats, preferably rocky streams with protected pools, cattle ponds, marshes, vernal pools, and other shallow bodies of water lacking large aquatic predators.	ND	Yes	High – Individuals were detected prior to 2002 in the Central and East Basins of the BSA (MEC 2002).

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
red-diamond rattlesnake *Crotalus ruber ruber*	CDFW: Species of Special Concern North County MSCP: Covered	Chaparral, coastal sage scrub, along creek banks, and in rock outcrops or piles of debris. Habitat preferences include dense vegetation in rocky areas.	ND	Yes	Moderate – Habitat is present within the BSA: however, this species is sensitive to edge effects. The closest documented location is approximately 6 miles to the east in Rancho Santa Fe just west of Camino Del Sur (CDFG 2011).
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 eelgrass and seaweed within estuaries.	D	No	Known to Occur – Detected during the BioBlitz (2009). Occurs within the 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 but has been recorded breeding in north coastal area of San Diego County.	ND	Yes	Moderate – Bred within the BSA in 1976 (SELC 2011; Unitt 2004).
common loon *Gavia immer*	CDFW: Species of Special Concern (nesting)	Widespread along the coast both in the ocean and within tidal bays and estuaries.	D	No	Known to Occur – Detected during the BioBlitz (2009). Common winter resident in San Diego County but does not breed within the BSA (Unitt 2004).
fork-tailed storm-petrel *Oceanodroma furcata*	CDFW: Species of Special Concern (nesting)	This species breeds in Alaska, Canada, and northwestern North America with Humboldt County being the southern limit of the species' breeding range. Offshore typically.	ND	No	Low – Historically detected within the BSA; however, the last detection date is unknown (SELC 2011). Does not breed in San Diego County (Unitt 2004).
black storm-petrel *Oceanodroma melania*	CDFW: Species of Special Concern (nesting)	Breeds on small rocky islands or talus slopes of larger islands. Breeding colonies located on offshore islands of Los Coronados in Baja California Mexico (Unitt 2004).	ND	No	Low – Not typically seen near the shore. Historically detected within the BSA; however, the last detection date is unknown (SELC 2011).

Common Name Scientific Name	**Sensitivity Status[1]**	**Habitat Requirements**	**Detected (D) or Not Detected (ND)[2]**	**Potential to Breed within BSA**	**Probability of Occurrence**
wood stork *Mycerterua anerucana*	CDFW: Species of Special Concern	Freshwater marsh and mudflats.	ND	No	Moderate – Historically detected within the BSA (SELC 2011). There are no recent records at San Elijo, but one to two have 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).
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.	D	No	Known to Occur – Detected during the BioBlitz (2009) and monthly bird counts. Foraging habitat within the BSA. Breeding has not been confirmed within the BSA (Unitt 2004). Known to nest on cliffs in La Jolla and 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.	D	No	Known to Occur – Detected during monthly bird counts and historically detected within the BSA (SELC 2011). This species is a migrant visitor within the BSA.
California brown pelican *Pelecanus occidentalis californicus*	CDFW: Fully Protected (nesting) City MHCP: Covered	Common along the coast where they dive for fish. 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 northern Gulf of California and along Pacific coast of California and Baja California.	D	No	Known to Occur – Detected during the BioBlitz (2009) and monthly bird counts. Winter and migrate within the BSA. The 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)	Marsh habitats or large emergent wetlands with cattails (*Typha* sp.) and tules.	ND	Yes	Moderate – Nesting within the BSA was last documented in 1982 (SELC 2011). Least bitterns are historically known to nest within the BSA (King et al. 1987).

Common Name **Scientific Name**	**Sensitivity Status**[1]	**Habitat Requirements**	**Detected (D) or Not Detected (ND)**[2]	**Potential to Breed within BSA**	**Probability of Occurrence**
white faced ibis *Plegadis chihi*	CDFW: Watch List North County MSCP: Covered City MHCP: 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.	D	No	Known to Occur – Detected during monthly bird counts. Only two known nesting colonies (Guajome Lake and San Luis Rey River) in San Diego County. Foraging habitat present within the BSA.
Ridgway's rail *Rallus longirostris levipes*	USFWS: Endangered CDFW: Endangered, Fully Protected North County MSCP: Covered City MHCP: Covered	Found in southern California in coastal salt marshes, especially those dominated by cordgrass. The Tijuana River estuary is an especially important site.	D	Yes	Known to Occur – Detected during species-specific surveys (Zembal et al. 2011 and 2013) and monthly bird counts. Suitable breeding habitat exists within the BSA (Patton 2010).
sandhill crane *Crus canadensis*	CDFW: Species of Special Concern or Fully Protected (nesting)	Winter residents or visitors. Typical in farm fields and marsh areas.	ND	No	Low – Only one confirmed spring migrant at San Elijo Lagoon in 1998 (Unitt 2004).
western snowy plover *Charadrius alexandrinus nivosus*	USFWS: Threatened CDFW: Species of Special Concern City MHCP: Covered	Nests on beaches, dunes, and salt flats in San Diego County, with the highest concentrations in two areas: Marine Corps Base Camp Pendleton and Silver Strand. Outside the breeding season species is more widespread but not common along the county's coast.	D	Yes	Known to Occur – Detected during monthly bird counts. Historically nested within the BSA and the last documented breeding attempt was in 2002 (Patton 2002).
long-billed curlew *Numenius americanus*	USFWS: BCC CDFW: Watch List City MHCP: Covered	Nests primarily in short-grass or mixed-prairie habitat with flat to rolling topography.	D	No	Known to Occur – Detected during the BioBlitz (2009) and monthly bird counts. San Diego County is outside this species' breeding range (Unitt 2004).

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
laughing gull *Larus atricilla*	CDFW: Watch List (nesting)	Nests on sandy or rocky shores and on salt-marsh islands.	ND	No	Low – Historically detected within the BSA; however, the last detection date is unknown (SELC 2011). San Diego County is outside this species' breeding range (Unitt 2004).
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.	D	No	Known to Occur – Detected during the BioBlitz (2009) and 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) City MHCP: 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.	D	Yes	Known to Occur – Detected during species-specific surveys (Patton 2011, 2012b) and monthly bird counts. Historically nested within the BSA (Patton 2010). Suitable nesting habitat is present within the BSA.
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.	ND	No	Low – Last detected within the BSA in 1988 (MEC 2002; SELC 2011). Only known to breed in San Diego Bay (Unitt 2004).
black tern *Childonias niger*	CDFW: Species of Special Concern (nesting)	Nests in colonies within marshes.	ND	No	Low – Last detected within the BSA in 1997 (SELC 2011). Closest nesting colony is in Central Valley and is only migrant visitor (Unitt 2004).
elegant tern *Sterna elegans*	CDFW: Watch List (nesting) City MHCP: Covered	Intensely gregarious. Feeds on off shore fish, principally anchovies.	D	No	Known to Occur – 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).

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
black rail *Laterallus jameicensis coturniculus*	USFWS: BCC CDFW: Threatened	Found in southern California coastal marshes.	ND	No	Low – Historically detected within the BSA; however, the last detection date is unknown (SELC 2011). 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.	D	No	Known to Occur – Detected during monthly bird counts. Breeding has not been confirmed within the BSA and observations are presumed migrants or nonbreeding individuals (Unitt 2004).
Cassin’s auklet *Ptychoramphus aleuticus*	USFWS: BCC CDFW: Species of Special Concern (nesting)	A small stocky seabird that nests in colonies on islands from Alaska to Mexico. Feeds on plankton in the open ocean. Rarely seen from shore.	ND	No	Low – Historically detected within the BSA; however, the last detection date is unknown (SELC 2011). Does not breed onshore within San Diego County (Unitt 2004).
Xantu’s murrelet *Synthliboramphus hypoleucus*	USFWS: Candidate, BCC CDFW: Threatened (nesting)	An offshore species along the west coast. Breeds on islands off of southern California and Baja, Mexico.	ND	No	Moderate – Historically detected within the BSA; however, the last detection date is unknown (SELC 2011). Does not breed in San Diego County (Unitt 2004). Nearest breeding colony is on Los Coronados Islands (Unitt 2004).
rhinoceros auklet *Cerorhinca monocerata*	CDFW: Watch List (nesting)	Breeds colonially on islands up to several thousand acres, either forested or covered in grass or dense forbs.	ND	No	Moderate – Historically detected and bred within the BSA (SELC 201). San Diego County is outside this species’ breeding range (Unitt 2004).
osprey *Pandion haliaetus*	CDFW: Watch List (nesting) North County MSCP: Covered City MHCP: 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.	D	Yes	Known to Occur – Detected during the BioBlitz (2009) and monthly bird counts. Suitable foraging and breeding habitat is present within the BSA.

Common Name **Scientific Name**	**Sensitivity Status**[1]	**Habitat Requirements**	**Detected (D) or Not Detected (ND)**[2]	**Potential to Breed within BSA**	**Probability of Occurrence**
white-tailed kite *Elanus leucurus majusculus*	CDFW: Fully Protected (nesting and wintering)	Widespread over the coastal slope of San Diego County preferring riparian woodlands, oak groves, or sycamore groves, adjacent to grasslands.	D	Yes	Known to Occur – Detected during the BioBlitz (2009) and monthly bird counts. Breeding has been documented within the BSA (Unitt 2004). Suitable nesting and foraging habitat occurs throughout the BSA.
northern harrier *Circus cyaneus*	CDFW: Species of Special Concern (nesting) North County MSCP: Covered City MHCP: Covered	Breeds predominantly in wetland habitats but will also use upland habitats. Prefers grasslands and agricultural fields during migration and in winter.	D	Yes	Known to Occur – 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.	D	No	Known to Occur – Detected during monthly bird counts. Suitable migratory and wintering habitat for the species occurs within the BSA. It is unlikely that this species nests within the BSA.
Cooper's hawk *Accipiter cooperi*	CDFW: Watch List (nesting) City MHCP: Covered	Usually in oak woodlands, but occasionally in willow or eucalyptus woodlands.	D	Yes	High – Detected during the BioBlitz (2009) and monthly bird counts. Nesting habitat is present within the BSA.
ferruginous hawk *Buteo regalis*	USFWS: BCC CDFW: Watch List (wintering)	Open country, primarily plains, prairies, badlands, sagebrush, shrubland, and desert.	ND	No	Moderate – Last detected within the BSA prior to 2002 (MEC 2002; SELC 2011). No suitable breeding habitat within the BSA.

Common Name Scientific Name	**Sensitivity Status[1]**	**Habitat Requirements**	**Detected (D) or Not Detected (ND)[2]**	**Potential to Breed within BSA**	**Probability of Occurrence**
golden eagle *Aquila chrysaetos*	USFWS: BCC CDFW: Fully Protected and Watch List (nesting and wintering) North County MSCP: 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.	ND	No	Not Expected – Last detected within the BSA in the 1950s (MEC 2002; SELC 2011). Breeding has not been confirmed within the BSA (Unitt 2004). Suitable foraging habitat occurs in upland portions of the BSA.
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.	ND	No	Low – A tagged juvenile from Catalina Island was detected within the BSA in January 2001 (MEC 2002; SELC 2011). Rare annual winter visitor to San Diego County (Unitt 2004). No suitable nesting habitat within the BSA.
merlin *Falco columbarius*	CDFW: Watch List (wintering)	Marshes, deserts, seacoasts, near coastal lakes and lagoons, open woodlands, fields, etc. May roost in conifers.	D	No	Known to Occur – Detected during monthly bird counts. San Diego County is outside this species' breeding range (Unitt 2004).
American peregrine falcon *Falco peregrinus anatum*	USFWS: BCC CDFW: Fully Protected (nesting) City MHCP: Covered	Open areas from tundra, moorlands, steppe, and seacoasts to mountains and open forested regions, especially where there are suitable nesting cliffs.	D	No	Known to Occur – Detected during monthly bird counts and historically detected within the BSA (SELC 2011). This species is likely a migrant or wintering bird (Unitt 2004). Suitable nesting habitat does not exist in BSA.
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.	ND	No	Low – Last detected within the BSA in 1987 (MEC 2002; SELC 2011). 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	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
burrowing owl *Athene cunicularia*	USFWS: BCC CDFW: Species of Special Concern (nesting) North County MSCP: Covered City MHCP: Covered	Found mainly in grassland and open scrub from the seashore to foothills. Strongly associated with California ground squirrel (*Spermophilus beecheyi*) burrows.	ND	Yes	Low – Last detected within the BSA in 1980 (MEC 2002; SELC 2011). Nearest CNDDB location is by Del Mar (CDFG 2011). Breeding has not been confirmed within the BSA (Unitt 2004) and the habitat within the BSA is low quality.
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.	ND	Yes	Low – Last detected within the BSA in 1993 (MEC 2002; SELC 2011). Breeding has not been confirmed within the BSA (Unitt 2004). Low-quality breeding habitat present within the BSA.
short-eared owl *Asio flammeus*	CDFW: Species of Special Concern (nesting)	Primarily nests in marshes and grassland.	ND	No	Low – Last detected within the BSA in 1997(MEC 2002; SELC 2011). Only confirmed breeding 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.	ND	No	Low – Last detected within the BSA in 1988 (MEC 2002; SELC 2011). No breeding sites in San Diego County and only occurs as a rare migrant (Unitt 2004).
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.	D	No	Known to Occur – Detected during the monthly bird counts. This species is a migrant and does not breed in San Diego County (Unitt 2004).
olive-sided flycatcher *Contopis cooperi*	USFWS: BCC CDFW: Watch List (nesting)	An uncommon summer resident of coniferous woodlands in San Diego County.	D	No	Known to Occur – Detected during the BioBlitz (2009). Once nested within the BSA in 1982 (Unitt 2004), but habitat within the BSA is not typical for this species and breeding is not expected to occur.

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
southwestern willow flycatcher *Empidonax traillii extimus*	USFWS: Endangered CDFW: Endangered (nesting) North County MSCP: Covered City MHCP: Covered	Restricted to a few colonies in riparian woodlands scattered throughout southern California. Riparian forests are integral to this species' persistence.	D	Yes	Known to Occur – Historically detected within the BSA, with most recent observation from 2011 (Patton 2012a). Breeding has not been confirmed within the BSA (Unitt 2004).
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.	ND	No	Low – Historically detected within the BSA (SELC 2011). Because of the known migration and nesting ranges of the species, the species is considered a rare occurrence in the BSA and is not likely to nest 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.	ND	Yes	Moderate – Last detected within the BSA prior to 2002 (SELC 2011). Suitable habitat is present within the BSA and the species is known to winter within the region (Unitt 2004).
least Bell's vireo *Vireo bellii pusillus*	USFWS: Endangered CDFW: Endangered (nesting) North County MSCP: Covered City MHCP: 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).	D	Yes	Known to Occur – Has been recorded during monthly bird counts. Suitable nesting habitat is present within the BSA (Patton 2010).
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.	ND	No	Low – Historically detected within the BSA; however, last detection date is unknown (SELC 2011). Not likely to breed within the BSA due to the low elevations (Unitt 2004).

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
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.	ND	Yes	Low – Last detected within the BSA prior to 2002 (MEC 2002; SELC 2011). Low-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.	ND	No	Low – Historically detected within the BSA (SELC 2011). 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.	ND	No	Low – Rare migrant recorded at San Elijo in 1980, 1981, 1984 (King et al. 1987), and September 1989, July 1997, and August 1997 (Patton 2010). Only known colony extirpated from San Diego County and last reported nesting anywhere in southern California was in 1976 (Unitt 2004).
coastal cactus wren *Campylorhynchus brunneicapillus couesi*	USFWS: BCC CDFW: Species of Special Concern North County MSCP: Covered City MHCP: Covered	Coastal sage scrub with extensive stands of tall prickly pear or cholla cacti (*Opuntia* sp.).	ND	Yes	Low – Last detected within the BSA in 1981 (SELC 2011). The nearest CNDDB locations are considered extirpated (CDFG 2011) and all observations nearby have been recorded only before 1997 (Unitt 2004). Breeding has not been confirmed within the BSA (Unitt 2004). Low- quality habitat present within BSA.

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
coastal California gnatcatcher *Polioptila californica californica*	USFWS: Threatened CDFW: Species of Special Concern North County MSCP: Covered City MHCP: 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.	D	Yes	Known to Occur – Detected during the BioBlitz (2009) and monthly bird counts. Nests within the BSA (Patton 2010).
western bluebird *Sialia mexicana*	City MHCP: Covered	Frequents open woodlands for foraging, but requires suitable roosting and nesting cavities usually in snags. Availability of snags may limit population density.	D	Yes	Known to Occur – Detected during the BioBlitz (2009) and monthly bird counts. 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 (CDFG 2003).	ND	No	Low – Last detected within the BSA in 1964 (SELC 2011). No breeding habitat within the BSA. This species may be a rare winter or migrant visitor within the BSA.
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.	ND	No	Low – Historically detected within the BSA (SELC 2011). This species is not known to breed in San Diego County (Unitt 2004).
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.	D	Yes	Known to Occur – Detected during the BioBlitz (2009) and monthly bird counts. Suitable breeding and foraging habitat is present within the BSA.

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
yellow-breasted chat *Icteria virens*	CDFW: Species of Special Concern (nesting) North County MSCP: Covered	Riparian woodland, with a dense undergrowth.	D	Yes	Known to Occur – Detected during the BioBlitz (2009) and monthly bird counts. Suitable breeding and foraging habitat is present within the BSA.
southern California rufous-crowned sparrow *Aimophila ruficeps canescens*	CDFW: Watch List North County MSCP: Covered City MHCP: Covered	Grassy or rocky slopes with open scrub at elevations from sea level to 2,000 feet. Occurs mainly in coastal sage scrub.	ND	Yes	Moderate – Last detected within the BSA in 1987 (SELC 2011). Nearest CNDDB location is approximately 0.5 mile northeast of the BSA. Moderate-quality habitat present within the BSA.
Bell's sage sparrow *Amphispiza belli belli*	USFWS: BCC CDFW: Watch List North County MSCP: Covered City MHCP: Covered	Occurs mainly in coastal sage scrub and chaparral habitats.	ND	Yes	Moderate – Historically detected within the BSA; however, the last detection date is unknown (SELC 2011). Breeding has not been confirmed within the BSA (Unitt 2004).
Belding's savannah sparrow *Passerculus sandwichensis beldingi*	CDFW: Endangered City MHCP: Covered	Locally common in open grassy or weedy areas throughout San Diego County.	D	Yes	Known to Occur – Breeds within the BSA (Unitt 2004). Commonly detected during monthly bird counts.
large-billed savannah sparrow *Passerculus sandwichensis rostratus*	CDFW: Species of Special Concern (wintering) City MHCP: Covered	Found along beaches and shores with marsh habitat.	ND	No	Low – Last detected within the BSA in 1991 (MEC 2002; SELC 2011). Does not breed in San Diego County (Unitt 2004).
grasshopper sparrow *Ammodramus savannarum perpallidus*	CDFW: Species of Special Concern (nesting) North County MSCP: Covered City MHCP: Covered	Arid grasslands with shrubs.	ND	Yes	Low – Last detected within the BSA in 1996 (MEC 2002; SELC 2011). Low potential breeding habitat within the BSA.

Common Name Scientific Name	**Sensitivity Status[1]**	**Habitat Requirements**	**Detected (D) or Not Detected (ND)[2]**	**Potential to Breed within BSA**	**Probability of Occurrence**
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.	ND	No	Low – Historically detected within the BSA (SELC 2011). Known to winter within the BSA (Unitt 2004).
tricolored blackbird *Agelaius tricolor*	USFWS: BCC CDFW: Species of Special Concern (nesting) North County MSCP: Covered City MHCP: Covered	Freshwater marshes with cattails and other emergent vegetation.,	ND	No	Moderate – Last detected within the BSA prior to 2002 (MEC 2002; SELC 2011). 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.	ND	No	Moderate – Last detected within the BSA prior to 2002 (MEC 2002; SELC 2011). Only one known nesting colony in San Diego County at Tule Lake (Unitt 2004). This species is a migrant or winter visitor to the BSA.
Mammals					
Mexican long-tongued bat *Choeronycteris mexicana*	CDFW: Species of Special Concern	In San Diego County, occurs primarily in urban areas. In Arizona and Mexico, found in deep canyons and in the mountains, foraging in riparian, desert scrub, and pinyon-juniper habitats, in particular on *Yucca* sp.	ND	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.	D	Yes	High – Detected during the BioBlitz (2009).
pocketed free-tailed bat *Nyctinomops femorosaccus*	CDFW: Species of Special Concern	Rugged cliffs, rocky outcrops, and slopes in desert shrub and pine oak forests.	ND	Yes	Moderate – Nearest CNDDB record is from 1988 within urban habitat a mile north of the BSA (CDFG 2011).

Common Name Scientific Name	**Sensitivity Status[1]**	**Habitat Requirements**	**Detected (D) or Not Detected (ND)[2]**	**Potential to Breed within BSA**	**Probability of Occurrence**
pallid bat *Antrozous pallidus*	CDFW: Species of Special Concern North County MSCP: 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.	ND	Yes	Moderate – Suitable breeding and foraging habitat exists within the BSA in uplands.
Townsend's (western) big-eared bat *Corynorhinus townsendii pallescens*	CDFW: Species of Special Concern North County MSCP: 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.	ND	No	Moderate – Habitat for roosting is marginal. Has not been observed within the BSA.
western red bat *Lasiurus blossevillii*	CDFW: Species of Special Concern	Feeds over grasslands, shrublands, open woodlands, forests, and croplands. Roosts primarily in trees and sometimes shrubs, often in edge habitats along streams, fields, or urban areas.	D	Yes	High – Detected during the BioBlitz (2009).
San Diego black-tailed jackrabbit *Lepus californicus bennettii*	CDFW: Species of Special Concern	Typical habitats include early stages of chaparral, open coastal sage scrub, and grasslands near the edges of brush.	ND	Yes	Moderate – Historically recorded within BSA as recent as 1990 (MEC 2002).
Dulzura California pocket mouse *Chaetodipus californicus femoralis*	CDFW: Species of Special Concern	Slopes covered with chaparral and live oaks.	ND	Yes	Low – Although suitable habitat for this species occurs in limited quantities in the BSA. The species has a very limited distribution and little is known about its range within the BSA.
northwestern San Diego pocket mouse *Chaetodipus fallax fallax*	CDFW: Species of Special Concern	Inhabits coastal sage scrub, sage scrub/grassland ecotones, and chaparral communities.	ND	Yes	High – Historically recorded within BSA as recent as 1990 (MEC 2002). A CNDDB location from 2002 is recorded in the northern portion of the Central Basin. Suitable habitat is present within coastal sage scrub and grassland habitat of the BSA.

Common Name Scientific Name	**Sensitivity Status[1]**	**Habitat Requirements**	**Detected (D) or Not Detected (ND)[2]**	**Potential to Breed within BSA**	**Probability of Occurrence**
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.	ND	Yes	Low – Historically recorded within BSA (MEC 2002); however, this record is from 1979.
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.	ND	Yes	Moderate – Potentially suitable breeding and foraging habit is present within the BSA (Figure 2-3). The nearest CNDDB record is from 2002 approximately 0.5 mile northeast of the BSA.
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.	ND	Yes	Moderate – Suitable breeding and foraging habitat occurs within the coastal sage scrub and chaparral habitat within the BSA.
American badger *Taxidea taxus*	CDFW: Species of Special Concern North County MSCP: Covered	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.	ND	Yes	High – Suitable breeding and foraging habitat occurs within the BSA.
mountain lion *Felis concolor*	CDFW: Legally protected species North County MSCP: Covered City MHCP: Covered	Rugged mountains, forests, deserts, and swamps.	ND	Yes	Moderate – Suitable breeding and foraging habitat for this species occurs throughout riparian and upland portions of the BSA. This species is susceptible to fragmentation and edge effects from development.

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Detected (D) or Not Detected (ND)[2]	Potential to Breed within BSA	Probability of Occurrence
southern mule deer *Odocoileus hemionus fulginata*	CDFW: Harvest species City MHCP: Covered	Coniferous forests, desert scrub, chaparral, and grassland with shrubs.	D	Yes	High – Detected during the BioBlitz (2009). Several families of southern mule deer inhabit the eastern end of the BSA (SELC 2014).
Harbor seals (*Phoca vitulina*)	MMPA	Permanent residents in the waters off of the San Diego coastline feeding on a variety of fish. Will forage on fish in shallow waters.	ND	No	Moderate potential to occur within the BSA. This species has the potential to occur at the mouth of the lagoon and in the west and central basin during higher tides to forage.
California sea lions (*Zalophus californianus*)	MMPA	Occurs along the entire California coast, and occurs year-round in the waters off the San Diego coast. Will forage on schooling fish in shallow waters.	ND	No	Moderate potential to occur within the BSA. This species has the potential to occur at the mouth of the lagoon and in the west and central basin during higher tides to forage.

[1] **Sensitivity Status Key**

Federal U.S. Fish and Wildlife Service (USFWS); BCC = Birds of Conservation Concern

State California Department of Fish and Wildlife (CDFW)

City: Covered Draft City of Encinitas Subarea Plan Proposed Covered Species

Coverage for the species within the Encinitas Subarea may be contingent on other MHCP cities that control major/critical locations or the majority of the species or its habitat. If no city is listed as a contingency, then the species will be covered within the Encinitas Subarea when Encinitas meets all Section 10(a), Natural Community Conservation Plan, and MHCP criteria within its boundaries.

North County MSCP: Covered Draft North County MSCP Proposed Covered Species

MMPA: Protected under Marine Mammal Protection Act

[2] **Findings**:

Species detected or not during studies outlined in Section 2.2.4, Table 2-3. Other previous detections are noted for reference, typically prior to 2001.

3.4.2.1 Federally Listed Species

Of the 94 special-status species with potential to occur within the BSA, six species are listed as federally threatened or endangered, were detected on-site during previous studies, and are considered resident/breeding within the BSA:

- Ridgway's rail,
- western snowy plover,
- California least tern,
- southwestern willow flycatcher,
- least Bell's vireo, and
- coastal California gnatcatcher.

These species are discussed in detail below.

Ridgway's Rail

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 species is restricted to coastal salt marshes in southern California where vegetation is dominated by 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. Ridgway's rail is a reclusive species and will nest and utilize relatively small patches of its preferred habitat when isolated from external anthropogenic disturbances (Zembal 2011; Zembal and Hoffman 2012).

Breeding pairs of the Ridgway's rail have been found at 22 marshes throughout its range since 1980. More recently, however, this number has declined, with Ridgway's rail s found in only 11 marshes in 1991. In 1990, the U.S. population of Ridgway's rail was estimated at 190 pairs (USFWS 1985). The Ridgway's rail ranges in disjunct populations from Santa Barbara County to San Diego County and into Baja California, Mexico. Ridgway's rail are uncommon, 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).

Habitat within the BSA

Within the BSA, the Ridgway's rail is a year-round resident at San Elijo Lagoon and can be heard calling in the evening, although it is rarely seen. Total number of breeding pairs in the lagoon has ranged from six to 31 over the past 5 years, with 15 breeding pairs recorded in 2010 and 2011 (Zembal et al. 2011), 31 pairs detected in 2012, and 20 pairs recorded in 2013 (Zembal et. al 2013). Breeding territories are usually focused in brackish marsh adjacent to saltmarsh, flats, and channels in the Central Basin north of the end of North Rios Avenue and adjacent to the Nature Center, and in the East Basin between the flood control dike and I-5, east of the south end of the dike, north of Santa Carina Street, and along Escondido Creek west of the power lines.

Surveys were conducted in appropriate breeding habitat. Ridgway's rail s were detected mostly by listening for the call of the rail. In some instances, a playback of a taped "duet" call was played to elicit responses. Ten of the vocalizing rails detected in 2011 were in freshwater marsh growth along the lagoon edges and Escondido Creek and five were in salt marsh habitat. In 2013, two pairs were detected in the west and central basins, while the remaining 18 pairs were detected in the eastern basin within the brackish marsh. Further counts detected Ridgway's rail s in 16 locations throughout the BSA (Figure 3-3).

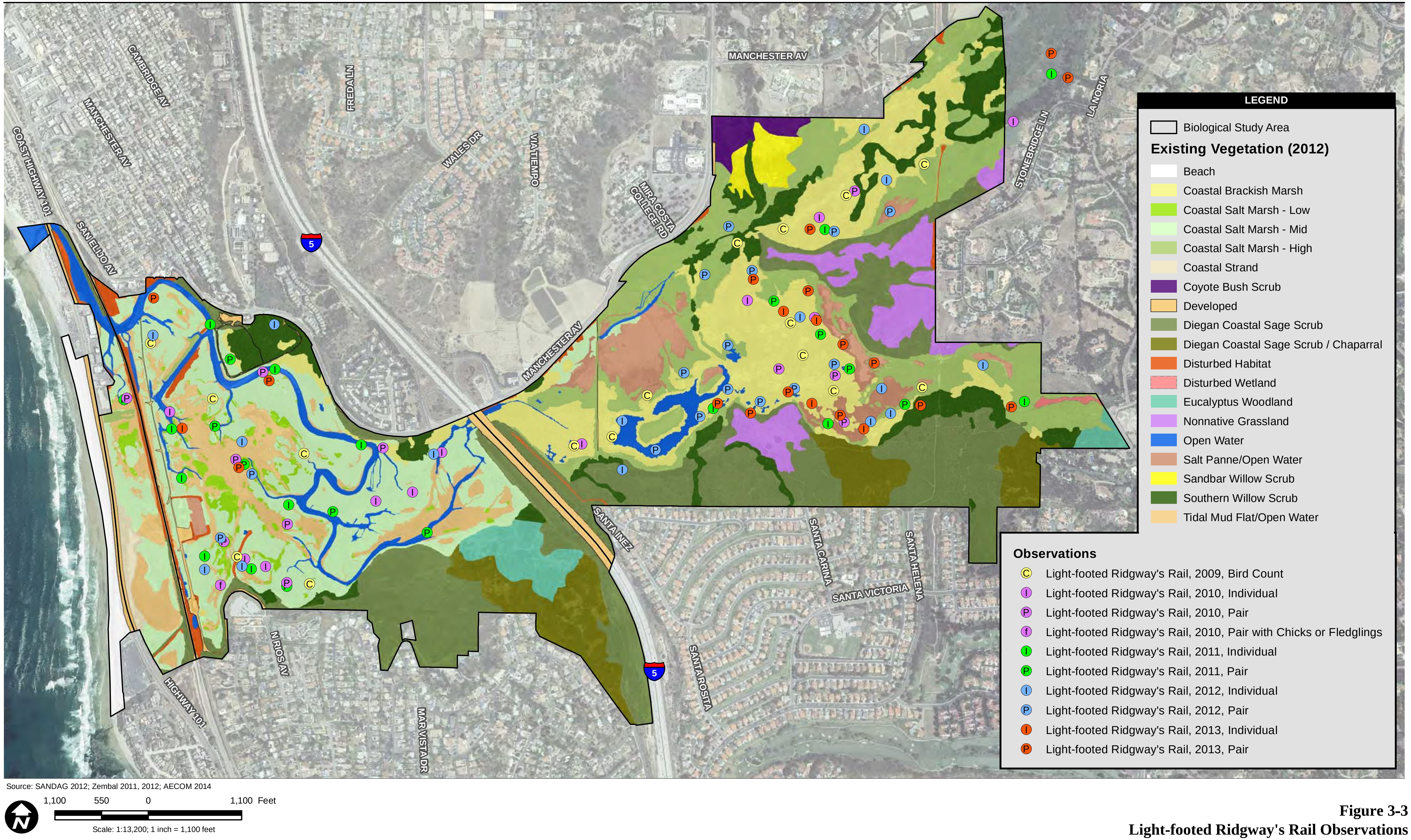
Western Snowy Plover

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 beach-surf interface, where they feed on small crustaceans, marine worms, insects, and amphipods. 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.

Habitat within the BSA

Within the BSA, western snowy plovers are regularly spotted foraging within mudflats. Up to 76 western snowy plover individuals were recorded within the lagoon and adjacent beach area on



Source: SANDAG 2012; Zembal 2011, 2012; AECOM 2014

Figure 3-3
Light-footed Ridgway's Rail Observations

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September 29, 2011 (Patton 2012b). Historically, plovers were recorded nesting within the BSA on the East Basin islands and East Basin dike. Post-breeding and wintering roosting flocks have been documented at Cardiff State Beach, which is adjacent to the BSA. Roost sites have varied but have included both sides of the mouth of the lagoon. No breeding has been recorded within the lagoon since 2002 (Patton 2010).

California Least Tern

The California least tern is federally and state listed as endangered. 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 the 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 and within 2 miles of roosting sites, although they are considered opportunistic and often shift their behavior in response to local prey patterns (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 2006a). In San Diego County, the least tern population has increased from approximately 500 pairs in the 1970s to 2,100–2,800 pairs in 1997–2002 and nearly 4,000 pairs in 2003 (Unitt 2004).

Habitat within the BSA

Within the BSA, the least tern is a common migrant and has been observed foraging. Records indicate that this species historically had a breeding population within the BSA. They have nested in colonies on saltpan, patches of sand on alluvial fans and channel edges, and on the two islands in the East Basin north of Santa Carina Street that were constructed by State Fish and Wildlife and County Public Works in 1981. Changes in flood patterns and habitat quality may have had a negative effect on the breeding success within the BSA. No breeding has been documented since 2002 (Patton 2010).

Least terns were observed in very limited numbers and only relatively late in the season in 2011. Two to three were reported on June 12 and five to seven on July 11 foraging throughout the lagoon and nearshore waters and roosting on mudflats in the lagoon. One fledgling was observed along the beach on July 22 and two adults on August 8. No nests were documented in 2011 and no on-ground tern activity was observed on the saltpan east of the east basin dike or in other potential nesting areas (Wolf 2010, 2011).

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 substantial 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.

Habitat within the BSA

Within the BSA, this species was observed in the riparian habitat near the nature center in the northwestern Central Basin in May and June of 2002, two in the same area on May 30, 2004, and one individual on June 3, 2007. An individual was also observed along a trail west of El Camino Real on June 11, 2007 (Patton 2010) and one individual was reported along the La Orilla Trail west of El Camino Real on May 15, 2010 (Patton 2012a).

Least Bell's Vireo

The least Bell's vireo was federally listed as endangered in 1986 and state listed as endangered in 1980. 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.

The 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 mid-successional riparian habitat is typically used for nesting by this vireo because this habitat supports the dense shrub cover required for nest concealment as well as a structurally diverse canopy for foraging (Kus 2002).

Habitat within the BSA

Within the BSA, this species has been recorded within southern willow scrub habitat. Observations of this species within willow scrub near the nature center were documented in 2007 (Patton 2010). In addition, breeding pairs were detected upstream of the La Bajada bridge in 2009 (Bache 2009). In 2011, breeding pairs were recorded adjacent to Escondido Creek and Lux Canyon Drainage (Patton 2011, 2012a).

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 (RECON 1987; 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.

Habitat within the BSA

The coastal California gnatcatcher is known to occur within the coastal sage scrub located on the slopes of the BSA. In 2009, gnatcatchers were recorded from 23 locations from within the BSA (Patton 2010). In 2010, gnatcatchers were recorded from 35 locations in the central and east basins (Patton 2012a). In 2011, gnatcatchers were recorded from 35 locations in all three basins (Patton 2012a) (Figure 3-4). The coastal California gnatcatcher is a resident breeder within the BSA (SELC 2009).

3.4.2.2 State-Listed Species

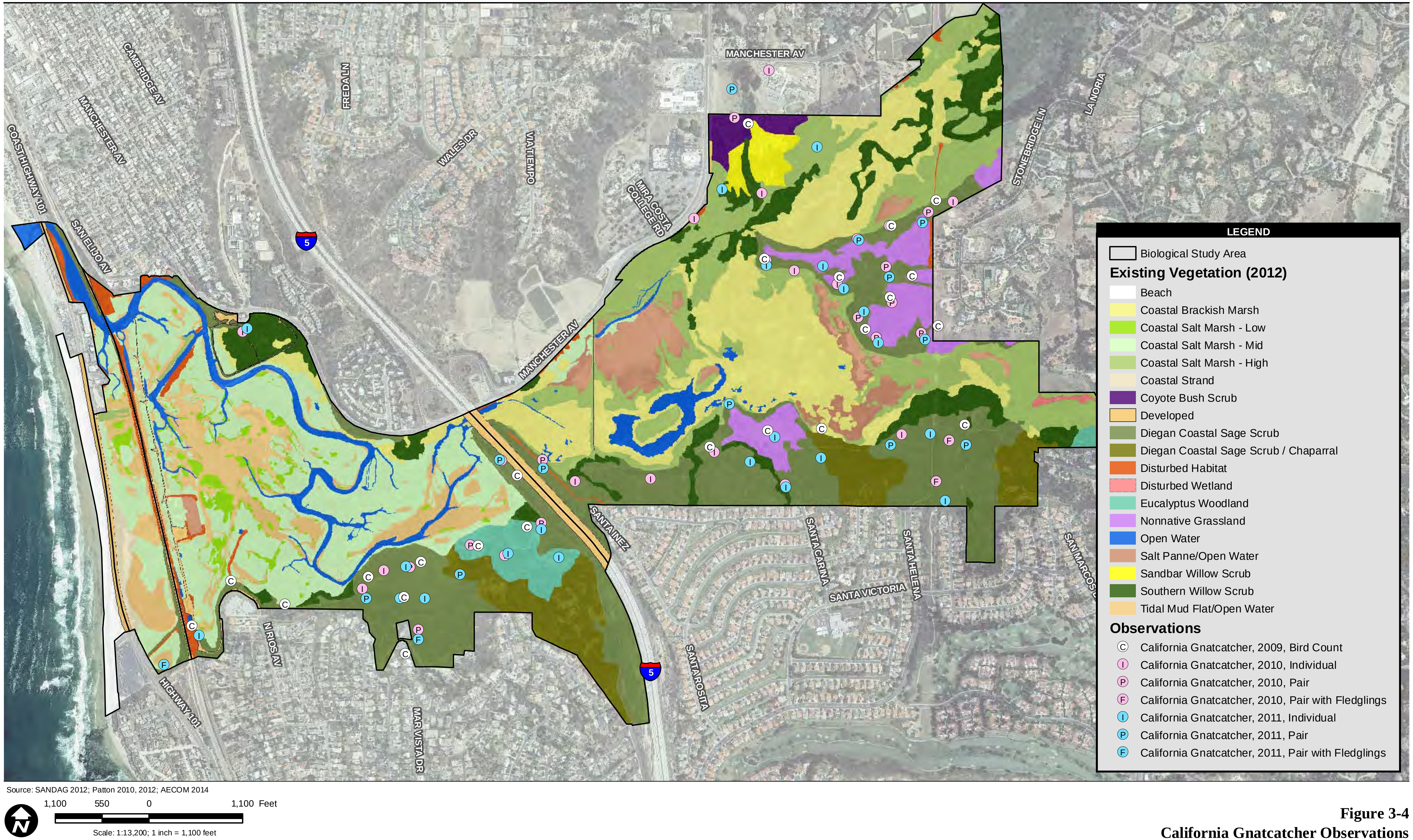
Of the 94 special-status species with potential to occur within the BSA, five species were listed as state threatened or endangered; were detected during previous studies; and are considered resident/breeding within the BSA:

- California least tern,
- least Bell’s vireo,
- Ridgway’s rail,
- southwestern willow flycatcher, and
- Belding’s savannah sparrow (*Passerculus sandwichensis beldingi*).

The California least tern, least Bell’s vireo, 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 pickleweed-dominated coastal salt marsh associations. This habitat is where the species forages and breeds; however, it can also be found foraging on mudflats and beaches in the vicinity of its preferred habitat. The primary threat to the species is the massive loss of coastal salt marsh habitat that has occurred in recent years.



Source: SANDAG 2012; Patton 2010, 2012; AECOM 2014

Figure 3-4
California Gnatcatcher Observations

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Habitat within the BSA

Within the BSA, the Belding's savannah sparrow is a common resident within the pickleweed marsh. Surveys were conducted within San Elijo Lagoon from 1973 through 2009. Surveys in 2009 by Robert Patton documented all observations of the sparrow within the lagoon with mapped locations and annotations of the behavior including, but not limited to, pairing, singing, posting/perching, chasing, foraging, and flying. Pairs included those observed nest building and feeding young. Many birds were observed demonstrating multiple behaviors, but final tallies were based on the behavior most indicative of territoriality. For example, if a bird was observed flying, then posting, and then singing, it was categorized as singing. All individuals observed involved in chases were seen to eventually pair, post, or sing, so chase does not appear as a category in the final tally. Birds observed in flight or foraging were not included in pair estimates since they likely were mates of those observed displaying territorial behaviors. Surveys in 2009 indicated that 136 pairs occurred within the BSA (Patton 2010). No species-specific surveys were conducted for Belding's savannah sparrow during 2010 and 2011. During 2010 and 2011 monthly bird counts, this species was observed in several locations in all three basins (Patton 2012) (Figure 3-5).

3.4.2.3 Nonlisted Special-Status Species

In addition to the federally listed and state-listed species discussed above, 13 nonlisted special-status wildlife species were detected during previous studies and are considered resident/breeding within the BSA. Nonlisted special-status species with potential to occur in the BSA, but not detected during historic surveys, are reviewed in Table 3-5 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 Table 3-5 and not addressed further in the text.

Nonlisted special-status wildlife species detected during previous studies and considered resident/breeding within the BSA include wandering (salt marsh) skipper (*Panoquina errans*), orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), silvery legless lizard (*Anniella pulchra pulchra*), Cooper's hawk (*Accipiter cooperi*), northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), western bluebird (*Sialia Mexicana*), white-tailed kite (*Elanus leucurus majuscules*) yellow warbler (*Dendroica petechia brewsteri*), yellow-breasted chat (*Icteria virens*), California (western) mastiff bat (*Eumops perotis californicus*), western red bat (*Lasiurus blossevillii*), and southern mule deer (*Odocoileus hemionus fulginata*). 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 saltgrass. 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 (Busnardo et al. 1989; Emmel and Emmel 1973). Native nectar sources include deerweed (*Lotus scoparius*), salty susan (*Jaumea carnosa*), 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 (Busnardo 1989).

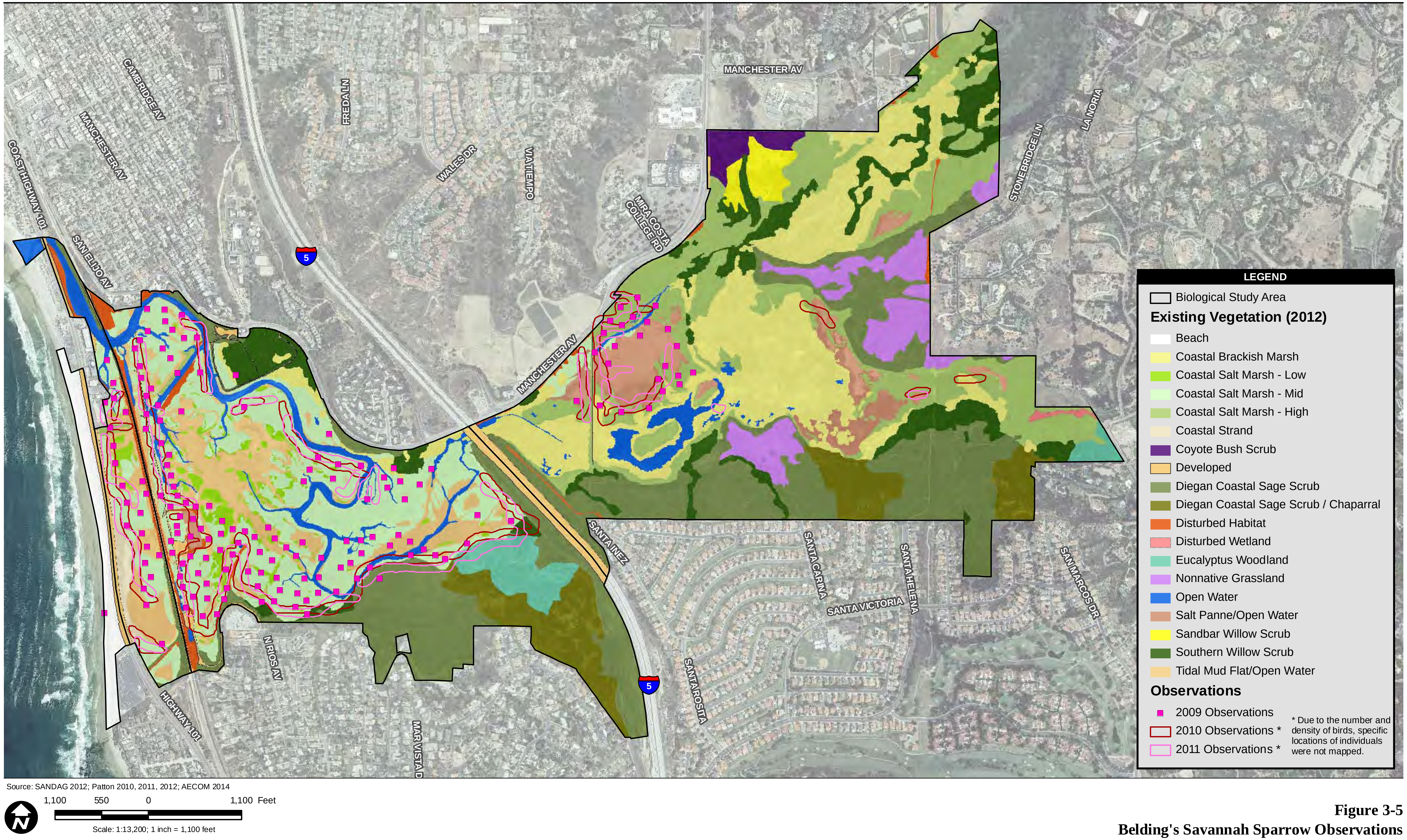
Habitat within the BSA

This species was detected during surveys in July and August 2010. Thirteen individuals were detected across the West, Central, and East Basins during the July surveys and 57 individuals were detected in the Central Basin during the August surveys (Figure 3-6). Suitable breeding and foraging habitat is present throughout the BSA.

Reptiles and Amphibians

Orange-Throated Whiptail

The orange-throated whiptail is a state species of special concern. In California, this subspecies is found on the west side of the Peninsular Ranges between sea level and 3,000 feet, in the southernmost counties (CDFG 1988). Orange-throated whiptails inhabit washes, streams, terraces, and other sandy areas associated with some perennial plants and open scrub. The principal threat to this species is loss of open sage scrub. Development of floodplains and stream terraces has also greatly contributed to this species' decline, as well as habitat fragmentation.



Source: SANDAG 2012; Patton 2010, 2011, 2012; AECOM 2014

Figure 3-5
Belding's Savannah Sparrow Observations

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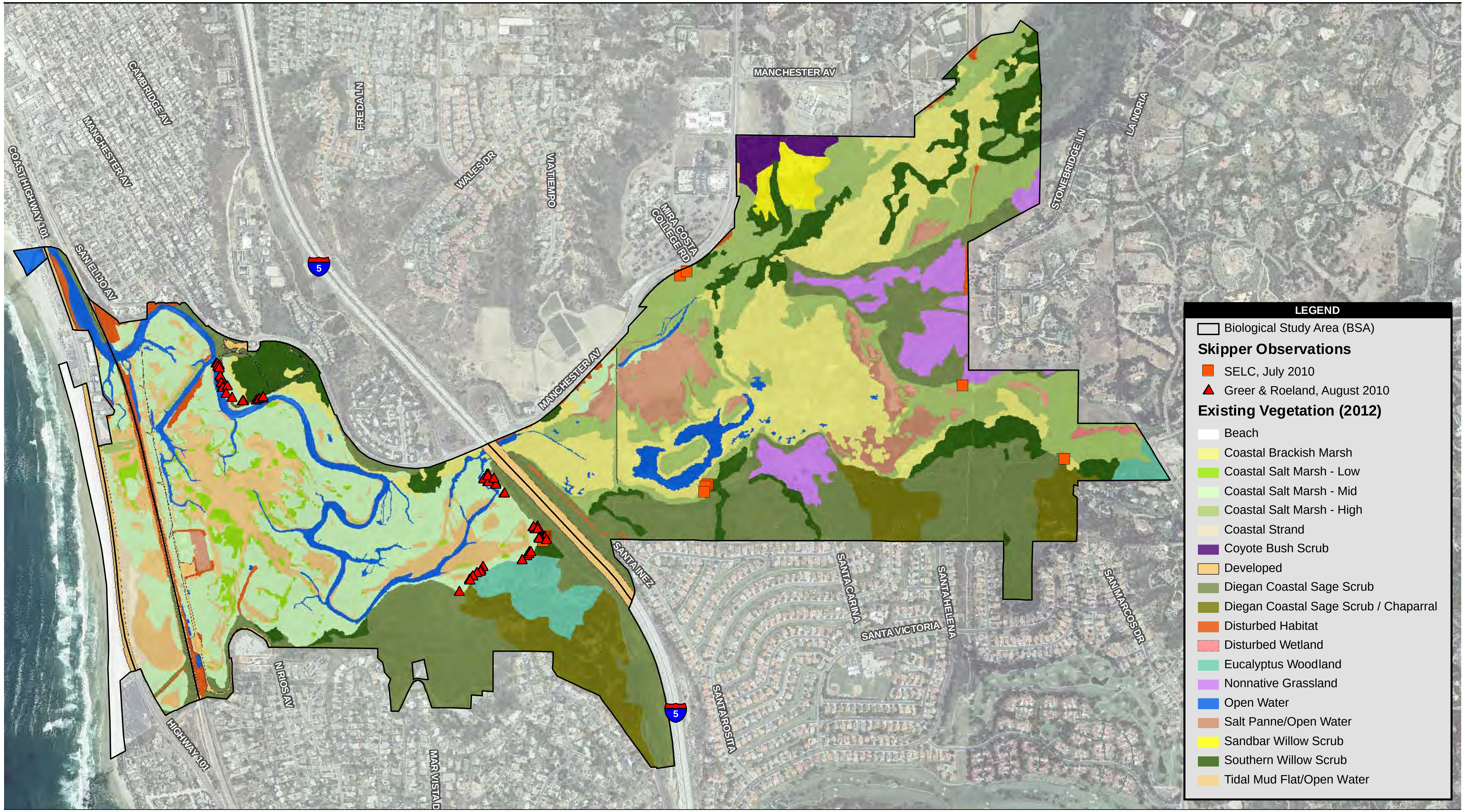

Source: SANDAG 2012; Patton 2010, 2011, 2012; AECOM 2014

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 3-6
Wandering (Salt Marsh) Skipper Observations

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Habitat within the BSA

The orange-throated whiptail was detected during the BioBlitz in 2009. This species likely inhabits much of the open scrub habitat in the BSA.

Silvery Legless Lizard

The silvery legless lizard is a state species of special concern. This species has a spotty distribution along the Coast Ranges, Transverse Mountains, and Peninsular Ranges, and along the coast of southern California (NatureServe 2012).

Habitat requirements include loose soil for burrowing (sand, loam, or leaf mold), moisture, warmth, and plant cover. This species is found where suitable soils occur in a number of vegetation communities, including sparse vegetation of coastal dunes; chaparral; pine-oak woodland; and streamside growth of sycamores, cottonwoods, or oaks.

Habitat within the BSA

The silvery legless lizard was detected during the BioBlitz in 2009. This species likely inhabits much of the riparian habitat in the BSA.

Birds

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 (AOU), *D. p. brewsteri* (Grinnell 1903) is considered not separable from *D. p. morcomi* (Bent 1953); 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 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*).

Habitat within the BSA

The yellow warbler was documented within the BSA during the 2009 BioBlitz and during the monthly bird counts. 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 eucalyptus woodland, 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.

Habitat within the BSA

The yellow-breasted chat was documented within the BSA during the 2009 BioBlitz and during the monthly bird counts. The yellow-breasted chat is primarily associated with southern willow scrub habitat.

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).

Habitat within the BSA

The white-tailed kite utilizes the entire BSA and was documented within the BSA during the 2009 BioBlitz and during the monthly bird counts. Suitable foraging and breeding habitat occurs throughout 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.

Habitat within the BSA

Cooper's hawk is typically found in wooded areas throughout the BSA and was documented within the BSA during the 2009 BioBlitz and during the monthly bird counts. Favored nested habitats of this species within the BSA include southern willow scrub and eucalyptus woodland.

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).

Habitat within the BSA

The osprey is found foraging over the open waters of the BSA and was documented within the BSA during the 2009 BioBlitz and 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 the northeast corner of the BSA where there are large trees.

Northern Harrier

The northern harrier is a state 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, Otay Ranch (Ogden 1992), 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.

Habitat within the BSA

Northern harrier is typically found utilizing the marshes, grasslands, and saltpan/open water habitats and was documented during monthly bird counts within the BSA. Suitable nesting and foraging habitat occurs throughout the BSA.

Western Bluebird

The western bluebird is a proposed covered species in the North County MSCP and Encinitas Subarea Plan. 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 this species 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.

Habitat within the BSA

Western bluebird is primarily found along the chaparral and nonnative grassland edge abutting the residential areas along the southern and eastern areas of the Central Basin and East Basin and was documented within the BSA during the 2009 BioBlitz and during the monthly bird counts. Suitable nesting and foraging habitat occurs within these areas.

Mammals

California Mastiff Bat

The California mastiff bat is listed as a state species of special concern. Historically, mastiff bats were widespread in the California central valley and coastal lowlands from the San Francisco Bay area southward to San Diego. It ranges from central California southward to central Mexico. In California, mastiff bats have been recorded from the central Sierra Nevada and from Yosemite Valley, but all other reports are from lower-lying regions. This species is resident within the state throughout the year but probably makes local seasonal movements. In San Diego County, mastiff bats are found in areas of chaparral or live oaks and in more arid, rocky regions. Mastiff bats favor rugged, rocky areas where suitable crevices are available for day-roosts. They inhabit crevices in cliff faces, high buildings, trees, and tunnels. Mastiff bats feed primarily on moths (which constitute approximately 80 percent of their diet), dragonflies, beetles, and hymenopterans, but also eat ground-living crickets and grasshoppers. Williams (l986) conjectures that extensive loss of habitat due to urbanization of coastal basins, marsh drainage, and cultivation of major foraging areas are likely factors in the decline. Widespread use of insecticides may have reduced insect abundance and also poisoned some bats.

Habitat within the BSA

California mastiff bat was detected during the BioBlitz in 2009. Suitable foraging habitat exists throughout the BSA. Large trees within the BSA provide some suitable roosting habitat.

Western Red Bat

The western red bat 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.

Habitat within the BSA

Western red bat was detected during the BioBlitz in 2009. Suitable foraging and roosting habitat exists throughout the BSA. Large trees within the BSA provide some suitable roosting habitat.

Southern Mule Deer

The southern mule deer is considered a harvest species by CDFW. The range of the southern mule deer extends throughout the western United States. While the southern mule deer occupies almost all types of habitat within its range, it prefers arid, open areas and rocky hillsides. The mating season for southern mule deer reaches its peak in November and December, as antlered stags round up females and fight for their possession. Males and females mix freely while traveling together in groups during winter months. Southern mule deer in the arid southwest may migrate in response to rainfall patterns.

Habitat within the BSA

The southern mule deer was detected during the BioBlitz in 2009, and several families of southern mule deer inhabit the eastern end of the BSA (SELC 2014). This species is expected to occur within suitable riparian/upland-transitional and upland habitats throughout the BSA.

Southern mule deer likely use Escondido Creek as a regional corridor to other open space habitat.

3.5 CRITICAL HABITAT

USFWS designates critical habitat for federally threatened and endangered species. However, not all threatened and endangered species have designated critical habitat. Critical habitat is a term defined and used in the federal ESA. It is a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but will be needed for its recovery. An area is designated as “critical habitat” after USFWS publishes final boundaries of the critical habitat area in the *Federal Register*.

The areas shown on critical habitat maps are often large, but it is important to note that the entire mapped area may not be considered critical habitat. Only areas that contain the primary constituent elements (PCEs) required by the target species are considered critical habitat. PCEs are the elements of physical or biological features that, when laid out in the appropriate quantity and spatial arrangement to provide for a species’ life-history processes, are essential to the conservation of the species. PCEs may include but are not limited to (1) space for individual and population growth and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing (or development) of offspring; and (5) habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a species (USFWS 2011).

Of the federally listed species known to occur within San Elijo Lagoon, two have critical habitat mapped within the BSA: coastal California gnatcatcher and western snowy plover. California gnatcatcher critical habitat was originally proposed in 2000 and subsequently revised in 2007 by USFWS (72 FR 72009). Approximately 205 acres of coastal California gnatcatcher critical habitat occurs within the BSA, as shown in Figure 3-7. California gnatcatcher critical habitat occurs primarily within the coastal sage scrub and chaparral upland habitats surrounding the lagoon. PCEs for the coastal California gnatcatcher include dynamic and successional sage scrub habitats that provide adequate space for population growth, normal behavior, breeding, reproduction, nesting, dispersal, and foraging. PCEs may also include non-sage scrub habitats (e.g., chaparral, grassland, and riparian areas) in proximity to sage scrub habitats that provide space for dispersal, foraging, and nesting.

Western snowy plover critical habitat was originally proposed in 1995 but was not finalized until 1999 (USFWS 1999). It was subsequently revised as part of the final rule in 2005 (USFWS

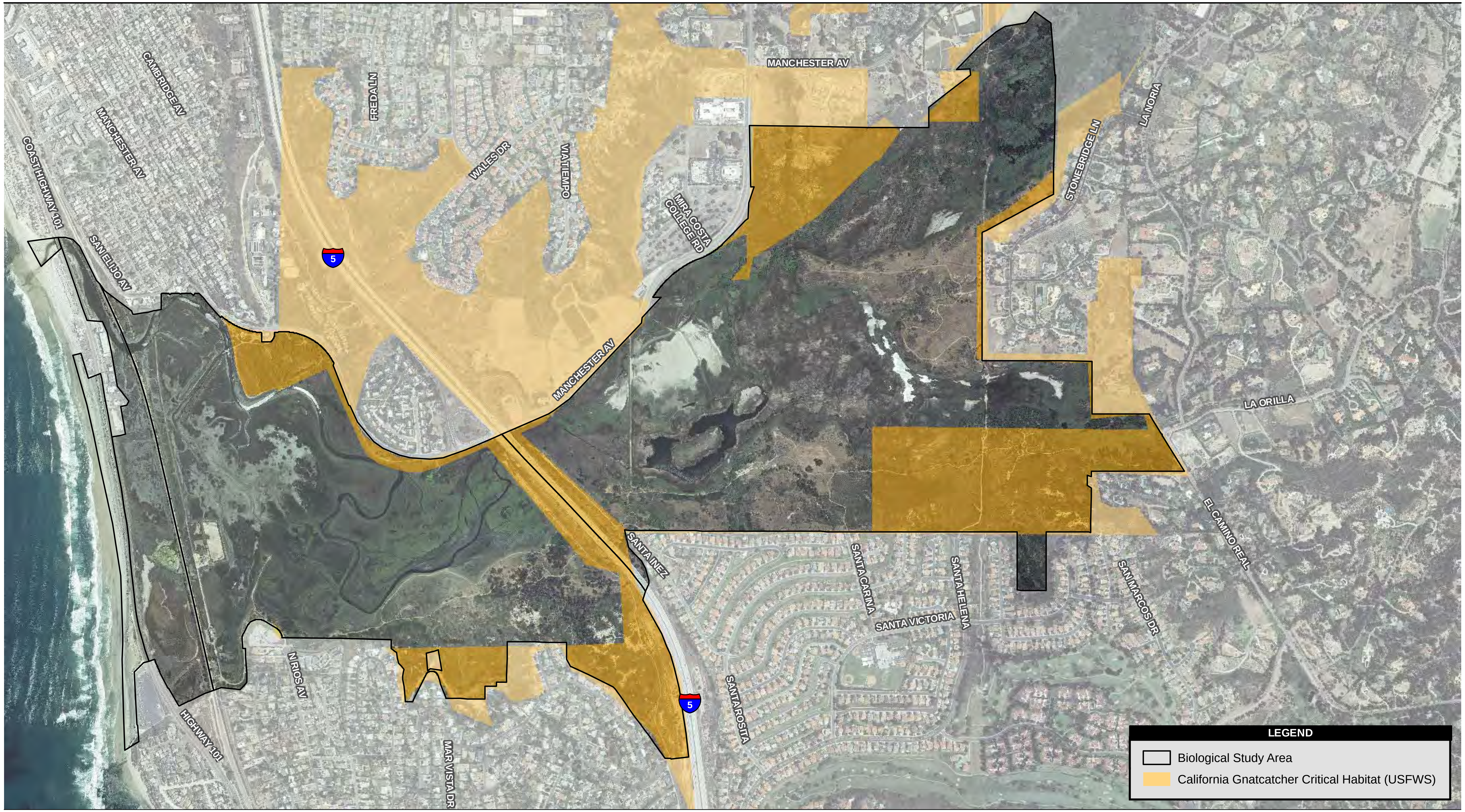
2005). In 2012, the critical habitat was once again updated and at that time approximately 15 acres was identified within San Elijo Lagoon and the BSA, including three potential nest sites (individual Subunits CA 51A, CA 51B, and CA 51C) (77 FR 36728) (Figure 3-8). It is important to note that the new designation of critical habitat within San Elijo Lagoon is a direct result of the SELRP restoration planning effort and the identified subunits for western snowy plover correspond to future nesting sites. PCEs for western snowy plover, including sandy beaches and tidally influenced estuarine mudflats with tide-cast organic debris supporting small invertebrates, would be restored as a part of this project.

3.6 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 effects 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. A wildlife movement study was not conducted within the BSA; however, the area is important to local wildlife movement. 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. San Elijo Lagoon is not functioning as a regional corridor. Instead, it is a large area of natural open space connected to Escondido Creek. Escondido Creek links San Elijo Lagoon with other open space habitat in Harmony Grove and the Elfin Forest to the northeast. San Elijo Lagoon is important in that it provides a large area of habitat for core populations of sensitive wildlife and plant species.



Source: SANDAG 2012; USFWS; AECOM 2014

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 3-7
California Gnatcatcher Critical Habitat

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Source: SANDAG 2012; USFWS; AECOM 2014

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 3-8
Western Snowy Plover Critical Habitat

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CHAPTER 4.0
PROJECT IMPACTS

4.1 GUIDELINES FOR DETERMINING SIGNIFICANCE

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. Direct and indirect impacts may be either long term or short term. These impact categories are defined below.

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

Short-Term Changes: Any benefits or impacts considered to have reversible effects 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 be reversible over 5–10 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.

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, County of San Biological Resources Diego Guidelines for Determining Significance (San Diego County 2010) as well as criteria developed in previous beach sand projects. A significant impact related to biological resources would occur if implementation of the Proposed Project would result in the following.

Sensitive Riparian and Natural Vegetation Communities

- The project would have a substantial adverse effect on riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by CDFW or USFWS.

All habitats within the San Elijo Lagoon BSA, as well as aquatic habitats (high-relief reefs and vegetated low-relief reefs) 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 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 San Elijo Lagoon, as described in more detail in the Sensitive Species section below (Chambers Group 2001).

In addition to sensitive habitat communities, specially designated habitats must also be considered, including USFWS Critical Habitat and EFH. For the purposes of this project, a permanent loss or substantial degradation of USFWS Critical Habitat and/ or EFH would be considered significant.

Wetlands

- The project would have a substantial adverse effect on local, state, and federally protected wetlands/waters.

The majority of San Elijo Lagoon is considered a jurisdictional water/wetland by the Corps, CDFW, RWQCB, and County of San Diego. For the purpose of this project, a substantial adverse effect on a federally protected wetland would include a permanent loss of wetlands in terms of aquatic function and value. Potential water quality impacts (including turbidity, salinity, etc.) associated with wetland function and value are addressed in the Water Quality Section, of the environmental impact report (EIR)/EIS and are not addressed herein.

Sensitive Species

- Have a substantial adverse effect, either directly or through habitat modifications, on a candidate, sensitive, or special-status species listed in local or regional plans, policies, or regulations, or by CDFW or USFWS, or the population or habitat of rare, threatened, or endangered species or species of special concern.

For the purposes of this project, the term "substantial" is defined as a temporary or permanent change that would cause a decline in the local population of a species to below self-sustaining levels within San Elijo 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 direct 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 San Elijo

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 SELRP 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.

- Have a substantial adverse effect on the movement of a native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

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.

Local Ordinances, Policies, Adopted Plans

- Conflict with one or more local policies or ordinances protecting biological resources and/or conflict with the provisions of an adopted HCP; Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

For the purposes of this project, an inconsistency with goals of the County of San Diego MHCP, and North County MSCP would be considered potentially significant.

4.2 ALTERNATIVE 2A – PROPOSED PROJECT

4.2.1 Sensitive Riparian and Natural Vegetation Communities

The proposed SELRP would result in short-term and long-term changes to sensitive vegetation communities. Short-term changes would result from project construction and direct impacts to vegetation from grading, dredging, and project construction (Figure 4-1). Long-term changes to sensitive vegetation communities would occur 5–10 years post-restoration, as vegetation in the lagoon becomes reestablished at the new elevations/grade. These anticipated changes to sensitive vegetation within the lagoon are described in detail below.

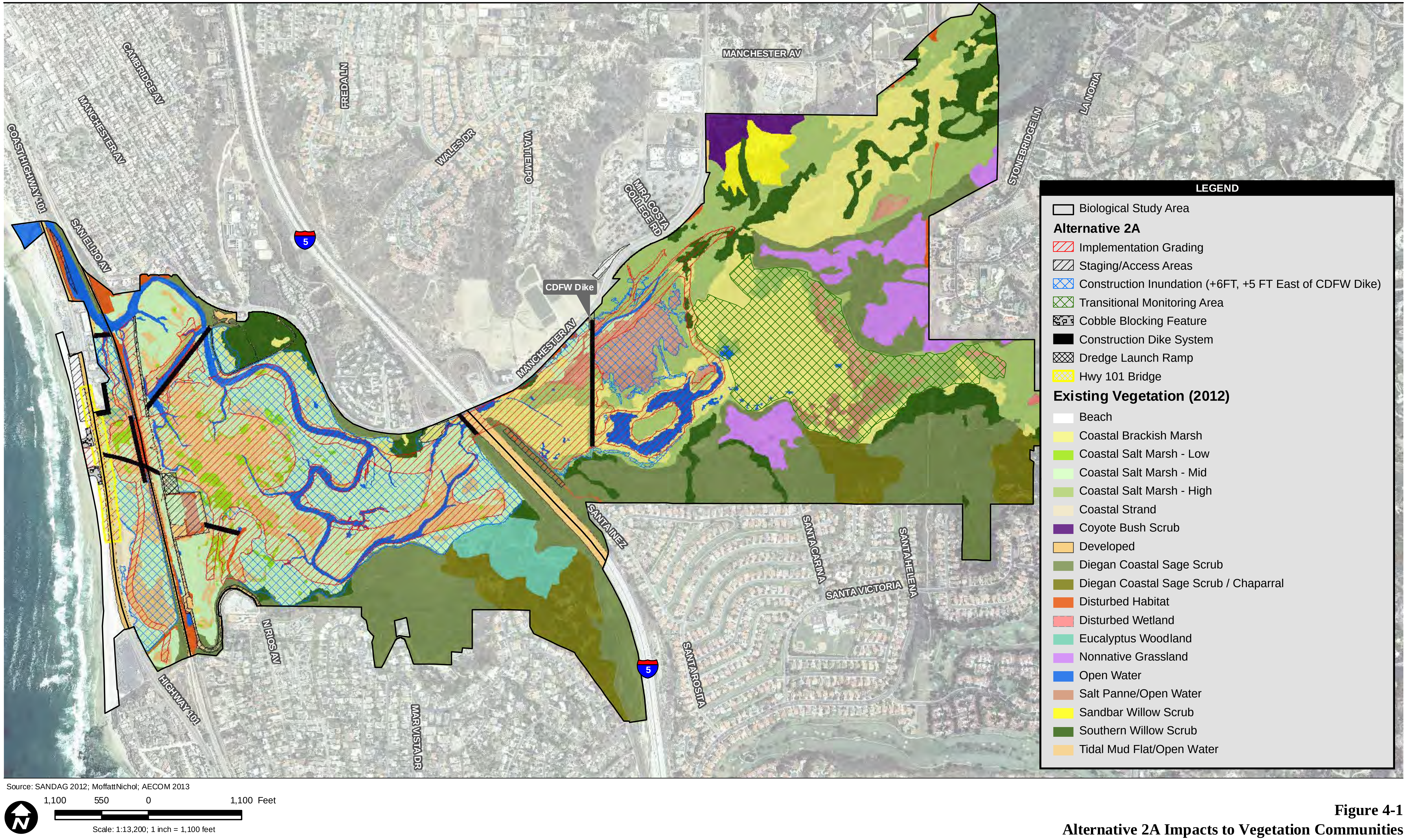
Short-term

Construction of Alternative 2A would result in temporary impacts to sensitive habitats associated with grading and dredging operations (Figure 4-1), as well as from extended inundation. The project is anticipated to take approximately 3 years to construct and would be phased to minimize impacts to lagoon habitats, allowing for refuge for species and retaining some habitat areas at any given time during construction. Phasing includes limitations on the overall duration of time a lagoon basin would be impacted, as well as limitations on the overall inundation and construction area within a given basin. Inundation would allow for dredging of channels within each basin. As described in Chapter 1.0, inundation durations were minimized to the extent practicable and vary by lagoon basin (west, central, or east) (see design features discussion in Section 1.2.3.5). Impacts are identified by basin in Table 4-1 and summarized for the entire BSA in Table 4-2. Impacts are separated into two types of short-term impacts: areas that would be graded/dredged during construction, areas that would be affected by inundation only.

Alternative 2A would result in temporary impacts to 32 percent of San Elijo Lagoon. Grading/dredging impacts would occur to approximately 198 acres (approximately 20 percent) of habitat and inundation would impact an additional 110 acres (approximately 12 percent) of habitat within the San Elijo Lagoon BSA (Figure 4-1). The extensive hillsides along the lagoon and the eastern end of the BSA would not be impacted by restoration construction.

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 above, temporary impacts to sensitive habitats were considered significant if more than 50 percent of a sensitive habitat within the lagoon would be lost for more than 12 months. Vegetation that would be inundated, but not graded or otherwise altered, may survive the extended inundation periods, but there is lack of verifiable data to make an accurate conclusion as to how much of the vegetation would be expected to survive. Because all areas would be inundated for 3 months or longer, it is assumed that inundated vegetation would not survive (i.e., habitat would be lost for more than 12 months) as a worst-case scenario. The Adaptive Management Program for the project, as described in Chapter 1.0, includes measures for monitoring and maintenance activities to aid in the recovery of inundated vegetation communities.

The duration in which vegetation may be temporarily lost would vary based on the basin, type of impact (dredged/graded or inundated), species tolerance to inundation, and recovery period. This length of impact may be as short as 6–12 months for habitats inundated in the west basin, due to the shorter duration of inundation (estimated to be 3.5 months) and may be greater than 5 years for habitats that would be grubbed and graded during construction. As shown in Table 4-1, restoration construction would result in greater than 50 percent temporal loss of sensitive habitats



Source: SANDAG 2012; MoffattNichol; AECOM 2013

Figure 4-1
Alternative 2A Impacts to Vegetation Communities

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Table 4-1
Direct Project Impacts from Construction of Alternative 2A by Basin

Basin/Habitat Community	Existing Vegetation (acres) within the BSA	Alternative 2A Direct Impacts from Dredging/ Grading (acres)	Alternative 2A Direct Impacts from Inundation	Habitat Temporarily Impacted (% in BSA)
Central Basin				
Coastal Brackish Marsh	6.1	1.5	3.7	85%
Coastal Salt Marsh — High	0.7	0.7	0	100%
Coastal Salt Marsh — Low	11.8	8.8	2.3	94%
Coastal Salt Marsh — Mid	121.3	49.0	52.3	84%
Developed	10.4	3.4	0	33%
Diegan Coastal Sage Scrub	67.0	1.0	0.8	3%
Diegan Coastal Sage Scrub/Chaparral	27.7	0	0	0%
Disturbed Habitat	6.7	2.3	0	34%
Eucalyptus Woodland	15.7	0	0.1	1%
Open Water	23.7	15.5	2.0	74%
Saltpan/Open Water	1.5	1.5	0	100%
Southern Willow Scrub	14.4	0.4	2.2	18%
Tidal Mudflat	49.3	37.5	6.8	90%
Total for Central Basin	**356.3**	**121.6**	**70.3**	54%
Coastal Area				
Beach	15.0	4.9	0	33%
Developed	3.0	1.5	0	50%
Open Water	1.5	**0**	0	0%
Total for Coastal Area	**19.5**	**6.4**	**0**	33%
East Basin				
Coastal Brackish Marsh	125.4	22.2	0.6	18%
Coastal Salt Marsh — High	118.5	11.7	2.6	12%
Coastal Salt Marsh — Mid	3.4	2.3	1.1	100%
Coyote Bush Scrub	7.5	0	0	0%
Developed	4.9	0.9	0	18%
Diegan Coastal Sage Scrub	108.1	1.5	0	1%
Diegan Coastal Sage Scrub/Chaparral	21.6	0	0	0%
Disturbed Habitat	2.6	0.4	0.2	23%
Disturbed Wetland	1.1	0	0	0%
Eucalyptus Woodland	3.4	0	0	0%
Nonnative Grassland	33.1	0	0	0%
Open Water	10.6	9.5	0.1	91%
Saltpan/Open Water	35.4	5.1	13.7	53%
Sandbar Willow Scrub	8.9	0	0	0%
Southern Willow Scrub	46.9	2.2	0.1	5%
Total for East Basin	**531.5**	**55.9**	**18.5**	14%
West Basin				
Coastal Salt Marsh — High	0.8	0.2	0.6	100%
Coastal Salt Marsh — Low	1.5	1.3	0.2	100%

Basin/Habitat Community	Existing Vegetation (acres) within the BSA	Alternative 2A Direct Impacts from Dredging/ Grading (acres)	Alternative 2A Direct Impacts from Inundation	Habitat Temporarily Impacted (% in BSA)
Coastal Salt Marsh — Mid	16.7	4.2	10.7	89%
Coastal Strand	5.0	1.2	1.1	46%
Developed	5.2	1.4	0	27%
Diegan Coastal Sage Scrub	3.1	0	0	0%
Disturbed Habitat	2.5	0.7	0.4	44%
Open Water	4.3	0.7	0.3	23%
Tidal Mudfllat	13.8	5.1	8.3	97%
Total for West Basin	**52.9**	**14.8**	**21.7**	69%
TOTAL	**960.2**	**197.8**	**110.6**	32%

BSA = Biological Study Area

Table 4-2
Direct Project Impacts from Construction of Alternative 2A

Basin/Habitat Community	Existing Vegetation (acres) within the BSA	Alternative 2A Direct Impacts from Dredging/ Grading (acres)	Alternative 2A Direct Impacts from Inundation	Habitat Temporarily Impacted (% in BSA)
Beach	15.0	4.9	0	33%
Coastal Brackish Marsh	131.5	23.7	4.3	21%
Coastal Salt Marsh – High	120.0	12.6	3.2	13%
Coastal Salt Marsh – Low	13.3	10.2	2.4	95%
Coastal Salt Marsh – Mid	141.4	55.4	64.0	84%
Coastal Strand	5.0	1.2	1.1	46%
Coyote Bush Scrub	7.5	0	0	0%
Developed	23.4	7.3	0.1	32%
Diegan Coastal Sage Scrub	178.2	2.5	1.0	2%
Diegan Coastal Sage Scrub / Chaparral	49.3	0	0.0	0%
Disturbed Wetland	1.1	0	0	0%
Disturbed Habitat	11.9	3.4	0.6	34%
Eucalyptus Woodland	19.1	0	0.1	1%
Nonnative Grassland	33.1	0	0	0%
Open Water	40.1	25.7	2.4	70%
Saltpan/Open Water	37.0	6.6	13.7	55%
Sandbar Willow Scrub	8.9	0	0	0%
Southern Willow Scrub	61.3	2.6	2.3	8%
Tidal Mudflat/Open Water	63.1	42.6	15.1	91%
Grand Total	**960.2**	**197.8**	**110.6**	**32%**

BSA = Biological Study Area

that would be significantly impacted by construction including coastal salt marsh (low-and mid), open water, saltpan/open water, and tidal mudflats. The temporal loss of these habitats may threaten local populations of sensitive resident species, as described further under Section 4.2.3. Short-term direct impacts to coastal salt marsh (low-and mid), open water, saltpan/open water, and tidal mudflats are therefore considered significant and adverse.

Temporary impacts to beach, coastal brackish marsh, high coastal salt marsh, coastal strand, Diegan coastal sage scrub, southern willow scrub, are not considered significant, because greater than 50 percent of the local habitat would remain available to local resident and migratory species during construction. Short-term direct impacts to beach, coastal brackish marsh, high coastal salt marsh, coastal strand, Diegan coastal sage scrub, and southern willow scrub are therefore considered less than significant and not substantially adverse.

No direct impacts are proposed to coyote bush scrub, Diegan coastal sage scrub/chaparral, disturbed wetland, nonnative grassland, and sandbar willow scrub.

USFWS Critical Habitat

Temporary impacts to approximately 15 acres of USFWS critical habitat for western snowy plover would occur as a result of construction. However, as described in the Federal Register (Vol. 77, No. 118, Part III), this habitat was designated with the expectation that the SELRP would improve the habitat (specifically the proposed nesting sites) for the plover in the long term. Western snowy plover have not nested at the lagoon in over 10 years. The long-term monitoring and management program would include species-specific goals/actions to maintain critical habitat areas for western snowy plover. Therefore, temporary impacts to western snowy plover critical habitat, for the purpose of restoration, are considered less than significant and not substantially adverse.

Coastal California gnatcatcher critical habitat would primarily remain unimpacted during restoration construction. There are two small areas where critical habitat exists in the vicinity of project grading and inundation. A very small area of critical habitat is mapped in the vicinity of the existing access road proposed for improvements, and a second area is mapped along the I-5 berm where the bridge is proposed to be widened by the I-5 North Coast Corridor Project. In the area of the proposed access road, impacts to critical habitat would be avoided by remaining within the existing roadbed and disturbed areas, as noted in Chapter 1.0, Section 1.2.3.5. Impacts to critical habitat in the area of the I-5 North Coast Corridor Project were considered and mitigated as a part of that project (Caltrans 2012). No additional impacts to gnatcatcher critical habitat would occur in this area. Therefore, no new impacts to coastal California gnatcatcher critical habitat would occur as a result of this restoration project and impacts are considered less than significant and not substantially adverse.

Essential Fish Habitat

Construction of Alternative 2A would result in temporary and short-term impacts to EFH associated with grading and dredging operations (e.g., excavation, turbidity, sediment disruption). The project would be phased, allowing for refuge and retaining available habitat at any given time during construction. In addition, the lagoon does not support rocky reefs or eelgrass habitat; therefore, construction impacts would only occur to soft-bottom habitat, which is known to recover quickly. Therefore, short-term impacts to EFH are considered less than significant and not substantially adverse.

Indirect Impacts

Indirect short-term/temporary impacts to adjacent vegetation communities, particularly uplands, are anticipated to be minimal with the implementation of Alternative 2A. Water-based construction minimizes dust, and noise impacts are considered relative to wildlife species and not vegetation. No significant or adverse indirect impacts to vegetation communities are anticipated with the proposed project.

Long-term

Long-term changes in vegetation (5–10 years post-restoration) would occur from implementation of Alternative 2A, as shown in Table 4-3 and Figure 1-2. Planting to facilitate recovery of dredged or inundated habitat would occur but, as described above, it would take time before habitats are reestablished in the lagoon. Within 5–10 years following restoration, habitats are expected to have substantially recovered and matured. The overall acreage of sensitive habitats within the lagoon would remain approximately 960 acres. However, conversion from one sensitive vegetation community to another within the lagoon would occur with the dredging of channels/basins, grading, and improvements to hydrologic function.

Alternative 2A incorporates hydrologic modification in the form of a new inlet located in the middle of the west basin (Figure 1-2). In addition, a subtidal basin extending from the west basin into the central basin would connect to enlarged tidal channels extending north and east. Alternative 2A would also include creation of an extensive network of tidal channels in the east basin. The tidal connection between the central and east basins would be widened and deepened.

Table 4-3
San Elijo Lagoon Restoration Project Post-Restoration Vegetation Summary

Habitat Description	Existing (2012)	Alternative 2A	Alternative 1B	Alternative 1A	No Project/No Federal Action
Avian Island	0	2	2	2	0
Mudflat	63	102	71	25	29
Low-Marsh	13	23	51	44	51
Mid-Marsh	141	124	98	140	107
High-Marsh	120	107	124	145	167
Saltpan	37	17	30	35	37
Freshwater/Brackish Marsh	132	96	99	121	131
Open Water/Tidal Channels and Basins	40	74	67	34	24
Riparian	72	67	67	70	71
Coastal Strand	5	5	5	5	5
Uplands & Others	299	292	295	299	299
Beach	15	14	15	15	15
Berms and Roads	23	24	24	24	23
Transitional (man-made)	0	12	12	2	0
Total[1]	**960**	**960**	**960**	**960**	**960**

[1] Totals may not sum due to rounding.

The primary change in habitat distributions under Alternative 2A would be an increase in subtidal habitat and mudflat within the lagoon compared to both existing conditions and the predicted No Project/No Federal Action conditions. Subtidal habitat would be increased in all three lagoon basins compared to existing conditions. Mudflat and mid-salt marsh habitats would increase due to conversion of saltpan, fresh/brackish marsh, open water/freshwater marsh, and habitats that currently occupy the transition zone.

Alternative 2A would facilitate efficient conveyance of seasonal freshwater flows through the subtidal basin and out through the new inlet. Freshwater flows could also be conveyed to the ocean via the existing inlet if naturally breached. Alternative 2A would require a new bridge on Highway 101 at the new inlet location and a new railroad bridge (proposed by others) to span the new inlet. Other infrastructure, such as Cobble Blocking Features, would be required to increase the stability of the new tidal inlet. An avian nesting area would be established in the central basin. A large portion of the saltpan habitat in the east basin would likely transition to salt marsh, limiting management options for avian nesting.

The overall acreage of habitat available for sensitive species would remain unchanged with this alternative, but benefits from the improved hydrologic function of the lagoon are expected. When considering changes to sensitive habitats, a change from one sensitive habitat to another does not necessarily represent a positive or negative impact. Rather, the ecological ramifications of the change on sensitive species and lagoon ecology would be the primary indicators of impact. As described in Chapter 1.0, existing lagoon habitat is rapidly converting, with continued loss of mudflat and rapid increase in low-and mid-salt marsh. Evidence of this rapid conversion is apparent in numerous surveys over time and in recent surveys conducted between 2010 and 2012. During the 2-year period between the 2010 and 2012 surveys, low-and mid-salt marsh habitat (dominated by cordgrass and pickleweed) increased by 13 acres and mudflats decreased by 12 acres. With rapid transition to salt marsh, there is a reduction in available foraging habitat for sensitive and nonsensitive birds, which has the potential for substantial ecological changes in the lagoon and is expected to dramatically change the diversity and density of wildlife that the lagoon is able to continue to support. With implementation of Alternative 2A, San Elijo Lagoon would experience improved hydrologic function and increased foraging habitat, and the rapid changes (loss of mudflat and conversion of low marsh to mid marsh) occurring under existing conditions and projected to continue under the No Project/No Federal Action Alternative would reverse. Species-specific impacts associated with these changes are evaluated below. With improved lagoon ecology, increased foraging for species, and no overall loss of lagoon resources, direct impacts to sensitive vegetation communities with implementation of Alternative 2A are considered less than significant and not substantially adverse.

USFWS Critical Habitat

No long-term impacts to USFWS critical habitat are anticipated for western snowy plover. Western snowy plover habitat would be improved with the proposed construction of Alternative 2A, as described in Section 4.3.2 below. No long-term loss of critical habitat is anticipated with project restoration. No new or permanent impacts would occur to coastal California gnatcatcher critical habitat as a result of this project. Impacts associated with the I-5 North Coast Corridor Project would be mitigated via that project. Therefore, long-term impacts to USFWS critical habitat are considered less than significant and not substantially adverse.

Essential Fish Habitat

Construction of Alternative 2A would result in long-term beneficial impacts to EFH because it would create additional acreages of open water, tidal channels, and mudflat habitat, as well as enhance the conditions of existing subtidal habitat by increasing tidal influence within the lagoon. This additional habitat would support local fish populations and therefore would benefit EFH within the project area. Therefore, no long-term significant or substantially adverse impact to EFH is anticipated with implementation of Alternative 2A.

4.2.2 Jurisdictional Waters and Wetlands

Short term

Construction of Alternative 2A would result in temporary or short-term direct impacts to jurisdictional waters and wetlands due to grading and dredging operations. Of the approximately 620 acres of jurisdictional area present in the BSA, 280 acres would be directly impacted by construction (172.5 acres from grading/dredging and 107.6 acres from inundation). 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 Chapter 1.0, several project design features have been incorporated to reduce temporary impacts on water quality within the lagoon. Due to the temporary nature of the direct impacts, and with implementation of project design features and compliance with local requirements for best management practices (BMP)s, short-term impacts to jurisdictional waters and wetlands associated with restoration construction are considered less than significant and not substantially adverse.

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 are described under sensitive vegetation communities. No significant or adverse indirect impacts to wetlands are anticipated with restoration implementation.

Long-term

Prior to construction of Alternative 2A, approximately 620 acres of the 960-acre BSA was delineated as jurisdictional waters and wetlands of the U.S. and state. Following construction of Alternative 2A, conversion from one wetland type to another would occur due to dredging of channels/basins, grading of estuarine habitats, and improvements to hydrologic function. Implementation of Alternative 2A would result in permanent impacts to 12 acres (2 percent) of the jurisdictional waters and wetlands within the BSA due to the construction of the man-made transitional areas within the east and central basins. These man-made transitional areas are designed to be above the high tide line and, as such, are not expected to meet the three-parameter wetland definition and may not be considered a wetland water of the U.S.

However, a portion of these man-made transitional areas would likely be considered waters of the state. The remaining jurisdictional waters and wetlands within the lagoon would be enhanced with improved hydrologic conditions and increased diversity. For example, the existing CDFW dike in the east basin would be removed and replaced with channel connections, which would increase tidal influence by allowing for salt water input and freshwater output within the east basin. Alternative 2A may result in a small decrease in jurisdictional wetland acreage overall; however, the improvement to wetland conditions and functions, as described in more detail in the 404(b)1 analysis, would more than offset this loss. Therefore, no long-term significant or adverse impacts to jurisdictional waters and wetlands are anticipated with implementation of Alternative 2A.

Indirect Impacts

Long-term indirect impacts to jurisdictional waters would include changes in habitat or water quality that may result from project implementation. Indirect impacts to vegetation are described under sensitive vegetation communities. No significant or adverse indirect impacts to wetlands are anticipated with restoration implementation.

4.2.3 Sensitive Species

As described above, the proposed SELRP would result in short-term and long-term changes to vegetation communities that support various sensitive species. Short-term changes would result from project construction and direct impacts to flora and fauna from grading, dredging, and project construction. Long-term changes to sensitive species would occur 5–10 years post-restoration, as the conditions in the lagoon recover as a result of the modified hydrology and new elevations/grade.

4.2.3.1 Flora

Federally Listed and State-Listed Plant Species

No federally listed or state-listed rare, threatened, or endangered plant species occur within the areas proposed for restoration. One federally listed plant species, Del Mar manzanita, and one state-listed species, Orcutt’s goldenbush, occur in uplands habitat and would not be affected by the proposed project. Of the 20 nonlisted sensitive plant species detected within the project area, 19 occur outside of the proposed grading limits and maintenance activity areas and are not expected to be affected by the proposed project.

Approximately four individuals of southwestern spiny rush (CNPS List 4.2) are within the grading limits of Alternative 2A and would be directly impacted. However, this direct impact is not considered significant or adverse, due to the several hundred individuals scattered throughout the mid- and high-salt marsh habitats within the lagoon. The large population of southwestern spiny rush is expected to persist within the lagoon, as the majority of the mid- and high-salt marsh habitats would remain intact.

Therefore, no significant or substantially adverse impacts to sensitive plant populations are anticipated with construction of Alternative 2A.

Nonlisted Special-status Plant Species

Twenty-nine nonlisted special-status plant species were determined to have potential to occur in the BSA. These species are considered sensitive by the CNPS (List 1, 2, 3, or 4). Of these 29 species, 21 were found present within the BSA and the remaining eight have a moderate to high potential to occur. These species are described above in Section 3.3.3.

The following eight species were not detected during project surveys; however, they are all considered to have a potential to occur based on the presence of potential habitat within the BSA. The decision to assign a moderate or high potential to occur for each species was based on the closest known occurrence to the BSA and best professional judgment. All of these species are associated with at least one vegetation community occurring within the grading limits and controlled inundation footprint for Alternative 2A and, as such, all of these species have the potential to be impacted during construction.

- Aphanisma, *Aphanisma blitoides* (high potential)
- Coulter’s saltbush, *Atriplex coulteri* (moderate potential)
- south coast saltscale, *Atriplex pacifica* (moderate potential)
- Davidson’s saltscale, *Atriplex serenana* var. *davidsonii* (moderate potential)
- southern tarplant, *Centromadia parryi* ssp. *australis* (high potential)
- smooth tarplant, *Centromadia pungens* ssp. *laevis* (moderate potential)
- Brand’s star phacelia, *Phacelia stellaris* (moderate potential)
- estuary seablite, *Suaeda esteroa* (high potential)

The following 18 species were detected during project surveys and occur within the BSA. All of these species are associated with at least one vegetation community occurring within the grading limits and controlled inundation footprint for Alternative 2A and, as such, all of these species have the potential to be impacted during construction.

- spineshrub, *Adolphia californica*
- San Diego sagewort, *Artemisia palmeri*
- Lewis’s evening-primrose, *Camissonia lewisii*

- Orcutt's pincushion, *Chaenactis glabriuscula* var. *orcuttiana*
- summer holly, *Comarostaphylis diversifolia* ssp. *diversifolia*
- sea dahlia, *Coreopsis maritima*
- Del Mar Mesa sand aster, *Corethrogyne filaginifolia* var. *filaginifolia* (*Corethrogyne filaginifolia* var. *linifolia*)
- western dichondra, *Dichondra occidentalis*
- coast wallflower, *Erysimum ammophilum*
- coast barrel cactus, *Ferocactus viridescens* var. *viridescens*
- Palmer's grapplinghook, *Harpagonella palmeri*
- San Diego marsh-elder, *Iva hayesiana*
- southwestern spiny rush, *Juncus acutus* ssp. *leopoldii*
- Coulter's goldfields, *Lasthenia glabrata* ssp. *coulteri*
- Nuttall's lotus, *Lotus nuttallianus*
- California desert thorn, *Lycium californicum*
- Coast woolly-heads, *Nemacaulis denudata* var. *denudata*
- mesa spike-moss, *Selaginella cinerascens*

Impacts to the 26 nonlisted plant species described above would include the direct loss of individuals as well as the short-term loss of habitat from grading and inundation. Short-term loss of habitat is addressed above. In addition the restoration plan, as described in Section 1.2.3.5, requires an evaluation of the need for seed collection and plant salvage for all sensitive species, listed and nonlisted. As the project involves restoration and will specifically plan for the seed collection, plant salvage, and/or long-term monitoring of these species, it is not expected to result in the decline of any species below self-sustaining levels; impacts are considered less than significant and not substantially adverse.

The following three species were detected during project surveys within the BSA;

- wart-stemmed ceanothus, *Ceanothus verrucosus*
- Nuttall's scrub oak, *Quercus dumosa*
- Torrey pine, *Pinus torreyana* var. *torreyana*

Although these species occur within the BSA, they do not occur within the grading limits or controlled inundation footprint for Alternative 2A. Their primary habitats occur at higher elevations and include closed-cone coniferous forest, chaparral, chaparral/sandstone, and coastal scrub. No impacts to these three species as a result of project construction are expected.

No long-term impacts to nonlisted plant species are expected as the restoration project and the corresponding improvements to ecological conditions are considered beneficial to all 29 species.

4.2.3.2 Fauna

Federally Listed and State-Listed Wildlife Species

Of the 94 special-status wildlife species that have potential to occur within the BSA, seven federally listed and/or state-listed species were detected during previous studies and are considered resident/breeding within the BSA. These include the federally listed coastal California gnatcatcher and western snowy plover; the federally listed and state-listed Ridgway's rail, California least tern, southwestern willow flycatcher, and least Bell's vireo; and the state-listed Belding's savannah sparrow. These seven bird species utilize different habitats within the lagoon and are expected to be influenced differently by the restoration project. There is the potential for both short-term/temporary effects and long-term/permanent effects associated with the implementation of Alternative 2A. These effects may be considered negative (impact) or positive (benefit); both are discussed below.

Short term

Direct short-term effects may include the short-term loss of nesting and/or foraging habitat for sensitive species resulting from construction activities.

As part of the restoration effort, nesting and/or foraging habitat would be temporarily impacted during construction. These direct temporary impacts are summarized in Table 4-4 and are separated into two types of short-term impacts: areas that would be graded/dredged during construction and areas that would be affected by controlled inundation only. Although both impacts are direct, the duration of the temporary impacts associated with inundation are less predictable as these vegetation communities are adapted to tolerate long periods of inundation. Professional experience in various lagoons has shown impacts to some salt marsh vegetation species after 8 weeks of inundation, others tolerate 3 months, while others may even tolerate longer periods. For the purposes of this evaluation, it is assumed that more than 3 months of contiguous inundation would result in vegetation mortality. Phased construction across basins limits inundation duration and geographic extent, thereby reducing impacts to nongraded inundated areas as well as preserving some tidal and noninundated habitat areas. Construction would also restrict vegetation removal activities to outside of the nesting season. In addition, discrete locations have been identified where temporary dikes would be placed to limit inundation and allow for species refugia.

Table 4-4
Alternative 2A Impacts to Suitable Habitat for Listed Bird Species

Species	Habitat Suitability*	Habitat Type	Existing Habitat (acres)	Habitat Impacted by Grading		Habitat Impacted by Inundation		Total Direct Impact to Existing Habitat	
				Acres	Percent	Acres	Percent	Acres	Percent
Ridgway's rail	Nesting/ Foraging	Coastal Brackish Marsh	131.5	23.7	18%	4.3	3%	28.0	21%
		Coastal Salt Marsh - Low	13.3	10.1	76%	2.5	19%	12.6	95%
		Total Nesting	144.8	33.8	23%	6.8	5%	40.6	28%
	Foraging	Mudflats	63.1	42.6	68%	15.1	24%	57.7	91%
		Coastal Salt Marsh – Mid	141.4	55.5	39%	64.1	45%	119.6	85%
		Coastal Salt Marsh – High	120	12.6	11%	3.2	3%	15.8	13%
		Total Foraging	324.5	110.7	34%	82.4	25%	193.1	60%
California least tern	Nesting	Saltpan	36.9	6.6	18%	13.7	37%	20.3	55%
		Coastal Strand	5	1.2	24%	1.1	22%	2.3	46%
		Nesting Area**	0	0	0%	0	0%	0.0	0%
		Total Nesting	41.9	7.8	19%	14.8	35%	22.6	54%
	Foraging	Subtidal/Channels	40.1	25	62%	2.4	6%	27.4	68%
		Beach	15	0	0%	0	0%	0.0	0%
		Total Foraging	55.1	25	45%	2.4	4%	27.4	50%
western snowy plover	Nesting	CDFW dike	0.4	0.4	100%	0	0%	0.4	100%
		Saltpan	36.9	6.6	18%	13.7	37%	20.3	55%
		Coastal Strand	5	1.2	24%	1.1	22%	2.3	46%
		Nesting Area**	0	0	0%	0	0%	0.0	0%
		Total Nesting	42.3	8.2	19%	14.8	35%	23.0	54%
	Foraging	Mudflats	63.1	42.6	68%	15.1	24%	57.7	91%
		Beach	15	0	0%	0	0%	0.0	0%
		Total Foraging	78.1	42.6	55%	15.1	19%	57.7	74%

Species	Habitat Suitability*	Habitat Type	Existing Habitat (acres)	Habitat Impacted by Grading		Habitat Impacted by Inundation		Total Direct Impact to Existing Habitat	
				Acres	Percent	Acres	Percent	Acres	Percent
coastal California gnatcatcher	Nesting/ Foraging	Diegan Coastal Sage Scrub	178.1	2.54	1%	1	1%	3.5	2%
		Diegan Coastal Sage Scrub/ Chaparral	49.3	0	0%	0.03	0%	0.0	0%
		Coyote Bush Scrub	7.5	0	0%	0	0%	0.0	0%
		Total Nesting/Foraging	234.9	2.54	1%	1.03	0%	3.6	2%
least Bell’s vireo	Nesting/ Foraging	Sandbar Willow Scrub	9	0	0%	0	0%	0.0	0%
		Southern Willow Scrub	61.4	2.6	4%	2.3	4%	4.9	8%
		Total Nesting/Foraging	70.4	2.6	4%	2.3	3%	4.9	7%
southwestern willow flycatcher	Nesting/ Foraging	Southern Willow Scrub	61.4	2.6	4%	2.3	4%	4.9	8%
		Total Nesting/Foraging	61.4	2.6	4%	2.3	4%	4.9	8%
Belding’s savannah sparrow	Nesting	Coastal Salt Marsh – Mid	141.4	55.5	39%	64.1	45%	119.6	85%
		Coastal Salt Marsh – High	120	12.6	11%	3.2	3%	15.8	13%
		Total Nesting	261.4	68.1	26%	67.3	26%	135.4	52%
	Foraging	Coastal Salt Marsh – Low	13.3	10.1	76%	2.5	19%	12.6	95%
		Total Foraging	13.3	10.1	76%	2.5	19%	12.6	95%

CDFW = California Department of Fish and Wildlife

*Nesting habitat is considered suitable for both breeding and foraging activities, while habitat identified as “Foraging” is not expected to support breeding activities.

**Under existing conditions, a portion of the nesting area is classified as saltpan.

Least Bell’s Vireo and Southwestern Willow Flycatcher

Both least Bell’s vireo and southwestern willow flycatcher have been observed in low numbers (less than five in any given year) within the central and east basins, foraging primarily within the southern willow scrub habitat. Neither species has been documented to breed on-site although there is the potential that successful vireo breeding has occurred (Patton 2010, 2012a). Construction of Alternative 2A would directly impact 4.9 acres (8 percent) of the southern willow scrub riparian habitat within the lagoon as a result of grading and inundation (Table 4-4). 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 use the site primarily for foraging during summer months, the short-term impact to 8 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. Therefore, short-term direct impacts to least Bell’s vireo and southwestern willow flycatcher would be less than significant and not substantially adverse.

Coastal California Gnatcatcher

Coastal California gnatcatchers are observed along the periphery of San Elijo Lagoon within sage scrub and chaparral habitats. As part of construction, an access road along the southwest corner of the central basin would need to be enhanced (widened) to accommodate construction vehicular traffic. All enhancements to the access road are expected to be contained within the existing footprint. However, gnatcatchers have been observed adjacent to the road. In addition to the access road, construction vehicles would need to temporarily access the man-made transitional area to deposit material to the north of the access road. As such, brush clearing may be needed along the small eastern footpath, to a width of approximately 12 feet, as well as minor grading to fill holes. There is the potential to impact nesting and foraging coastal California gnatcatchers during vegetation removal. To avoid this potential temporary direct impact, the project has included a design feature that limits vegetation clearing to outside of the bird nesting season. Outside the nesting season, resident gnatcatchers may be present in the area. However, due to their high mobility out of the breeding season coupled with the presence of a bird monitor, short-term direct impacts to gnatcatcher associated with vegetation clearing would be avoided. Impacts associated with vegetation clearing are not considered substantial and would not result in a decline in the local population below self-sustaining levels.

California Least Tern and Western Snowy Plover

Both California least tern and western snowy plover are documented annually foraging and roosting at San Elijo Lagoon. Western snowy plover has not successfully nested at San Elijo Lagoon since 2002, and California least tern since 2005 (CDFG 2006; Patton 2010). The western snowy plover forages on mudflats, while the least tern utilizes subtidal channels and open water within the lagoon. Impacts to foraging habitat for both species would occur during construction, with 4.9 (33 percent) acres of beach, 27.4 (68 percent) acres of open water/tidal channels, and 57.7 acres (91 percent) of mudflat disturbed as a result of grading and controlled inundation for Alternative 2A. A total of 27.4 acres (50 percent) of California least tern and 57.7 acres (74 percent) of western snowy plover suitable foraging habitat would be impacted as a result of construction for Alternative 2A.

All impacts to foraging habitat would be phased across the three lagoon basins, and within each basin (i.e., daily dredging focused in a small area), so that large contiguous areas of foraging habitat would remain at any given time. 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 substantial adverse effect on these species. In addition, many of these areas post-restoration are expected to return to the same habitat type but with improved conditions as a result of improved hydrology. Although short-term impacts to foraging habitat would occur, short-term benefits are also expected. Sediment-dwelling organisms would be released into the water column during dredging, which may improve foraging efficiency for diving birds such as the least tern.

The benthic community that resides in the mudflats would be temporarily impacted; recovery time for these communities is highly variable with location and environmental conditions but may be relatively rapid. The recovery of the benthic community will be monitored as part of the monitoring and maintenance program. The relatively quick recovery time coupled with improved tidal hydrology and water quality is expected to enhance the benthic community within the lagoon and, in particular, the mudflats. The improved conditions would result in higher productivity in the restored mudflats and direct benefits to birds that forage on them, such as the western snowy plover. Similarly, the improved hydrologic and water quality conditions are expected to have a positive effect on the fish community, which is the primary food of California least tern.

Belding's Savannah Sparrow

Belding's savannah sparrow occupies mid- and high-marsh habitat throughout San Elijo Lagoon but are particularly dense in the central basin and western portion of the east basin where pickleweed-dominated mid-marsh habitat is prevalent. As a result of dredging and controlled inundation, Alternative 2A would temporarily impact 119.6 acres (85 percent) of mid-marsh and 15.8 acres (13 percent) of high-marsh habitat across the three basins (Table 4-4 and Figure 4-2). A total of 135.4 acres out of 261.4 acres (52 percent) of suitable nesting habitat for Belding's savannah sparrow would be impacted as a result of construction for Alternative 2A.

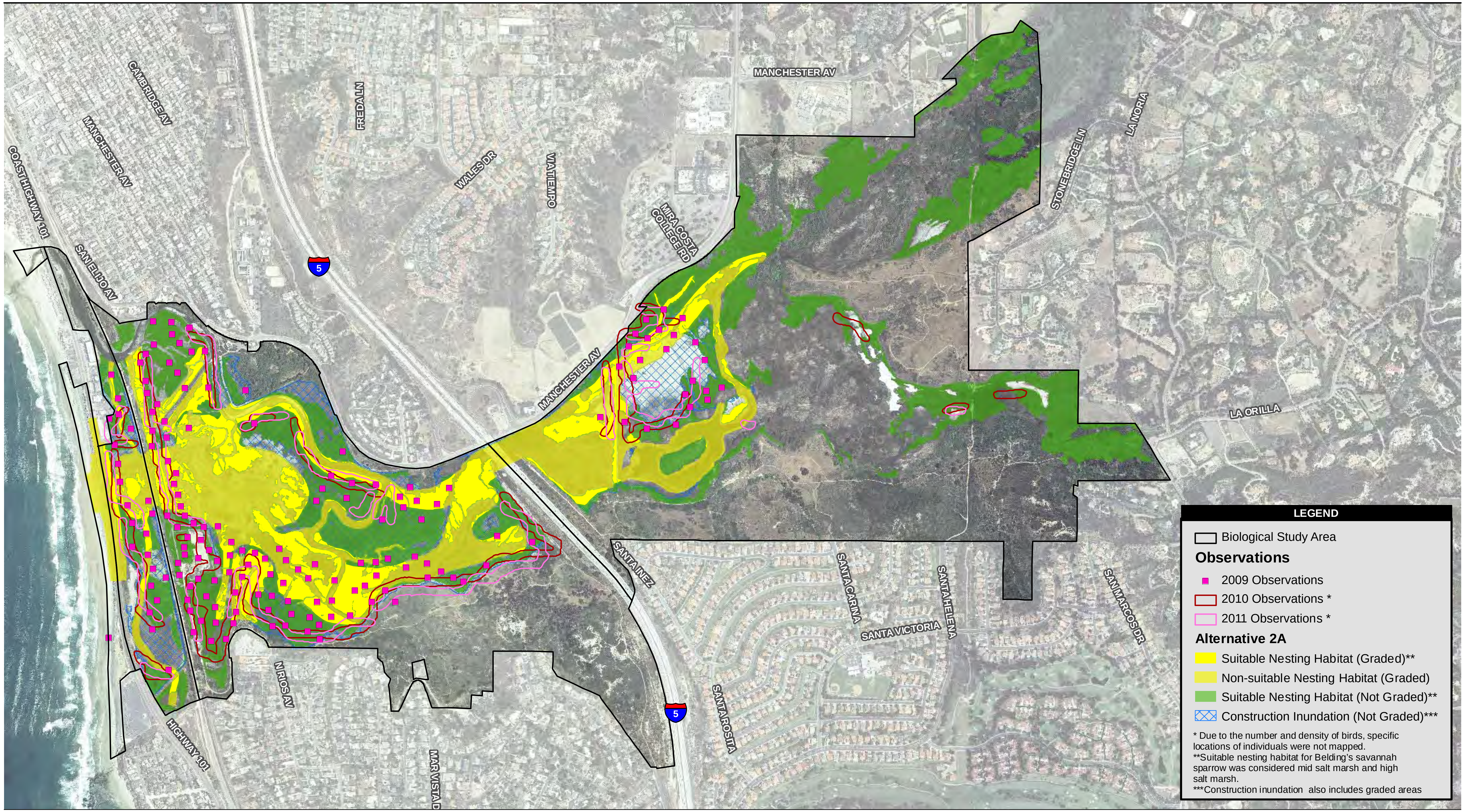
Although Belding’s savannah sparrows maintain territories, they do not often nest in the exact same location. In addition, the size of the territories and their boundaries are variable and change year to year based on environmental conditions, with expansion in dry years and contraction in wet years. It is anticipated that the resident birds would respond to the restoration as they do to seasonal variability by shifting and contracting their territory size to accommodate the new acreage available. The project would minimize impacts by removing vegetation outside of the breeding season to avoid direct impacts to Belding’s savannah sparrow and to allow birds time needed to establish new breeding territories in unimpacted habitat.

In addition, the project has included the creation of dry and noninundated refugia during Phase 1 and Phase 2 to maximize the potential breeding habitat available during construction. Finally, the project includes a habitat enhancement plan as a design feature that would be developed and implemented prior to and during construction to enhance target locations of unimpacted suitable habitat for Belding’s savannah sparrow. The habitat enhancement plan would allow for refugia during construction, when suitable breeding and foraging habitat areas would be reduced. The plan would include measures such as removal of perches that competitor birds (song sparrow) use, removal of non-pickleweed vegetation, and predator control. Belding’s savannah sparrow is a year-round resident and project construction would result in the temporary loss of greater than 50 percent of their nesting habitat (mid- and high-salt marsh). This temporary construction impact is considered a significant impact to the local population. **As such, Alternative 2A would have a significant and adverse short-term direct impact on Belding’s savannah sparrow.**

Ridgway’s Rail

Ridgway’s rail are year-round residents in the lagoon, nesting in low-marsh and coastal brackish marsh habitat. Alternative 2A would directly impact 40.6 acres (28 percent) of existing suitable nesting habitat through direct grading and controlled inundation (Table 4-3 and Figure 4-3). These direct impacts would affect the low-marsh and brackish marsh habitat that supports this species. The project has proposed design features to minimize impacts to wildlife (birds in particular) that would be associated with dredging and other earthwork. Project design features include the removal of all vegetation outside of the bird breeding season to avoid direct impacts to species and to allow birds the time needed to establish new breeding territories in unimpacted habitat.

In addition, dry and tidal refugia have been included in the project to provide continued breeding opportunities for the species. These wildlife refugia are focused on the west basin and the western portion of the central basin where the Ridgway’s rail population is smallest (two pairs in 2013) and, as such, can likely accommodate those individuals. The remaining population (18 pairs) is focused in the eastern basin within the brackish marsh, with most of the 2013 observations occurring east of the grading and controlled inundation limits.



* Due to the number and density of birds, specific locations of individuals were not mapped.
**Suitable nesting habitat for Belding's savannah sparrow was considered mid salt marsh and high salt marsh.
***Construction inundation also includes graded areas

Source: SANDAG 2012; Patton 2010, 2011, 2012; AECOM 2012

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 4-2
Belding's Savannah Sparrow
Suitable Nesting Habitat Impact Analysis, Alternative 2A

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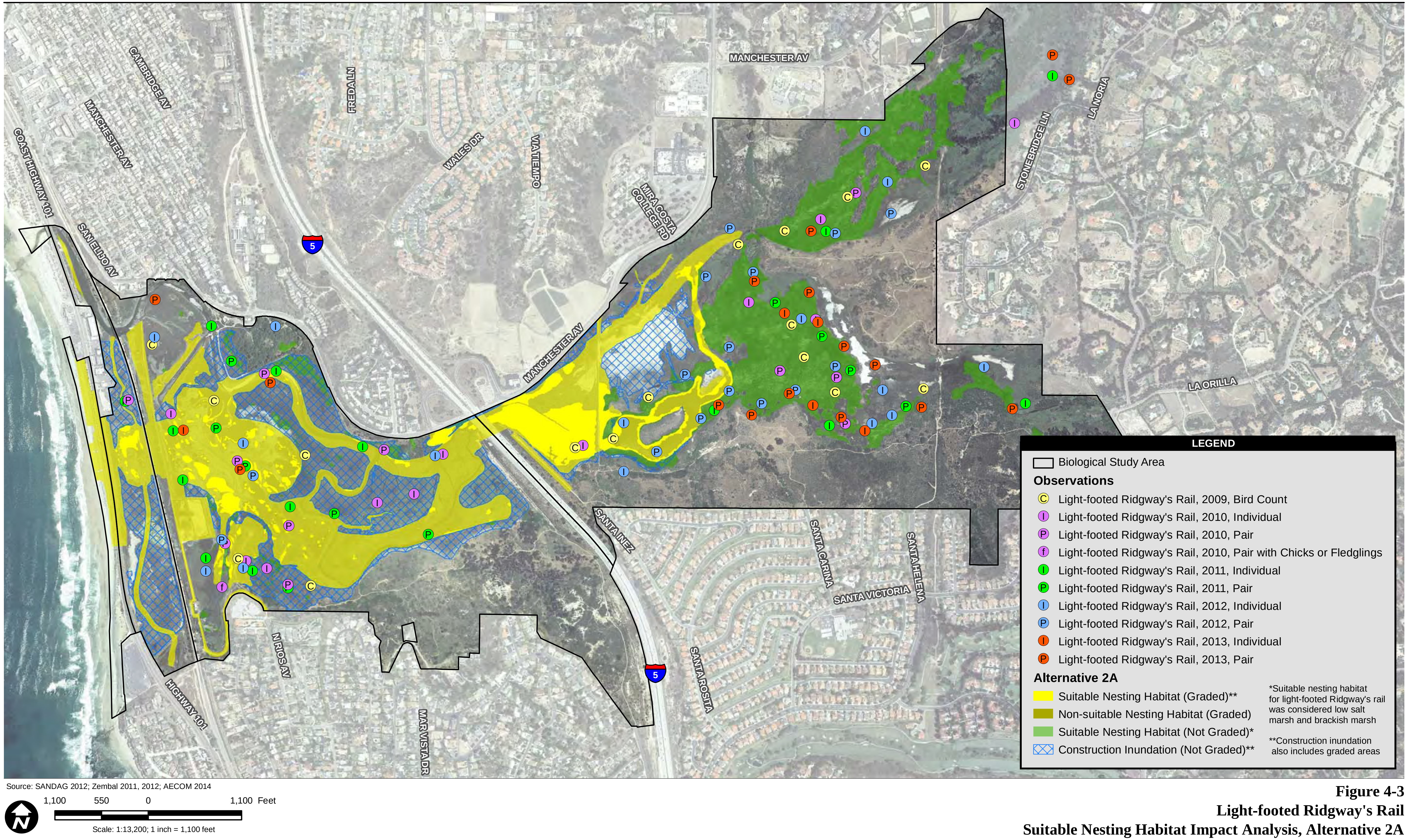

Source: SANDAG 2012; Zembal 2011, 2012; AECOM 2014

Figure 4-3
Light-footed Ridgway's Rail
Suitable Nesting Habitat Impact Analysis, Alternative 2A

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The project also includes a design feature to implement a habitat enhancement plan prior to and during construction to enhance target locations of unimpacted habitat that may be suitable for Ridgway's rail with additional management. The habitat enhancement plan would allow for additional refugia during construction when suitable habitat areas would be reduced. The plan would include things such as nesting platforms, focused cordgrass plantings, and fencing, as well as select predator control.

In addition to direct impacts associated with temporary habitat loss, the Ridgway's rail is a year-round resident in the lagoon and is considered by local experts difficult to flush. Therefore, there is the potential for direct mortality during vegetation removal. In an effort to avoid direct take of this species, the project would take advantage of a natural behavior in which Ridgway's rail move to higher elevations during inundation events. Although Ridgway's rail can swim, it is not preferred and cannot be sustained for long periods of time. The project would initiate inundation (as described in construction phasing, Section 1.2.3.5) outside of the nesting season and would allow adequate time for Ridgway's rail and other wildlife to move to higher ground along the periphery of the lagoon. Inundation would be maintained for dredging purposes but would also be used to conduct vegetation grubbing and removal to maximize avoidance of Ridgway's rail while they are outside of their preferred habitat. With implementation of project design features and construction monitoring, and because greater than 50 percent of breeding habitat would remain available during construction of the proposed project, short-term direct impacts on Ridgway's rail are considered less than significant and not substantially adverse.

Indirect

Indirect short-term/temporary effects to sensitive species may include increases in exposure to predators, degraded water quality, disturbed unconsolidated sediment, and noise.

During construction, and as habitat becomes reestablished on-site, Belding's savannah sparrow and 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. In addition, many of the unimpacted areas considered suitable nesting habitat for these species are not currently used for nesting, indicating this habitat may not be preferred for nesting. To reduce temporary impacts to marsh birds resulting from the indirect effects of the short-term loss of nesting and foraging habitat, the project has included a various design features such as preparation and implementation of a habitat enhancement plan and a predator control program, as described above under direct short-term/temporary impacts.

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. The increase in turbidity and unconsolidated sediments, resulting in lowered visibility, would occur relatively close to the active dredge and other construction activities and would dissipate with distance. 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). As the dredge is slow moving, impacts would be isolated to discrete areas on any given day, leaving many areas within the working basin still suitable for foraging. In addition, the other basins not under active construction in the phasing scheme would also be available for foraging. Due to the daily isolation and concentration of the impact (immediate proximity to the dredge) and the availability of other foraging habitat, these impacts are not expected to substantially adversely affect sensitive bird species. In addition, the project would implement BMPs to further reduce water quality impacts and the indirect effects to sensitive birds (see Chapter 1.0). With implementation of project design features, short-term/temporary indirect impacts to sensitive species resulting from predation and water quality are considered less than significant and not substantially adverse.

In addition to indirect impacts described above, there is also the potential for short-term indirect noise impacts to sensitive species as a result of construction activities. Existing ambient noise levels at San Elijo Lagoon are considered moderate for a natural setting and are directly related to the numerous transportation corridors that traverse the lagoon. The largest contributors to ambient noise levels are I-5, separating the lagoon's largest two basins, and Highway 101 near the western edge of the lagoon. In addition, Manchester Road borders the northern edge of the lagoon and the railroad separates the west and central basins. Short-term noise measurements ranged from 47.0 to 65.4 A-weighted decibels (dBA) L_{eq} with corresponding maximum noise levels ranging from 58.2 to 86.7 dBA L_{max}. The Draft Encinitas General Plan Update (2012) included a model of existing traffic noise contours near the lagoon (excluding the railroad), which is reproduced in the Noise Analysis Section 3.12 of the EIR/EIS. As shown in the model, the highest noise levels are found closest to I-5 and reach 80 dBA CNEL. Noise dissipates exponentially and, as such, the greatest reduction occurs in short distances from the source. The contours illustrate that the quietest areas in the lagoon are located in the middle and eastern portions of the east basin and the southwest corner of the central basin (although the railroad was not included in the contours). Ambient CNEL noise levels do not reach below 60 dBA until the eastern edge of the BSA.

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 Ridgway's rail, Belding's savannah sparrow, western snowy plover, California least tern, least Bell's vireo, southwestern willow flycatcher, and upland species such as the coastal California gnatcatcher. In addition, elevated noise levels have the potential to affect bird foraging behavior during the nonbreeding season. 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 hydraulic engine, which equates to 73 dBA L_{eq} at 50 feet (see Noise Analysis Section 3.12 of the EIR/EIS). 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 dry construction. A worst-case equipment usage scenario was developed including two dump trucks, a bulldozer, and a large backhoe resulting in an average noise level of approximately 81 dBA L_{eq} at 50 feet. 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 least Bell’s vireo, southwest willow flycatcher, and coastal California gnatcatcher. Sensitive birds, including Belding’s savannah sparrow and Ridgway’s rail, currently forage and breed 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 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 dry construction (i.e., along the access road, CDFW dike, utility corridor, and nesting area).

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 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 effects on sensitive birds are considered significant and adverse.

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 and construction traffic routes occur outside of the lagoon environment or on the periphery where ambient noise levels from existing traffic already exist. The one vehicle route that coincides with sensitive birds is the southwest entry point in the central basin where vehicles would enter from North Rios Avenue and travel west into the lagoon. Four coastal California gnatcatchers have been observed along this access route in previous years and are expected to nest in this area. Although implementation of the proposed project would increase the frequency of vehicular traffic along this access route, this is an area already used as a maintenance corridor for the existing pump station, the railroad, and the transmission line. 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 and not substantially adverse.

Long term

Direct long-term/permanent effects 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 restoration 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-restoration. Habitat may be actively converted (graded) or passively converted, i.e. a predictable change resulting from the new hydrology pattern associated with the restoration alternative. Implementing Alternative 2A, tidal hydrology would be extended to the east basin and the lagoon would have a modified high tide line of +4.4 feet National Geodetic Vertical Datum (NGVD), which is higher than the existing

Table 4-5
Alternative 2A Existing and Post-Construction Acreage of Suitable Habitat for Listed Bird Species

Species	Habitat Suitability*	Habitat Type	Existing Habitat Acres	Habitat Acreage Post-Restoration	Net Change in Habitat Acreage Post-Restoration	Percent Change Post-Restoration
Ridgway's rail	Nesting/Foraging	Coastal Brackish Marsh	131.5	96	-35.5	-27%
		Coastal Salt Marsh – Low	13.3	23	9.7	73%
		Total Nesting	144.8	119	-25.8	-18%
	Foraging	Mudflats	63.1	102	38.9	62%
		Coastal Salt Marsh – Mid	141.4	124	-17.4	-12%
		Coastal Salt Marsh – High	120	107	-13	-11%
		Total Foraging	324.5	333	8.5	3%
California least tern	Nesting	Saltpan	36.9	17	-19.9	-54%
		Coastal Strand	5	5	0	0%
		Nesting Area**	0	2	2	200%
		Total Nesting	41.9	24	-17.9	-43%
	Foraging	Subtidal/Channels	40.1	74	33.9	85%
		Beach	15	14	-1	-7%
		Total Foraging	55.1	88	32.9	60%
western snowy plover	Nesting	CDFW dike	0.4	0	-0.4	-100%
		Saltpan	36.9	17	-19.9	-54%
		Coastal Strand	5	5	0	0%
		Nesting Area**	0	2	2	200%
		Total Nesting	42.3	24	-18.3	-43%
	Foraging	Mudflats	63.1	102	38.9	62%
		Beach	15	14	-1	-7%
		Total Foraging	78.1	116	37.9	49%

Species	Habitat Suitability*	Habitat Type	Existing Habitat Acres	Habitat Acreage Post-Restoration	Net Change in Habitat Acreage Post-Restoration	Percent Change Post-Restoration
coastal California gnatcatcher	Nesting/Foraging	Diegan Coastal Sage Scrub	178.1	175.56	-2.54	-1%
		Diegan Coastal Sage Scrub/Chaparral	49.3	49.3	0	0%
		Coyote Bush Scrub	7.5	7.5	-0.02	0%
		Total Nesting/Foraging	234.9	232.34	-2.56	-1%
least Bell's vireo	Nesting/Foraging	Sandbar Willow Scrub	9	9	-0.06	-1%
		Southern Willow Scrub	61.4	58.8	-2.6	-4%
		Total Nesting/Foraging	70.4	67.74	-2.66	-4%
southwestern willow flycatcher	Nesting/Foraging	Southern Willow Scrub	61.4	58.8	-2.6	-4%
		Total Nesting/Foraging	61.4	58.8	-2.6	-4%
Belding's savannah sparrow	Nesting	Coastal Salt Marsh – Mid	141.4	124	-17.4	-12%
		Coastal Salt Marsh – High	120	107	-13	-11%
		Total Nesting	261.4	231	-30.4	-12%
	Foraging	Coastal Salt Marsh – Low	13.3	23	9.7	73%
		Total Foraging	13.3	23	9.7	73%

CDFW = California Department of Fish and Wildlife

*Nesting habitat is considered suitable for both breeding and foraging activities, while habitat identified as "Foraging" is not expected to support breeding activities.

**Under existing conditions, a portion of the nesting area is classified as saltpan.

high tide line of +3.5 feet NGVD. As a result of the increased tidal expression and the elevated high tide line, areas below the high tide line that are not graded as part of the restoration project may passively convert as a result of increased exposure to salt water and improved freshwater export. These areas are expected to begin conversion immediately post-restoration as a result of exposure to the new tidal regime and the corresponding changes to tidal inundation frequencies. These areas would convert in a predictable manner; therefore, their acreages have been included in the post-project habitat calculations and factored into this discussion regarding long-term permanent direct impacts to sensitive species.

Least Bell's Vireo and Southwestern Willow Flycatcher

Both least Bell's vireo and southwestern willow flycatcher utilize riparian habitat on-site for foraging habitat. Both species have been observed in low numbers (less than five in any given year) within the central and east basins, primarily within the southern willow scrub habitat. Neither species has been documented to breed on-site although vocalizing male vireos (three individuals) detected in 2011 may indicate that successful breeding has occurred (Patton 2010, 2012a). Alternative 2A would actively convert (i.e., grade) 4 percent of the southern willow scrub riparian habitat within the lagoon as a result of the expansion of tidal channels in the east basin and widening of tidal channels in the central basin (Table 4-5). As least Bell's vireo use the site primarily for foraging and occur in low numbers, the loss of 4 percent of southern willow scrub riparian habitat is not substantial and would not result in a decline in the local population below self-sustaining levels. Therefore, impacts to least Bell's vireo with project implementation would be less than significant and not substantially adverse.

Coastal California Gnatcatcher

Coastal California gnatcatchers are observed along the periphery of San Elijo Lagoon within the sage scrub and chaparral habitats. As part of construction, an access road along the southwest corner of central basin would need to be enhanced (widened) to accommodate construction vehicular traffic. Table 4-5 shows up to 2.54 acres (1 percent) of permanent impacts associated with the project. This includes a buffer around the access road as well as the I-5 North Coast Corridor Project. The access road enhancement is expected to occur within the existing footprint and the small trail that would be expanded to temporarily accommodate construction equipment would be restored following construction. The impacts associated with the I-5 North Coast Corridor Project are evaluated and mitigated under a separate EIR/EIS (Caltrans 2012). As such, no direct impacts would occur to occupied gnatcatcher habitat.

However, in an effort to be conservative regarding long-term permanent impacts, the project evaluated the potential to impact occupied coastal sage scrub habitat along the access road off of

North Rios Avenue. Over the last 5 years, up to two coastal California gnatcatcher territories were located annually within the vicinity of the road improvements area. Although coastal California gnatcatcher often occupy the same territory over consecutive years, their territories fluctuate in size and nesting often occurs throughout that territory. Any vegetation removal that would occur for the road enhancement could be narrow and linear (parallel to the existing access road). As such, impacts to any existing gnatcatcher territories would occur along the margin of the territory and would not result in the entire loss of any territories. Therefore, future nesting in this area is expected to continue following widening of the access road. The acreage associated with the access road improvements (up to 0.7 acre) in addition to the other direct impacts associated with the larger restoration effort (1.8 acres) is the equivalent of 1 percent of the suitable nesting habitat for coastal California gnatcatcher. Impacts associated with the loss of 1 percent of suitable habitat are not considered substantial and would not result in a decline in the local population below self-sustaining levels. Therefore, impacts to coastal California gnatcatcher with project implementation would be less than significant and not substantially adverse.

California Least Tern and Western Snowy Plover

Both California least tern and western snowy plover are documented annually foraging and roosting at San Elijo Lagoon. Western snowy plover has not successfully nested at San Elijo Lagoon since 2002, and California least tern since 2005 (, CDFG 2006; Patton 2010).Ideal nesting sites for each species are similar, consisting of undisturbed, sparsely vegetated, flat areas with loose, sandy substrate. Potential nesting habitat for these species within the lagoon includes the saltpan, coastal strand, and the CDFW dike. Alternative 2A would permanently decrease suitable nesting habitat for California least tern by 6.8 acres (16.1 percent of suitable nesting habitat) and decrease suitable nesting habitat for western snowy plover by 7.2 acres (16.9 percent of suitable nesting habitat). As neither species currently breeds on-site, the loss of nesting habitat does not substantially affect either species.

Following restoration, both species are expected to benefit from the restoration of the lagoon. Foraging habitat for both species would increase, with an 85 percent increase in open water and subtidal channels used by California least tern and a 62 percent increase in mudflat used by Ridgway’s rail. The condition of foraging habitat is also expected to improve as a result of restoration due to tidal influx and improved benthic community. The improved tidal circulation and restoration to appropriate habitat elevations would enhance environmental conditions for the prey communities that both birds feed on. The regular influx of tidal waters is expected to deliver larvae to the site, which may in turn increase densities and species richness of the benthic community. This directly benefits western snowy plover in addition to other foraging birds. Similarly, tidal circulation would improve environmental conditions for the fish community, which would benefit least tern and other diving birds. The restoration project would directly benefit these species that regularly use the lagoon for foraging and roosting, by increasing foraging habitat in both quantity and quality. As such, no significant or substantially adverse impacts would result with project implementation.

Belding's Savannah Sparrow

As depicted in Table 4-5, Alternative 2A would reduce available nesting habitat for Belding's savannah sparrow by 30.4 acres, which equates to a loss of 11 percent compared to existing conditions. The greatest reduction is within the central basin, where mid-marsh is being replaced with mudflat and low-marsh habitat. Based on best professional judgment, trends observed in other lagoon restoration projects, and long-term species monitoring programs, Belding's savannah sparrow territory size and density are highly variable and often reflect environmental conditions (Zembal and Hoffman 1988). In extreme wet and dry years when habitat is unsuitable for nesting, territory size may be substantially smaller than in moderate years when more area is suitable. Similarly, when restoration efforts at Bolsa Chica reduced available nesting habitat but improved the quality of the available habitat, the population increased and territory sizes reduced, resulting in higher densities in remaining habitat (Merkel and Associates 2009). Based on this information, the reduction in nesting habitat for Alternative 2A would not result in a decline in the local population below self-sustaining levels.

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 high-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 enhance tidal flushing and freshwater export, which would facilitate the drying of high-marsh habitat used for ground nesting. In addition, restoring tidal flushing and salt water exposure to the existing salt marsh habitat in the northeast portion of the lagoon may also improve habitat structure. Although these areas support pickleweed, they are dominated by other native salt marsh species. The presence of these other native salt marsh species makes these areas less preferable for nesting as compared to the dense pickleweed habitat found within the central basin and the western end of the east basin. While the project would result in an overall reduction in available nesting habitat of 11 percent, the improved conditions for the remaining 231 acres (89 percent) of mid- and high-marsh habitat resulting from the restoration as well as the improved lagoon condition outweigh the impact associated with the numeric loss of habitat acreage. The project would ultimately benefit the Belding's savannah sparrow population at San Elijo Lagoon and impacts are considered less than significant and not substantially adverse.

Ridgway's Rail

Ridgway's rail nesting and foraging habitat would be modified as part of this alternative. Post-restoration, there would be a net loss of nesting habitat acreage for Ridgway's rail by 24.8 acres, which equates to a loss of 18 percent when compared to existing conditions. The greatest reduction would be within the east basin, where brackish marsh would be replaced by subtidal and low-marsh habitat. Although brackish marsh would be reduced, the preferred habitat of Ridgway's rail is low-marsh, which is currently limited in the lagoon. Alternative 2A would result in an increase in low-marsh from the current 13.3 acres to 23 acres.

It should be noted that, although the No Project/No Federal Action Alternative is analyzed separately, low-marsh habitat is expected to continue to expand under existing conditions. This is a result of the now regular maintenance of the lagoon mouth and the artificially established mudflat that currently exists at an unsustainable higher elevation. When the lagoon reaches an equilibrium state, it is predicted that low-marsh would increase to 51 acres compared to existing conditions (13 acres) while brackish marsh would remain unchanged. 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 low-marsh habitat occupied by Ridgway's rail is denoted under existing conditions by the overall poor conditions of the lagoon resulting from poor tidal flushing and these less than optimal conditions would continue without restoration. The increase in low-marsh habitat expected at equilibrium would be directly correlated to the net loss of mudflat acreage (63 acres in 2012 versus 29 acres at equilibrium), which is critical foraging habitat for the year-round resident Ridgway's rail, as well as other foraging birds.

Under Alternative 2A, the expansion of the low-marsh habitat (compared to existing conditions) for Ridgway's rail would occur in the central and east basins. In addition to affecting habitat acreage, the changes to lagoon hydrology under the alternative would also improve the condition of the remaining foraging and nesting habitat for Ridgway's rail. Under current conditions, much of the brackish marsh in the east lagoon is inundated with standing, potentially stagnant, water and the low-marsh habitat is occupying nutrient-laden sediment that often experiences periods of anoxia. The extension of the tidal prism farther east, in addition to the improved tidal flushing and freshwater export, is expected to enhance the condition of the remaining brackish marsh. Foraging habitat would also be affected by Alternative 2A with a small net increase in acreage but a larger increase in condition. Ridgway's rail forage within their nesting habitat in addition to mudflats, mid-marsh, and high-marsh habitats. The regular influx of tidal waters and proper tidal flushing are expected to enhance the benthic community in all foraging habitats, but in particular mudflats. 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 Ridgway's rail populations at San Elijo Lagoon. Therefore, impacts to Ridgway's rail with implementation of Alternative 2A are considered less than significant and not substantially adverse.

As part of the restoration project, there would be long-term monitoring and maintenance. This may include, but is not limited to, biological monitoring, nonnative species treatment, isolated regrading or recontouring, 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, 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 impacts are considered less than significant and not substantially adverse.

With implementation of project design features and the net benefits of the restoration project, permanent direct impacts to sensitive species from active conversion of nesting and/or foraging habitat, modified lagoon conditions, and long-term maintenance and operation are considered less than significant and not substantially adverse.

Indirect

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

Habitat above the high tide line, within the transitional area, may passively transition (change) over a long period of time. The transitional area is considered to begin at the high tide line and extend up to 2+ feet above the high tide line. For Alternative 2A, this area is found between +4.4 feet NGVD and +6.4 feet NGVD. Transitional areas provide opportunity for refugia to estuarine-dependent wildlife during extreme high tides and periods of extensive lagoon inundation. As a result of this project, the transitional area would include man-made and existing natural areas. Passive transition of habitat within the new natural transitional area is possible although unpredictable. In particular, these areas are important for Belding's savannah sparrow and Ridgway's rail as these species are year-round residents that occupy lower elevation marsh habitat that is regularly affected by tides. In addition, Ridgway's rail currently occupies and nests in a large portion of brackish marsh in the east basin that would occur within the new natural transitional area. Over time, this area may change from brackish marsh to salt marsh habitat. Although the change in habitat is unpredictable in the transitional area, the connection to tidal hydrology and the improved freshwater export is expected to ultimately enhance the condition of the existing habitat within the east basin transitional area. In addition, any impacts to sensitive species resulting from changes to the new transitional area are not considered substantial.

It is possible that reduced periods of saturation and increased salinity may make transitional areas in the east basin more prone to invasion by nonnative species. In particular, areas going through a transition from one habitat type to another may have an increased percentage of bare ground as species die and new recruits arrive. Of particular concern is the salt tolerant *Tamarix* spp. (tamarisk or salt cedar), which can be highly invasive in estuarine systems and preclude native plant community development. Nonnative invasive species have the potential to exclude native plant recruits and ultimately shape the vegetation community to something less than suitable for estuarine wildlife, including the Belding’s savannah sparrow and Ridgway’s rail. As part of the post-construction habitat monitoring and maintenance program for this project, the occurrence of these invasive species would be closely monitored as well as the potential die-off of emergent vegetation (i.e., cattails) in the east basin. 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 substantial.

Indirect changes to lagoon conditions are expected as a result of restoration and the corresponding improvement to tidal hydrology (i.e., circulation, turnover, freshwater export, etc.). Although not quantifiable, these changes are associated with a properly functioning lagoon system with a predominantly open mouth. In particular changes to water quality are expected including increased oxygenation, reduced or eliminated periods of anoxic conditions, and water temperature regulation. These improvements to water quality and overall lagoon conditions are expected to directly and indirectly benefit sensitive species on-site. The improved conditions would likely result in increased food web complexity, including improvements to the terrestrial insect population, the benthic invertebrate population, and the subtidal fish population. All of these communities are primary food sources for various sensitive species and others residing in the lagoon. The indirect improvement to water quality would benefit sensitive species.

With implementation of project design features and the net benefits of the restoration project, indirect permanent impacts to sensitive species from passive transition of nesting and/or foraging habitat and invasive species are considered less than significant and not substantially adverse.

<u>Nonlisted Special-status Wildlife Species</u>

Of the 98 special-status wildlife species with potential to occur within the BSA, 87 are nonlisted (CDFG 2011; BioBlitz 2009; Patton 2010; SELC 2011; MEC 2002). Table 3-5 provides a summary of the special-status species known or potentially occurring with the BSA.

Resident/Breeding Species

Forty-five (45) nonlisted wildlife species are considered residents within the BSA or the BSA supports suitable breeding habitat for these species. Of those 45 species, 13 nonlisted special-status wildlife species were detected during previous studies within the BSA (CDFG 2011; BioBlitz 2009; Patton 2010; SELC 2011; MEC 2002). Each of these species and their potential use of the lagoon are described above.

Invertebrates

- wandering (salt marsh) skipper, *Panoquina errans*

Reptiles and Amphibians

- orange-throated whiptail, *Aspidoscelis hyperythra beldingi*
- silvery legless lizard, *Anniella pulchra pulchra*

Birds

- Cooper's hawk, *Accipiter cooperi*
- northern harrier, *Circus cyaneus*
- osprey, *Pandion haliaetus*
- western bluebird, *Sialia Mexicana*
- white-tailed kite, *Elanus leucurus majuscules*
- yellow warbler, *Dendroica petechia brewsteri*
- yellow-breasted chat, *Icteria virens*

Mammals

- California (western) mastiff bat, *Eumops perotis californicus*
- western red bat, *Lasiurus blossevillii*
- southern mule deer, *Odocoileus hemionus fulginata*

In addition the following 32 nonlisted special-status species have the potential to occur and breed in the BSA but were not detected during historic survey.

Invertebrates

- western beach tiger beetle, *Cicindela latesignata latesignata* (moderate potential)
- globose dune beetle, *Coelus globosus* (moderate potential)
- sandy beach tiger beetle, *Cicindela hirticollis gravid* (moderate potential)

Reptiles and Amphibians

- western spadefoot toad, *Spea* (Sacphiopus) *hammondii* (high potential)
- southwestern pond turtle, *Actinemys marmorata pallid* (moderate potential)
- San Diego coast horned lizard, *Phrynosoma coronatum* (blainvillei) (high potential)

- Coronado skink, Eumeces *skitonianus interparietalis* (high potential)
- coast patch-nosed snake, *Salvadora hexalepis virgultea* (moderate potential)
- two-striped gartersnake, *Thamnophis hammondii* (high potential)
- red-diamond rattlesnake, *Crotalus ruber ruber* (moderate potential)

Birds

- Redhead, *Aythya Americana* (moderate potential)
- least bittern, *Ixobrychus exilis* (moderate potential)
- burrowing owl, *Athene cunicularia* (low potential)
- long-eared owl, *Asio otus* (low potential)
- loggerhead shrike, *Lanius ludovicanus* (moderate potential)
- California horned lark, *Eremophila alpestris actia* (low potential)
- coastal cactus wren, *Campylorhynchus brunneicapillus couesi* (low potential)
- southern California rufous-crowned sparrow, *Aimophila ruficeps canescens* (moderate potential)
- Bell's sage sparrow, *Amphispiza belli belli* (moderate potential)
- grasshopper sparrow, *Ammodramus savannarum perpallidus* (low potential)

Mammals

- Mexican long-tongued bat, *Choeronycteris mexicana*
- pocketed free-tailed bat, *Nyctinomops femorosaccus*
- pallid bat, *Antrozous pallidus*
- Townsend's (western) big-eared bat, *Corynorhinus townsendii pallescens*
- San Diego black-tailed jackrabbit, *Lepus californicus bennettii*
- Dulzura California pocket mouse, *Chaetodipus californicus femoralis*
- northwestern San Diego pocket mouse, *Chaetodipus fallax fallax*
- southern grasshopper mouse, *Onychomys torridus Ramona*
- Pacific pocket mouse, *Perognathus longimembris pacificus*
- San Diego desert woodrat, *Neotoma lepida intermedia*
- American badger, *Taxidea taxus*
- mountain lion, *Felis concolor*

Impacts to the 45 nonlisted resident wildlife species described above may include the direct loss of individuals as well as the short-term loss of habitat from grading and inundation. Although these species are considered residents of the lagoon, the majority will breed in areas outside the grading and inundation zone as they are associated with upland habitats. A few species may use habitats within the impact footprint, including western beach tiger beetle and wandering (saltmarsh) skipper, which are both associated with salt marshes, as well as the redhead and least bittern, which breed in brackish marsh. The short-term loss of habitat is addressed above. The project includes various design features to minimize impacts to sensitive species, including resident fauna that may breed on-site (Table 1-5). Design features that would minimize impacts to resident species include the use of biological monitors, vegetation removal outside of the breeding season, and controlled inundation to help encourage movement to outside the impact area. 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 resident/breeding species are not expected to result in the decline of any species below self-sustaining levels; impacts are considered less than significant and not substantially adverse. No long-term impacts to migratory and nonresident wildlife species are expected as the restoration project and the corresponding improvements to ecological conditions are considered beneficial to all 45 species.

Nonresident/Migratory Species

The following 43 nonlisted special-status species are considered migrants/nonbreeding season residents and/or where the BSA does not contain suitable breeding habitat. Of these the following 35 were detected during historical surveys.

- brant, *Branta bernicla*
- common loon, *Gavia immer*
- double-crested cormorant, *Phalacrocorax auritus*
- American white pelican, *Pelecanus erythrorhynchos*
- California brown pelican, *Pelecanus occidentalis californicus*
- white faced ibis, *Plegadis chihi*
- long-billed curlew, *Numenius americanus*
- sandhill crane, *Crus Canadensis*
- California gull, *Larus californicus*
- gull-billed tern, *Gelochelidon nilotica*
- black tern, *Childonias niger*
- elegant tern, *Sterna elegans*
- black skimmer, *Rynchops niger*
- black rail, *Laterallus jameicensis coturniculus*
- Cassin’s auklet, *Ptychoramphus aleuticus*
- ferruginous hawk, *Buteo regalis*
- golden eagle, *Aquila chrysaetos*
- bald eagle, *Haliaeetus leucocephalus*
- sharp-shinned hawk, *Accipiter striatus*
- merlin, *Falco columbarius*
- American peregrine falcon, *Falco peregrinus anatum*
- prairie falcon, *Falco mexicanus*

- short-eared owl, *Asio flammeus*
- black swift, *Cypseloides niger*
- Vermilion flycatcher, *Pyrocephalus rubinus*
- purple martin, *Progene subis*
- bank swallow, *Riparia riparia*
- Bendire's thrasher, *Toxostoma bendirei*
- Virginia's warbler, *Vermivora virginiae*
- large-billed savannah sparrow, *Passerculus sandwichensis rostratus*
- summer tanager, *Piranga rubra*
- tricolored blackbird, *Agelaius tricolor*
- yellow-headed blackbird, *Xanthocephalus xanthocephalus*
- Vaux's swift, *Chaetura vauxi*
- olive-sided flycatcher, *Contopis cooperi*

The following 7 nonlisted special-status species including one bat, were not detected during historical surveys but have the potential to occur within the BSA.

Birds

- fork-tailed storm-petrel, *Oceanodroma furcate*
- black storm-petrel, *Oceanodroma melania*
- wood stork, *Mycerterua anerucana*
- laughing gull, *Larus atricilla*
- Scripps's murrelet, *Synthliboramphus hypoleucus scrippsi*
- rhinoceros auklet, *Cerorhinca monocerata*
- gray vireo, *Vireo vicinior*

Mammal

- Townsend's (western) big-eared bat, *Corynorhinus townsendii pallescens*

The project includes various design features that would facilitate avoidance of migratory species including use of biological monitors and vegetation removal outside of the breeding season, and with the aid of controlled inundation (Table 1-5). As impacts would be phased across the lagoon, foraging habitat would remain in other areas at any given time so that migratory species would continue to have access to the lagoon as a whole during construction. Short-term impacts to migratory and nonresident species are considered less than significant and not substantially adverse. No long-term impacts to migratory and nonresident wildlife species are expected as the restoration project and the corresponding improvements to ecological conditions are considered beneficial to all 43 species.

4.2.4 Wildlife Corridors/Connectivity

As described in Section 3.6, San Elijo Lagoon is not functioning as a regional corridor. Instead, it is a large area of natural open space connected to Escondido Creek. Escondido Creek links San Elijo Lagoon with other open space habitat in Harmony Grove and the Elfin Forest to the northeast. San Elijo Lagoon is an important natural open space that provides a large area of habitat for core populations of sensitive wildlife and plant species. Alternative 2A would result in temporary and short-term impacts to wildlife movement throughout the lagoon during grading, dredging, and controlled inundation operations. However, construction would be phased and occur within discrete locations at discrete timeframes within the lagoon basins, thereby allowing for wildlife movement within adjacent habitat 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 or substantially adverse short-term or long-term impacts to wildlife movement/connectivity are anticipated with implementation of Alternative 2A.

4.2.5 Local Ordinances/Policies/Adopted Plans

The project would be required to be consistent with Regional Conservation Plans. Two regional planning documents cover the Lagoon BSA, the draft North County MSCP (County of San Diego 2009) and the North County MHCP (AMEC et al. 2003). The North County MSCP is a draft and expands the County MSCP into the northwestern unincorporated areas of San Diego County. The portions of the lagoon owned by the County of San Diego (primarily the east basin) are within the North County MSCP. Portions of the BSA are within conservation areas referred to as the Preserve Area and Pre-Approved Mitigation Area under the draft North County MSCP (County of San Diego 2009). The majority of the central and west basins are covered in the MHCP. Both documents allow for restoration of preserve areas. Specifically, the MHCP and the North County MSCP acknowledge the intent for restoration of San Elijo Lagoon (see North County MSCP Section 8.16 and MHCP Section 6.3.5). All restoration, maintenance, and monitoring plans prepared for SELRP Alternative 2A 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 both the MHCP and draft North County MSCP. Therefore, no significant or substantially adverse impact would result with implementation of Alternative 2A.

4.3 ALTERNATIVE 1B

The following section evaluates direct and indirect impacts, as well as permanent and temporary impacts to biological resources associated with Alternative 1B. Where impacts are similar or less than Alternative 2A, minimal discussion is provided. However, if the impact is unique to this alternative or notably different than Alternative 2A, then further discussion is provided.

4.3.1 Sensitive Riparian and Natural Vegetation Communities

Short-term

Construction of Alternative 1B would, similar to Alternative 2A, result in temporary or short-term impacts to sensitive habitats associated with grading and dredging operations. The project is anticipated to take approximately 3 years to construct and would be phased to minimize impacts to the lagoon habitats, allowing for refuge and retaining some available habitats at any given time during construction. Inundation durations would be similar to 2A, as areas proposed for inundation would be inundated for 3 months or longer. Therefore, it is assumed that this vegetation would be substantially impacted; as a worst case scenario, it is assumed that vegetation in inundated areas would not survive (i.e., habitat would be lost for more than 12 months). The Adaptive Management Program for the project, as described in Chapter 1.2.3.5, includes measures for monitoring and maintenance activities to aid in the recovery of inundated vegetation communities.

Impacts are summarized by basin in Table 4-6 and for the entire BSA in Table 4-7. Impacts are separated into two types of short-term impacts: areas that would be graded/dredged during construction and areas that would be affected by inundation only. Impacts associated with Alternative 1B would be similar to the impacts from Alternative 2A, while there would be slightly reduced grading/dredging impacts and slightly greater inundation impacts. Overall, impacts to the lagoon are similar with approximately 32 percent of the lagoon impacted by restoration construction. Grading/dredging impacts would occur in approximately 182 acres (approximately 19 percent) of habitat and inundation would impact an additional 130 acres (approximately 13 percent) of habitat within the San Elijo Lagoon BSA (Figure 4-4). The extensive hillsides along the lagoon and the eastern end of the BSA would not be impacted by restoration construction.

Similar to Alternative 2A, restoration construction would result in greater than 50 percent temporal loss of sensitive habitats that would be significantly impacted by construction. These habitats include coastal salt marsh (low-and mid), open water, saltpan/open water, and tidal mudflats. The temporal loss of these habitats may threaten local populations of sensitive resident species, as described further Section 4.3.3. Short-term direct impacts to coastal salt marsh (low-and mid), open water, saltpan/open water, and tidal mudflats are therefore considered significant and adverse.

Table 4-6
Direct Project Impacts from Construction of Alternative 1B by Basin

Basin/Habitat Community	**Existing Vegetation (acres) within the BSA**	**Alternative 1B Direct Impacts from Dredging/ Grading (acres)**	**Alternative 1B Direct Impacts from Inundation**	**Habitat Temporarily Impacted (% in BSA)**
Central Basin				
Coastal Brackish Marsh	6.1	1.7	3.6	87%
Coastal Salt Marsh – High	0.7	0.7	0.0	100%
Coastal Salt Marsh – Low	11.8	6.1	4.6	91%
Coastal Salt Marsh – Mid	121.3	46.1	55.5	84%
Developed	10.4	3.5	0.0	34%
Diegan Coastal Sage Scrub	67.0	2.8	0.5	5%
Diegan Coastal Sage Scrub/Chaparral	27.7	0.0	0.0	0%
Disturbed Habitat	6.7	2.1	0.0	31%
Eucalyptus Woodland	15.7	0.0	0.1	1%
Open Water	23.7	18.2	2.6	88%
Saltpan/Open Water	1.5	1.5	0.0	100%
Southern Willow Scrub	14.4	0.7	2.1	19%
Tidal Mudflat	49.3	29.1	14.9	89%
Total for Central Basin	**356.3**	**112.0**	83.8	55%
Coastal Area				
Beach	15.0	2.1	0	14%
Developed	3.0	0.1	0	3%
Open Water	1.5	**0.1**	**0**	7%
Total for Coastal Area	**19.5**	**2.3**	**0**	12%
East Basin				
Coastal Brackish Marsh	125.4	22.2	0.6	18%
Coastal Salt Marsh – High	118.5	11.7	2.6	12%
Coastal Salt Marsh – Mid	3.4	2.3	1.1	100%
Coyote Bush Scrub	7.5	0.0	0	0%
Developed	4.9	0.9	0	18%
Diegan Coastal Sage Scrub	108.1	1.5	0	1%
Diegan Coastal Sage Scrub/Chaparral	21.6	0.0	0	0%
Disturbed Habitat	2.6	0.4	0.2	23%
Disturbed Wetland	1.1	0.0	0	0%
Eucalyptus Woodland	3.4	0.0	0	0%
Nonnative Grassland	33.1	0.0	0	0%
Open Water	10.6	9.5	0.1	91%
Saltpan/Open Water	35.4	5.1	13.7	53%
Sandbar Willow Scrub	8.9	0.0	0	0%
Southern Willow Scrub	46.9	2.2	0.1	5%
Total for East Basin	**531.5**	**55.9**	**18.5**	14%
West Basin				
Coastal Salt Marsh – High	0.8	0.1	0.7	100%

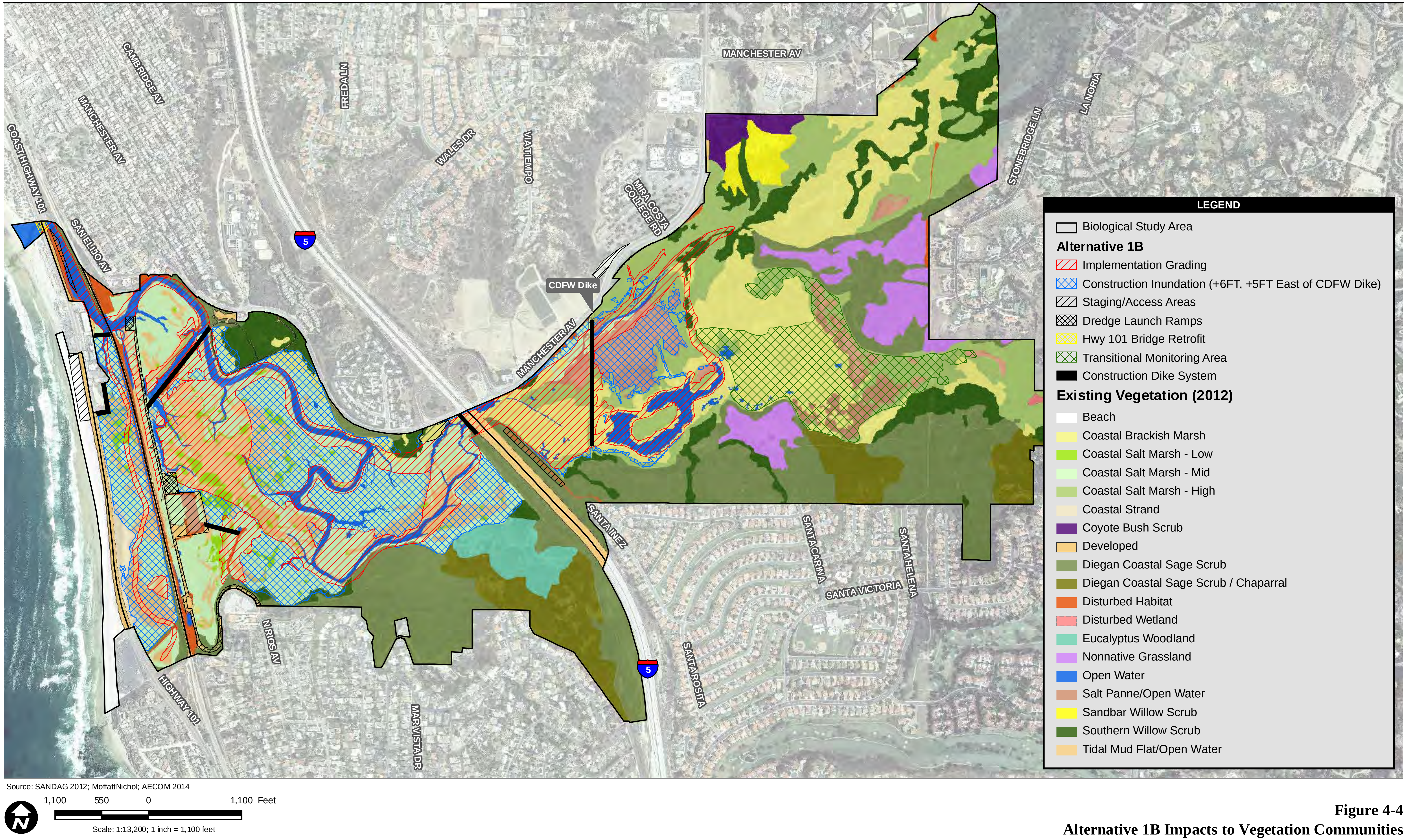
Basin/Habitat Community	**Existing Vegetation (acres) within the BSA**	**Alternative 1B Direct Impacts from Dredging/ Grading (acres)**	**Alternative 1B Direct Impacts from Inundation**	**Habitat Temporarily Impacted (% in BSA)**
Coastal Salt Marsh – Low	1.5	0.3	1.2	100%
Coastal Salt Marsh – Mid	16.7	2.3	12.6	89%
Coastal Strand	5.0	0.0	1.4	28%
Developed	5.2	0.2	0	4%
Diegan Coastal Sage Scrub	3.1	0.3	0.2	16%
Disturbed Habitat	2.5	0.3	0.6	36%
Open Water	4.3	3.7	0.3	93%
Tidal Mudflat	13.8	3.0	10.3	96%
Total for West Basin	**52.9**	**10.0**	27.4	71%
TOTAL	**960.2**	**181.9**	**129.8**	32%

BSA = Biological Study Area

Table 4-7
Direct Project Impacts from Construction of Alternative 1B

Basin/Habitat Community	**Existing Vegetation (acres) within the BSA**	**Alternative 1B Direct Impacts from Dredging/ Grading (acres)**	**Alternative 1B Direct Impacts from Inundation**	**Habitat Temporarily Impacted (% in BSA)**
Beach	15.0	2.1	0	14%
Coastal Brackish Marsh	131.5	23.9	4.2	21%
Coastal Salt Marsh – High	120.0	12.5	3.3	13%
Coastal Salt Marsh – Low	13.3	6.4	5.8	92%
Coastal Salt Marsh – Mid	141.4	50.6	69.2	85%
Coastal Strand	5.0	0	1.4	28%
Coyote Bush Scrub	7.5	0	0	0%
Developed	23.4	6.0	0.1	26%
Diegan Coastal Sage Scrub	178.2	4.5	0.7	3%
Diegan Coastal Sage Scrub/Chaparral	49.3	0	0	0%
Disturbed Habitat	11.9	2.9	0.8	31%
Disturbed Wetland	1.1	0	0	0%
Eucalyptus Woodland	19.1	0	0.1	1%
Nonnative Grassland	33.1	0	0	0%
Open Water	40.1	31.5	3.0	86%
Saltpan/Open Water	37.0	6.6	13.7	55%
Sandbar Willow Scrub	8.9	0	0	0%
Southern Willow Scrub	61.3	2.9	2.2	8%
Tidal Mudflat/Open Water	63.1	32.0	25.2	91%
Total	**960.2**	**181.9**	**129.7**	**32%**

BSA = Biological Study Area



Source: SANDAG 2012; MoffattNichol; AECOM 2014

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 4-4
Alternative 1B Impacts to Vegetation Communities

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Temporary impacts to beach, coastal brackish marsh, high coastal salt marsh, coastal strand, Diegan coastal sage scrub, and southern willow scrub are not considered significant because greater than 50 percent of the local habitat would remain available to local resident and migratory species during construction. Short-term direct impacts to beach, coastal brackish marsh, high coastal salt marsh, coastal strand, Diegan coastal sage scrub, and southern willow scrub are therefore considered less than significant and not substantially adverse.

No direct impacts are proposed to coyote bush scrub, Diegan coastal sage scrub/chaparral, disturbed wetland, nonnative grassland, and sandbar willow scrub.

USFWS Critical Habitat

Impacts to USFWS critical habitat for western snowy plover would be similar to those discussed for Alternative 2A. As with Alternative 2A, temporary impacts to critical habitat, for the purpose of restoration, would be considered less than significant.

Similar to Alternative 2A, no new impacts to coastal California gnatcatcher critical habitat would result from restoration construction. Therefore, impacts would be considered less than significant and not substantially adverse.

Essential Fish Habitat

Construction of Alternative 1B would result in similar temporary and short-term impacts to EFH associated with grading and dredging operations as discussed for Alternative 2A. No significant or substantially adverse impacts to EFH are anticipated with implementation of Alternative 1B.

Indirect Impacts

Short-term indirect impacts associated with Alternative 1B would be similar to Alternative 2A. No significant or substantially adverse indirect impacts to vegetation communities would result with project implementation.

Long-term

Long-term changes in vegetation (5–10 years post-restoration) would occur from implementation of Alternative 1B, as shown in Table 4-2 and Figure 1-3. Within 5–10 years following restoration, habitats are expected to have substantially recovered and matured. The overall acreage of sensitive habitats within the lagoon would remain approximately 960 acres. However, changes between sensitive vegetation in the lagoon would occur with the dredging of channels/basins, grading, and improvements to hydrologic function.

Alternative 1B incorporates hydrologic improvements and proposes additional grading and dredging to further increase tidal influence in the central and east basins while retaining the existing ocean inlet. Major features of Alternative 1B include a matrix of mudflats and secondary channels south of the main channel. Existing emergent low-marsh would be retained (i.e., would not be graded, but would be inundated) to the extent possible to create a diverse habitat distribution in the basin. Based on hydrologic modeling (Moffatt and Nichol 2012), little change in habitat distributions would occur in the east basin under Alternative 1B relative to Alternative 2A, except that under Alternative 1B greater low-marsh would be retained at the expense of additional mudflat.

Alternative 1B would result in an increase in subtidal habitat relative to the existing and projected No Project/No Federal Action conditions. Most of the increase in subtidal habitat would occur in the central and east basins and would result in a corresponding decrease in nontidal high-salt marsh, saltpan, freshwater/brackish marsh, and riparian habitats. The open freshwater ponds currently maintained by the CDFW dike would be converted to subtidal habitat. Intertidal mudflat habitat would be increased relative to existing and projected No Project/No Federal Action conditions, with a corresponding decrease in mid-salt marsh. Man-made transition zone habitat would increase through placement of dredged sediments in selected areas of the central and east basins. This increase would result in a corresponding decrease in mid-salt marsh, and upland area.

Alternative 1B would facilitate the efficient conveyance of seasonal freshwater flows through the system to the existing inlet. Similar to Alternative 2A, an avian nesting area located in the central basin would be established. Removal of the CDFW dike under this alternative may restrict management options that would support avian nesting on saltpan habitat in the east basin.

In summary, habitat changes under Alternative 1B trend similarly to Alternative 2A, although the majority of the saltpan and low-marsh habitat is retained, with less mid-marsh and mudflat habitat planned under this alternative. Similar to Alternative 2A, with implementation of Alternative 1B, mudflat, open water, and man-made transitional habitats would substantially increase over existing conditions. Under Alternative 1B salt marsh, freshwater/brackish marsh, and riparian habitats would be reduced.

The overall acreage of habitat available for sensitive species would remain unchanged with this alternative. In addition, habitats that remain unchanged are expected to benefit from the improved hydrologic function of the lagoon. When considering changes to sensitive habitats, a change from one sensitive habitat to another does not necessarily represent a positive or negative impact. Rather, the ecological ramifications of the change on sensitive species and lagoon ecology would be the primary indicators of impact. As described in Chapter 1.0 and noted above under Alternative 2A, the lagoon habitat is rapidly transitioning over time, with continued loss of mudflat and rapid increase in salt marsh. With rapid transition to salt marsh, there is a reduction in available foraging habitat for sensitive and nonsensitive birds, which has the potential for significant ecological changes in the lagoon and is expected to dramatically change the diversity and density of wildlife that the lagoon is able to continue to support.

With implementation of the proposed SELRP Alternative 1B, the project would result in improved hydrologic function and increased foraging habitat, and would reverse the rapid changes that are occurring under existing conditions. Species-specific impacts associated with these changes are evaluated below. The substantial change in habitat from one sensitive vegetation community to another sensitive vegetation community does not in itself represent a significant biological impact. With improved lagoon ecology, increased foraging for species, and no overall loss of lagoon resources, impacts to sensitive vegetation communities with project implementation of Alternative 1B are considered less than significant and not substantially adverse.

USFWS Critical Habitat

The impacts to USFWS critical habitat would be the same as Alternative 2A and are therefore considered less than significant and not substantially adverse.

Essential Fish Habitat

Construction of Alternative 1B would result in similar long-term beneficial impacts to EFH as discussed for Alternative 2A. This alternative would create additional acreages of open water, tidal channels, and mudflat habitat, as well as enhance the conditions of existing subtidal habitat by increasing tidal influence within the lagoon. Although less subtidal habitat would be created under this alternative, this additional acreage of habitat would also support local fish populations and benefit EFH within the project area. No long-term significant or substantially adverse impact to EFH is anticipated with implementation of Alternative 1B.

Indirect Impacts

Long-term indirect changes to the vegetation communities under Alternative 1B would be similar to those described for Alternative 2A. Indirect passive/natural transition of habitat is anticipated to be neutral or beneficial to the lagoon, and would be monitored via the project's Adaptive

Management program; therefore, impacts are considered less than significant and not substantially adverse.

4.3.2 Jurisdictional Waters and Wetlands

Of the approximately 620 acres of wetlands, approximately 285.8 acres would be directly impacted by construction (159.2 acres from grading/dredging and 126.6 acres from inundation). Of this, approximately 0.28 acre is considered state-only waters, because it represents the riprap bank at the existing inlet to the lagoon. The short-term and long-term (direct and indirect) impacts resulting from the implementation of Alternative 1B would be similar to those discussed for Alternative 2A and are considered less than significant and not substantially adverse.

4.3.3 Sensitive Species

4.3.3.1 Flora

Federally Listed and State-Listed Plant Species

No federally listed or state-listed rare, threatened, or endangered plant species occur within the areas proposed for restoration. As with Alternative 2A, one federally listed plant species, Del Mar manzanita, and one state-listed species, Orcutt's goldenbush, occur in uplands habitat and would not be affected by the proposed project.

Approximately 11 individuals of southwestern spiny rush (CNPS List 4.2) are within the grading limits of Alternative 1B and would be directly impacted. However, this direct impact is not considered significant, due to the several hundred individuals scattered throughout the mid- and high-salt marsh habitats within the lagoon. The large population of southwestern spiny rush is expected to persist within the lagoon, as the majority of the mid- and high-salt marsh habitats would remain intact. Therefore, no significant or substantially adverse impacts to sensitive plant populations are anticipated with construction of Alternative 1B.

Nonlisted Plant Species

Impacts to nonlisted plant species are similar to Alternative 2A. Alternative 1B is not expected to result in the decline of any species below self-sustaining levels; impacts are considered less than significant and not substantially adverse. In addition, no long-term impacts to nonlisted plant species are expected as the restoration project and the corresponding improvements to ecological conditions are considered beneficial to all 28 species.

4.3.3.2 Fauna

There is the potential for both short-term/temporary effects and long-term/permanent effects associated with the implementation of Alternative 1B. There is also the potential for direct and indirect short-term changes as a result of Alternative 1B that may affect sensitive species. As with Alternative 2A, these effects would be the result of grading, dredging, and controlled prolonged inundation. These effects may be considered negative (impact) or positive (benefit); both are discussed related to the seven state-listed and/or federally listed species as described for Alternative 2A.

Short term

Direct short-term/temporary effects may include the short-term loss of nesting and/or foraging habitat as well as noise impacts as a result of construction activities such as grading, dredging, and controlled prolonged inundation.

Impacts resulting from Alternative 1B are similar to Alternative 2A but to a lesser extent. This alternative was designed to maximize lagoon habitat diversity while minimizing direct impacts to the rapidly expanding low-marsh habitat. As part of the restoration effort, nesting or foraging habitat would be temporarily impacted (i.e., graded, dredged, or inundated) during construction, which may affect listed species that use the lagoon and rely on this habitat. The direct temporary impacts to listed species habitat, including nesting and foraging, are summarized in Table 4-8. As with Alternative 2, short-term impacts are separated into two types: 1. areas that would be graded/dredged during construction and areas that would be affected by controlled inundation only. Although both impacts are direct, the duration of the temporary impacts associated with inundation are less predictable as these vegetation communities are adapted to tolerate long periods of inundation. Phased construction across the three lagoon basins would preserve some habitat areas, allowing for species refugia during construction, and would also restrict vegetation removal activities to outside of the nesting season.

<u>Least Bell’s Vireo and Southwestern Willow</u>

Short-term direct impacts to least Bell’s vireo and southwestern willow flycatcher as a result of Alternative 1B are similar as those described for Alternative 2A. Both species have been observed in low numbers foraging primarily within the southern willow scrub habitat. Construction of Alternative 1A would directly impact 5.1 acres (8 percent) of the southern willow scrub riparian habitat within the lagoon as a result of grading and inundation (Table 4-8). As vegetation would be removed outside of the breeding season and both species use the site primarily for foraging during summer months, the short-term impact to 8 percent of the southern

Table 4-8
Alternative 1B Impacts to Suitable Habitat for Listed Bird Species

				Grading Direct Impact to Existing Habitat		Inundation Direct Impact to Existing Habitat		Total Direct Impact to Existing Habitat	
Species	**Habitat Suitability***	**Habitat Type**	**Existing Habitat Acres**	**Acres**	**Percent**	**Acres**	**Percent**	**Total Acres**	**Total Percent**
Ridgway's rail	Nesting/Foraging	Coastal Brackish Marsh	131.5	23.9	18%	4.2	3%	28.1	21%
		Coastal Salt Marsh – Low	13.3	6.4	48%	5.8	44%	12.2	92%
		Total Nesting	144.8	30.3	21%	10	7%	40.3	28%
	Foraging	Mudflats	63.1	32.1	51%	25.2	40%	57.3	91%
		Coastal Salt Marsh – Mid	141.4	50.7	36%	69.2	49%	119.9	85%
		Coastal Salt Marsh – High	120	12.5	10%	3.3	3%	15.8	13%
		Total Foraging	324.5	95.3	29%	97.7	30%	193.0	59%
California least tern	Nesting	Saltpan	36.9	6.6	18%	13.7	37%	20.3	55%
		Coastal Strand	5	0	0%	1.4	28%	1.4	28%
		Nesting Area**	0	0	0%	0	0%	0.0	0%
		Total Nesting	41.9	6.6	16%	15.1	36%	21.7	52%
	Foraging	Subtidal/Channels	40.1	31.4	78%	3	7%	34.4	86%
		Beach	15	2.1	0%	0	0%	2.1	14%
		Total Foraging	55.1	31.4	57%	3	5%	34.4	62%
western snowy plover	Nesting	CDFW dike	0.4	0.4	100%	0	0%	0.4	100%
		Saltpan	36.9	6.6	18%	13.7	37%	20.3	55%
		Coastal Strand	5	0	0%	1.4	28%	1.4	28%
		Nesting Area**	0	0	0%	0	0%	0.0	0%
		Total Nesting	42.3	7	17%	15.1	36%	22.1	52%
	Foraging	Mudflats	63.1	32.1	51%	25.2	40%	57.3	91%
		Beach	15	2.1	0%	0	0%	2.1	14%
		Total Foraging	78.1	32.1	41%	25.2	32%	57.3	73%
coastal California	Nesting/Foraging	Diegan Coastal Sage Scrub	178.1	4.6	3%	0.7	0%	5.3	3%
		Diegan Coastal Sage Scrub/Chaparral	49.3	0	0%	0.03	0%	0.0	0%

Species	Habitat Suitability*	Habitat Type	Existing Habitat Acres	Grading Direct Impact to Existing Habitat		Inundation Direct Impact to Existing Habitat		Total Direct Impact to Existing Habitat	
				Acres	Percent	Acres	Percent	Total Acres	Total Percent
gnatcatcher		Coyote Bush Scrub	7.5	0	0%	0	0%	0.0	0%
		Total Nesting/Foraging	234.9	4.6	2%	0.73	0%	5.3	2%
least Bell's vireo	Nesting/Foraging	Sandbar Willow Scrub	9	0	0%	0	0%	0.0	0%
		Southern Willow Scrub	61.4	2.9	5%	2.2	4%	5.1	8%
		Total Nesting/Foraging	70.4	2.9	4%	2.2	3%	5.1	7%
southwestern willow flycatcher	Nesting/Foraging	Southern Willow Scrub	61.4	2.9	5%	2.2	4%	5.1	8%
		Total Nesting/Foraging	61.4	2.9	5%	2.2	4%	5.1	8%
Belding's savannah sparrow	Nesting	Coastal Salt Marsh – Mid	141.4	50.7	36%	69.2	49%	119.9	85%
		Coastal Salt Marsh – High	120	12.5	10%	3.3	3%	15.8	13%
		Total Nesting	261.4	63.2	24%	72.5	28%	135.7	52%
	Foraging	Coastal Salt Marsh – Low	13.3	6.4	48%	5.8	44%	12.2	92%
		Total Foraging	13.3	6.4	48%	5.8	44%	12.2	92%

CDFW = California Department of Fish and Wildlife

*Nesting habitat is considered suitable for both breeding and foraging activities, while habitat identified as "Foraging" is not expected to support breeding activities.

**Under existing conditions, a portion of the nesting area is classified as saltpan.

willow scrub riparian habitat is not substantial and would not result in a decline in the local population below self-sustaining levels. Therefore, short-term direct impacts to least Bell’s vireo and southwestern willow flycatcher would be less than significant and not substantially adverse.

Coastal California Gnatcatcher

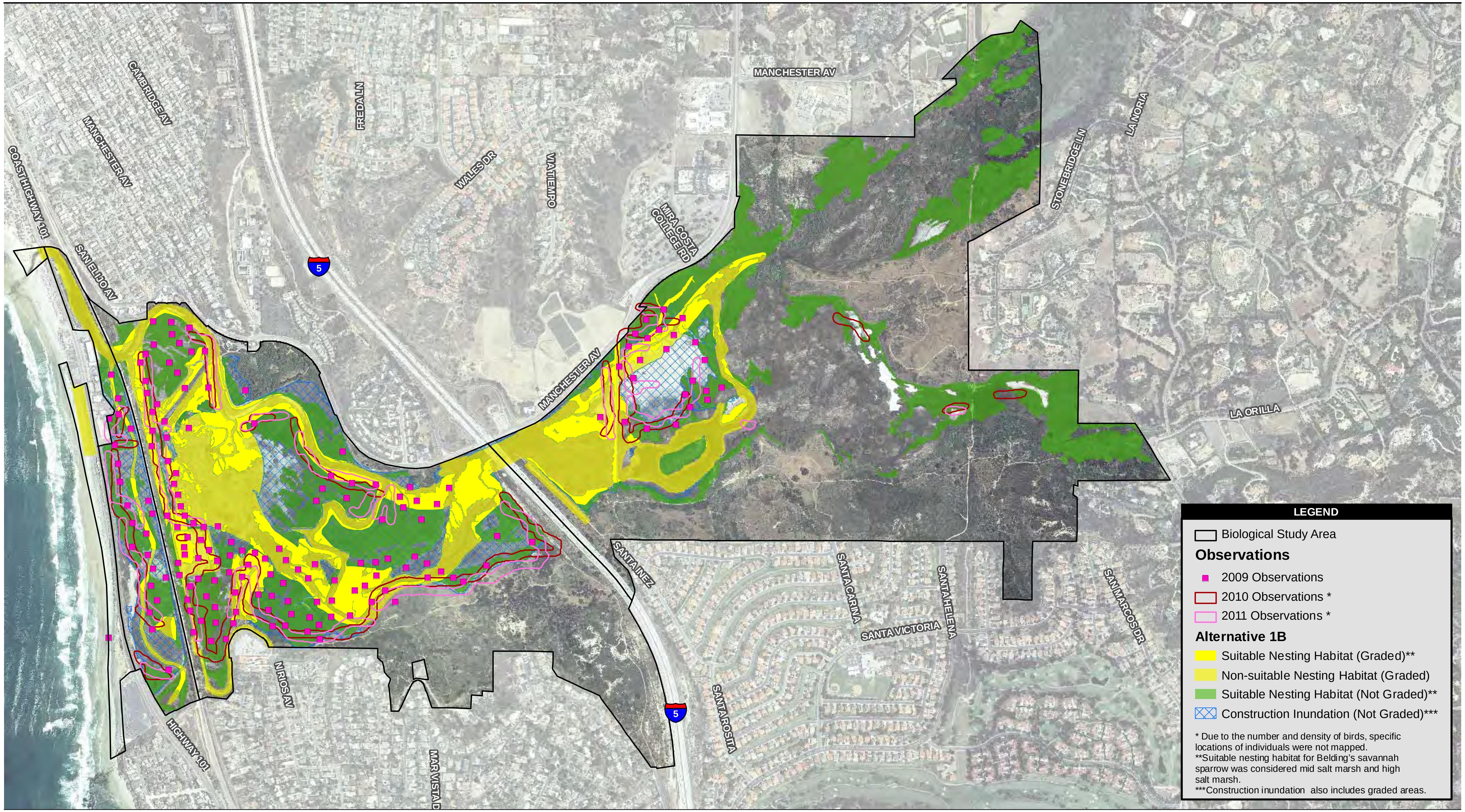
Coastal California gnatcatcher are observed along the periphery of San Elijo Lagoon within the sage scrub and chaparral habitats. As described for Alternative 2A, an access road along the southwest corner of the central basin may need to be enhanced to accommodate construction vehicular traffic for Alternative 1B. In addition, a small foot trail would be temporarily expanded to allow vehicle access to the man-made transitional habitat and staging area. The intent is to maintain road enhancement activities to the existing footprint; however a conservative analysis of potential impacts has been included. The road and trail enhancement activities are the same for both alternatives. There is the potential to impact nesting coastal California gnatcatcher in this area during vegetation removal. To avoid this potential impact, vegetation would be cleared outside of the bird nesting season. Temporary impacts to gnatcatcher would not result in a decline in the local population below self-sustaining levels. Therefore impacts are considered less than significant and not substantially adverse.

California Least Tern and Western Snowy Plover

Impacts to California least tern and western snowy plover are similar to those described for Alternative 2A, including impacts to foraging habitat for both species as a result of grading and habitat conversion (Table 4-8). Primary differences include 7 additional acres of temporary impacts on subtidal channels under Alternative 1B relative to Alternative 2A in addition to 2.8 acres of few impacts to beach habitat for Alternative 1B. Impacts to foraging habitat would be phased across the three lagoon basins, and within each basin, so that large contiguous areas of foraging habitat would remain. Although short-term impacts to foraging habitat would occur, short-term benefits are also expected as lagoon conditions improve. The improved conditions would result in higher productivity in the restored mudflats and subtidal habitat and direct benefits to birds that forage on them, such as the California least tern and western snowy plover.

Belding’s Savannah Sparrow

Under Alternative 1B, temporary impacts to Belding’s savannah sparrow are almost identical to Alternative 2A with impacts to nesting and foraging habitat resulting from dredging and inundation (Figure 4-5). Temporary impact acreages are presented in Table 4-8. Of the 261.4 acres of suitable nesting habitat for Belding’s savannah sparrow, 135.7 acres (52 percent) would be impacted as a result of construction for Alternative 1B. In addition 12.2 acres (92 percent) of



Source: SANDAG 2012; Patton 2010, 2012; AECOM 2014

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 4-5
Belding's Savannah Sparrow
Suitable Nesting Habitat Impact Analysis, Alternative 1B

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low-marsh, an important foraging habitat for Belding's, would be impacted. The temporary loss of habitat is considered a substantial impact to the existing population of Belding's savannah sparrow as it is greater than 50 percent of the habitat.

As with Alternative 2A, Alternative 1B would create noninundated refugia in the west and central basins to maximize available nesting and foraging habitat during construction. It is anticipated that the resident Belding's savannah sparrow would respond to the restoration as they do to seasonal variability by shifting and contracting their territory size to accommodate new available acreage available. Birds that do not relocate to the refugia may remain on the perimeter of the lagoon or may choose to leave the lagoon and seek residency elsewhere. The project would minimize impacts by removing all vegetation outside of the breeding season, using controlled inundation to move birds out of the work area, and implementing a habitat enhancement plan. Belding's savannah sparrow is a year-round resident and project construction would result in the temporary loss of greater than 50 percent of their nesting habitat (mid- and high-salt marsh). This temporary construction impact is considered a significant impact to the local population. As such, Alternative 2A would have a significant and adverse short-term direct impact on Belding's savannah sparrow.

Ridgway's Rail

Impacts to Ridgway's rail from Alternative 1B would be similar to Alternative 2A including direct impacts to 40.3 acres (28 percent) of existing suitable nesting habitat (Table 4-8 and Figure 4-6). In addition, Alternative 1B would temporarily impact 193 acres (59 percent) of foraging habitat including mudflats (57.3 acres), mid-marsh (119.9 acres), and high-marsh (15.8 acres). As mentioned above, Alternative 1B was designed to minimize grading impacts to the rapidly expanding low-marsh habitat, which is the preferred nesting habitat of the Ridgway's rail. The primary impact to low-marsh habitat is a result of the overdredge pit in the central basin, which is needed for soil disposal associated with dredging as well as the need to conduct controlled inundation to accommodate the dredge. These impacts in addition to the channel expansion into the east basin would affect both the low-marsh and brackish marsh habitat that support Ridgway's rail.

The loss of habitat is an impact; however it is not considered substantial as the impact is less that 50 percent of the habitat and the remaining habitat can support the existing population of Ridgway's rail. The project has proposed design features to minimize impacts, including the removal of all vegetation outside of the bird breeding season, use of a biological monitor, flushing techniques, and a habitat enhancement plan. With implementation of project design features and construction monitoring, and because greater than 50 percent of breeding habitat would remain available during construction of the proposed project, short-term direct impacts on Ridgway's rail are considered less than significant and not substantially adverse.

Indirect

Indirect short-term/temporary effects may include increases in exposure to predators, degraded water quality, disturbed unconsolidated sediment, and noise. These impacts are identical to those described for Alternative 2A.

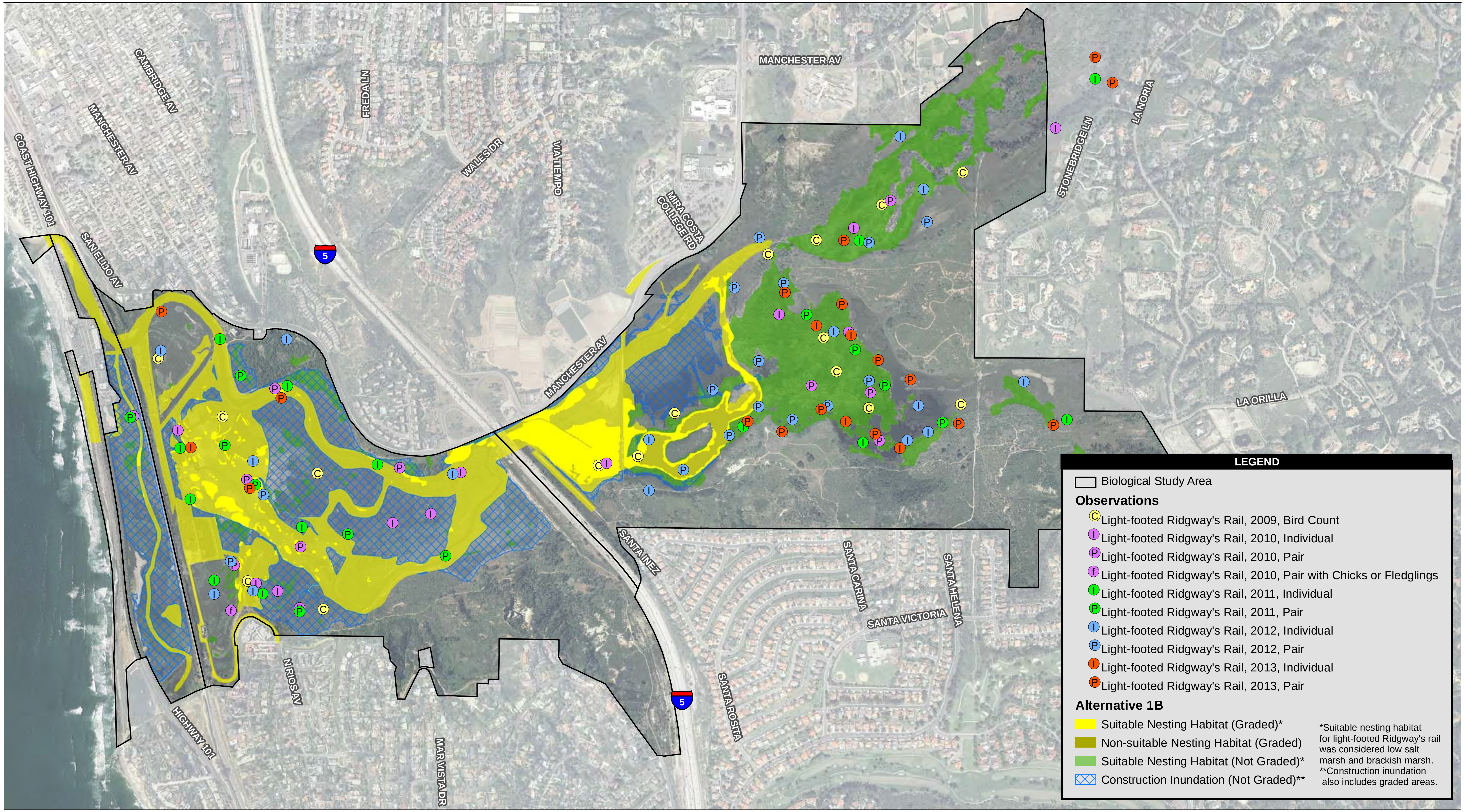
Species may be exposed to higher predation as they would be more concentrated in the remaining unimpacted habitat, much of which is lower condition. To reduce temporary impacts to marsh birds resulting from the indirect effects of the short-term loss of nesting and foraging habitat, the project has included a variety of design features, including preparation and implementation of a habitat enhancement plan and a predator control program, as described for Alternative 2A.

During construction, sensitive birds using the lagoon may be exposed to degraded water quality resulting from dredging and other sediment-disturbing activities. These impacts are expected to be localized to the active dredge area and not expected to substantially affect sensitive bird species. In addition, the project would implement BMPs to further reduce water quality impacts and the indirect effects to sensitive birds (see Chapter 1.0). Dredging activities may also facilitate foraging as benthic organisms are disturbed and released into the water column increasing foraging success for birds.

With implementation of project design features, temporary indirect impacts to sensitive species from predation, water quality, and unconsolidated sediment are considered less than significant and not substantially adverse.

Indirect noise impacts associated with Alternative 1B would be similar to those described for Alternative 2A. The construction (dredging and inundation) footprint for Alternative 1B is similar to Alternative 2A. The total footprint for Alternative 1B is larger than Alternative 2A by 3.2 acres; however, the grading-only footprint is 15.9 acres smaller. The overall construction approach is the same for both alternatives, including the potential use of a diesel dredge and other large construction equipment; as such, temporary impacts from noise to listed species would be similar to those previously described. Similar to Alternative 2A, short-term noise effects on sensitive birds from construction would result in a significant and adverse impact.

As with Alternative 2A, noise from increased vehicular traffic associated with construction of Alternative 1B may also occur. Similar to Alternative 2A, one vehicle route coincides with sensitive birds is the southwest entry point in the central basin where vehicles would enter off of North Rios Avenue and travel west into the lagoon. Noise impacts to birds from vehicular traffic are therefore considered less than significant and not substantially adverse.



Source: SANDAG 2012; Zembal 2011, 2012; AECOM 2014

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 4-6
Light-footed Ridgway's Rail
Suitable Nesting Habitat Impact Analysis, Alternative 1B

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Long term

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

Habitat for sensitive species would be changed and/or converted as a result of the proposed restoration project. This change may include a direct increase or decrease in the total acreage of a specific habitat type post-restoration. This change may be a result of grading or attributed to the modified hydrology and the elevated high tide line. The direct permanent changes to suitable habitat for sensitive species are summarized in Table 4-9. Implementation of Alternative 1B would extend tidal hydrology to the east basin and result in a modified high tide line of +3.9 feet NGVD, which is higher than the existing high tide line of +3.5 feet NGVD.

Least Bell's Vireo and Southwestern Willow Flycatcher

Least Bell's vireo and southwestern willow flycatcher utilize riparian habitat on-site for foraging habitat. Both species are not known to breed on-site, but there is the potential that successful vireo breeding has occurred. As with Alternative 2A, Alternative 1B would actively convert 5 percent of the southern willow scrub habitat and 1 percent of sandbar willow scrub as a result of the expansion of tidal channels in the east basin and widening of tidal channels in the central basin (Table 4-9). The loss of 4 percent of riparian habitat is not substantial and would not result in a decline in the local populations of least Bell's vireo and southwestern willow flycatcher below self-sustaining levels. Therefore, impacts are considered less than significant and not substantially adverse**.**

Coastal California Gnatcatcher

Coastal California gnatcatcher are observed along the periphery of San Elijo Lagoon within the sage scrub and chaparral habitats. Enhancement of the access road off North Rios Avenue could permanently impact 0.7 acre of occupied habitat, although the intent is to conduct activities within the existing road alignment, with the exception of focused widening along the trail to access the man-made transitional area. This impact, along with the additional 1.2 acres of coastal sage scrub habitat impacted within the lagoon, equates to 1 percent of the total nesting habitat on-site. Impacts associated with permanent impacts to gnatcatcher habitat associated with the road enhancement and lagoon restoration are not substantial and would not result in a decline in the local population below self-sustaining levels.

Table 4-9
Alternative 1B Existing and Post-Construction Acreage of Suitable Habitat for Listed Bird Species

Species	Habitat Suitability*	Habitat Type	Existing Habitat Acres	Habitat Acreage Post-Restoration	Net Change in Habitat Acreage Post-Restoration	Percent Change Post-Restoration
Ridgway's rail	Nesting/Foraging	Coastal Brackish Marsh	131.5	99	-32.5	-25%
		Coastal Salt Marsh – Low	13.3	51	37.7	283%
		Total Nesting	144.8	150	5.2	4%
	Foraging	Mudflats	63.1	71	7.9	13%
		Coastal Salt Marsh – Mid	141.4	98	-43.4	-31%
		Coastal Salt Marsh – High	120	124	4	3%
		Total Foraging	324.5	293	-31.5	-10%
California least tern	Nesting	Saltpan	36.9	30	-6.9	-19%
		Coastal Strand	5	5	0	0%
		Nesting Area**	0	2	2	200%
		Total Nesting	41.9	37	-4.9	-12%
	Foraging	Subtidal/Channels	40.1	67	26.9	67%
		Beach	15	15	0	0%
		Total Foraging	55.1	82	26.9	49%
western snowy plover	Nesting	CDFW dike	0.4	0	-0.4	-100%
		Saltpan	36.9	30	-6.9	-19%
		Coastal Strand	5	5	0	0%
		Nesting Area**	0	2	2	200%
		Total Nesting	42.3	37	-5.3	-13%
	Foraging	Mudflats	63.1	71	7.9	13%
		Beach	15	15	0	0%
		Total Foraging	78.1	86	7.9	10%
coastal California gnatcatcher	Nesting/Foraging	Diegan Coastal Sage Scrub	178.1	173.5	-4.6	-3%
		Diegan Coastal Sage Scrub/Chaparral	49.3	49.3	0	0%
		Coyote Bush Scrub	7.5	7.5	-0.02	0%
		Total Nesting/Foraging	234.9	230.28	-4.62	-2%
least Bell's vireo	Nesting/Foraging	Sandbar Willow Scrub	9	9	-0.06	-1%
		Southern Willow Scrub	61.4	58.5	-2.9	-5%
		Total Nesting/Foraging	70.4	67.44	-2.96	-4%
southwestern willow flycatcher	Nesting/Foraging	Southern Willow Scrub	61.4	58.5	-2.9	-5%
		Total Nesting/Foraging	61.4	58.5	-2.9	-5%
Belding's savannah sparrow	Nesting	Coastal Salt Marsh – Mid	141.4	98	-43.4	-31%
		Coastal Salt Marsh – High	120	124	4	3%
		Total Nesting	261.4	222	-39.4	-15%
	Foraging	Coastal Salt Marsh – Low	13.3	51	37.7	283%
		Total Foraging	13.3	51	37.7	283%

CDFW = California Department of Fish and Wildlife

*Nesting habitat is considered suitable for both breeding and foraging activities, while habitat identified as "Foraging" is not expected to support breeding activities.

**Under existing conditions, a portion of the nesting area is classified as saltpan.

California Least Tern and Western Snowy Plover

California least tern and western snowy plover are documented annually, foraging and roosting at San Elijo Lagoon. Western snowy plover has not successfully nested at San Elijo Lagoon since 2002, and California least tern since 2005 (, CDFG 2006; Patton 2010).. Impacts to suitable nesting habitat from Alternative 1B would be less than with Alternative 2A. Primary differences between the alternatives include 13 fewer acres of long-term impacts on saltpan habitat under Alternative 1B in addition to 7 fewer acres of impacts to subtidal/channel habitat for Alternative 1B. Alternative 1B would permanently decrease suitable nesting habitat for California least tern by 4.9 acres (12 percent of suitable nesting habitat) and decrease suitable nesting habitat for western snowy plover by 5.3 acres (13 percent of suitable nesting habitat) (Table 4-9). As neither species currently breeds on-site, the loss of nesting habitat does not substantially affect either species. In addition, implementation of a predator control program may also improve conditions of remaining suitable nesting habitat. Furthermore, both species are expected to benefit from restoration of the lagoon, including increased acreage and improved condition of foraging habitat. Implementation of Alternative 1B would directly benefit these species.

Belding’s Savannah Sparrow

As depicted in Table 4-9, Alternative 1B would reduce available nesting habitat for Belding’s savannah sparrow by 39.4 acres, which equates to a loss of 15 percent compared to existing conditions. The loss of Belding’s nesting habitat associated with Alternative 1B is 3 percent (9 acres) more than with Alternative 2A. The greatest reduction in habitat is within the central basin where mid-marsh is being replaced with mudflat habitat. This reduction in nesting habitat would not result in a substantial decline in the local population below self-sustaining levels as Belding’s savannah sparrow are known to modify their densities based on natural annual variations in habitat availability. In addition, the changes to lagoon hydrology would increase the condition of the remaining foraging and nesting habitat suitable for Belding’s savannah sparrow. While the project would result in an overall reduction in available nesting habitat of 15 percent, the improved conditions for the remaining 222 acres of mid- and high-marsh habitat resulting from the restoration outweigh the impact associated with the loss of habitat acreage. Implementation of Alternative 1B would ultimately benefit the Belding’s savannah sparrow population at San Elijo Lagoon and long-term direct impacts are considered less than significant and not substantially adverse.

Ridgway’s Rail

Ridgway’s rail nesting and foraging habitat would be modified as part of Alternative 1B. Post-restoration, a small increase of nesting habitat acreage would occur for Ridgway’s rail of 5.2

acres equating to a gain of 4 percent when compared to existing conditions. This increase in acreage is a combination of change associated with the loss of coastal brackish marsh and the gain of low-marsh. The greatest change is within the east basin where brackish marsh is being replaced by subtidal and low-marsh habitat. Although brackish marsh is being reduced by 32.5 acres (25 percent), the preferred habitat of Ridgway's rail is considered low-marsh, which is currently limited in the lagoon. Alternative 1B would result in an increase in the low-marsh from the current 13.3 acres to 51 acres, an increase of 37.7 acres.

Under Alternative 1B, the expansion of preferred habitat (compared to existing conditions) would occur in the central and east basins. In addition to affecting habitat acreage, the changes to lagoon hydrology under Alternative 1B would improve the condition of the remaining foraging and nesting habitat for Ridgway's rail. Foraging habitat would also be affected by Alternative 1B, with a small net increase in acreage but a larger increase in condition. 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 would benefit Ridgway's rail populations at San Elijo Lagoon. Therefore, impacts are considered less than significant and not substantially adverse.

As part of the restoration project, there would be long-term monitoring and maintenance, which has the potential to impact sensitive birds in the lagoon. Avoidance measures would be included in the adaptive management, maintenance, and monitoring program. As such, long-term monitoring and maintenance activities are not expected to have a substantial effect on any sensitive species, and impacts are considered less than significant and not substantially adverse.

With implementation of project design features and the net benefits of the restoration project, permanent direct impacts to sensitive species from active conversion of nesting and/or foraging habitat, modified lagoon conditions, and long-term maintenance and operation are considered less than significant and not substantially adverse.

<u>Indirect</u>

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

Habitat above the high tide line, within the transitional area, may passively transition (change) over a long period of time. The transitional area is considered to begin at the high tide line and extend up to 2+ feet above the high tide line. For Alternative 1B, this area is found between +3.9

feet NGVD and +5.9 feet NGVD. As a result of Alternative 1B, the transitional area would include man-made and existing natural areas. Passive transition of habitat within the new natural transitional area is possible although unpredictable. Over time, this area may change from brackish marsh and saltpan habitat to salt marsh habitat. Although the change in habitat is unpredictable in the transitional area, the connection to tidal hydrology and the improved freshwater export is expected to ultimately enhance the condition of the existing habitat within the east basin transitional area. Indirect impacts to sensitive species resulting from changes to the new transitional area are less than significant and not substantially adverse.

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-construction 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 Alternative 2A, indirect changes to lagoon condition are expected as a result of Alternative 1B and the corresponding improvement to tidal hydrology (i.e., circulation, turnover, freshwater export, etc.). The indirect improvement to water quality would benefit sensitive species.

With implementation of project design features and the net benefits of the restoration project, indirect permanent impacts to sensitive species from passive transition of nesting and/or foraging habitat and invasive species are considered less than significant and not substantially adverse for Alternative 1B.

Nonlisted Special-status Wildlife Species

Impacts to nonlisted special-status wildlife species associated with the construction of Alternative 1B will be the same as Alternative 2A as the extent of grading and use of controlled inundation are similar. Short-term impacts to migratory and nonresident wildlife species are considered less than significant and not substantially adverse. No long-term impacts to migratory and nonresident wildlife species are expected as the restoration project and the corresponding improvements to ecological conditions are considered beneficial to all 87 nonlisted species.

4.3.4 Wildlife Corridors/Connectivity

Alternative 1B would have similar temporary and short-term impacts to wildlife corridors and connectivity as discussed for Alternative 2A. 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 or adverse short-term or long-term impacts to wildlife movements or connectivity are anticipated with implementation of Alternative 1B.

Local Ordinances/Policies/Adopted Plans

Similar to Alternative 2A, all restoration, maintenance, and monitoring plans prepared for Alternative 1B 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 both the MHCP and draft North County MSCP. Therefore, no significant or substantially adverse impact would result with implementation of Alternative 1B.

4.4 ALTERNATIVE 1A

4.4.1 Sensitive Riparian and Natural Vegetation Communities

Short-term

Construction of Alternative 1A would result in fewer temporary/short-term impacts to sensitive habitats as compared to Alternative 2A and Alternative 1B. Alternative 1A would be constructed in a single phase of approximately 9 months and would not involve inundation. The total acreage by habitat community that would be directly impacted during construction is shown in Table 4-10 by basin and in Table 4-11 for the entire BSA. Alternative 1A would result in impacts to approximately 51 acres (approximately 5 percent) of habitat within the BSA (Figure 4-7).

Temporary impacts to all habitat communities associated with construction of Alternative 1A are not considered significant or substantially adverse, because greater than 50 percent of the local habitat would remain available to local resident and migratory species during construction.

No direct impacts are proposed to coastal strand, coyote bush scrub, Diegan coastal sage scrub/chaparral, disturbed wetland, eucalyptus woodland, nonnative grassland, and sandbar willow scrub.

Table 4-10
Direct Project Impacts from Construction of Alternative 1A by Basin

Basin/Habitat Community	Existing Vegetation (acreage) within the BSA	Alternative 1A Direct Impacts from Dredging/ Grading (acres)	Habitat Temporarily Impacted (% in Basin)
Central Basin			
Coastal Brackish Marsh	6.1	1.1	18%
Coastal Salt Marsh – High	0.7	0.2	29%
Coastal Salt Marsh – Low	11.8	0.1	1%
Coastal Salt Marsh – Mid	121.3	8.7	7%
Developed	10.4	3.1	30%
Diegan Coastal Sage Scrub	67.0	0.7	1%
Diegan Coastal Sage Scrub/Chaparral	27.7	0.0	0%
Disturbed Habitat	6.7	1.2	18%
Eucalyptus Woodland	15.7	0.0	0%
Open Water	23.7	9.0	38%
Saltpan/Open Water	1.5	1.5	100%
Southern Willow Scrub	14.4	0.1	1%
Tidal Mudflat	49.3	1.0	2%
Total for Central Basin	**356.3**	**26.7**	**7%**
Coastal Area			
Beach	15.0	2.1	14%
Developed	3.0	0.1	3%
Open Water	1.5	0.6	40%
Total for Coastal Area	**19.5**	**2.7**	**14%**
East Basin			
Coastal Brackish Marsh	125.4	3.8	3%
Coastal Salt Marsh – High	118.5	2.0	2%
Coastal Salt Marsh – Mid	3.4	1.0	29%
Coyote Bush Scrub	7.5	0.0	0%
Developed	4.9	0.6	12%
Diegan Coastal Sage Scrub	108.1	1.2	1%
Diegan Coastal Sage Scrub/Chaparral	21.6	0.0	0%
Disturbed Habitat	2.6	0.4	15%
Disturbed Wetland	1.1	0.0	0%
Eucalyptus Woodland	3.4	0.0	0%
Nonnative Grassland	33.1	0.0	0%
Open Water	10.6	1.4	13%
Saltpan/Open Water	35.4	0.5	1%
Sandbar Willow Scrub	8.9	0.0	0%
Southern Willow Scrub	46.9	1.3	3%
Total for East Basin	**531.5**	**12.1**	**2%**
West Basin			
Coastal Salt Marsh – High	0.8	0.1	13%

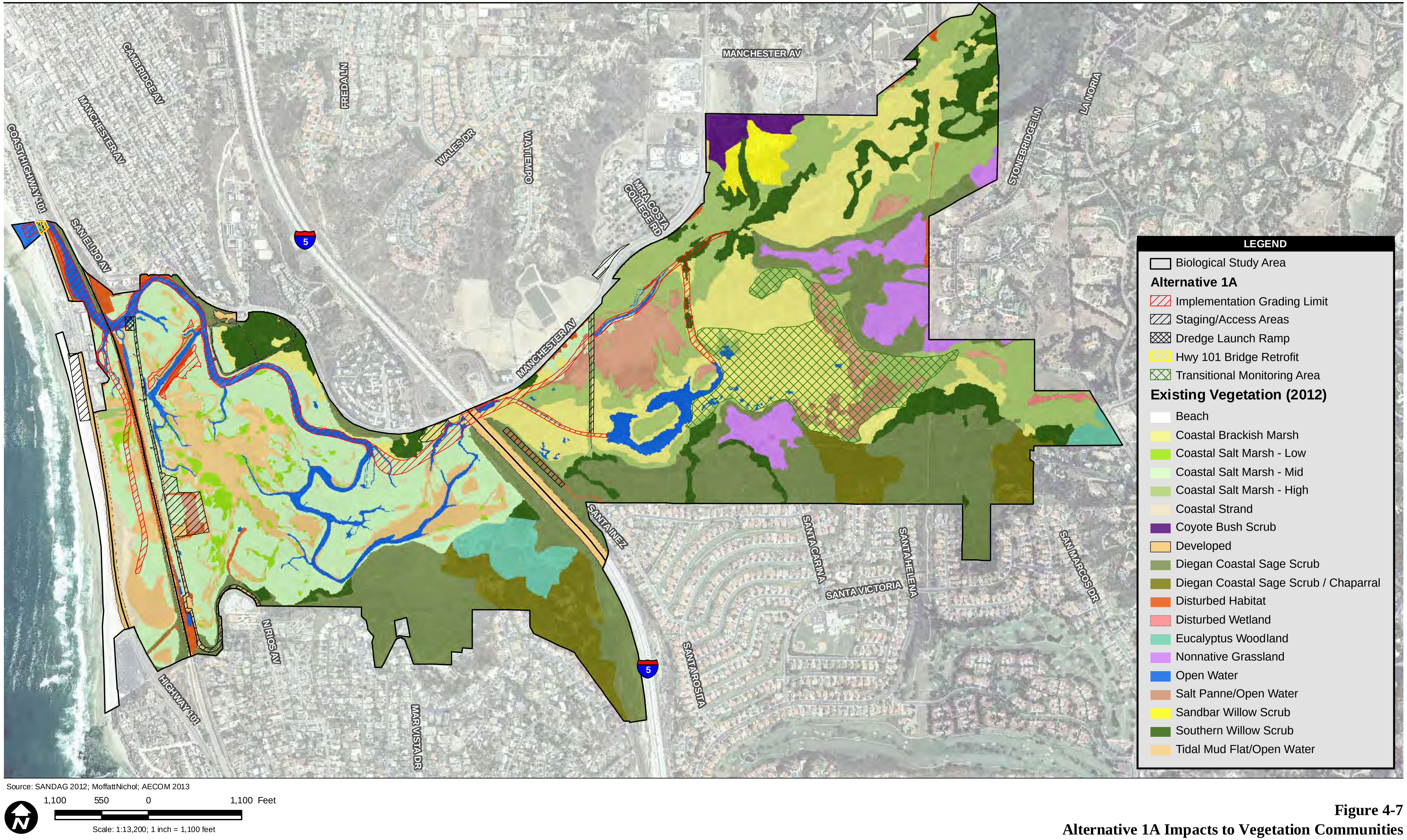
Basin/Habitat Community	Existing Vegetation (acreage) within the BSA	Alternative 1A Direct Impacts from Dredging/ Grading (acres)	Habitat Temporarily Impacted (% in Basin)
Coastal Salt Marsh – Low	1.5	0.3	20%
Coastal Salt Marsh – Mid	16.7	1.7	10%
Coastal Strand	5.0	0.0	0%
Developed	5.2	0.2	4%
Diegan Coastal Sage Scrub	3.1	0.0	0%
Disturbed Habitat	2.5	0.4	16%
Open Water	4.3	3.9	91%
Tidal Mudflat	13.8	1.3	9%
Total for West Basin	**52.9**	**7.8**	15%
TOTAL	**960.2**	**49.4**	**5%**

BSA = Biological Study Area

Table 4-11
Direct Project Impacts from Construction of Alternative 1A

Basin/Habitat Community	Existing Vegetation (acreage) within the BSA	Alternative 1A Direct Impacts from Dredging/ Grading (acres)	Habitat Temporarily Impacted (% in BSA)
Beach	15	2.1	14%
Coastal Brackish Marsh	131.5	4.9	4%
Coastal Salt Marsh – High	120	2.3	2%
Coastal Salt Marsh – Low	13.3	0.3	2%
Coastal Salt Marsh – Mid	141.4	11.4	8%
Coastal Strand	5	0	0%
Coyote Bush Scrub	7.5	0	0%
Developed	23.4	5.3	23%
Diegan Coastal Sage Scrub	178.2	1.9	1%
Diegan Coastal Sage Scrub/Chaparral	49.3	0	0%
Disturbed Habitat	11.9	2	17%
Disturbed Wetland	1.1	0	0%
Eucalyptus Woodland	19.1	0	0%
Nonnative Grassland	33.1	0	0%
Open Water	40.1	15	37%
Saltpan/Open Water	37	2	5%
Sandbar Willow Scrub	8.9	0	0%
Southern Willow Scrub	61.3	1.4	2%
Tidal Mudflat/Open Water	63.1	2.3	4%
Grand Total	**960.2**	**50.9**	**5%**

BSA = Biological Study Area



Source: SANDAG 2012; MoffattNichol; AECOM 2013

Figure 4-7
Alternative 1A Impacts to Vegetation Communities

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USFWS Critical Habitat

Impacts to USFWS critical habitat for western snowy plover would be similar to those of Alternative 1B and Alternative 2A. As with Alternative 2A, temporary impacts to critical habitat, for the purpose of restoration, would be considered less than significant. Similar to Alternative 1B and Alternative 2A, no new impacts to coastal California gnatcatcher critical habitat would result from restoration construction. Therefore, impacts would be considered less than significant and not substantially adverse.

Essential Fish Habitat

Construction of Alternative 1A would result in similar temporary impacts to EFH associated with grading and dredging operations as discussed for Alternative 2A and Alternative 1B. However, Alternative 1A has the smallest amount of construction proposed and therefore would result in fewer temporary impacts to EFH compared to the other alternatives. No significant or substantially adverse impacts to EFH are anticipated with implementation of Alternative 1A.

Indirect Impacts

Short-term indirect impacts associated with Alternative 1A would be less than Alternative 2A. No significant or substantially adverse indirect impacts to vegetation communities would result with project implementation.

Long-term

Long-term changes in vegetation (5–10 years post-restoration) would occur from implementation of Alternative 1A, as shown in Table 4-2 and Figure 1-4. Within 5–10 years following restoration, habitats are expected to have substantially recovered and matured. The overall acreage of sensitive habitats within the lagoon would remain approximately 960 acres. However, changes between sensitive vegetation in the lagoon would occur with dredging, grading, and improvements to hydrologic function.

Alternative 1A proposes modest change to existing conditions within the lagoon. This alternative emphasizes enhancement of existing tidal channels and creation of new tidal channels and therefore providing increased tidal flows in the three lagoon basins. Alternative 1A would utilize the existing tidal inlet, create a north-south-trending tidal channel in the west basin; create a new channel linking the central basin and the east basin beneath I-5; and enhance existing tidal channels in the east basin.

Retention of the current inlet location combined with minimal grading would result in a slight increase in tidal prism and tidal range compared to existing conditions. This slight increase may result in improved water quality throughout the lagoon, and an increase in the area of tidally influenced habitats. A portion of the central basin currently functioning as intertidal mudflat would continue to transition to mid-salt marsh under this alternative due to relatively high site elevations combined with minimal grading and better tidal drainage, which leads to less frequent tidal inundation of existing mudflats.

Alternative 1A differs substantially from Alternative 1B and Alternative 2A, when comparing changes in habitats over existing conditions. With implementation of Alternative 1A, mudflat and open water/channels/basins would substantially decrease over existing conditions. Creation of man-made transitional habitats would be limited to 2 acres. Under Alternative 1A, salt marsh would substantially increase over existing conditions. Saltpan, freshwater/brackish marsh, and riparian habitats would be negligibly reduced. As with all proposed alternatives, the overall acreage of habitat available for sensitive species would remain unchanged with Alternative 1A. In addition, habitats that remain unchanged are expected to benefit from the improved hydrologic function of the lagoon.

As described in Chapter 1.0, the lagoon habitat is rapidly transitioning over time, with continued loss of mudflat and rapid increase in salt marsh. Rapid transition to salt marsh results in a reduction in available foraging habitat for sensitive and nonsensitive birds. This has the potential for significant ecological changes in the lagoon and is expected to dramatically change the diversity and density of wildlife that the lagoon is able to continue to support. With implementation of Alternative 1A, the project would result in improved hydrologic function, but it would not increase foraging habitat or reverse the rapid changes that are occurring under existing conditions. Species-specific impacts associated with the changes proposed under Alternative 1A are evaluated in Section 4.4.3. With improved lagoon ecology and no overall loss of lagoon resources, impacts to sensitive vegetation communities with project implementation of Alternative 1A are considered less than significant and not substantially adverse.

Long-term indirect changes to the vegetation communities may occur as a result of restoration activities. Restoration would improve water quality, which is expected to have a positive effect on the lagoon. Less change to vegetation communities is expected under Alternative 1A as compared to Alternative 2A and Alternative 1B. Regardless, any changes in habitat are anticipated to be neutral or beneficial to the lagoon and are therefore considered less than significant and not substantially adverse.

USFWS Critical Habitat

No long-term significant or substantially adverse impacts to USFWS critical habitat are anticipated with implementation of Alternative 1A.

Essential Fish Habitat

Construction of Alternative 1A would result in similar long-term beneficial impacts to EFH as discussed for Alternative 2A and Alternative 1B. This alternative would create additional acreages of open water, tidal channels, and/or mudflat habitat, as well as enhance conditions of existing subtidal habitat by increasing tidal influence within the lagoon. Although lower amounts of subtidal habitat would be created under this alternative compared to the other alternatives, this additional acreage of habitat would still benefit EFH. No long-term significant or substantially adverse impact to EFH is anticipated with implementation of Alternative 1A.

4.4.2 Jurisdictional Waters and Wetlands

The short-term temporary and long-term permanent impacts resulting from the implementation of Alternative 1A would be smaller than those discussed for Alternative 2A and Alternative 1B, due to the reduction in area impacted by construction under this alternative (Table 4-11). Of the approximately 620 acres of wetlands, approximately 37.8 acres would be directly impacted by construction.

The amounts of jurisdictional waters and wetlands are expected to be similar to existing conditions following implementation of Alternative 1A. However, Alternative 1A would result in up to 2 acres of permanent impacts to jurisdictional waters and wetlands of the U.S. and state due to the construction of the man-made transitional habitat within the central basin. This small amount of permanent loss would be immediately offset by the enhanced wetland conditions and increased diversity of jurisdictional waters and wetlands within the lagoon. For example, the main tidal channel would be extended farther into the east basin, and existing constricted channel connections would be cleared and enlarged allowing for an increase in tidal influence compared to existing conditions. The short-term and long-term (direct and indirect) impacts resulting from the implementation of Alternative 1A would be less than those discussed for Alternative 2A and are considered less than significant.

4.4.3 Sensitive Species

4.4.3.1 Flora

Federally Listed and State-Listed Species

No federally listed or state-listed rare, threatened, or endangered plant species occur within the areas proposed for restoration. As with Alternative 2A and Alternative 1B, Del Mar manzanita and Orcutt’s goldenbush occur in uplands habitat and would not be affected by the proposed project.

Approximately three individuals of southwestern spiny rush (CNPS List 4.2) are within the grading limits of Alternative 1A and would be directly impacted. As noted in Alternative 2A and Alternative 1B, this direct impact is not considered significant, given that there are several hundred individuals scattered throughout the mid- and high-salt marsh habitats within the lagoon. The large population of southwestern spiny rush is expected to persist within the lagoon, as the majority of the mid- and high-salt marsh habitats would remain intact. Therefore, no significant or substantially adverse impacts to sensitive plant populations are anticipated with construction of Alternative 1A.

Nonlisted Plant Species

Impacts to nonlisted plant species are similar to Alternative 2A. Alternative 1B is not expected to result in the decline of any species below self-sustaining levels; impacts are considered less than significant and not substantially adverse. In addition, no long-term impacts to nonlisted plant species are expected as the restoration project and the corresponding improvements to ecological conditions are considered beneficial to all 28 species.

4.4.3.2 Fauna

Federally Listed and State-Listed Wildlife Species

There is the potential for both short-term/temporary effects as well as long-term/permanent effects associated with the implementation of Alternative 1A. These effects may be considered negative (impact) or positive (benefit); both are discussed related to the seven state-listed and/or federally listed species described for Alternative 2A.

Short term

Direct short-term/temporary effects may include the short-term loss of nesting and/or foraging habitat as well as noise impacts as a result of construction activities.

Impacts resulting from Alternative 1A would be similar in nature to Alternative 2A, but to a much lesser extent. Alternative 1A requires the least grading, with 49.4 acres of the habitat within the 960-acre BSA (5 percent) directly impacted as part of restoration grading activities. This alternative was designed to minimize impacts to existing habitat while increasing tidal circulation to the east basin. As part of the restoration effort, nesting or foraging habitat would be temporarily impacted (i.e., graded or dredged) during construction, which may affect listed species that use the lagoon and rely on this habitat. Table 4-12 presents the temporary impacted acreages and post-restoration acreages of suitable habitat for the evaluated listed species, including nesting and foraging habitat. Unlike Alternative 2A and Alternative 1B, Alternative 1A would not be phased but would occur over a single 9-month time period. Within that single phase, construction activities would still be phased so that across the three lagoon basins some habitat areas would be preserved at any given time. This would allow for species refugia during construction. In addition, vegetation removal activities would be restricted to outside of the nesting season.

Table 4-12
Alternative 1A Impact Acreage of Suitable Habitat for Listed Bird Species

Species	Habitat Suitability*	Habitat Type	Existing Habitat Acres	Total Acres Existing Habitat Directly Impacted by Grading***	Percent Existing Habitat Directly Impacted
Ridgway's rail	Nesting	Coastal Brackish Marsh	131.5	4.9	4%
		Coastal Salt Marsh – Low	13.3	0.4	3%
		Total Nesting	144.8	5.3	4%
	Foraging	Mudflats	63.1	2.3	4%
		Coastal Salt Marsh – Mid	141.4	11.4	8%
		Coastal Salt Marsh – High	120	2.3	2%
		Total Foraging	324.5	16	5%
California least tern	Nesting	Saltpan	36.9	2	5%
		Coastal Strand	5	0	0%
		Nesting Area**	0	0	0%
		Total Nesting	41.9	2	5%
	Foraging	Subtidal/Channels	40.1	14.3	36%
		Beach	15	0	0%
		Total Foraging	55.1	14.3	26%

Species	Habitat Suitability*	Habitat Type	Existing Habitat Acres	Total Acres Existing Habitat Directly Impacted by Grading***	Percent Existing Habitat Directly Impacted
western snowy plover	Nesting	CDFW dike	0.4	0.4	100%
		Saltpan	36.9	2	5%
		Coastal Strand	5	0	0%
		Nesting Area**	0	0	0%
		Total Nesting	42.3	2.4	6%
	Foraging	Mudflats	63.1	2.3	4%
		Beach	15	0	0%
		Total Foraging	78.1	2.3	3%
coastal California gnatcatcher	Nesting/Foraging	Diegan Coastal Sage Scrub	178.1	1.9	1%
		Diegan Coastal Sage Scrub/ Chaparral	49.3	0	0%
		Coyote Bush Scrub	7.5	0	0%
		Total Nesting/Foraging	234.9	1.9	1%
least Bell's vireo	Nesting/Foraging	Sandbar Willow Scrub	9	0	0%
		Southern Willow Scrub	61.4	1.4	2%
		Total Nesting/Foraging	70.4	1.4	2%
southwestern willow flycatcher	Nesting/Foraging	Southern Willow Scrub	61.4	1.4	2%
		Total Nesting/Foraging	61.4	1.4	2%
Belding's savannah sparrow	Nesting	Coastal Salt Marsh – Mid	141.4	11.4	8%
		Coastal Salt Marsh – High	120	2.3	2%
		Total Nesting	261.4	13.7	5%
	Foraging	Coastal Salt Marsh – Low	13.3	0.4	3%
		Total Foraging	13.3	0.4	3%

CDFW = California Department of Fish and Wildlife

*Nesting habitat is considered suitable for both breeding and foraging activities, while habitat identified as "Foraging" is not expected to support breeding activities.

**Under existing conditions, a portion of the nesting area is classified as saltpan.

*** Please note that no temporary inundation impacts are associated with Alternative 1A as extensive controlled inundation would not be required.

Coastal California Gnatcatcher

Coastal California gnatcatcher have been observed along the periphery of San Elijo Lagoon within the sage scrub and chaparral habitats. As described for Alternative 2A, an access road along the southwest corner of central basin would be improved to accommodate construction vehicular traffic. There is the potential to impact nesting coastal California gnatcatcher in this area during vegetation removal. To avoid this potential impact, vegetation would be cleared outside of the bird nesting season. Temporary impacts to gnatcatcher are not considered substantial and would not result in a decline in the local population below self-sustaining levels.

Least Bell’s Vireo and Southwester Willow Flycatcher

Short-term direct impacts to least Bell’s vireo and southwestern willow flycatcher as a result of Alternative 1A are less than those described for Alternative 2A as long periods of controlled inundation are not required for construction. Both species have been observed in low numbers foraging primarily within the southern willow scrub habitat. Construction of Alternative 1A would directly impact 1.4 acres (2 percent) of the southern willow scrub riparian habitat within the lagoon as a result of grading (Table 4-12). As vegetation would be removed outside of the breeding season and both species use the site primarily for foraging during summer months, the short-term impact to 2 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. Therefore, short-term direct impacts to least Bell’s vireo and southwestern willow flycatcher would be less than significant and not substantially adverse.

California Least Tern and Western Snowy Plover

Impacts to both California least tern and western snowy plover are similar as those described for Alternative 2A, including impacts to foraging habitat for both species as a result of grading and habitat conversion (Table 4-12). Impacts to potential nesting habitat is minimal with 2 acres of saltpan and a small portion (0.4 acre) of the CDFW dike impacted. Short-term direct impacts would occur on 2 acres of mudflat (foraging habitat for western snowy plover) and 14.3 acres of subtidal/channels (foraging habitat for California least tern). These impacts to foraging habitat would be phased across the three lagoon basins, and within each basin, so that contiguous areas of foraging habitat would remain at any given time. Unlike Alternative 2A and Alternative 1B, phasing would occur over a shorter period of time as construction would take 9 months instead of 3 years. Although short-term impacts to foraging habitat would occur, short-term benefits are also expected as lagoon conditions improve. The improved conditions would result in higher productivity in the subtidal habitat and direct benefits to birds that forage on them, such as the California least tern and other diving birds. Direct short-term/temporary impacts from Alternative 1A to California least tern and western snowy plover would be less than significant and not substantially adverse.

Belding’s Savannah Sparrow

Under Alternative 1A, impacts to Belding’s savannah sparrow would be similar to Alternative 2A (although fewer) with direct impacts to nesting and foraging habitat. Impact acreages are presented in Table 4-12. Alternative 1A would impact 11.4 acres of mid-marsh and 2.3 acres of high-marsh habitat across the three basins (Figure 4-8). A total of 13.7 acres out of 261.4 acres (5 percent) of suitable nesting habitat for Belding’s savannah sparrow would be directly impacted.

The loss of habitat is an impact; however, it is not considered a substantial impact (i.e., greater than 50 percent of the habitat or greater than 50 percent of the population) to the existing population of Belding's savannah sparrow. The project would further minimize impacts by removing all vegetation outside of the breeding season, use of a biological monitor, and a habitat enhancement plan. Direct short-term/temporary impacts from Alternative 1A to Belding's savannah sparrow would be less than significant and not substantially adverse.

Ridgway's Rail

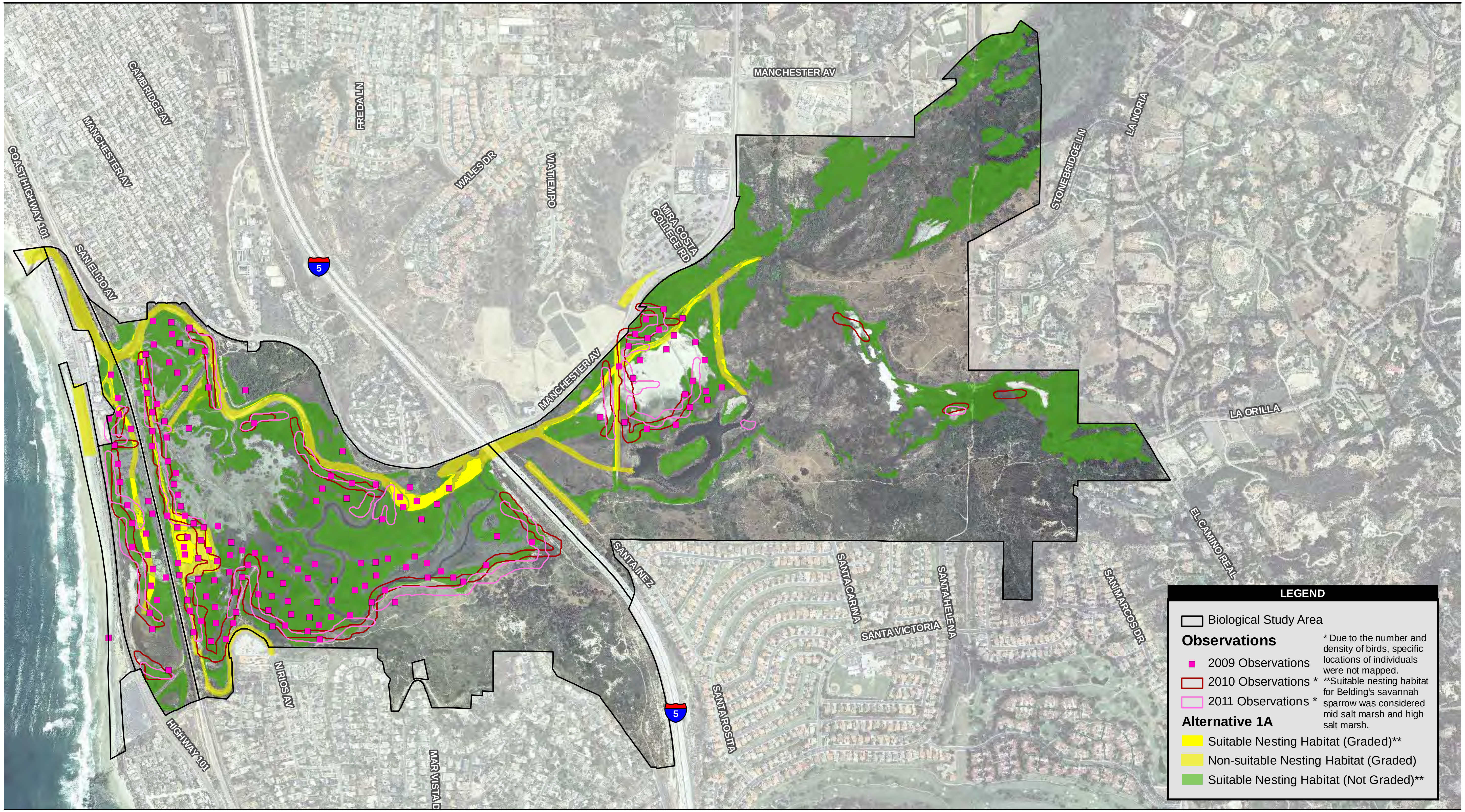
Short-term/temporary direct impacts to Ridgway's rail from implementation of Alternative 1A would be similar but substantially less than Alternative 2A including direct impacts to 5.3 acres (4 percent) of existing suitable nesting habitat (Table 4-9 and Figure 4-9). These primary direct impacts are associated with the channel widening and expansion of the channel into the east basin where Ridgway's rail occupy brackish marsh habitat. The loss of habitat is an impact; however, it is not considered a substantial impact (i.e. greater than 50 percent of the habitat or greater than 50 percent of the population) to the existing population of Ridgway's rail. The project has proposed design features to minimize impacts, including removal of all vegetation outside of the bird breeding season, use of a biological monitor, and a habitat enhancement plan. With implementation of project design features, temporary direct impacts to sensitive species from habitat loss (both nesting and foraging) are considered less than significant and not substantially adverse.

Indirect

Indirect short-term/temporary effects from Alternative 1A may include degraded water quality, disturbed unconsolidated sediment, and prolonged inundation. These impacts are similar to those described for Alternative 2A (excluding increased exposure to predators) but to a lesser degree as the footprint is substantially smaller.

During construction, sensitive birds using the lagoon may be exposed to degraded water quality resulting from dredging and other sediment-disturbing activities. As with Alternative 2A and Alternative 1B, the project would implement BMPs to reduce water quality impacts and the indirect effects to sensitive birds. With implementation of project design features, temporary indirect impacts to sensitive species from water quality and inundation are considered less than significant and not substantially adverse.

Short-term construction noise could impact sensitive species via the diesel or electric dredge and other large construction equipment. Temporary noise impacts to listed species would be similar to those previously described for Alternative 2A and Alternative 1B. However, under Alternative 1A, no impacts to the east basin would occur, and noise would be limited to the west of I-5.



Source: SANDAG 2012; Patton 2011; AECOM 2014

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 4-8

Belding's Savannah Sparrow

Suitable Nesting Habitat Impact Analysis, Alternative 1A

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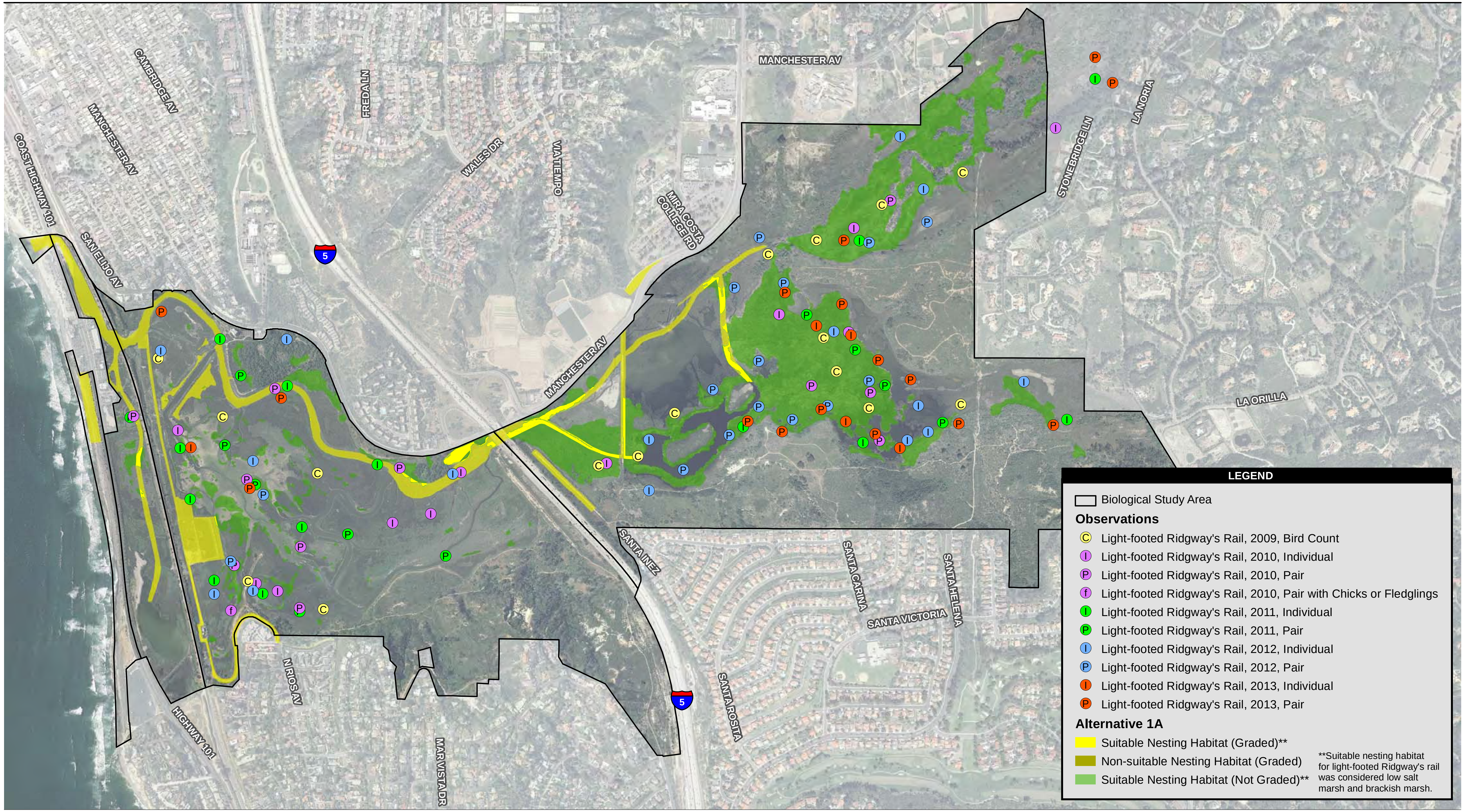

Source: Landiscor 2010; Patton 2012; AECOM 2012

1,100 550 0 1,100 Feet

Scale: 1:13,200; 1 inch = 1,100 feet

Figure 4-9
Light-footed Ridgways's Rail
Suitable Nesting Habitat Impact Analysis, Alternative 1A

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Temporary indirect impacts associated with construction noise in the west basin are considered significant and substantially adverse.

As with Alternative 2A, the construction vehicle route at North Rios Avenue would experience increased noise. Two coastal California gnatcatchers have been observed along this existing access route. They are accustomed to vehicular traffic in this area from other maintenance vehicles and 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 and not substantially adverse**.**

Long term

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

Habitat for sensitive species would be changed and/or converted as a result of this alternative (Table 4-13). This change may include a direct increase or decrease in the total acreage of a specific habitat type post-restoration. This change may result from grading, modified hydrology, or elevated high tide line. Implementation of Alternative 1A would extend tidal hydrology to the east basin and result in a modified high tide line of +3.8 feet NGVD, which is moderately higher than the existing high tide line of +3.5 feet NGVD.

Least Bell’s Vireo and Southwestern Willow Flycatcher

Both least Bell’s vireo and southwestern willow flycatcher utilize riparian habitat on-site for foraging habitat. Southwestern willow flycatcher are not known to breed on-site. Least Bell’s vireo have not been documented but there is the potential that successful breeding has occurred. Alternative 1A would actively convert 4 percent (2.7 acres) of the riparian habitat within the lagoon BSA as a result of the expansion of tidal channels in the east basin and widening of tidal channels in the central basin (Table 4-13). The loss of riparian habitat is not substantial and would not result in a decline in the local populations of least Bell’s vireo and southwestern willow flycatcher below self-sustaining levels.

Coastal California Gnatcatcher

Coastal California gnatcatcher are observed along the periphery of San Elijo Lagoon within the sage scrub and chaparral habitats. As with Alternative 2A, the existing access road at North Rios Avenue would need to be widened to accommodate construction vehicular traffic. Alternative 1A would permanently impact 0.7 acre of coastal sage scrub habitat with road enhancement in

Table 4-13
Alternative 1A Existing and Post-Construction Acreage of Suitable Habitat for Listed Bird Species

Species	Habitat Suitability*	Habitat Type	Existing Habitat Acres	Habitat Acreage Post-Restoration	Net Change in Habitat Acreage Post-Restoration	Percent Change Post-Restoration
Ridgway’s rail	Nesting	Coastal Brackish Marsh	131.5	122	-9.5	-7%
		Coastal Salt Marsh – Low	13.3	44	30.7	231%
		Total Nesting	144.8	166	21.2	15%
	Foraging	Mudflats	63.1	25	-38.1	-60%
		Coastal Salt Marsh – Mid	141.4	140	-1.4	-1%
		Coastal Salt Marsh – High	120	145	25	21%
		Total Foraging	324.5	310	-14.5	-4%
California least tern	Nesting	Saltpan	36.9	35	-1.9	-5%
		Coastal Strand	5	5	0	0%
		Nesting Area**	0	2	2	200%
		Total Nesting	41.9	42	0.1	0%
	Foraging	Subtidal/Channels	40.1	34	-6.1	-15%
		Beach	15	15	0	0%
		Total Foraging	55.1	49	-6.1	-11%
western snowy plover	Nesting	CDFW dike	0.4	0	-0.4	-100%
		Saltpan	36.9	35	-1.9	-5%
		Coastal Strand	5	5	0	0%
		Nesting Area**	0	2	2	200%
		Total Nesting	42.3	42	-0.3	-1%
	Foraging	Mudflats	63.1	25	-38.1	-60%
		Beach	15	15	0	0%
		Total Foraging	78.1	40	-38.1	-49%

Species	Habitat Suitability*	Habitat Type	Existing Habitat Acres	Habitat Acreage Post-Restoration	Net Change in Habitat Acreage Post-Restoration	Percent Change Post-Restoration
coastal California gnatcatcher	Nesting/Foraging	Diegan Coastal Sage Scrub	178.1	178.1	0	0%
		Diegan Coastal Sage Scrub/Chaparral	49.3	49.3	0	0%
		Coyote Bush Scrub	7.5	7.5	0	0%
		Total Nesting/Foraging	234.9	234.9	0	0%
least Bell's vireo	Nesting/Foraging	Sandbar Willow Scrub	9	8.9	-0.06	-1%
		Southern Willow Scrub	61.4	58.8	-2.7	-4%
		Total Nesting/Foraging	70.4	67.7	-2.7	-4%
southwestern willow flycatcher	Nesting/Foraging	Southern Willow Scrub	61.4	58.8	-2.7	-4%
		Total Nesting/Foraging	61.4	58.8	-2.7	-4%
Belding's savannah sparrow	Nesting	Coastal Salt Marsh – Mid	141.4	124	-17.4	-12%
		Coastal Salt Marsh – High	120	145	25	21%
		Total Nesting	261.4	269	7.6	3%
	Foraging	Coastal Salt Marsh – Low	13.3	44	30.7	231%
		Total Foraging	13.3	44	30.7	231%

CDFW = California Department of Fish and Wildlife

*Nesting habitat is considered suitable for both breeding and foraging activities, while habitat identified as "Foraging" is not expected to support breeding activities.

**Under existing conditions, a portion of the nesting area is classified as saltpan.

addition to 1.2 acres within the lagoon equating to 1 percent of the total nesting habitat in the BSA. Expansive contiguous undisturbed upland sage habitat would still be present along most lagoon hillsides. Permanent impacts to gnatcatcher habitat associated with the road enhancement and lagoon restoration would not be considered substantial because they would not result in a decline in the local population below self-sustaining levels.

California Least Tern and Western Snowy Plover

Both California least tern and western snowy plover are annually documented foraging and roosting at San Elijo Lagoon. Western snowy plover has not successfully nested at San Elijo Lagoon since 2002, and California least tern since 2005 (CDFG 2006; Patton 2010). Suitable nesting habitat under Alternative 1A would remain the same for California least tern and would only negligibly decreasefor western snowy plover by 0.3 acre (1 percent of suitable nesting habitat) (Table 4-13). In addition, implementation of a predator control program may also improve conditions of the suitable nesting habitat.

Belding’s Savannah Sparrow

As depicted in Table 4-13, Alternative 1A would ultimately increase available nesting habitat for Belding’s savannah sparrow by 7.6 acres, which equates to a gain of 5 percent compared to existing conditions. The greatest increase is within the central basin where mid-marsh is being replaced with high-marsh habitat. This increase in nesting habitat would be considered a benefit to the local population. Although nesting acreage would increase, Alternative 1A would have a minimal effect on lagoon condition and so the increased habitat would still be of moderate quality. Implementation of Alternative 1A would ultimately benefit the Belding’s savannah sparrow population at San Elijo Lagoon and no long-term significant or substantially adverse impacts are expected.

Ridgway’s Rail

Ridgway’s rail nesting and foraging habitat would be modified as part of Alternative 1A. Post-restoration, there would be a net gain of 21.2 acres of nesting habitat acreage for Ridgway’s rail, which equates to a gain of 15 percent when compared to existing conditions. The greatest increase is within the central basin where mudflat would continue to convert to low-marsh habitat. In the east basin, a portion of the existing brackish marsh (9.5 acres) would also be replaced by subtidal and low-marsh habitat. Although brackish marsh would be reduced, the preferred habitat of Ridgway’s rail is low-marsh, which is currently limited in the lagoon.

In addition to affecting habitat acreage, the changes to lagoon hydrology under Alternative 1A would improve the condition of the remaining foraging and nesting habitat for Ridgway's rail. Foraging habitat would have a small net decrease in total acreage (4 percent). This can be deceptive, however, as mudflat, another important foraging habitat, would decrease by 60 percent as a result of the expansion of low-marsh and mid-marsh habitat. The net gain of nesting habitat is considered a benefit; however, the reduction in a preferred foraging habitat (i.e., mudflat) would be a negative impact. Implementation of Alternative 1A would not substantially affect the sustainability of the Ridgway's rail population within the lagoon and, in fact, may ultimately benefit the population if nesting habitat is considered more limiting than foraging habitat. Therefore, no long-term significant or substantially adverse impacts to Ridgway's rail would result with implementation of Alternative 1A.

As part of the implementation of Alternative 1A, long-term monitoring and maintenance would occur, which has the potential to impact sensitive birds in the lagoon. Avoidance measures would be included in the adaptive management, maintenance, and monitoring program. Therefore, long-term monitoring and maintenance activities are not expected to have a substantial effect on any sensitive species and impacts are considered less than significant and not substantially adverse.

Indirect

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

Habitat above the high tide line, within the transitional area, may passively transition over a long period of time. The transitional area is considered to begin at the high tide line and extend up to 2+ feet above the high tide line. For Alternative 1A, this area is found between +3.8 feet NGVD and +5.8 feet NGVD. Passive transition of habitat within the new natural transitional area is possible although unpredictable. The greatest passive habitat change would be expected in the east basin where the channel would be expanded and tidal exchange introduced. Over time, this area may change from brackish marsh and saltpan habitat to salt marsh habitat. Indirect impacts to sensitive species resulting from passive unpredictable changes to the new transitional area are not considered substantial.

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-construction habitat monitoring and maintenance program for this project, the occurrence of these invasive species would be closely monitored. Maintenance would regularly include treatments to limit the possibility of invasion. Indirect impacts to sensitive species resulting from invasive species are not considered substantial.

As described for Alternative 2A, indirect changes to lagoon condition are expected as a result of Alternative 1A and the corresponding improvement to tidal hydrology (i.e., circulation, turnover, freshwater export, etc.). The magnitude of the improved conditions would be less than under Alternative 2A or Alternative 1B as the improvement to tidal expression is less for Alternative 1A. The indirect improvement to water quality would benefit sensitive species.

With implementation of project design features and the net benefits of the restoration project, indirect permanent impacts to sensitive species from passive transition of nesting and/or foraging habitat and invasive species are considered less than significant and not substantially adverse.

Nonlisted Special-status Wildlife Species

Impacts to nonlisted special-status wildlife species will be less than Alternative 2A and Alternative 1B as the extent of grading is lower and controlled inundation is not required. Short-term impacts to migratory and nonresident species are considered less than significant and not substantially adverse. No long-term impacts to migratory and nonresident wildlife species are expected as the restoration project and the corresponding improvements to ecological conditions are considered beneficial to all 87 species, both resident and migratory.

4.4.4 Wildlife Corridors/Connectivity

Alternative 1A would have similar temporary and short-term impacts to wildlife corridors and connectivity as discussed for Alternative 2A and Alternative 1B. However, less construction is proposed under this alternative; therefore, the potential to impede wildlife movement would be less compared to the other alternatives. No long-term impacts are anticipated; the project area would continue to function not as a regional corridor, but as a large area of natural open space that would allow for wildlife movement and connectivity similar to existing conditions. Therefore, no significant or substantially adverse impacts to wildlife movements or connectivity are anticipated with implementation of Alternative 1A.

4.4.5 Local Ordinances/Policies/Adopted Plans

Similar to Alternative 2A, all restoration, maintenance and monitoring plans prepared for Alternative 1A 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 both the MHCP and draft North County MSCP. Therefore, no significant or substantially adverse impact would result with implementation of Alternative 1A.

4.5 NO PROJECT/NO FEDERAL ACTION ALTERNATIVE

This alternative would not directly modify the lagoon, inlet, or Highway 101, 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. Over the past decade, the lagoon has benefited from routine maintenance of the mouth, but it is still operating at a lower condition than would be possible if tidal expression were improved with restoration. Without restoration, water quality conditions and the wildlife community observed in the lagoon would continue to exist as a mid-level marine system with some diversity and richness. Given the constraints of tidal muting for the lagoon, higher diversity and increased EFH value are not expected without greater tidal expression; under the No Project/No Federal Action Alternative, habitat conversion is expected to trend toward a more monotypic system.

This section discloses the anticipated habitat types in the future condition (at equilibrium), assuming continued management of the lagoon mouth by the SELC. It also addresses how habitat conversion may affect nesting and/or foraging habitat of sensitive animal species (no sensitive plant species would be affected). As these changes may be considered negative (impact) or positive (benefit), both are discussed.

4.5.1 Sensitive Vegetation Communities

Long-term changes in vegetation are anticipated to occur as shown in Table 4-14. Specifically, there would be a substantial reduction in mudflat and open water/tidal channels and basins, with an increase in overall salt marsh habitat, plus increases in low-and high-marsh and a decrease in mid-marsh communities. A rapid conversion of mudflat was observed between 2010 and 2012, with a gain of 13 acres of low-marsh (cordgrass dominated) habitat and a direct loss of mudflat. Mudflat is expected to continue to decrease to 29 acres at equilibrium (net loss 34 acres) (Table 4-14). This loss of mudflat corresponds to an increase in low-marsh habitat (37.7 acres). In addition, mid-marsh habitat would revert to high-marsh habitat, which would increase by 47 acres and a portion of the open water on-site would revert to mudflat.

All other habitats and land cover types would remain relatively the same under the No Project/No Federal Action Alternative and the present spectrum of environmental constraints

Table 4-14
Existing Habitat and No Project/No Federal Action Habitat Acreage of Suitable Habitat for Listed Bird Species

Species	Habitat Suitability	Habitat Type	Habitat in Acres			Percent Change
			Existing	No Project/No Federal Action	Net Change	
Ridgway's rail	Nesting	Coastal Brackish Marsh	131.5	131	-0.5	0%
		Coastal Salt Marsh – Low	13.3	51	37.7	283%
		Total Nesting	144.8	182	37.2	26%
	Foraging	Mudflats	63.1	29	-34.1	-54%
		Coastal Salt Marsh – Mid	141.4	107	-34.4	-24%
		Coastal Salt Marsh – High	120	167	47	39%
		Total Foraging	324.5	303	-21.5	-7%
California least tern	Nesting	Saltpan	36.9	36.9	0	0%
		Coastal Strand	5	5	0	0%
		Nesting Area*	0	0	0	0%
		Total Nesting	41.9	41.9	0	0%
	Foraging	Subtidal/Channels	40.1	24	-16.1	-40%
		Beach	15	15	0	0%
		Total Foraging	55.1	39	-16.1	-29%
western snowy plover	Nesting	CDFW dike	0.4	0	-0.4	-100%
		Saltpan	36.9	36.9	0	0%
		Coastal Strand	5	5	0	0%
		Nesting Area*	0	0	0	0%
		Total Nesting	42.3	41.9	-0.4	-1%
	Foraging	Mudflats	63.1	29	-34.1	-54%
		Beach	15	15	0	0%
		Total Foraging	78.1	44	-34.1	-44%
coastal California gnatcatcher	Nesting/Foraging	Diegan Coastal Sage Scrub	178.1	178.1	0	0%
		Diegan Coastal Sage Scrub/Chaparral	49.3	49.3	0	0%
		Coyote Bush Scrub	7.5	7.5	0	0%
		Total Nesting/Foraging	234.9	234.9	0	0%

Species	Habitat Suitability	Habitat Type	Habitat in Acres			Percent Change
			Existing	No Project/No Federal Action	Net Change	
least Bell’s vireo	Nesting/Foraging	Sandbar Willow Scrub	9	9	0	0%
		Southern Willow Scrub	61.4	60.4	-1	-2%
		Total Nesting/Foraging	70.4	69.4	-1	-1%
southwestern willow flycatcher	Nesting/Foraging	Southern Willow Scrub	61.4	60.4	-1	-2%
		Total Nesting/Foraging	61.4	60.4	-1	-2%
Belding’s savannah sparrow	Nesting	Coastal Salt Marsh – Mid	141.4	107	-34.4	-24%
		Coastal Salt Marsh – High	120	167	47	39%
		Total Nesting	261.4	274	12.6	5%
	Foraging	Coastal Salt Marsh – Low	13.3	51	37.7	283%
		Total Foraging	13.3	51	37.7	283%

CDFW = California Department of Fish and Wildlife
*Under existing conditions, a portion of the nesting area is classified as saltpan.

would continue to limit the quality and productivity of the lagoon. The change in habitat from one sensitive vegetation community to another sensitive vegetation community does not, in itself, represent a significant biological impact. However, the No Project/No Federal Action Alternative would not improve lagoon ecology and the lagoon would not benefit from the improved water quality and increased habitat diversity provided by the SELRP.

4.5.2 Rare, Threatened, or Endangered Animal Species

Anticipated habitat conversion would result in a net gain of nesting habitat for both Ridgway's rail (low-marsh) and Belding's savannah sparrow (high-marsh) but a loss of critical foraging habitat for western snowy plover (mudflat) and least tern (subtidal) in addition to other migratory birds that use the lagoon for foraging habitat. There would be little to no change in habitats that occur above the high tide line; therefore, no impacts to coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher are expected under the No Project/No Federal Action Alternative. Changes in marsh habitat from one type to another would benefit some species and impact other species.

4.5.3 Local Ordinances/Policies/Adopted Plans

The MHCP and North County MSCP both refer to the opportunity for restoration at San Elijo Lagoon. While the No Project/No Federal Action Alternative represents a lost opportunity for enhancement to a preserve area designated within these plans, the lack of restoration does not specifically represent a conflict with these plans. Efforts for preserve management and monitoring would continue consistent with the goals and objectives of these plans.

CHAPTER 5.0
SUMMARY OF CONCLUSIONS

The SELRP is, by design, a project for the long-term improvement of water quality and health/diversity of biological resources. Numerous design features are incorporated into the project to minimize impacts during construction, and most potential impacts to biological resources would be less than significant. However, during construction, significant impacts would result to sensitive vegetation communities and resident marsh birds where temporary loss of habitat would exceed 50 percent. In addition, short-term significant and substantially adverse impacts to birds may result from indirect noise impacts. No long-term significant or substantial adverse impacts would occur; ultimately, the noise levels would reduce to existing levels where these sensitive species are residents, and habitat diversity would facilitate stable populations of these species. A summary of lagoon impacts is provided in Table 5-1, by Alternative 2A, Alternative 1B, and Alternative 1A.

Table 5-1
Summary of Impacts to Biological Resources by Alternative

CEQA Threshold of Significance Category			**Alternative**		
			Alternative 2A	**Alternative 1B**	**Alternative 1A**
Sensitive Riparian and Natural Vegetation Communities	Short Term	Sensitive Riparian and Natural Vegetation Communities	Significant Direct Impact (low-and mid-salt marsh, open water, saltpan, and tidal mudflats)	Significant Direct Impact (low-and mid-salt marsh, open water, saltpan, and tidal mudflats)	Less than significant (all habitats)
		USFWS Critical Habitat	Less than significant	Less than significant	Less than significant
		EFH	Less than significant	Less than significant	Not significant
	Long Term	Sensitive Riparian and Natural Vegetation Communities	Less than significant direct impact	Less than significant direct impact	Less than significant direct impact
		USFWS Critical Habitat	Less than significant	Less than significant	Less than significant
		EFH	Less than significant	Less than significant	Not significant
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

CEQA Threshold of Significance Category			Alternative		
			Alternative 2A	**Alternative 1B**	**Alternative 1A**
Sensitive Species	Short Term	Flora	Less than significant	Less than significant	No impact
		Fauna	Significant direct impact (Belding’s) Less than significant direct impact (Ridgway’s rail) Significant indirect impact (construction noise)	Significant direct impact (Belding’s) Less than significant direct impact (Ridgway’s rail) Significant indirect impact (construction noise)	Less than significant direct impact (Belding’s, Ridgway’s rail, least tern, and snowy plover) 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 impact (Belding’s and Ridgway’s rail) Less than significant indirect impact (transitional habitat)	Less than significant direct impact (Belding’s and Ridgway’s rail) Less than significant indirect impact (transitional habitat)	No direct impact Less than significant indirect impact (transitional habitat)
		Wildlife Corridors/Connectivity	Less than significant	Less than significant	No impact
Local Ordinances, Policies, Adopted Plans	Short Term		No impact	No impact	No impact
	Long Term		No impact	No impact	No impact

EFH = Essential Fish Habitat; U.S. Fish and Wildlife Service

CHAPTER 6.0
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APPENDIX A

PLANT SPECIES OCCURRING
WITHIN SAN ELIJO LAGOON

APPENDIX A
PLANT SPECIES OCCURRING WITHIN THE SAN ELIJO LAGOON

Scientific Name	**Common Name**	**Source**[1]
Adoxaceae		
Sambucus nigra	Black Elderberry	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Agavaceae		
Agave shawii var. *shawii* (Planted)	Shaw's Agave	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Hesperoyucca whipplei	Chaparral Candle	BioBlitz 2009, AECOM 2010
Yucca schidigera	Mohave Yucca	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Aizoaceae		
*Carpobrotus chilensis**	Sea-Fig	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Carpobrotus edulis**	Hottentot-Fig	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Mesembryanthemum crystallinum**	Crystal Ice Plant	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Mesembryanthemum nodiflorum**	Little Ice Plant	Tom Chester 2003, AECOM 2010
Sesuvium verrucosum	Western Sea Purslane	Tom Chester 2003, AECOM 2010
*Tetragonia tetragonioides**	New Zealand Spinich	Tom Chester 2003
Alliaceae		
Allium praecox	Early Onion	Tom Chester 2003, AECOM 2010
Amaranthaceae		
*Amaranthus albus**	White Tumbleweed	Tom Chester 2003, AECOM 2010
Aphanisma blitoides	Aphanisma	Tom Chester 2003
Arthrocnemum subterminale	Parish's glasswort	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Atriplex canescens ssp. *canescens*	Shade Scale	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Atriplex lentiformis ssp. *breweri*	Brewer's Saltbush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Atriplex patula	Fat Hen	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Atriplex prostrata	Spearscale	Tom Chester 2003
*Atriplex semibaccata**	Australian Saltbush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Bassia hyssopifolia**	Five-Hook Bassia	Tom Chester 2003, AECOM 2010
*Chenopodium album**	White Goosefoot	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Chenopodium californicum	California Goosefoot	Tom Chester 2003, AECOM 2010
Chenopodium macrospermum	Coast Goosefoot	Tom Chester 2003
Dysphania multifida	Cut-leaf Goosefoot	Tom Chester 2003, AECOM 2010
Salicornia depressa	Slender Glasswort	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Salsola tragus**	Russian-Thistle	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Sarcocornia pacifica	Pacific Pickleweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Suaeda nigra	Bush Seepweed	Tom Chester 2003, AECOM 2010

Scientific Name	**Common Name**	**Source**[1]
Anacardiaceae		
Malosma laurina	Laurel Sumac	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Rhus integrifolia	Lemonade Berry	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Schinus molle**	Peruvian Pepper Tree	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Schinus terebinthifolius**	Brazilian pepper-tree	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Toxicodendron diversilobum	Poison Pepper Tree	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Apiaceae		
*Apium graveolens**	Common Dill	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Conium maculatum**	Common Poison Hemlock	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Daucus pusillus	Rattlesnake Weed	Tom Chester 2003, AECOM 2010
*Foeniculm vulgare**	Sweet Fennel	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Hydrocotyle verticillata	Whorled Marsh-Pennywort	Tom Chester 2003, BioBlitz 2009
Lomatium lucidum	Shiny Lomatium	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Sanicula crassicaulis	Pacific Sanicle	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Yabea microcarpa	California Hedge-Parsley	Tom Chester 2003
Apocynaceae		
Sarcostemma cynanchoides ssp. *hartwegii*	Climbing Milkweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Araceae		
Lemna gibba	Swollen Duckweed	Tom Chester 2003
Lemna minor	Common Duckweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Arecaceae		
*Phoenix canariensis**	Canary Island Date Palm	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Washingtonia filifera	Fan Palm	Tom Chester 2003, BioBlitz 2009
Asparagaceae		
*Asparagus asparagoides**	Florist's Smilax	Tom Chester 2003, AECOM 2010
*Asparagus officinalis**	Garden Asparagus	Tom Chester 2003, AECOM 2010
Asteraceae		
Achillea millefolium	Yarrow	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Acourtia microcephala	Sacapellote	Tom Chester 2003, AECOM 2010
*Amblyopappus pusillus**	Pineapple Weed	Tom Chester 2003, AECOM 2010
Ambrosia psilostachya	Western Ragweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Ambrosia chamissonis	Beach-Bur	Tom Chester 2003, BioBlitz 2009
*Anthemis cotula**	Mayweed	Tom Chester 2003, AECOM 2010
Artemisia douglasiana	Douglas Mugwort	Tom Chester 2003, AECOM 2010
Artemisia dracunculus	Dragon Sagewort	Tom Chester 2003, AECOM 2010
Artemisia californica	Coastal Sagebrush	Tom Chester 2003, BioBlitz 2009, AECOM 2010

Scientific Name	**Common Name**	**Source**[1]
Artemisia palmeri	San Diego Sagewort	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Baccharis sarothroides	Broom Baccharis	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Baccharis pilularis	Coyote Brush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Baccharis salicifolia	Mule Fat	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Brickellia californica	California Brickelbush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Carduus pycnocephalus**	Italian Thistle	BioBlitz 2009, AECOM 2010
*Centaurea melitensis**	Tocalote	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Chaenactis glabriuscula var. *glabriuscula*	Yellow pincushion	Tom Chester 2003, AECOM 2010
Chaenactis glabriuscula var. *orcuttiana*	Orcutt's Pincushion	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Chrysanthemum coronarium**	Garland Daisy	BioBlitz 2009, AECOM 2010
Cirsium occidentale var. *californicum*	California Thistle	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cirsium occidentale var. *occidentale*	Cobwebby Thistle	Tom Chester 2003, AECOM 2010
Conyza canadensis	Horseweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Conyza coulteri	Coulter's Fleabane	Tom Chester 2003
Coreopsis maritima	San Diego Sea-Dahlia	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Corethrogyne filaginifolia var. *filaginifolia*	Common Sand-Aster	Tom Chester 2003, BioBlitz 2009
*Cotula coronopifolia**	African Brass-Buttons	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Deinandra fasciculata	Fascicled Tarweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Delairea odorata**	German-Ivy	BioBlitz 2009
Encelia californica	California Encelia	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Erigeron foliosus var. foliosus	Leafy Daisy	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Eriophyllum confertiflorum var. *confertiflorum*	Long-Stem Golden-Yarrow	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Euthamia occidentalis	Western Goldenrod	Tom Chester 2003, AECOM 2010
Grindelia camporum var. *bracteosa*	Rayless Gumplant	Tom Chester 2003, AECOM 2010
Hazardia orcuttii	Orcutt's Goldenbush	Tom Chester 2003, BioBlitz 2009
Hazardia squarrosus ssp. *grindelioides*	Southern Sawtooth Goldenbush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Hedypnois cretica**	Crete Hedypnois	Tom Chester 2003, AECOM 2010
Heterotheca grandiflora	Telegraph Weed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Heterotheca sessiliflora ssp. *sessiliflora*	False Goldenstar	Tom Chester 2003
*Hypochaeris glabra**	Smooth Cat's Ear	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Isocoma menziesii var. *vernonioides*	Coastal Goldenbush	Tom Chester 2003, BioBlitz 2009, AECOM 2010

Scientific Name	**Common Name**	**Source**[1]
Iva hayesiana	San Diego Marsh-Elder	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Juamea carnosa	Salty Susan	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Lactuca serriola**	Prickly lettuce	BioBlitz 2009, AECOM 2010
Lasthenia coronaria	Southern Goldfields	Tom Chester 2003, AECOM 2010
Lasthenia glabrata ssp. *coulteri*	Coulter's Salt-Marsh Daisy	Tom Chester 2003, AECOM 2010
Lasthenia gracilis	Common Goldfields	Tom Chester 2003, AECOM 2010
Layia platyglossa ssp. *campestris*	Tidy Tips	Tom Chester 2003, AECOM 2010
Lepidospartum squamatum	Scale-Broom	Tom Chester 2003, AECOM 2010
Logfia arizonica	Arizona Filago	Tom Chester 2003, AECOM 2010
*Logfia gallica**	Narrow-Leaf Filago	Tom Chester 2003, AECOM 2010
Osmadenia tenella	Osmadenia	Tom Chester 2003, AECOM 2010
*Picris echioides**	Bristly Ox-Tongue	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pluchea odorata	Salt Marsh Fleabane	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pluchea sericea	Arrow Weed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pseudognaphalium biolettii	Bicolor Cudweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pseudognaphalium californicum	Everlasting	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pseudognaphalium canescens	Fragrant Everlasting	Tom Chester 2003, AECOM 2010
Pseudognaphalium luteo-album	Fragrant Cudweed	Tom Chester 2003, AECOM 2010
Pseudognaphalium microcephalum	White Everlasting	Tom Chester 2003
Pseudognaphalium ramosissimum	Pink Everlasting	Tom Chester 2003, AECOM 2010
Pseudognaphalium stramineum	Cotton-Batting Plant	Tom Chester 2003, AECOM 2010
Senecio californicus	California Butterweed	Tom Chester 2003, AECOM 2010
Sonchus asper ssp. *asper**	Prickly Sow-Thistle	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Sonchus oleraceus**	Common Sow-Thistle	Tom Chester 2003, AECOM 2010
Stephanomeria diegensis	San Diego Wreath-Plant	Tom Chester 2003, AECOM 2010
Stephanomeria exigua ssp. *exigua*	Small Wreath-Plant	BioBlitz 2009
Stephanomeria virgata ssp. *pleurocarpa*	Tall Wreath-Plant	Tom Chester 2003, BioBlitz 2009
Stylocline gnaphaloides	Everlasting Nest-Straw	Tom Chester 2003, AECOM 2010
Symphyotrichum subulatum var. *ligulatum*	Slim Aster	Tom Chester 2003, AECOM 2010
Xanthium strumarium var. *canadense*	Cocklebur	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Azollaceae		
Azolla filiculoides	Pacific Mosquito Fern	BioBlitz 2009
Bataceae		
Batis maritima	Saltwort	Tom Chester 2003, AECOM 2010
Berberidaceae		
Berberis pinnata ssp. *pinnata*	Shiny-Leaf Barberry	Tom Chester 2003
Boraginaceae		
Amsinckia menziesii var. *intermedia*	Rancher's Fiddleneck	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cryptantha intermedia	Nievitas cryptantha	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cryptantha micromeres	Minute-Fower Cryptantha	Tom Chester 2003

Scientific Name	**Common Name**	**Source**[1]
Crytantha clevelandii	Cleveland's Cryptantha	Tom Chester 2003, AECOM 2010
*Echium candicans**	Pride of Madeira	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Eriodictyon crassifolium var. *crassifolium*	Felt-Leaf Yerba Santa	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Eucrypta chrysanthemifolia var. *chrysanthemifolia*	Common Eucrypta	Tom Chester 2003, AECOM 2010
Harpagonella palmeri	Palmer's Grapplinghook	Tom Chester 2003, AECOM 2010
Heliotropium curassavicum	Salt Heliotrope	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Nemophila rotata	Eastwood's Baby Blue Eyes	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pectocarya penicillata	Winged Pectocarya	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Phacelia circutaria ssp. *hispida*	Caterpillar Phacelia	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Phacelia distans	Wild-Heliotrope	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pholistoma auritum var. *auritum*	Fiesta Flower	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pholistoma membranaceum	White Fiesta Flower	Tom Chester 2003, AECOM 2010
Pholistoma racemosum	San Diego Fiesta Flower	Tom Chester 2003, AECOM 2010
Plagiobothrys collinus var. *californicus*	California Popcornflower	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Brassicaceae		
*Brassica nigra**	Black Mustard	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Brassica rapa**	Field Mustard	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Cakile maritima**	European Sea Rocket	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cardamine californica	Milkmaids	Tom Chester 2003
Caulanthus heterophyllus var. *heterophyllus*	San Diego Jewel Flower	Tom Chester 2003
Descurainia pinnata ssp. *menziesii*	Menzies's Tansy Mustard	Tom Chester 2003, AECOM 2010
Erysimum ammophilum	Coast Wallflower	AECOM 2010
Erysimum capitatum ssp. *capitatum*	Western Wallflower	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Hirschfeldia incana**	Short-Pod Mustard	Tom Chester 2003, AECOM 2010
Lepidium lasiocarpum var. *lasiocarpum*	Sand Peppergrass	Tom Chester 2003, AECOM 2010
*Lepidium latifolium**	Broad-Leaf Peppercress	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Lepidium latipes var. *latipes*	Dwarf Peppergrass	Tom Chester 2003
Lepidium virginicum var. *robinsonii*	Robinson's Peppergrass	Tom Chester 2003
*Matthiola incana**	Common Stock	Tom Chester 2003, AECOM 2010
*Raphanus sativus**	Wild Radish	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Rorippa nasturtium-aquaticum	Water-Cress	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Sisymbrium officinale**	Hedge Mustard	Tom Chester 2003
*Sisymbrium orientale**	Hare's-Ear Cabbage	Tom Chester 2003, AECOM 2010

Scientific Name	**Common Name**	**Source**[1]
Cactaceae		
Cylindropunta prolifera	Coast Cholla	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Ferocactus viridescens var. *viridescens*	Coast Barrel Cactus	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Opuntia littoralis	Coast Prickly-Pear	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Caprifoliaceae		
Lonicera subspicata var. *denudata*	Johnston's Honeysuckle	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Caryophyllaceae		
*Cardionema ramosissima**	Tread Lightly	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Polycarpon tetraphyllum ssp. *tetraphyllum**	Four-Leaf Allseed	Tom Chester 2003, AECOM 2010
*Silene gallica**	Common Catchfly	Tom Chester 2003, AECOM 2010
Silene laciniata ssp. *laciniata*	Southern Pink	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Spergularia bocconi**	Boccone's Sand-Spurry	Tom Chester 2003, AECOM 2010
Spergularia macrotheca var. macrotheca	Sticky Sand-Spurry	Tom Chester 2003, AECOM 2010
Spergularia salina	Salt Marsh Sand-Spurry	Tom Chester 2003, AECOM 2010
*Spergularia villosa**	Villous Sand-Spurry	Tom Chester 2003, AECOM 2010
*Stellaria media**	Common Chickweed	Tom Chester 2003, AECOM 2010
Cistaceae		
Helianthemum scoparium	Peak Rush-Rose	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cleomaceae		
Peritoma arborea	Bladderpod	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Convolvulaceae		
Calystegia macrostegia ssp. *tenuifolia*	San Diego Morning-Glory	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Calystegia soldanella	Seashore Morning-Glory	Tom Chester 2003
*Convolvulus arvensis**	Bindweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cressa truxillensis	Alkali Weed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cuscuta californica var. *californica*	Chaparral dodder	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cuscuta salina var. major	Large-Flower Salt Marsh Dodder	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Dichondra occidentalis	Western Ponyfoot	Tom Chester 2003
Crassulaceae		
Crassula connata	Pygmyweed	Tom Chester 2003, AECOM 2010
Dudleya edulis	Ladies' Fingers	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Dudleya lanceolata	Lance-Leaf Dudleya	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Dudleya pulverulenta	Chalk Dudleya	Tom Chester 2003, BioBlitz 2009, AECOM 2010

Scientific Name	**Common Name**	**Source**[1]
Cucurbitaceae		
Marah macrocarpus var. *macrocarpus*	Manroot	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cyperaceae		
Bolboschoenus maritimus ssp. *Paludosus*	Prairie Bulrush	Tom Chester 2003
Carex spissa	San Diego Sedge	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Carex triquetra	Triangular-Fruit Sedge	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cyperus eragrostis	Tall Flatsedge	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cyperus esculentus	Nutsedge	Tom Chester 2003
Eleocharis acicularis	Needle Spike-Rush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Schoenoplectus acutus var. *occidentalis*	Viscid Bulrush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Schoenoplectus americanus	Olney's Bulrush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Schoenoplectus californicus	California Bulrush	Tom Chester 2003, AECOM 2010
Ericaceae		
Arctostaphylos glandulosa ssp. *crassifolia*	Del Mar Manzanita	Tom Chester 2003, BioBlitz 2009
Comarostaphylis diversifolia ssp. *diversifolia*	Summer Holly	Tom Chester 2003, BioBlitz 2009
Xylococcus bicolor	Mission Manzanita	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Euphorbiaceae		
Croton setigerus	Doveweed	Tom Chester 2003, AECOM 2010
Croton californicus	California Croton	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Euphorbia peplus**	Petty Spurge	Tom Chester 2003, AECOM 2010
*Ricinus communis**	Castor Bean	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Fabaceae		
*Acacia decurrens**	Green Wattle	Tom Chester 2003
*Acacia farnesiana var. farnesiana**	Sweet Acacia	Tom Chester 2003
*Acacia longifolia**	Golden wattle	Tom Chester 2003, BioBlitz 2009
*Acacia retinodes**	Everblooming Acacia	Tom Chester 2003
Amorpha fruticosa	False Indigo	Tom Chester 2003, AECOM 2010
Astragalus trichopodus var. *lonchus*	Ocean Locoweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Genista monspessulana**	French Broom	Tom Chester 2003
Lathyrus vestitus var. *alefeldii*	San Diego Sweet Pea	Tom Chester 2003, AECOM 2010
Lotus hamatus	Grab Lotus	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Lotus nuttallianus	Nuttall's Lotus	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Lotus purshianus var. *purshianus*	Spanish Clover	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Lotus scoparius ssp. *scoparius*	Coastal Deerweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Lotus strigosus	Bishop's Lotus	Tom Chester 2003, AECOM 2010

Scientific Name	**Common Name**	**Source**^{1}
Lupinus bicolor	Miniature Lupine	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Lupinus concinnus	Bajada Lupine	Tom Chester 2003, AECOM 2010
Lupinus succulentus	Arroyo Lupine	Tom Chester 2003, AECOM 2010
Lupinus truncatus	Collar Lupine	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Medicago polymorpha**	California Burclover	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Melilotus albus**	White Sweetclover	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Melilotus indicus**	Indian Sweetclover	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Prosopis glandulosa	Honey Mesquite	BioBlitz 2009
Vicia sativa ssp. *nigra**	Common Vetch	Tom Chester 2003, AECOM 2010
Fagaceae		
Quercus agrifolia var. *agrifolia*	Coast Live Oak	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Quercus dumosa	Nuttall's Scrub Oak	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Frankeniaceae		
Frankenia salina	Alkali-Heath	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Gentianaceae		
Zeltnera venustum	Canchalagua	Tom Chester 2003, AECOM 2010
Geraniaceae		
*Erodium cicutarium**	Red-Stem Filaree	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Geranium carolinianum	Carolina Geranium	Tom Chester 2003
Grossulariaceae		
Ribes indecorum	White-Flower Currant	Tom Chester 2003, AECOM 2010
Ribes speciosum	Fuchsia-Flower Gooseberry	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Hyacinthaceae		
Chloragalum parviflorum	Small-Flower Soap-Plant	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Hydrocharitaceae		
Najas marina	Holly-Leaf Water-Nymph	Tom Chester 2003
Hydrophyllaceae		
Eriodictyon crassifolium var. *crassifolium*	Felt-Leaf Yerba Santa	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Iridaceae		
Sisyrinchium bellum	Blue-Eyed Grass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Juglandaceae		
Juglans californica var. *californica*	California Walnut	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Juncaceae		
Juncus acutus ssp. *leopoldii*	Southwestern Spiny Rush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Juncus arcticus var. *mexicanus*	Mexican Rush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Juncus dubious	Mariposa Rush	Tom Chester 2003, AECOM 2010
Juncus oxymeris	Pointed Rush	Tom Chester 2003

Scientific Name	**Common Name**	**Source[1]**
Juncus triformis	Yosemite Dwarf Rush	Tom Chester 2003
Juncaginaceae		
Triglochin maritima	Arrow-Grass	Tom Chester 2003
Lamiaceae		
*Marrubium vulgare**	Horehound	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Salvia apiana	White Sage	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Salvia clevelandii	Fragrant Sage	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Salvia mellifera	Black Sage	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Stachys ajugoides var.*rigida*	Hedge-Nettle	Tom Chester 2003
Lilaceae		
Calochortus splendens	Splendid Mariposa Lily	Tom Chester 2003, AECOM 2010
Calochortus weedii var. *weedii*	Weed's Mariposa Lily	Tom Chester 2003
Lythraceae		
*Lythrum hyssopifolium**	Grass Poly	Tom Chester 2003, AECOM 2010
Malvaceae		
*Lavatera assurgentiflora**	Island Mallow	Tom Chester 2003
Malacothamnus fasciculatus	Chaparral Bushmallow	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Malva parviflora**	Cheeseweed	Tom Chester 2003, AECOM 2010
Malvella leprosa	Alkali Mallow	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Sidalcea malviflora ssp. *sparsifolia*	Checker-Bloom	Tom Chester 2003, AECOM 2010
Melanthiaceae		
Zigadenus fremontii	Fremont's Camas	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Myrtaceae		
*Callistemon viminalis**	Bottlebrush	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Chamelaucium uncinatum**	Geraldton Waxflower	Tom Chester 2003
*Eucalyptus globulus**	Blue Gum	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Eucalyptus camaldulensis**	River Red Gum	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Nyctaginaceae		
Abronia maritima	Red-Sand Verbena	Tom Chester 2003
Abronia umbellata var. *umbellata*	Beach Sand-Verbena	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Mirabilis laevis var. *crassifolia*	Coastal Wishbone Plant	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Oleaceae		
Fraxinus spp.	Ash	Tom Chester 2003
*Olea europaea**	Olive	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Onagraceae		
Camisonia lewisii	Lewis's Evening-Primrose	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Camissonia bistorta	CaliforniaSuncup	Tom Chester 2003, BioBlitz 2009, AECOM 2010

Scientific Name	**Common Name**	**Source**[1]
Camissonia cheiranthifolia ssp. *suffruticosa*	Beach Evening-Primrose	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Clarkia epilobioides	Canyon Godetia	Tom Chester 2003, AECOM 2010
Oenothera elata ssp. *hirsutissima*	Great Marsh Evening-Primrose	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Orchidaceae		
Piperia unalascensis	Slenderspire Piperia	Tom Chester 2003
Orobanchaceae		
Castilleja affinis ssp. *affinis*	Coast Paintbrush	Tom Chester 2003, AECOM 2010
Castilleja exserta ssp. *exserta*	Purple Owl's-Clover	Tom Chester 2003
Castilleja foliolosa	Woolly Indian Paintbrush	Tom Chester 2003, AECOM 2010
Cordylanthus rigidus ssp. *setigerus*	Dark-Tip Bird's Beak	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pedicularis densiflora	Indian Warrior	Tom Chester 2003, AECOM 2010
Oxalidaceae		
*Oxalis pes-caprae**	Bermuda Buttercup	BioBlitz 2009, AECOM 2010
Paeoniaceae		
Paeonia californica	California Peony	Tom Chester 2003, AECOM 2010
Papaveraceae		
Dendromecon rigida	Bush Poppy	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Eschscholzia californica	California Poppy	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Platystemon californicus	Cream Cups	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Stylomecon heterophylla	Wind Poppy	Tom Chester 2003, BioBlitz 2009
Phrymaceae		
Mimulus aurantiacus var. *puniceus*	Coast Monkey Flower	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Pinaceae		
Pinus torreyana var. *torreyana*	Torrey Pine	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Plantaginaceae		
Antirrhinum nuttallianum ssp. *nuttallianum*	Nuttall's Snapdragon	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Antirrhinum kelloggii	Climbing Snapdragon	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Collinsia heterophylla	Chinese Houses	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Linaria canadensis	Large Blue Toadflax	Tom Chester 2003, AECOM 2010
Plantago erecta	Dot-Seed Plantain	Tom Chester 2003, AECOM 2010
*Plantago lanceolata**	Rib-Grass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Plantago major**	Common Plantain	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Veronica anagallis-aquatica**	Water Speedwell	Tom Chester 2003, AECOM 2010
Platanaceae		
Platanus racemosa	Western Sycamore	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Plumbaginaceae		
Limonium californicum	Western Marsh-Rosemary	Tom Chester 2003, BioBlitz 2009, AECOM 2010

Scientific Name	**Common Name**	**Source**[1]
*Limonium perezii**	Perez's Marsh-Rosemary	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Limonium sinuatum**	Notch-Leaf Marsh-Rosemary	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Poaceae		
Achnatherum coronata	Giant Stipa	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Agrostis stolonifera**	Creeping Bent	Tom Chester 2003
*Agrostis viridis**	Water Bent	Tom Chester 2003, AECOM 2010
*Arundo donax**	Giant Reed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Avena barbata**	Slender Wild Oat	Tom Chester 2003, AECOM 2010
*Avena fatua**	Wild Oat	Tom Chester 2003, AECOM 2010
Bromus matritensis ssp. *rubens**	Foxtail Chess	Tom Chester 2003, AECOM 2010
Bromus carinatus var. *carinatus**	California Brome	Tom Chester 2003, AECOM 2010
*Bromus catharticus**	Rescue Grass	Tom Chester 2003
*Bromus diandrus**	Ripgut Grass	Tom Chester 2003, AECOM 2010
*Bromus hordeaceus**	Soft Chess	Tom Chester 2003, AECOM 2010
*Cortaderia selloana**	Selloa Pampas Grass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Crypsis schoenoides	Prickle Grass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Cynodon dactylon**	Bermuda Grass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Distichlis spicata	Saltgrass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Echinochloa crus-galli**	Common Barnyard Grass	Tom Chester 2003, AECOM 2010
*Ehrharta erecta**	Panic Veldt Grass	BioBlitz 2009, AECOM 2010
*Ehrharta calycina**	Perennal Veldt Grass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Hordeum murinum ssp. *leporinum**	Hare Barley	Tom Chester 2003, AECOM 2010
Leptochloa fusca ssp. *uninervia*	Mexican Spangletop	Tom Chester 2003
Leymus condensatus	Giant Wild-Rye	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Leymus triticoides	Beardless Wild-Rye	Tom Chester 2003, AECOM 2010
*Lolium multiflorum**	Italian Ryegrass	Tom Chester 2003, AECOM 2010
Melica imperfecta	Coast Range Melic	Tom Chester 2003, AECOM 2010
Monanthochloe littoralis	Shoregrass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Muhlenbergia microsperma	Little-Seed Muhly	Tom Chester 2003, AECOM 2010
Nassella lepida	Foothill Needlegrass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Nassella pulchra	Purple Needlegrass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Phalaris aquatica**	Harding Grass	Tom Chester 2003
*Phalaris canariensis**	Canary Grass	Tom Chester 2003
*Phalaris paradoxa**	Paradox Canary Grass	Tom Chester 2003, AECOM 2010
*Parapholis incurva**	Sicklegrass	Tom Chester 2003, AECOM 2010
*Pennisetum clandestinum**	Kikuyu Grass	Tom Chester 2003
*Pennisetum setaceum**	African Fountain Grass	Tom Chester 2003, AECOM 2010
Poa secunda ssp. *secunda*	One-Sided Bluegrass	Tom Chester 2003, AECOM 2010
*Polypogon monspeliensis**	Annual Beard Grass	Tom Chester 2003, AECOM 2010

Scientific Name	**Common Name**	**Source**[1]
Spartina foliosa	California Cordgrass	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Stenotaphrum secundatum**	Saint Augustine Grass	Tom Chester 2003, AECOM 2010
*Vulpia myuros**	Fescue	Tom Chester 2003, AECOM 2010
Polemoniaceae		
Allophyllum glutinosum	Blue False-Gilia	Tom Chester 2003
Eriastrum filifolium	Thread-Leaf Woolly-Star	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Navarretia hamata ssp. *hamata*	Hooked Skunkweed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Polygonaceae		
Chorizanthe procumbens	Prostrate Spineflower	Tom Chester 2003, AECOM 2010
Chorizanthe staticoides	Turkish Rugging	Tom Chester 2003, AECOM 2010
Eriogonum elongatum var. *elongatum*	Tall Buckwheat	Tom Chester 2003, AECOM 2010
Eriogonum fasciculatum var. *foliolosum*	Inland California Buckwheat	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Eriogonum gracile var. *gracile*	Slender Suckwheat	Tom Chester 2003, AECOM 2010
Eriogonum parvifolium	Bluff Buckwheat	Tom Chester 2003, AECOM 2010
Lastarriaea coriacea	Lastarriaea	Tom Chester 2003
Nemacaulis denudata var. *denudata*	Coast Woolly-Heads	Tom Chester 2003, AECOM 2010
*Polygonum arenastrum**	Common Knotweed	Tom Chester 2003
Pterostegia drymarioides	Granny's Hairnet	Tom Chester 2003, AECOM 2010
*Rumex conglomeratus**	Whorled Dock	Tom Chester 2003
*Rumex crispus**	Curly Dock	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Rumex maritimus	Golden Dock	Tom Chester 2003, AECOM 2010
Polypodiaceae		
Polypodium californicum	California Polypody	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Portulacaceae		
Calandrinia ciliata	Red Maids	Tom Chester 2003, AECOM 2010
Calandrinia maritima	Sea Kisses	Tom Chester 2003, AECOM 2010
Claytonia perfoliata ssp. *perfoliata*	Miner's Lettuce	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Potamogetonaceae		
Ruppia maritima	Beakfruit sea-tassle	Tom Chester 2003, AECOM 2010
Stuckenia pectinata	Fennel-Leaf Pondweed	Tom Chester 2003, AECOM 2010
Primulaceae		
Anagallis arvensis*	Scarlet Simpernel	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Dodecatheon clevelandii ssp. *clevelandii*	Padre's Shooting Star	Tom Chester 2003, AECOM 2010
Pteridaceae		
Adiantum jordanii	California Maidenhair	Tom Chester 2003, AECOM 2010
Pellaea andromedifolia	Coffee Fern	Tom Chester 2003, AECOM 2010
Pentagramma triangularis var. *maxonii*	Maxon's Silverback Fern	Tom Chester 2003
Pentagramma triangularis var. *trangularis*	California Goldenback Fern	Tom Chester 2003, AECOM 2010
Ranunculaceae		
Clematis pauciflora	Ropevine Clematis	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Delphinium parryi ssp. maritimum	Maritime Larkspur	Tom Chester 2003, AECOM 2010
Thalictrum fendleri var. *polycarpum*	Smooth-Leaf Meadow-Rue	Tom Chester 2003, AECOM 2010

Scientific Name	**Common Name**	**Source[1]**
Rhamnaceae		
Adolphia californica	Spineshrub	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Ceanothus verrucosus	Wart-Stem-Lilac	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Rhamnus crocea	Spiny Redberry	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Rosaceae		
Adenostoma fasciculatum	Chamise	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cercocarpus minutiflorus	San Diego Mountain-Mahogany	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Cotoneaster spp.	Cotoneaster	Tom Chester 2003
Heteromeles arbutifolia	Toyon	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Lyonothamnus floribundus	Catalina Ironwood	BioBlitz 2009
Prunus ilicifolia ssp. *ilicifolia*	Holly-Leaf Cherry	Tom Chester 2003, AECOM 2010
Prunus virginiana var. *demissa*	Western Choke Cherry	Tom Chester 2003
Rosa californica	California Rose	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Rubus laciniatus**	Evergreen Blackberry	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Rubiaceae		
Galium angustifolium ssp. *angustifolium*	Narrow-Leaf Bedstraw	Tom Chester 2003, AECOM 2010
Galium aparine	Common Bedstraw	Tom Chester 2003, AECOM 2010
Galium nuttallii ssp. *nuttallii*	San Diego Bedstraw	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Rutaceae		
Cneoridium dumosum	Coast Spice Bush	BioBlitz 2009
Salicaceae		
Populus fremontii ssp. *fremontii*	Western Cottonwood	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Salix exigua	Narrow-Leaf Willow	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Salix gooddingii	Goodding's Black Willow	Tom Chester 2003, AECOM 2010
Salix laevigata	Red Willow	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Salix lasiolepis	Arroyo Willow	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Salix lucida ssp. *lasiandra*	Shining Willow	Tom Chester 2003, BioBlitz 2009
Saururaceae		
Anemopsis californica	Yerba mansa	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Saxifragaceae		
Lithophragma affine	Woodland Star	Tom Chester 2003, AECOM 2010
Scrophulariaceae		
Myoporum laetum*	Mousehole Tree	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Scrophularia californica ssp. *floribunda*	California Bee Plant	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Selaginellaceae		
Selaginella cinerascens	Mesa Spike-Moss	Tom Chester 2003, AECOM 2010

Scientific Name	**Common Name**	**Source**[1]
Solanaceae		
Datura wrightii	Western Jimson Weed	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Lycium californicum	California Desert Thorn	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Nicotiana glauca**	Tree Tobacco	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Solanum americanum	White Nightshade	Tom Chester 2003, AECOM 2010
Solanum parishii	Parish's Nightshade	Tom Chester 2003, AECOM 2010
Solanum umbelliferum	Blue Witch	Tom Chester 2003
Tamaricaceae		
*Tamarix parviflora**	Tamerisk	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Themidaceae		
Bloomeria crocea var. *crocea*	Common Goldenstar	Tom Chester 2003, AECOM 2010
Dichelostemma capitatum ssp. *capitatum*	Blue Dicks	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Tropaeolaceae		
*Tropaeolum majus**	Garden Nasturtium	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Typhaceae		
Typha domingensis	Southern Cattail	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Typha latifolia	Broad-Leaf Cattail	Tom Chester 2003, BioBlitz 2009, AECOM 2010
Urticaceae		
Hesperocnide tenella	Western Nettle	Tom Chester 2003, AECOM 2010
Parietaria hespera var. *californica*	California Pellitory	Tom Chester 2003, BioBlitz 2009
Urtica dioica ssp. *holosericea*	Hoary Nettle	Tom Chester 2003, BioBlitz 2009, AECOM 2010
*Urtica urens**	Dwarf nettle	Tom Chester 2003, AECOM 2010
Verbenaceae		
*Lantana camara**	Lantana	BioBlitz 2009, AECOM 2010
Verbena lasiostachys var. *lasiostachys*	Western Vervain	Tom Chester 2003, AECOM 2010
Violaceae		
Viola pedunculata	Johnny-Jump-Up	Tom Chester 2003, AECOM 2010
Vitaceae		
Vitis girdiana	Desert Wild Grape	Tom Chester 2003, BioBlitz 2009, AECOM 2010

[1] Tom Chester 2003 – Plant species observed at the San Elijo Lagoon by Tom Chester.
Bioblitz 2009 – Plant species observed during the May 2009 BioBlitz at the San Elijo Lagoon.
AECOM 2010 – Plant species observed during spring 2010 rare plant surveys.
*Nonnative

APPENDIX B

WILDLIFE SPECIES OCCURRING WITHIN SAN ELIJO LAGOON

APPENDIX B
WILDLIFE SPECIES OCCURRING WITHIN THE SAN ELIJO LAGOON

Family	Scientific Name	Common Name	Resource
INVERTEBRATES			
Order: Canalipalpata			
Class: Capitellidae			
	Polydora sp.	Mudworm	4
	Polydora nuchalis	Mudworm	5
	Spiophanes missionensis	Worm	5
	Capitella capitata	Worm	5
Phylum: Molusca			
	Aplysia californica	California Sea Hare	5
	Aplysia vaccaria	Black Sea Hare	
	Cerithidea californica	California Horn Snail	5
	Chione californiensis	Bi-valve	5
	Cylichnella culcitella	Pillow Barrel-bubble	5
	Lacuna sp.	Chink Snail	5
	Lottia sp.	Sea Snail	5
	Mytilus californianus	Mussel	5
	Navanax intermis	Sea Slug	5
	Ostrea sp.	Oyster	5
	Protothaca staminea	Little Neck Clam	5
	Tagelus californianus	Razor Clam	5
	Tellina carpenteri	Bi-valve	5
	Tellina sp.		
Phylum: Arthropoda			
Class: Crustacea			
Order: Decapoda			
	Cancer sp,	Brown Crab	5
	Hemigrapsus oregonensis	Crab	5
	Majidae sp.	Spider Crab	5
	Neotrypaea sp.	Ghost Shrimp	5
	Pachygrapus crassipes	Stripped Crab	5
	Palaemon macrodactylus	Orient Shrimp	5
	Uca sp,	Fiddler Crab	5
Class: Insecta			
Order: Lepidoptera			
	Panoquina errans [2]	Saltmarsh skipper	6
VERTEBRATES			
FISH			
Family Atherinidae			
	Atherinops affinis	Topsmelt	4

Family	Scientific Name	Common Name	Resource
	Atherinops californiensis	Jacksmelt	4
Family Cottidae			
	Leptocottus armatus	Staghorn Sculpin	4
Family Cyprinidae			
	Cyprinus carpio	Carp	4
Family Cyprindontidae			
	Fundulus parvipinnis	California Killifish	4
Family Engraulidae			
	Anchoa compressa	Deepbody Anchovy	4
	Engraulis mordax	Northern Anchovy	4
Family Gobiidae			
	Gillichthys mirabilis	Longjaw Mudsucker	4
	Ilypnus gilberti	Cheekspot Goby	4
	Clevelandia ios	Arrow Goby	4
	Queietula ycauda	Shadow Goby	4
	Acanthogobieus flavimanus	Yellowfin Goby	4
Family Gymnuridae			
	Gymnura marmorata	California Butterfly Ray	4
Family Ictaluridae			
	Ictalurus melas	Black Bullhead	4
Family Kyphosidae			
	Girella nigricans	Opaleye	4
Family Mugilidae			
	Mugil cephalus	Striped Mullet	4
Family Myliobatidae			
	Myliobatus californicus	Bat Ray	4
Family Pleuronectidae			
	Hypsopsetta guttulata	Diamond Turbot	4
Family Paralichthyidae			
	Paralichthys californicus	California Halibut	4
Family Serrandae			
	Paalabrax maculatofasciatus	Spotted Sand Bass	4
Family Syngnathidae			
	Syngnathus leptorhynchus	Bay Pipefish	4
	Syngnathus lauliscus	Barred Pipefish	4
Family Trikidae			
	Mustelus californicus	Grey Smoothhound	4

Family	Scientific Name	Common Name	Resource
REPTILES AND AMPHIBIANS			
Order: Caudata	**Salamanders**		
Family Plethodontidae			
	Batrachoseps major	Slender salamander	1
Order: Anura (Salientia)	**Frogs and Toads**		
Family Hylidae			
	Pseudacris regilla	Pacific treefrog	1
Family Ranidae			
	Rana catesbeiana	Bullfrog	1
Order: Testudines	**Turtles**		
Family Emydidae			
	Trachemys scripta	Red-eared slider	1
Order: Squamata	**Lizards and Snakes**		
Family Phrysonomatidae			
	Sceloporus occidentalis	Western fence lizard	1
	Uta stansburiana	Side-blotched lizard	1
Family Teiidae			
	Aspidoscelis hyperythya beldingi [4]	Orange-throated whiptail	1
	Aspidoscelis tigris	Western whiptail	1
Family Anguidae			
	Elgaria multicarinata	Southern alligator lizard	1
Family Anniellidae			
	Anniella pulchra pulchra [4]	Silvery legless lizard	1
Family Viperidae			
	Crotalus oreganus	Southern Pacific rattlesnake	1
BIRDS			
Order: Anseriformes			
Family Anatidae			
	Branta bernicla[4]	Brant	1
	Branta canadensis	Canada Goose	2
	Anas strepera	Gadwall	1,2
	Anas americana	American Wigeon	2
	Anas platyrhynchos	Mallard	1,2
	Anas discors	Blue-winged Teal	2
	Anas cyanoptera	Cinnamon Teal	1,2
	Anas clypeata	Northern Shoveler	1,2

Family	Scientific Name	Common Name	Resource
	Anas acuta	Northern Pintail	2
	Anas crecca	Green-winged Teal	2
	Aythya marila	Greater Scaup	2
	Aythya affinis	Lesser Scaup	2
	Melanitta perspicillata	Surf Scoter	2
	Bucephala albeola	Bufflehead	2
	Oxyura jamaicensis	Ruddy Duck	2
Order: Galliformes			
Family Odontophoridae			
	Callipepla californica	California Quail	1,2
Order: Gaviiformes			
Family Gaviidae			
	Gavia pacifica	Pacific Loon	1
	Gavia immer[4]	Common Loon	1
Order: Podicipediformes			
Family Podicipedidae			
	Podilymbus podiceps	Pied-billed Grebe	1,2
	Podiceps nigricollis	Eared Grebe	1,2
	Aechmophorus occidentalis	Western Grebe	2
Order: Suliformes			
Family Phalacrocoracidae			
	Phalacrocorax penicillatus	Brandt's Cormorant	1
	Phalacrocorax auritus[5]	Double-crested Cormorant	1,2
Order: Pelecaniformes			
Family Pelecanidae			
	Pelecanus erythrorhynchos[4]	American White Pelican	2
	Pelecanus occidentalis[3]	Brown Pelican	1,2
Family Ardeidae			
	Ardea herodias	Great Blue Heron	1,2
	Ardea alba	Great Egret	1,2
	Egretta thula	Snowy Egret	1,2
	Egretta caerulea	Little Blue Heron	1,2
	Bubulcus ibis	Cattle Egret	2
	Butorides virescens	Green Heron	1,2
	Nycticorax nycticorax	Black-crowned Night-Heron	1,2
Family Threskiornithidae			
	Plegadis chihi[4]	White-Faced Ibis	1,2
Order: Accipitriformes			
Family Cathartidae			
	Cathartes aura	Turkey Vulture	2

Family	Scientific Name	Common Name	Resource
Family Pandioninae			
	Pandion haliaetus[5]	Osprey	1,2
Family Accipitridae			
	Elanus leucurus[3]	White-tailed Kite	1,2
	Circus cyaneus[3]	Northern Harrier	2
	Accipiter striatus[5]	Sharp-shinned Hawk	2
	Accipiter cooperii[5]	Cooper's Hawk	1,2
	Buteo lineatus	Red-shouldered Hawk	1,2
	Buteo jamaicensis	Red-tailed Hawk	1,2
Order: Falconiformes			
Family Falconidae			
	Falco sparverius	American Kestrel	1,2
	Falco peregrinus anatum[3]	American Peregrine Falcon	2
	Falco columbarius[5]	Merlin	2
Order: Gruiformes			
Family Rallidae			
	Rallus longirostris levipes[1,2,3]	Light-footed Clapper Rail	1,2,3
	Rallus limicola	Virginia Rail	1,2
	Porzana carolina	Sora	2
	Gallinula chloropus	Common Moorhen	1
	Fulica americana	American Coot	1,2
Order: Charadriiformes			
Family Charadriidae			
	Charadrius alexandrinus nivosus[1,4]	Western Snowy Polover	2,3
	Charadrius semipalmatus	Semipalmated Plover	2
	Charadrius vociferus	Killdeer	1,2
	Pluvialis squatarola	Black-bellied Plover	1,2
Family Recurvirostridae			
	Himantopus mexicanus	Black-necked Stilt	1,2
	Recurvirostra americana	American Avocet	1,2
Family Scolopacidae			
	Actitis macularius	Spotted Sandpiper	1,2
	Tringa semipalmata	Willet	1,2
	Tringa melanoleuca	Greater Yellowlegs	1,2
	Tringa flavipes	Lesser Yellowlegs	2
	Numenius phaeopus	Whimbrel	1,2
	Numenius americanus[5]	Long-billed Curlew	1,2
	Limosa fedoa	Marbled Godwit	1,2
	Arenaria interpres	Ruddy Turnstone	2
	Arenaria melanocephala	Black Turnstone	2
	Calidris alba	Sanderling	1,2
	Calidris mauri	Western Sandpiper	2
	Calidris minutilla	Least Sandpiper	2
	Calidris alpina	Dunlin	2

Family	Scientific Name	Common Name	Resource
	Limnodromus griseus	Short-billed Dowitcher	2
	Limnodromus scolopaceus	Long-billed Dowitcher	1,2
	Phalaropus tricolor	Wilson's Phalarope	1
Family Laridae			
	Larus heermanni	Heermann's Gull	1,2
	Chroicocephalus philadelphia	Bonaparte's Gull	1
	Larus delawarensis	Ring-Billed Gull	1,2
	Larus occidentalis	Western Gull	1,2
	Larus californicus[5]	California Gull	1,2
	Larus glaucescens	Glaucous-winged Gull	1
	Sternula antillarum browni [1,2,3]	California Least Tern	3
	Hydroprogne caspia	Caspian Tern	1,2
	Sterna forsteri	Forster's Tern	1,2
	Thalasseus maximus	Royal Tern	1,2
	Thalasseus elegans[5]	Elegant Tern	1
	Rynchops niger[4]	Black Skimmer	2
Order: Columbiformes			
Family Columbidae			
	Columba livia	Rock Pigeon	2
	Columba livia	Rock Dove	1
	Streptopelia decaocto	Eurasian Collared-dove	1,2
	Zenaida macroura	Mourning Dove	1,2
	Patagioenas fasciata	Band-tailed Pigeon	2
Order: Caprimulgiformes			
Family Caprimulgidae			
	Phalaenoptilus nuttallii	Common Poorwill	2
Order: Apodiformes			
Family Apodidae			
	Chaetura vauxi[4]	Vaux's Swift	2
	Aeronautes saxatalis	White-throated Swift	1,2
Family Trochilidae			
	Archilochus alexandri	Black-chinned Hummingbird	1
	Calypte anna	Anna's Hummingbird	1,2
	Calypte costae	Costa's Hummingbird	1,2
	Selasphorus rufus	Rufous Hummingbird	2
	Selasphorus sasin	Allen's Hummingbird	1,2
Order: Coraciiformes			
Family Alcedinidae			
	Megaceryle alcyon	Belted Kingfisher	2
Order: Piciformes			
Family Picidae			
	Picoides nuttallii	Nuttall's Woodpecker	1,2
	Picoides pubescens	Downy Woodpecker	1,2
	Colaptes auratus	Northern Flicker	2

Family	Scientific Name	Common Name	Resource
Order: Passeriformes			
Family Tyrannidae			
	Contopus cooperi[5]	Olive-sided Flycatcher	1
	Contopus sordidulus	Western Wood-pewee	2
	Empidonax difficilis	Pacific-slope Flycatcher	1,2
	Sayornis nigricans	Black Phoebe	1,2
	Sayornis saya	Say's Phoebe	1,2
	Myiarchus cinerascens	Ash-throated Flycatcher	1,2
	Empidonax traillii extimus[1,2]	Southwestern Willow Flycatcher	2,3
	Tyrannus vociferans	Cassin's Kingbird	1,2
	Tyrannus verticalis	Western Kingbird	2
Family Laniidae			
Family Vireonidae			
	Vireo bellii pusillus[1,2]	Least Bell's Vireo	3
	Vireo plumbeus	Plumbeous Vireo	2
	Vireo cassinii	Cassin's Vireo	2
	Vireo huttoni	Hutton's Vireo	1,2
	Vireo gilvus	Warbling Vireo	1
Family Corvidae			
	Aphelocoma californica	Western Scrub-jay	1,2
	Corvus brachyrhynchos	American Crow	1,2
	Corvus corax	Common Raven	1,2
Family Alaudidae			
Family Hirundinidae			
	Tachycineta bicolor	Tree Swallow	1,2
	Tachycineta thalassina	Violet-green Swallow	2
	Stelgidopteryx serripennis	Northern Rough-winged Swallow	1,2
	Petrochelidon pyrrhonota	Cliff Swallow	1,2
	Hirundo rustica	Barn Swallow	1,2
Family Aegithalidae			
	Psaltriparus minimus	Bushtit	1,2
Family Sittidae			
	Sitta pygmaea	Pygmy Nuthatch	2
Family Troglodytidae			
	Thryomanes bewickii	Bewick's Wren	1,2
	Troglodytes aedon	House Wren	1,2
	Cistothorus palustris	Marsh Wren	1,2
Family Polioptilidae			
	Polioptila caerulea	Blue-gray Gnatcatcher	2
	Polioptila californica californica[1,4]	Coastal California Gnatcatcher	1,2

Family	Scientific Name	Common Name	Resource
Family Regulidae			
	Regulus calendula	Ruby-Crowned Kinglet	2
Family Sylviidae			
	Chamaea fasciata	Wrentit	1,2
Family Turdidae			
	Sialia mexicana	Western Bluebird	1,2
	Catharus ustulatus	Swainson's Thrush	2
	Catharus guttatus	Hermit Thrush	2
	Turdus migratorius	American Robin	1
Family Mimidae			
	Mimus polyglottos	Northern Mockingbird	1,2
	Toxostoma redivivum	California Thrasher	1,2
Family Sturnidae			
	Sturnus vulgaris	European Starling	1,2
Family Motacillidae			
	Anthus rubescens	American Pipit	2
Family Bombycillidae			
	Bombycilla cedrorum	Cedar Waxwing	2
Family Ptilogonatidae			
Family Parulidae			
	Oreothlypis celata	Orange-crowned Warbler	1,2
	Dendroica petechia[4]	Yellow Warbler	1,2
	Dendroica coronata	Yellow-rumped Warbler	2
	Geothlypis trichas	Common Yellowthroat	1,2
	Wilsonia pusilla	Wilson's Warbler	1,2
	Icteria virens	Yellow-breasted Chat	1,2
	Dendroica nigrescens	Black-throated Gray Warbler	2
Family Emberizidae			
	Pipilo maculatus	Spotted Towhee	1,2
	Melozone (Pipilo) crissalis	California Towhee	1,2
	Chondestes grammacus	Lark Sparrow	2
	Melospiza melodia	Song Sparrow	1,2
	Zonotrichia leucophrys	White-crowned Sparrow	2
	Zonotrichia atricapilla	Golden-crowned Sparrow	2
	Passerculus sandwichensis[1]	Savannah Sparrow	2
	Passerculus sandwichensis beldingi[1]	Belding's Savannah Sparrow	1,3
Family Cardinalidae			
	Pheucticus melanocephalus	Black-headed Grosbeak	1,2

Family	Scientific Name	Common Name	Resource
	Passerina caerulea	Blue Grosbeak	2
	Passerina amoena	Lazuli Bunting	2
	Piranga ludoviciana	Western Tanager	1,2
Family Icteridae			
	Agelaius phoeniceus	Red-winged Blackbird	1,2
	Sturnella neglecta	Western Meadowlark	2
	Euphagus cyanocephalus	Brewer's Blackbird	1,2
	Quiscalus mexicanus	Great-tailed Grackle	1,2
	Molothrus ater	Brown-headed Cowbird	1,2
	Icterus cucullatus	Hooded Oriole	1,2
	Icterus bullockii	Bullock's Oriole	2
Family Estrildidae			
	Lonchura punctulata	Nutmeg Mannikin	1
Family Fringillidae			
	Carpodacus purpureus	Purple Finch	2
	Carpodacus mexicanus	House Finch	1,2
	Spinus psaltria	Lesser Goldfinch	1,2
	Spinus tristis	American Goldfinch	1,2
Family Passeridae			
	Passer domesticus	House Sparrow	1,2
MAMMALS			
Order: Chiroptera	**Bats**		
Family Vespertilionidae			
	Myotis yumanensis	Yuma Myotis	1
	Lasiurus borealis [4]	Red Bat	1
Family Molossidae			
	Tadarida brasiliensis	Mexican Free-tailed Bat	1
	Eumops perotis [4]	Western Mastiff Bat	1
Order: Lagomorpha	**Rabbits, Hares, and Pikas**		
Family Leporidae			
	Sylvilagus audubonii	Audubon’s Cottontail	1
Order: Rodentia	**Squirrels, Rats, Mice, and Relatives**		
Family Sciuridae			
	Spermophilus beecheyi	California Ground Squirrel	1
Family Geomyidae			
	Thomomys bottae	Botta’s Pocket Gopher	1
Family Cricetidae			
	Neotoma fuscipes	Dusky-Footed Woodrat	1

Family	Scientific Name	Common Name	Resource
Order: Carnivora	**Carnivores**		
Family Canidae			
	Canis latrans	Coyote	1
Family Procyonidae			
	Procyon lotor	Raccoon	1
Family Mustelidae			
	Mephitis mephitis	Striped Skunk	1
Order: Artiodactyla	**Even-Toed ungulates**		
Family Cervidae			
	Odocoileus hemionus	Mule Deer	1

Resources:

1 - San Elijo Lagoon BioBlitz
2 - Monthly Bird Count Data San Elijo Lagoon
3 - Patton reports on surveys conducted for the western snowy plover, light-footed clapper rail, California least tern, and Belding’s savannah sparrow
4 - San Elijo Lagoon Fish Sampling - Spring Surveys: Inlet and Nature Center
5 - San Elijo Lagoon Spring Invertebrate Sampling: Inlet and Nature Center
6 - Saltmarsh skipper presence absence surveys conducted by SELC and SANDAG

Footnotes:

[1] Federally threatened or endangered species
[2] State threatened or endangered species
[3] State fully protected species
[4] State species of special concern
[5] State watch list species

APPENDIX C

SELC BIOBLITZ

San Elijo Lagoon BioBlitz
May 10-16, 2009

Survey Results

(Observations within 7-day period—May 10-16)

Vascular Plants	**227**
Algae	**86**
Mosses	**9**
Fungi	**4**
Liverworts	**1**
	327

(24-hour survey period—May 15-16)

Insects	**213**
Birds	**109**
Spiders	**28**
Fish	**16**
Mammals	**13**
Reptiles & Amphibians	**11**
Invertebrates (freshwater)	**9**
Invertebrates (marine)	**8**
Arthropod	**1**
	408

TOTAL SPECIES:	**735**

Taxa Counts and List of Participants

Vascular Plants: 227 Species

Detailed species list available as a separate document.

Participants: Janine Free, Tara Fuad, Jayne Lesley, Andrew Mauro, Kathleen Mauro, Robert Patton, Denise Stillinger, Elizabeth Venrick, Susan Welker.

Insects: 213 Species

Participants: Robert Wall, Jim Berrian, Dave Dyer, UCSD Ecology Lab students.

BIRDS: 109 Species

Species included: Pacific loon, common loon, pied-billed grebe, eared grebe, brown pelican, double-crested cormorant, Brandt's cormorant, great blue heron, great egret, snowy egret, little blue heron, green heron, black-crowned night-heron, white-faed ibis, brant, mallard, cinnamon teal, gadwall, northern shoveler, osprey, white-tailed kite, Cooper's hawk, red-shouldered hawk, red-tailed hawk, American kestrel, California quail, clapper rail, Virginia rail, common moorhen, American coot, black-bellied plover, killdeer, black-necked stilt, American avocet, spotted sandpiper, greater yellowlegs, willet, whimbrel, long-billed curlew, marbled godwit, sanderling, long-billed dowitcher, Wilson's phalarope, Bonaparte's gull, Heermann's gull, ring-billed gull, California gull, western gull, glaucous-winged gull, Caspian tern, royal tern, Forster's tern, least tern, rock dove, Eurasian collared-dove, mourning dove, white-throated swift, black-chinned hummingbird, Anna's hummingbird, Costa's hummingbird, Allen's hummingbird, Selasphorus sp., Nuttall's woodpecker, downy woodpecker, olive-sided flycatcher, Pacific slope flycatcher, ash-throated flycatcher, black phoebe, Say's phoebe, Cassin's kingbird, tree swallow, rough-winged swallow, cliff swallow, barn swallow, scrub jay, American crow, common raven, bushtit, Bewick's wren, house wren, marsh wren, California gnatcatcher, western bluebird, American robin, wrentit, northern mockingbird, California thrasher, European starling, Hutton's vireo, warbling vireo, orange-crowned warbler, yellow warbler, common yellowthroat, Wilson's warbler, yellow-breasted chat, western tanager, black-headed grosbeak, spotted towhee, California towhee, Belding's savannah sparrow, song sparrow, red-winged blackbird, Brewer's blackbird, great-tailed grackle, brown-headed cowbird, hooded oriole, house finch, lesser goldfinch, American goldfinch, house sparrow, nutmeg mannikin.

Participants: Steve Brad, Bob Chaddock, Lori Chamberlain, Janine Free, Karen Jones, John Konecny, Jayne Lesley, Robert Patton, and Jim Wilson.

Algae: 86 Species

Participants: Elizabeth Venrick, Mary Hilbern

Spiders: 28 Species

Participants: Jim Berrian, Robert Wall

Fish: 16 Species

Participants: Doug Gibson, Amy Trujillo

Mammals: 13 Species

Species included: Red bat, Yuma myotis, western mastiff bat, Mexican free-tailed bat, coyote, striped skunk, raccoon, mule deer, California ground squirrel, valley pocket gopher, mouse sp., dusky-footed woodrat, desert cottontail.
(Seen offshore but not included in count: California sea lion, common dolphin.)

Participants: Drew Stokes (bats), Steve Brad, Janine Free, John Konecny, Jim Wilson, and Robert Patton.

Reptiles and Amphibians: 11 Species

Species included: Garden slender salamander, Pacific treefrog, bullfrog, California legless lizard, western fence lizard, side-blotched lizard, southern alligator lizard, orange-throated whiptail, tiger whiptail, western rattlesnake, pond slider turtle.

Participants: Brad Hollingsworth, John Neville, Jim Wilson, Robert Patton, Lori Chamberlain, Steve Brad, John Konecny

Non-vascular Plants: 10 Species

Participant: Chris Harrell.

Freshwater Invertebrates: 9 Species

Participants: Doug Gibson, Amy Trujillo, Barry Holcome.

Marine Invertebrates: 8 Species

Participants: Doug Gibson, Amy Trujillo

Fungii: 4 Species

Species included: Schizophyllum, Cantharellus, Fusarium, Crepidotus

Participant: Wayne Green.

Phytoplankton and algae:

Fresh Water Species: **52** species
(includes single and multicellular algae)
those added by "marine team" indicated with asterisk

Cyanobacteria (11 species)
Anabaena iyengarii
Calothrix fusca
Chamaesiphon incrustans
Heteroleiblenia kossinskajae
Leptolyngbya foveolarum
Leptolyngbya fragilis
Leptolyngbya notata
Lyngbya aestuarii
Phormidium cortianum
Phormidium inundatum
**cf. Picocystis* (from salty square pond)
Green algae (9 species)
Carteria globosa
Chara vulgaris
Cladophora glomerata
Gongrosira schmidlei
Oedogonium sp.
Rhizoclonium hieroglyphicum

Ulva flexuosa
**2 unidentified desmids*
Euglenoids (1 species)
Euglena sp.
Yellow-green algae (2 species)
Ophiocytium arbuscula
Pseudocharaciopsis minuta
Red algae (1 species)
Chantransia sp.
Diatoms (27 species)
Achnanthes brevipes
**cf. Amphiprora sp.*
Amphora sp.
Bacillaria paradoxa
Cyclotella sp.
Cymbella spp.
Entomoneis sp.
**cf. Fragilaria sp.*
Gomphonema spp.
**cf. Grammatophora sp.*
Melosira varians sp.
Navicula spp.
Nitzschia spp.
** Pleurosigma cf fasciola*
Pleurosigma sp.
Pleurosira laevis
Rhoicosphaenia sp.
Rhopalodia sp.
Surirella sp.
Synedra fasciculata
Synedra ulna
**Synedra sp.*
** 5 unidentified pennate diatoms*
Prasinophyte (1 species)
**cf. Tetraselmis* (from salty square pond)

Marine Species - single celled (**24** spp)

Diatoms (15 spp)
Bacteriastrum delicatulum
cf Campylosira
Chaetoceros compressus
cf. Cylindrotheca closterium
*Grammatophora cf angulos*a
cf Hantschia sp.
Licmophora sp.
Melosira sulcata
M. cf moniliformis
Navicula sp.
Ondontella cf rhombus
Pseudo-nitzschia sp. single cells
Rhizosolenia setigera
Skeletonema costatum
pennate sp.

Dinoflagellates (8 spp)
Ceratium divaricatum
C. falcatiformes
C. furca
Dinophysis fortii
Pronoctiluca sp.
Prorocentrum micans (dominant)
P. gracile
Pyrocystics lunula
Green algae (1 sp)
Eutreptiella sp.

Final Plant List

2009 San Elijo Lagoon BioBlitz
May 10-16, 2009

(Total Vascular Plant Species Observed: 231)

Seen	Scientific Name	Common Name
	Ferns	
	Polypodiaceae	
X	*Polypodium californicum*	California polypody
	Pteridaceae	
	Adiantum jordanii	California maidenhair
	Pellea andromedaefolia var.*andromedaefolia*	Coffee fern
	Pentagramma triangularis var. *trangularis*	Goldenback fern
	P. triangularis var. *maxonii*	Silverback fern
	Club Mosses	
	Selaginelaceae	
	Selaginella cinerascens	Spike moss, mossfern
	Gymnosperms	
	Pinaceae	
X	*Pinus torreyana*	Torrey Pine
	Subclass Dicotyledons	
	Aizoaceae	
X	*Carpobrotus chilensis*	Sea-fig
X	*C. edulis*	Hottentot-fig
X	*Mesembryanthemum crystallinum*	Crystal ice plant
	M. nodiflorum	Little ice plant
	Sesuvium verrucosum	Western sea purslane
	Tetragonia tetragonioides	New Zealand Spinich
	Amaranthaceae	
X	*Atriplex canescens ssp. canescens*	Shad scale
X	*A. patula*	Fat hen
X	*A. lentiformis* ssp. *breweri*	Brewer's saltbush
X	*A. semibaccata*	Australian saltbush
	Bassia hyssopifolia	Five-hook bassia
X	*Chenopodium album*	White goosefoot
	C. californicum	California goosefoot
	Dysphania multifidum	Cut-leaf goosefoot
X	*Salicornia europaea*	Slender glasswort
X	*S. subterminalis*	Parish's glasswort
X	*S. virginica*	Woody glasswort

X	*Salsola tragus*	Russian-thistle
	Suaeda moqunii	Torrey's sea-blite
	Anacardiaceae	
X	*Malosma laurina*	Laurel sumac
X	*Rhus integrifolia*	Lemonade berry
X	*Schinus molle*	Peruvian pepper-tree
X	*S. terebinthifolius*	Brazilian pepper-tree
X	*Toxicodendron diversilobum*	Poison oak
	Apiaceae	
X	*Apium graveolens*	Common celery
X	*Conium maculatum*	Common poison-hemlock
X	*Foeniculm vulgare*	Sweet fennel
X	*Hydrocotlye verticillata* var. *verticillata*	Whorled marsh-pennyworth
X	*Lomatium lucidum*	Shiny lomatium
X	*Sanicula crassicaulis* var. *crassicaulis*	Pacific sanicle
	Yabea microcarpa	California hedge-parsley
	Apocynaceae	
	Vinca major	Periwinkle
	Araliaceae	
	Hedra helix	Algerian ivy
	Asclepidaceae	
X	*Funastrum cynanchoides* ssp. *hartwegii*	Hartweg's milkvine
X	*Sarcostemma cynanchoides*	Climbing milkweed
	Asteraceae	
X	*Achillea millefolium*	California yarrow
	Acourtia microcephala	Sacapellote
	Amblyopappus pusillus	
X	*Ambrosia chamissonis*	Bather's delight
X	*A. psilostachya*	Western ragweed
	Anthemis cotula	Dog mayweed
X	*Artemisia californica*	Coastal sagebrush
X	*A. douglasiana*	Douglas mugwort
X	*A. dracunculus*	Dragon sagewort
X	*A. palmeri*	San Diego sagewort
X	*B. pilularis* ssp. *consanguinea*	Coyote brush
X	*Baccharis salicifolia*	Mule fat
X	*B. sarothroides*	Broom baccharis
X	*Brickellia californica* var. *californica*	California brickelbush
X	*Carduus pycnocephalus*	
X	*Centaurea melitensis*	Tocalote
	Chaenactis glabriuscula var. *tenuifolia*	San Diego pincushion
X	*C. glabriuscula* var. orcuttiana	Yellow pincushion
X	*Chrysanthemum coronarium*	Garland chrysanthemum
X	*Cirsium occidentale*	California thistle
X	*Conyza canadensis*	Common Horseweed

	C. coulteri	Coulter's Fleabane
X	*Coreopsis maritima*	Sea-dahlia
X	*Corethrogyne filaginifolia*	San Diego sand-aster
X	*Cotula coronopifolia*	Brass-buttons
X	*Deinandra fasciculata*	Fascicled tarweed
X	*Delairea odorata*	German ivy
X	*Encelia californica*	California encelia
X	*Erigeron foliosus*	
X	*Eriophyllum confertiflorum* var. *confertiflorum*	Golden yarrow
	Euthamia occidentalis	Western goldenrod
	Gnaphalium canescens ssp. *beneolens*	Fragrant everlasting
X	*G. bicolor*	Bicolor cudweed
X	*G. californicum*	Everlasting
	G. canescens ssp. *microcephalum*	White everlasting
	G. ramosissimum	Pink everlasting
	Grindelia camporum var. *robusta*	Big gumplant
X	*Hazardia orcuttii*	Orcutt's goldenbush
X	*Hazardia squarrosus* ssp. *grindelioides*	Sawtooth goldenbush
	Hedypnois cretica	Crete hedypnois
X	*Heterotheca grandiflora*	Telegraph weed
X	*Hypochoeris glabra*	Smooth cat's ear
X	*Isocoma menziesii* var. *vernonioides*	Coastal goldenbush
X	*Iva hayesiana*	San Diego marsh-elder
X	*Juamea carnosa*	Salty susan
X	*Lactuca serriola*	Prickly lettuce
	Lasthenia californica	Common goldfields
	L. coronaria	Southern goldfields
	L. glabrata ssp. *coulteri*	Coulter's salt-marsh daisy
	Layia platyglossa ssp. *campestris*	Tidy tips
	Lepidospartum squamatus	Scale-broom
	Logfia arizonica	Arizona filago
	L. gallica	Narrow-leaf filago
X	*Picris echioides*	Bristly Ox-tongue
X	*Pluchea odorata* var.*odorata*	Salt-marsh fleabane
X	*P. sericea*	Desert arrow-weed
	Osmadenia tenella	Southern calycadenia
	Senecio californicus	California butterweed
X	*Sonchus asper*	Sow-thistle
X	*Stephanomeria exigua*	Small wreath-plant
X	*S. virgata* ssp. *pleurocarpa*	Tall wreath-plant
	Stylocline gnaphalioides	Everlasting nest-straw
	Symphotrichum divaricatum	Slim aster
X	*Xanthium strumarium* var. *canadense*	Eastern cockebur
	Azollaceae	
X	*Azolla filiculoides*	
	Berberidaceae	
	Berberis pinnata	Shinyleaf mahonia
	Boraginaceae	
X	*Amsinckia menziesii* var. *intermedia*	Rancher's fiddleneck
X	*Cryptantha intermedia*	Nievitas cryptantha

	C. micromeres	Minute-flower cryptantha
X	*Echium candicans*	Pride of Madeira
X	*Eriodictyon crassifolium*	
	Eucrypta chrysanthemifolia var. *chrysanthemifolia*	Common eucrypta
	Harpagonella palmeri	Palmer's grapplinghook
X	*Heliotropium curassavicum*	Salt heliotrope
X	*Nemophila rotata*	
X	*Pectocarya penicillata*	Winged pectocarya
X	*Phacelia circutaria* ssp. *hispida*	Caterpillar phacelia
X	*P. distans*	Wild-heliotrope
	P. grandiflora	Large-flowered phacelia
X	*Pholistoma auritum*	Fiesta flower
	P. racemosum	
X	*Plagiobothrys collinus* var. *californicus*	California popcornflower
	Brassicaceae	
X	*Brassica nigra*	Black mustard
X	*B. rapa*	Field mustard
	B. tournefortii	
X	*Cakile maritima*	Sea-rocket
	Cardamine californica	Milkmaids
	Caulanthus heterophyllus	San Diego jewelflower
X	*Erysimum capitatum*	Douglas' wallflower
	Lepidium lasiocarpum var. *lasiocarpum*	
X	*L. latifolium*	Peppercress
	L. latipes	Dwarf peppergrass
	Matthiola incana	Common stock
X	*Nasturtium officinale*	White water-cress
X	*Raphanus sativus*	Wild radish
	Sisymbrium orientale	Hare's-ear cabbage
	Cactaceae	
X	*Ferocactus viridescens*	Coast barrel cactus
X	*Cylindropunta prolifera*	Coast cholla
X	*Opuntia littoralis* var. *litoralis*	Coast prickly-pear
	Capparaceae	
X	*Isomeris arborea*	Bladderpod
	Caprifoliaceae	
X	*Lonicera subspicata* var. *denudata*	San Diego honeysuckle
X	*Sambucus mexicana*	Desert Elderberry
	Caryophyllaceae	
X	*Cardionema ramosissimum*	Tread lightly
	Silene gallica	Common catchfly
X	*S. laciniata* ssp. *major*	Southern pink
	Spergularia bocconii	Buccone's sand-spurry
	S. marina	Salt marsh sand-spurry
	S. villosa	Sand-spurry

	Stellaria media	Common chickweed
	Chenopodiaceae	
	Cistaceae	
X	*Helianthemum scoparium*	Rush rose
	Convolvulaceae	
X	*Calystegia macrostegia* ssp. *tenuifolia*	Narrow-leaf morning-glory
X	*Convolvulus arvensis*	Bindweed
X	*Cressa truxillensis* var. *vallicola*	Alkali-weed
	Dichondra occidentalis	Western ponyfoot
	Crassulaceae	
	Crassula connata	
X	*Dudleya edulus*	Ladies-fingers
X	*D. lanceolata*	Coastal dudleya
X	*D. pulverulenta*	Chalk-lettuce
	Cucurbitaceae	
	Cucurbita foetidissima	Calabazilla
X	*Marah macrocarpus*	Wild cucumber
	Cuscutaceae	
X	*Cuscuta californica* var. *californica*	Witch's hair
X	*C. salina* var. *salina*	Salty dodder
	Ericaceae	
X	*Arctostaphylos glandulosa* ssp. *crassifolia*	Del Mar Manzanita
X	*Comarostaphylis diversifolia* ssp. *diversifolia*	Summer holly
X	*Xylococcus bicolor*	Mission manzanita
	Euphorbiaceae	
	Chamaesyce albomarginata	
X	*Croton californicus* var. *californicus*	
	C. setigerus	Doveweed
	Euphorbia peplus	Petty spurge
X	*Ricinus communis*	Castor bean
	Fabaceae	
	Acacia dealbata	Green wattle
X	*A. longifolia*	Golden wattle
	Amorpha fruticosa	False Indigo
X	*Astragalus trichopodus* ssp. *lonchus*	Ocean locoweed
	Lathyrus laetiflorus	San Diego sweetpea
X	*Lotus hamatus*	Grab lotus
X	*L. nuttallianus*	Nuttall's lotus
X	*L. purshianus* ssp. *purshianus*	Spanish clover
X	*L. scoparius* ssp. *scoparius*	Coastal deer weed
	L. strigosus	Bishop's lotus

X	*Lupinus bicolor*	Dove lupine
	L. succulentus	Arroyo lupine
X	*L. truncatus*	Collar lupine
X	*Medicago polymorpha*	Bur-clover
X	*Melilotus albus*	White sweet clover
X	*M. indicus*	Indian sweet clover
	Vicia sativa	Common vetch
X	Prosopis *glandulosa*	Honey mesquite
	Fagaceae	
X	*Quercus agrifolia*	Coast Live Oak
X	*Q. dumosa*	Nuttall's scrub oak
	Frankeniaceae	
X	*Frankenia salina*	Alkali-heath
	Gentianaceae	
	Zeltnera venustum	Canchalagua
	Geraniaceae	
X	*Erodium cicutarium*	Red-stem filaree
	Geranium carolinianum	Carolina geranium
	Grossulariaceae	
	Ribes indecorum	Winter currant
X	*R. speciosum*	Fuchsia-flowered gooseberry
	Hydrophyllaceae	
X	*Eridictyon crassifolium*	Yerba santa
	Juglandaceae	
X	*Juglans californica*	California walnut
	Lamiaceae	
X	*Marrubium vulgare*	Horehound
X	*Salvia apiana*	White sage
X	*S. clevelandii*	Cleveland sage
X	*S. mellifera*	Black sage
	Stachys ajugoides var.*rigida*	Hedge-nettle
	Lythraceae	
	Lythrum hyssopifolium	Grass poly
	Malvaceae	
	Lavatera assurgentiflora ssp. *assurgentiflora*	Malva rosa
X	*Malacothamnus fasciculatus* ssp. *fasciculatus*	Mesa bushmallow
	Malva parviflora	Cheeseweed
X	*Malvella leprosa*	Alkali-mallow
	Sidalcea malvaiflora ssp. *sparsifolia*	Checker-bloom
	Moraceae	
	Ficus carica	Fig

	Myoporaceae	
X	*Myoporum laetum*	
	Myrtaceae	
X	Callistemon spp.	Bottlebrush
X	*Eucalyptus camaldulensis*	Red gum
X	*E. globulus*	Blue gum
	E. polyanthemos	Silver dollar eucalyptus
	Leptospermum laevigatum	Australian Tea Tree
	Nyctaginaceae	
X	*Abronia umbellata*	Beach sand-verbena
X	*Mirabilis laevis* var. *crassifolia*	Wishbone bush
	Oleaceae	
	Fraxinus spp.	Ash
X	*Olea europaea*	Olive
	Onagraceae	
X	*Camissonia cheiranthifolia* ssp. *suffruticosa*	Beach evening-primrose
X	*C. lewisii*	
	Epilobium ciliatum ssp. *Ciliatum*	Willow-herb
X	*Oenothera elata* ssp. *hirsutissima*	Great marsh evening-primrose
X	*Camissonia bistorta*	California suncup
	Oxalidaceae	
X	*Oxalis pes-caprae*	Bermuda buttercup
	Paeoniaceae	
	Paeonia californica	California peony
	Papaveraceae	
X	*Dendromecon rigida*	Bush poppy
X	*Eschscholzia californica*	California poppy
X	*Platystemon californicus*	Cream cups
X	*Stylomecon heterophylla*	Wind poppy
	Plantaginaceae	
	Plantago erecta	Dot-seed plantain
X	*P. lanceolata*	Ribgrass
X	*P. major*	Common plantain
	Platanaceae	
X	*Platanus racemosa*	California sycamore
	Plumbaginaceae	
X	*Limonium californicum*	San Diego rosemary
X	*L. perezii*	Perez rosemary
X	*L. sinuatum*	Notchleaf marsh rosemary

	Polemoniaceae	
	Allophyllum glutinosum	Blue false-gilia
X	*Eriastrum filifolium*	Thread-leaf wooly star
X	*Navarretia hamata* var. *hamata*	Hooked skunkweed
	Polygonaceae	
	Chorizanthe procumbens var. *procumbens*	Prostrate spine-flower
	C. staticoides	Turkish rugging
	Eriogonum elongatum var. *elongatum*	Tall buckwheat
X	*E. fasciculatum* ssp. *fasciculatum*	California buckwheat
	E. gracile	Slender buckwheat
	E. parvifolium	Bluff buckwheat
	Lastarriaea coriacea	Lastarriaea
	Nemacaulis denudata var. *denudata*	Coast wooly-heads
	Polygonum arenastrum	Yard knotweed
	Pterostegia drymarioides	Granny's hairnet
	Rumex conglomeratus	Whorled dock
X	*R. crispus*	Curly dock
	Portulacaceae	
	Calandrinia ciliata	Red maids
X	*Claytonia perfoliata* var. *perfoliata*	Miner's lettuce
	Primulaceae	
X	*Anagallis arvensis* var. *arvensis*	Scarlet pimpernel
	Dodecatheon clevelandii ssp. *clevelandii*	Shooting star
	Ranunculaceae	
X	*Clematis pauciflora*	Virgin's bower
	Delphinium parryi	Maritime larkspur
	Thalictrum polycarpum	Meadow rue
	Rhamnaceae	
X	*Adolphia californica*	California spinebush
X	*Ceanothus verrucosus*	Wart-stemmed ceanothus
X	*Rhamnus crocea*	Redberry
	Rosaceae	
X	*Adenostoma fasciculatum*	Chamise
X	*Cercocarpus minutiflorus*	San Diego mountain mahogany
	Cotoneaster spp.	Cotoneaster
X	*Heteromeles arbutifolia*	Toyon
X	*Lyonothamnus floribundus*	Catalina ironwood
	Prunus ilicifolia	Holly-leaved cherry
X	*Rosa californica*	California rose
X	*Rubus laciniatus*	Evergreen Blackberry
	Rubiaceae	
X	*Galium angustifolium* ssp. *angustifolium*	Narrow-leaf bedstraw
X	*G. aparine*	Common bedstraw

X	*G. nuttallii* ssp. *nuttallii*	Nuttall's bedstraw
	Rutaceae	
	Cneoridium dumosum	Coast spice bush
	Salicaceae	
X	*Populus fremontii* var. *fremontii*	Fremont's cottonwood
X	*S. laevigata*	Red willow
X	*S. lucida* ssp. *lasiandra*	Lance-leafed willow
X	*S. lasiolepis*	Arroyo willow
X	S. *hindsiana*	Sand bar willow
	Saururaceae	
X	*Anemopsis californica*	Yerba mansa
	Saxifragaceae	
	Lithophragma affine	Woodland-star
	Scrophulariaceae	
X	*Antirrhinum kelloggii*	Climbing snapdragon
X	*A. nuttallianum* ssp. *nuttallianum*	Nuttall's snapdragon
	Castilleja affinis var. *affinis*	Coast paint-brush
	C. foliolosa	Felt paint-brush
X	*Collinsia heterophylla* var. *heterophylla*	Chinese houses
X	*Cordylanthus rigidus* ssp. *setigerus*	Dark-tip bird's beak
	Linaria canadensis	Large blue toadflax
X	*Mimulus puniceus*	Coast monkey flower
	Orthocarpus purpurascens	Owl's clover
	Pedicularis densiflora	Indian warrior
X	*Scrophularia californica* var. *floribunda*	California bee plant
	Veronica anagallis-aquatica	Speedwell
	Solanaceae	
X	*Datura wrightii*	Jimson weed
X	*Lycium californicum*	California desert thorn
X	*Nicotiana glauca*	Tree tobacco
	Solanum americanum	Black nightshade
	S. parishii	Parish's nightshade
	S. umbelliferum var. *glabrescens*	Blue witch
	Tamaricaceae	
X	*Tamarix parviflora*	Tamerisk
	Tropaeolaceae	
X	*Tropaeolum majus*	Garden nasturtium
	Urticaceae	
	Hesperocnide tenella	Western nettle
X	*Parietaria hespera* var. *californica*	Western pellitory
X	*Urtica dioica* ssp. *holosericea*	Hoary nettle
	U. urens	Dwarf nettle

	Verbenaceae	
X	*Lantana camara*	Lantana
	Verbena lasiostachys	Western vervain
	Violaceae	
	Viola pedunculata	Johnny-jump-up
	Vitaceae	
X	*Vitis girdiana*	Desert grape
	Subclass Monocotyledones	
	Arecaceae	
X	*Phoenix canariensis*	Canary Island date palm
X	Washingtonia sp.	Fan palm
	Cyperaceae	
X	*Carex spissa*	San Diego sedge
X	*C. triquetra*	Triangular-fruit sedge
X	*Cyperus eragrostis*	Tall flatsedge
	C. esculentus	Nut-grass
X	*Eleocharis acicularis*	Needle spike sedge
X	*Scirpus acutus* var. *occidentalis*	Viscid bulrush
X	*S. americanus*	Olney's bulrush
	S. californicus	California bulrush
	S. maritimus	Coastal bulrush
	Iridaceae	
	Crocosmia x crocosmiflora	Montbretia
	Iris pseudacorus	
X	*Sisyrinchium bellum*	Blue-eyed grass
	Juncaceae	
X	*Juncus acutus* ssp. *leopoldii*	Southwestern spiny rush
X	*J. mexicanus*	Mexican rush
	J. oxymeris	Pointed rush
	J. rugulosus	Wrinkled rush
	J. triformis	Yosemite dwarf-rush
	Lemnaceae	
X	*Lemna minor*	Least Duckweed
	Lilaceae	
	Allium praecox	Early onion
	A. haematochiton	Red-skin onion
X	*Agave shawii*	Coastal agave
	Asparagus asparagoides	Florist's smilax
	A. officinalis	Garden asparagus
	Asphodelus fistulosus	Asphodel
	Bloomeria crocea var. *crocea*	Common goldenstars

	Calochortus splendens	Splendid mariposa
	C. weedii var. *weedii*	Weed's mariposa
X	*Chloragalum parviflorum*	Wavy-leaf soap-plant
X	*Dichelostemma capitatum*	Blue dicks
X	*Yucca schidigera*	Mohave yucca
X	*Y. whipplei*	Lord's Candle
X	*Zigadenus fremontii* var. *fremontii*	Fremont's camas
	Najadaceae	
	Najas marina	Large Najas
	Orchidaceae	
	Piperia unalascensis	Slenderspire piperia
	Poaceae	
X	*Achnatherum coronata*	Giant stipa
	Agrostis stolonifera	European redtop
X	*Arundo donax*	Giant reed
	Avena barbata	Slender wild oat
	A. fatua	Wild oat
	Bothriochloa barbinodis	Plumed beardgrass
	Bromus carinatus	California brome
	B. diandrus	Ripgut brome
	B. matritensis ssp. *rubens*	Foxtail chess
X	*Cortaderia selloana*	Pampas grass
X	*Crypsis schoenoides*	Swamp timothy
X	*Cynodon dactylon*	Bermuda-grass
X	*Distichlis spicata* var. *spicata*	Saltgrass
	Echinochloa crus-galli	Common barnyard grass
X	*Ehrharta calycina*	African veldt-grass
X	*E. erecta*	
	Koeleria cristata	Junegrass
	Lamarckia aurea	Golden-top
	Leptochloa univerva	Spangletop
X	*Leymus condensatus*	Giant wild rye
	L. triticoides ssp. *triticoides*	Beardless wild ryegrass
	Lolium perenne ssp. *multiflorum*	Italian ryegrass
	Melica imperfecta	Coast range melic
X	*Monanthochloe littoralis*	Shoregrass
	Muhlenbergia microsperma	Littleseed muhly
X	*Nassella lepida*	Foothill stipa
X	*N. pulchra*	Purple stipa
	Pennisetum setaceum	African fountain grass
	Phalaris aquatica	Harding grass
	P. canariensis	Mediterranean canary grass
	P. paradoxa	Paradox canary grass
	Poa secunda	Malpais bluegrass
	Polypogon monspeliensis	Rabbitfoot beardgrass
X	*Spartina foliosa*	California cordgrass
	Sporobolus airoides	Alkali Sacaton

	Potamogetonaceae	
	Ruppia maritima	Beakfruit sea-tassle
	Typhaceae	
X	*Typha domingensis*	Tule cattail
X	*T. latifolia*	Soft flag

Total Vascular Plant Species Observed: 231

Algae (spp.)

X **(86 different species)**

Non-vascular plants

Mosses (spp.)

X **(Nine different species)**

Liverwort

X Asterela *californica*

Summary Results:

Vascular Plants	**231**
Algae	**86**
Mosses	**9**
Liverworts	**1**
Fungii	**4**
	331

Participants:

Tara Fuad
Janine Free
Wayne Green (Fungi)
Chris Harrell (Non-vascular)
Mary Hilbern (Phytoplankton)
Jayne Lesley
Andrew Mauro
Kathleen Mauro
Robert Patton
Denise Stillinger
Elizabeth Venrick (Phytoplankton)
Susan Welker

APPENDIX D

MONTHLY BIRD COUNT DATA SAN ELIJO LAGOON, ROBERT T. PATTON (EBIRD DATABASE)

FIELD CHECKLIST

for the

BIRDS OF SAN ELIJO LAGOON ECOLOGICAL RESERVE

and

ADJACENT SHORELINE

Over 330 species have been recorded at San Elijo Lagoon, including nesting species and sensitive, threatened, or endangered species. Please observe all rules and regulations to ensure the presence of these species and their habitats for future generations.

B - known to have bred in the area in recent times
I - nonnative species introduced into the area
* - very rare in San Diego County

Date/Notes____________________________

Ducks, Geese & Swans
__Greater White-fronted Goose
__Snow Goose
__Ross's Goose
__Brant
__Cackling Goose
__Canada Goose
__Tundra Swan*
__Wood Duck
__Gadwall (B)
__Eurasian Wigeon
__American Wigeon
__Mallard (B)
__Blue-winged Teal
__Cinnamon Teal (B)
__Northern Shoveler
__Northern Pintail
__Green-winged Teal
__Canvasback
__Redhead
__Ring-necked Duck
__Tufted Duck (hybrid)
__Greater Scaup
__Lesser Scaup
__Surf Scoter
__White-winged Scoter
__Long-tailed Duck
__Bufflehead
__Common Goldeneye
__Hooded Merganser
__Common Merganser
__Red-breasted Merganser
__Ruddy Duck

Turkeys & Pheasants
__Ring-necked Pheasant (I)

Quail
__California Quail (B)

Loons
__Red-throated Loon
__Pacific Loon
__Common Loon

Grebes
__Pied-billed Grebe (B)
__Red-necked Grebe*
__Horned Grebe
__Eared Grebe
__Western Grebe
__Clark's Grebe

Fulmars & Shearwaters
__Northern Fulmar
__Pink-footed Shearwater
__Buller's Shearwater*
__Sooty Shearwater
__Short-tailed Shearwater
__Black-vented Shearwater

Storm-Petrels
__Fork-tailed Storm-Petrel*
__Black Storm-Petrel

Boobies
__Masked Booby*

Pelicans
__American White Pelican
__Brown Pelican

Cormorants
__Brandt's Cormorant
__Double-crested Cormorant
__Pelagic Cormorant

Frigatebirds
__Magnificent Frigatebird*

Bitterns & Herons
__American Bittern
__Least Bittern
__Great Blue Heron (B)
__Great Egret (B)
__Snowy Egret (B)
__Little Blue Heron
__Tricolored Heron*
__Reddish Egret
__Cattle Egret
__Green Heron (B)
__Black-crowned Night-Heron (B)
__Yellow-crowned Night-Heron*

Ibises
__White-faced Ibis

Storks
__Wood Stork*

American Vultures
__Turkey Vulture

Hawks, Kites & Eagles
__Osprey
__White-tailed Kite (B)
__Bald Eagle
__Northern Harrier
__Sharp-shinned Hawk
__Cooper's Hawk (B)
__Red-shouldered Hawk (B)
__Red-tailed Hawk (B)
__Ferruginous Hawk
__Rough-legged Hawk*
__Golden Eagle

Falcons
__American Kestrel
__Merlin
__Peregrine Falcon
__Prairie Falcon

Rails & Coots
__Black Rail*
__Clapper Rail (B)
__Virginia Rail (B)
__Sora
__Common Moorhen
__American Coot (B)

Cranes
__Sandhill Crane*

Plovers
__Black-bellied Plover
__Pacific Golden-Plover
__Snowy Plover (B)
__Semipalmated Plover
__Killdeer (B)

Stilts & Avocets
__Black-necked Stilt (B)
__American Avocet (B)

Sandpipers
__Spotted Sandpiper
__Solitary Sandpiper
__Wandering Tattler
__Greater Yellowlegs
__Willet
__Lesser Yellowlegs
__Whimbrel
__Long-billed Curlew
__Marbled Godwit
__Ruddy Turnstone
__Black Turnstone
__Surfbird
__Red Knot
__Sanderling
__Semipalmated Sandpiper*
__Western Sandpiper
__Least Sandpiper
__Baird's Sandpiper
__Pectoral Sandpiper
__Dunlin
__Curlew Sandpiper*
__Stilt Sandpiper*
__Ruff*
__Short-billed Dowitcher
__Long-billed Dowitcher
__Wilson's Snipe
__Wilson's Phalarope
__Red-necked Phalarope
__Red Phalarope

Gulls & Terns
__Black-legged Kittiwake
__Bonaparte's Gull
__Laughing Gull*
__Franklin's Gull*
__Heermann's Gull
__Mew Gull
__Ring-billed Gull
__Western Gull
__California Gull
__Herring Gull
__Thayer's Gull
__Glaucous-winged Gull
__Glaucous Gull*
__Least Tern (B)
__Gull-billed Tern
__Caspian Tern
__Black Tern
__Common Tern
__Forster's Tern
__Royal Tern
__Sandwich Tern*
__Elegant Tern
__Black Skimmer

Jaegers
__Pomarine Jaeger
__Parasitic Jaeger

Alcids
__Common Murre
__Xantus's Murrelet
__Ancient Murrelet
__Cassin's Auklet
__Rhinoceros Auklet

Pigeons & Doves
__Rock Pigeon (B,I)
__Band-tailed Pigeon
__Eurasian Collared-Dove (I)
__Spotted Dove* (I)
__White-winged Dove
__Mourning Dove (B)

Cuckoos
__Greater Roadrunner

Barn Owls
__Barn Owl

Typical Owls
__Great Horned Owl
__Burrowing Owl
__Long-eared Owl
__Short-eared Owl

Nightjars
__Lesser Nighthawk
__Common Poorwill

Swifts
__Black Swift*
__Chimney Swift*
__Vaux's Swift
__White-throated Swift

Hummingbirds
__Broad-billed Hummingbird*
__Black-chinned Hummingbird (B)
__Anna's Hummingbird (B)
__Costa's Hummingbird
__Calliope Hummingbird
__Rufous Hummingbird
__Allen's Hummingbird

Kingfishers
__Belted Kingfisher

Woodpeckers
__Red-naped Sapsucker
__Red-breasted Sapsucker
__Nuttall's Woodpecker (B)
__Downy Woodpecker (B)
__Hairy Woodpecker
__Northern Flicker

Tyrant Flycatchers
__Olive-sided Flycatcher
__Western Wood-Pewee
__Willow Flycatcher
__Hammond's Flycatcher
__Pacific-slope Flycatcher
__Black Phoebe (B)
__Eastern Phoebe
__Say's Phoebe
__Vermilion Flycatcher
__Ash-throated Flycatcher
__Tropical Kingbird
__Cassin's Kingbird (B)
__Western Kingbird
__Eastern Kingbird*
__Scissor-tailed Flycatcher*

Shrikes
__Loggerhead Shrike

Vireos
__Bell's Vireo (B)
__Plumbeous Vireo
__Cassin's Vireo
__Hutton's Vireo
__Warbling Vireo

Jays & Crows
__Western Scrub-Jay (B)
__American Crow
__Common Raven

Larks
__Horned Lark

Swallows
__Purple Martin
__Tree Swallow (B)
__Violet-green Swallow
__Northern Rough-winged Swallow (B)
__Bank Swallow
__Cliff Swallow (B)
__Barn Swallow

Chickadees
__Mountain Chickadee

Verdin
__Verdin

Bushtits
__Bushtit (B)

Nuthatches
__Red-breasted Nuthatch
__White-breasted Nuthatch

Wrens
__Cactus Wren
__Rock Wren
__Bewick's Wren (B)
__House Wren (B)
__Marsh Wren (B)

Kinglets
__Golden-crowned Kinglet
__Ruby-crowned Kinglet

Gnatcatchers
__Blue-gray Gnatcatcher
__California Gnatcatcher (B)

Thrushes
__Western Bluebird
__Mountain Bluebird
__Townsend's Solitaire
__Swainson's Thrush
__Hermit Thrush
__American Robin
__Varied Thrush

Wrentit
__Wrentit (B)

Mockingbirds & Thrashers
__Northern Mockingbird (B)
__Sage Thrasher
__Brown Thrasher*
__Bendire's Thrasher*
__California Thrasher (B)

Starlings
__European Starling (I)

Pipits & Wagtails
__American Pipit

Waxwings
__Cedar Waxwing

Silky Flycatchers
__Phainopepla

Wood Warblers
__Tennessee Warbler
__Orange-crowned Warbler
__Nashville Warbler
__Virginia's Warbler
__Northern Parula
__Yellow Warbler
__Yellow-rumped Warbler
__Black-throated Gray Warbler
__Townsend's Warbler
__Hermit Warbler
__Prairie Warbler*
__Palm Warbler
__Blackpoll Warbler
__Black-and-white Warbler
__American Redstart
__Prothonotary Warbler*
__Northern Waterthrush
__MacGillivray's Warbler
__Common Yellowthroat (B)
__Wilson's Warbler
__Yellow-breasted Chat (B)

Tanagers
__Summer Tanager
__Western Tanager

Sparrows & Towhees
__Green-tailed Towhee
__Spotted Towhee (B)
__California Towhee (B)
__Rufous-crowned Sparrow
__Chipping Sparrow
__Black-chinned Sparrow
__Vesper Sparrow
__Lark Sparrow
__Black-throated Sparrow
__Sage Sparrow
__Savannah Sparrow (B:Belding's subsp.)
__Grasshopper Sparrow
__Fox Sparrow
__Song Sparrow (B)
__Lincoln's Sparrow
__Swamp Sparrow
__White-throated Sparrow
__Harris's Sparrow*
__White-crowned Sparrow
__Golden-crowned Sparrow
__Dark-eyed Junco

Cardinals & Grosbeaks
__Rose-breasted Grosbeak
__Black-headed Grosbeak (B)
__Blue Grosbeak
__Lazuli Bunting

Blackbirds & Orioles
__Bobolink*
__Red-winged Blackbird (B)
__Tricolored Blackbird
__Western Meadowlark
__Yellow-headed Blackbird
__Brewer's Blackbird
__Great-tailed Grackle
__Brown-headed Cowbird (B)
__Orchard Oriole*
__Hooded Oriole (B)
__Bullock's Oriole
__Baltimore Oriole
__Scott's Oriole

Finches
__Purple Finch
__House Finch (B)
__Pine Siskin
__Lesser Goldfinch (B)
__Lawrence's Goldfinch
__American Goldfinch (B)

Old World Sparrows
__House Sparrow (I)

Exotic Species
__Fulvous Whistling-Duck* (I)
__Bean-Goose sp. (I)
__Mute Swan (I)
__Common Shelduck (I)
__Common Peafowl (I)
__American Flamingo (I)
__Parrot spp. (I)
__Black-throated Magpie-Jay (I)
__Orange Bishop (I)
__Nutmeg Mannikin (I,B)

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Thank you to Mona Baumgartel and Robert Patton for updating this list.

January 2010

APPENDIX E

SAN ELIJO LAGOON FISH AND INVERTEBRATE DATA

Methods

Benthic Invertebrates

Benthic invertebrates are monitored at three sites (corresponding to Water Quality sites 1, 3, & 4) – two sites after 2006 (sites 1 & 3). Sampling is completed by first, nine shallow cores are taken to estimate the abundance's of the small, shallow-dwelling invertebrates. Cores were collected by pushing a cylindrical "clam gun" (15 cm in diameter) 5 cm into the sediment. These nine cores are split into thirds where three are high channel, three are mid channel and three are middle channel (thalweg).

Samples were sieved through a 1mm screen in the field; all large, easily identified animals are counted and released, others are preserved and sorted, and identified and counted under a dissecting microscope in the lab.

Second, another nine cores were taken to estimate abundances of large, deep-dwelling invertebrates (mainly bivalves). The sampling method is the same except that the "clam gun" is pushed 20 cm into the sediment and it is sieved through a 3mm screen.

Fish

Fish are monitored by using two 50m blocking nets (3mm mesh) which span the entire channel length and are set at approximately 10m apart (creating a rectangle with the channel banks), A 15m (3 mm mesh) seine is attached to two brails and passed in between the blocking nets. Each pass is logged as a pass and species are recorded with the first 100 individuals of each species being measured and the remaining counted. This process is repeated until the fish numbers are depleted (or close to depletion). Then the blocking nets are closed in on each other making that the last pass for the site.

San Elijo Lagoon Fish Sampling - Spring Surveys at two sites, Inlet and Nature Center

Species	Common Nam	Site 1, 2007 (Inlet)				Site 2, 2007 (Nature Center)					Site 1, 2008 (Inlet)				Site 2, 2008 (Nature Center)				Site 1, 2009 (Inlet)					Site 2, 2009 (Nature Center)			
MARINE SPECIES		Pass 1	Pass 2	Pass 3	Blocking nets	Pass 1	Pass 2	Pass 3	Pass 4	Blocking nets	Pass 1	Pass 2	Pass 3	Blocking nets	Pass 1	Pass 2	Pass 3	Blocking nets	Pass 1	Pass 2	Pass 3	Pass 4	Blocking nets	Pass 1	Pass 2	Pass 3	Blocking nets
Fundulus parvipinnis	California Killifish	7	2			6	1		1		6	2		1	11	4	2	2			2	1	1	4	4		1
Clevelandia ios	Arrow Goby	2		1		2	9	4		2	3	5	4	3	8	9		1	4	9	6	3	2	6	2	1	
Ilypnus gilberti	Cheekspot Goby												1														
Quietula ycauda	Shadow Goby																		1	1							
Acanthogobius flavimanus	Yellowfin Goby																										
Gillichthys mirabilis	Longjaw Mudsucker	3		1		9	2	5	3	2	1	1		1	2			1						1			
Paralichthys californicus	California Halibut	5	2	2	1	2	1	1			3	3		1	1		2	1	6	3	3	1	1	5	3		2
Hypsopsetta guttulata	Diamond Turbot	5	2	1	2	3	1	1		1	3	1				1			5	1	4		1	5		2	1
Atherinops affinis	Topsmelt	9	3	0	1	5	3				54	21	17	10	33	11	6	2	29	13	5		6	18	13	3	1
Atherinops californiensis	Jacksmelt		3																								
Engraulis mordax	Northern Anchovy																										
Anchoa compressa	Deepbody Anchovy				1						13	2			3				17	4	4		2	7	3		
Mugil cephalus	Striped Mullet				1		2				Ob								2	2			1	2	1	1	
Gymnura marmorata	California Butterfly Ray											1								1							
Myliobatis californica	Bat Ray										1																
Paralabrax maculatofasciatus	Spotted Sand Bass																		Ob								
Girella nigricans	Opaleye	Ob									Ob								Ob								
Leptocottus armatus	Staghorn Sculpin	7	2		1	7	5	1			2		1				2		15	8	3		1	12	6		1
Mustelus californicus	Gray Smoothhound																										
Sygnathus leptorhynchus	Bay Pipefish	2	1	1	2	5	1		1	1																	
Sygnathus auliscus	Barred Pipefish	6	2					1	1										1	1				1			
FRESH or BRACKISH SP.																											
Cyprinus carpio	Carp																		3sp East basin figure 8 pond								
Ictalurus melas	Black Bullhead																		1sp East basin figure 8 pond								
Total Number of Species		13									13								16								

Ob = Observed around net within 10

San Elijo Lagoon Fish Sampling - Spring Surveys at two sites, Inlet and Nature Center

Species	Common Name	Site 1, 2007 (Inlet)				Site 2, 2007 (Nature Center)					Site 1, 2008 (Inlet)				Site 2, 2008 (Nature Center)				Site 1, 2009 (Inlet)					Site 2, 2009 (Nature Center)			
MARINE SPECIES		Pass 1	Pass 2	Pass 3	Blocking nets	Pass 1	Pass 2	Pass 3	Pass 4	Blocking nets	Pass 1	Pass 2	Pass 3	Blocking nets	Pass 1	Pass 2	Pass 3	Blocking nets	Pass 1	Pass 2	Pass 3	Pass 4	Blocking nets	Pass 1	Pass 2	Pass 3	Blocking nets
Fundulus parvipinnis	California Killifish	7	2			6	1		1		6	2		1	11	4	2	2			2	1	1	4	4		1
Clevelandia ios	Arrow Goby	2		1		2	9	4		2	3	5	4	3	8	9		1	4	9	6	3	2	6	2	1	
Ilypnus gilberti	Cheekspot Goby												1														
Quietula ycauda	Shadow Goby																		1	1							
Acanthogobius flavimanus	Yellowfin Goby																										
Gillichthys mirabilis	Longjaw Mudsucker	3		1		9	2	5	3	2	1	1		1	2			1						1			
Paralichthys californicus	California Halibut	5	2	2	1	2	1	1			3	3		1	1		2	1	6	3	3	1	1	5	3		2
Hypsopsetta guttulata	Diamond Turbot	5	2	1	2	3	1	1		1	3	1				1			5	1	4		1	5		2	1
Atherinops affinis	Topsmelt	9	3	0	1	5	3				54	21	17	10	33	11	6	2	29	13	5		6	18	13	3	1
Atherinops californiensis	Jacksmelt		3																								
Engraulis mordax	Northern Anchovy																										
Anchoa compressa	Deepbody Anchovy				1						13	2			3				17	4	4		2	7	3		
Mugil cephalus	Striped Mullet				1		2				Ob								2	2			1	2	1	1	
Gymnura marmorata	California Butterfly Ray											1								1							
Myliobatis californica	Bat Ray										1																
Paralabrax maculatofasciatus	Spotted Sand Bass																		Ob								
Girella nigricans	Opaleye	Ob									Ob								Ob								
Leptocottus armatus	Staghorn Sculpin	7	2		1	7	5	1			2		1				2		15	8	3		1	12	6		1
Mustelus californicus	Gray Smoothhound																										
Sygnathus leptorhynchus	Bay Pipefish	2	1	1	2	5	1		1	1																	
Sygnathus auliscus	Barred Pipefish	6	2					1	1										1	1				1			
FRESH or BRACKISH SP.																											
Cyprinus carpio	Carp																		3sp East basin figure 8 pond								
Ictalurus melas	Black Bullhead																		1sp East basin figure 8 pond								
Total Number of Species		13									13								16								

Ob = Observed around net within 100'

Fish Survey measurements

	2007		2008		2009	
	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2
Length of Channel (m)	42	36	48	29	45	28
Distance between blocking nets (m)	9	9.5	8.5	8	8.2	10

San Elijo Lagoon Spring Invert Sampling at two stations, Inlet and Nature Center

Species			Site 1, 2007 (Inlet)			Site 2, 2007 (Nature Center)			Site 1, 2008 (Inlet)			Site 2, 2008 (Nature Center)			Site 1, 2009 (Inlet)			Site 2, 2009 (Nature Center)		
Invertebrates	**Common Name**	**fresh/marine**	High	Mid	Thalweg	High	Mid	Thalweg	High	Mid	Thalweg	High	Mid	Thalweg	High	Mid	Thalweg	High	Mid	Thalweg
Crustaceans																				
	unidentified shrimp	m												1		3	1			
Palaemon macrodactylus	shrimp	m		1															1	
Neotrypaea sp.	ghost shrimp	m	3	8	1		1		.	8	3		1	1			1			
Hemigrapsus oregonensis		m	Ob			Ob			Ob			Ob			Ob			Ob		
Uca sp.	fiddler crab	m	Ob			Ob			Ob			Ob						Ob		
Majidae sp.		m				1			1											
Pachygrapsus crassipes		m	Ob			Ob			Ob			1			Ob			Ob		
Cancer sp.		m	Ob															Ob		
unidentified	amphipod		2	5	6	3	7	9		2	1	6	5	1	1		7		1	4
unidentified	isopod																	1		
unidentified	Copepods		7		6			2	2								3	9		
Polychaetes																				
Class Capitellidae																				
Polydora nuchalis		m/f	1		4	5	8	3					1		1	3	8	3	2	2
Polydora sp.		m/f					5			1	1	15		11			5			
Capitella capitata		m	2	6	3	1		4												
Spiophanes missionensis		b/m						2												
Mulluscs																				
Lacuna sp.				1												2				
Cylichna culcitella		m															1			
Tagelus californianus		m		1	1				2	4	2	5	1	3		5	5	2	3	1
Certhidea californica		m	1	5		1	3	5	1	3	3	10	9	2	3	7	2	21	8	
Tellina sp.		m	1	3	3						2									
Protothaca staminea		m							1	5	2		3						1	
Chione californiensis		m		4		1					1									
Ostrea sp		m	Ob						Ob			Ob			Ob			Ob		
Lottia sp.		m	Ob			Ob						Ob						Ob		
Mytilus californianus		m	Ob									Ob			Ob			Ob		
Tellina carpenteri		m														1				
Insects																				
	Water Boatmen	f																1		
MISC Taxa																				
Aplysia *californica*		m																	1	
Aplysia vaccaria		m																	1	
Navanax intermis		m		Ob						Ob							1			1
# of Species			14	10	7	10	5	6	9	7	8	10	6	6	7	6	10	13	8	4
Total # of species for the site			20						19						25					

Ob = Observed within 25' of core location

APPENDIX F

WANDERING (SALT MARSH) SKIPPER 2010 SURVEYS

Wandering Skipper Survey 7/9/2010

🟥 West/Central Basin Team 🟩 East Basin Team

Wandering Skipper Survey at the San Elijo Lagoon, Encinitas California

12 August 2010

Observers: Keith Greer and Kim Roeland

Introduction

The wandering skipper (*Panoquina errans*) is a small butterfly of the family Hesperiidae. It is identifiable by its rich dark brown color and cream-colored spots on the dorsal forewing. The wandering skipper is found only along the coast in southern California, Baja California and northwestern mainland Mexico. Populations have been recorded from Huntington Beach, Upper Newport Bay, and Capistrano Beach (Orsak, 1977). In San Diego, the wandering skipper has been documented in the Tijuana Estuary, San Dieguito Lagoon, and Agua Hedionda lagoon (SanGIS, 2010), but it appears that no extensive survey data have been published.

The wandering skipper is on the IUCN Red List of Threatened Species (World Conservation Monitoring Centre, 1996) and is under consideration for possible listing on the endangered species list as a threatened species because of the reduction of salt marsh habitat.

The larval host plant for this species, salt grass (*Distichlis spicata*), is found at the lagoon in transitional habitats along the edge of the high marsh. Nectar sources include *Heliotropium* spp., *Haplopappus* spp., and *Frankenia salina* (Orsak, 1977). *Frankenia* can be found in the high marsh zone between uplands and pickleweed saltmarsh habitat. Potential habitat for the wandering skipper was considered to be areas containing the larval host plant in close proximity to nectar plants.

Surveys were completed to determine presence of the wandering skipper in potential habitat areas within the San Elijo Lagoon, Encinitas California, adjacent and to the west of I-5, along the south side of the lagoon to the entrance at Rios drive and adjacent to the trail at the visitor center (see Figure 1).

Methods

The surveys were conducted on August 12, 2010. The first survey was conducted between 10:53 a.m. and 1:45 p.m. in transitional marsh habitat starting along the western slope of Interstate 5 and continuing along the Rios Avenue path south of the marsh. The second survey, 2:44 p.m. to 3:27 p.m., followed an elevated walkway loop at the San Elijo Lagoon Visitor Center.

Butterflies were detected using a Pollard walk (Pollard, 1977) with two observers moving along a meandering line through potential habitat. Binoculars were used to aid visual identification. A handheld GPS unit (Garmin GPSMAP 60, WAAS enabled) was used to record the location of each individual detected; photos were taken when possible to confirm identification. Significant salt grass patches (typically > 5 m^2) were also recorded using the handheld GPS device. The observers were conscience about not counting the same individual twice, by noting the direction of flight of the individual and having one observer track any individuals that moved in the same direction of the observers. The observers felt that no individuals were double counted.

Temperature and wind speed remained fairly constant for both surveys (74.1°F to 75.9°F and 2.2 – 2.6 miles/hr). Both wind and temperature were ideal for the identification of the wandering skipper.

Results

Fifty-seven individuals of wandering skipper were detected at the San Elijo Lagoon in the areas surveyed (Table 1). Though salt grass was often found mixed with nectar plants and other transitional plants, five significant salt grass patches were counted and recorded (Table 2 and Figure 1).

About two dozen individuals of a similar species, the umber skipper (*Poanes (= Paratytone) melane*), was also detected at San Elijo Lagoon in similar habitat. This species is not restricted to coastal areas. The umber skipper was brighter orange in color and readily distinguishable from the darker brown wandering skipper. The observers felt that the presence of the umber skipper did not hinder the identification of the wandering skipper.

Of note is the observation that all of the individuals of wandering skipper were found on *Frankenia*. Orsak (1977) studies of upper Newport Bay, California indicates that "*I have usually found errans adults nectaring at flowers of Heliotropium or Haplopappus although they also sometimes nectar on Frankenia blossoms*." This difference should be noted for future studies.

The results show widespread distribution of wandering skipper in San Elijo Lagoon in the two study areas. This survey is not intended to be a comprehensive survey of the entire lagoon, but can be added to surveys by others.

References

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(Pollard, E. 1977*. A method for assessing changes in the abundance of butterflies*. Biological Conservation. 12:115-134.

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World Conservation Monitoring Centre. 1996. *Panoquina errans*. 2006 IUCN Red List of Threatened Species. (Accessed on 13 Aug 2010).

Table 1. Wandering Skipper Locations, San Elijo Lagoon

Observers: Keith Greer, Kim Roeland

Observation Point	Date	Time	N (degree)	W (degrees)
1	8/12/2010	10:57	33.0088	-117.263983
2	8/12/2010	11:10	33.00911667	-117.2643
3	8/12/2010	11:14	33.00908333	-117.2643
4	8/12/2010	11:23	33.00938333	-117.264583
5	8/12/2010	11:24	33.00938333	-117.264633
6	8/12/2010	11:28	33.00925	-117.26475
7	8/12/2010	11:35	33.00916667	-117.264567
8	8/12/2010	11:38	33.00935	-117.2646
9	8/12/2010	11:45	33.00926667	-117.264367
10	8/12/2010	12:06	33.00778333	-117.26275
11	8/12/2010	12:09	33.00771667	-117.26285
12	8/12/2010	12:10	33.00776667	-117.2629
13	8/12/2010	12:13	33.00771667	-117.262733
14	8/12/2010	12:17	33.00751667	-117.26255
15	8/12/2010	12:18	33.00746667	-117.262533
16	8/12/2010	12:18	33.00748333	-117.262483
17	8/12/2010	12:18	33.00746667	-117.26245
18	8/12/2010	12:21	33.00745	-117.262633
19	8/12/2010	12:22	33.00743333	-117.26265
20	8/12/2010	12:22	33.00743333	-117.262683
21	8/12/2010	12:23	33.00741667	-117.262683
22	8/12/2010	12:32	33.00738333	-117.262417
23	8/12/2010	12:36	33.00686667	-117.263133
24	8/12/2010	12:36	33.00686667	-117.263133
25	8/12/2010	12:37	33.00693333	-117.26305
26	8/12/2010	12:38	33.007	-117.263033
27	8/12/2010	12:40	33.007	-117.262967
28	8/12/2010	12:44	33.00673333	-117.2633
29	8/12/2010	1:02	33.00651667	-117.264733
30	8/12/2010	1:05	33.00641667	-117.264817
31	8/12/2010	1:06	33.00636667	-117.26485
32	8/12/2010	1:08	33.00633333	-117.264967
33	8/12/2010	1:09	33.00621667	-117.265117
34	8/12/2010	1:10	33.00611667	-117.265233
35	8/12/2010	1:10	33.00608333	-117.265217
36	8/12/2010	1:16	33.00573333	-117.2656

37	8/12/2010	2:40	33.01276667	-117.27465
38	8/12/2010	2:40	33.01278333	-117.274633
39	8/12/2010	2:40	33.01278333	-117.274633
40	8/12/2010	2:42	33.01271667	-117.274567
41	8/12/2010	2:43	33.01266667	-117.2746
42	8/12/2010	2:47	33.01263333	-117.27455
43	8/12/2010	2:52	33.01231667	-117.274483
44	8/12/2010	2:53	33.01236667	-117.274533
45	8/12/2010	2:56	33.01215	-117.27445
46	8/12/2010	2:57	33.01216667	-117.274467
47	8/12/2010	3:00	33.01201667	-117.274417
48	8/12/2010	3:01	33.01206667	-117.27425
49	8/12/2010	3:04	33.01183333	-117.2743
50	8/12/2010	3:08	33.01171667	-117.274083
51	8/12/2010	3:15	33.01161667	-117.27365
52	8/12/2010	3:16	33.01161667	-117.273667
53	8/12/2010	3:23	33.01163333	-117.273167
54	8/12/2010	3:24	33.01166667	-117.273067
55	8/12/2010	3:25	33.0117	-117.272933
56	8/12/2010	3:25	33.01173333	-117.272933
57	8/12/2010	3:25	33.01173333	-117.272917

Table 2. Significant Salt Grass Patches, San Elijo Lagoon

Observation Point	Date	Time	N (degrees)	W (degrees)
1	8/12/2010	12:19	33.00736667	-117.26255
2	8/12/2010	12:40	33.00701667	-117.26293
3	8/12/2010	1:06	33.00635	-117.26477
4	8/12/2010	1:12	33.00586667	-117.26542
5	8/12/2010	3:14	33.01165	-117.27358

San Elijo Lagoon Wandering Skipper Survey

Figure 1

APPENDIX G

CALIFORNIA GNATCATCHER SIGHTINGS FROM SAN ELIJO LAGOON MONTHLY BIRD COUNTS

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2006 California Gnatcatcher sightings from San Elijo Lagoon monthly bird counts (see map)
At least 16 territories estimated within San Elijo Lagoon Ecological Reserve, although surveys were not specifically for California Gnatcatchers and surveys were limited to public access trails (areas of suitable habitat away from public trails were not surveyed, additional pairs were likely not detected between Sta Inez and Sta Carina trailheads, the hill adjacent to the north end of Sta Florencia, and to the northwest and northeast of Sta Helena)

Central Basin North
Location #1 – nature center site – nesting pair with fledglings
1/9 – 2 observed
1/22 – 1
2/13 – 2
2/26 – 1
3/13 – 3
3/26 – 1
4/10 – 2
4/30 – pair observed
5/8 – pair with 3 begging fledglings
5/14 – pair feeding fledgling
6/12 – adult with 2 fledglings
7/2 – pair tending 3 nestlings, older fledgling also seen
7/10 - 2
7/23 – pair with 4 fledglings
8/14 - 2
8/20 - pair
9/11 - 2
10/1 - 4
10/9 - 1
10/26 - 2
11/13 - 1
12/4 - 1
12/11 - 4
12/31 – 1

Central Basin South
reported along trail from Rios Ave to I-5, but sites not specified:
1/9 – 4
3/13 – 3
6/12 - 2
7/10 – 2

Location #2 – N Rios Ave –
2/13 – 1
5/8 – 1
11/13 – 2

Location #3 – NW of Holmwood Canyon – likely pair with sightings in adjacent areas
2/13 – 2
10/9 – 1
11/13 - 2

Location #4 – N Holmwood Canyon –
5/8 – 2

10/9 – 1
12/11 – 1

Location #5 – S Holmwood Canyon –
5/8 – 1

Location #6 – NE of Holmwood Canyon – likely pair
4/10 – 1
5/8 – 2
8/14 – 2
11/13 – 1

Location #7 – SE central basin – likely pair
4/10 – 2
5/8 – 2
8/14 - 2
9/11 – 2

Location #8 – W Interstate 5 – likely pair
4/10 – 1
8/14 – 1
9/11 – 3
10/9 - 1
12/11 – 1

East Basin South

reported along trail from El Camino Real to I-5, but sites not specified:
1/9 – 2
4/10 – 3
7/10 – 4
11/13 - 5
12/11 – 4

Location #9 – E Interstate 5 – likely pair
2/13 – 2
9/11 – 1

Location #10 – NW of Santa Carina – pair
6/12 – pair observed

Location #11 – N of Santa Carina – pair
6/12 – pair observed
9/11 – 1

Location #12 – NE of Santa Carina
9/11 – 2

Location #13 – NW of Santa Helena
10/9 – 1

Location #14 – N Santa Helena
10/9 – 1

Location #15 – NE of Santa Helena – likely pair
5/8 – 1
9/11 – 1
10/9 – 2

East Basin Northeast

Location #16 – Lux drainage area
6/12 – 1 observed NE of large Torrey pine, SSW of school
7/10 – 1 W of S Lux Canyon drainage
11/13 – 2, including 1 W of large Torrey pine & 1 S of school

East Basin East

reported along trail around Stonebridge mesa, but sites not specified:
1/9 – 2

Location #17 – NW Stonebridge mesa – likely pair
2/13 – 1
3/13 – 1
4/10 – 1
5/8 – 1
9/11 - 1
10/9 - 1
11/13 – 2

Location #18 – NW central Stonebridge mesa – pair
2/13 – 1
3/13 – 2
4/10 – 1
5/8 – 1
6/12 – 1
7/10 - pair
8/12 – 1
9/11 - 2
10/9 - 2
11/13 - 1

Location #19 – N Stonebridge mesa
4/10 – 1
5/8 – 1
6/12 -1
7/10 - 1
9/11 – 2

Location #20 – NE Stonebridge mesa – pair
4/10 – pair
5/8 – 1
7/10 – 2
8/14 - 1
9/11 – 1

Location #21 – central Stonebridge mesa – pair
4/10 – 1
5/8 – pair
6/12 -1
7/10 - 1
8/14 - 1
10/9 – 1

Location #22 – SW central Stonebridge mesa – nesting pair
6/12 – female on nest with 4 eggs

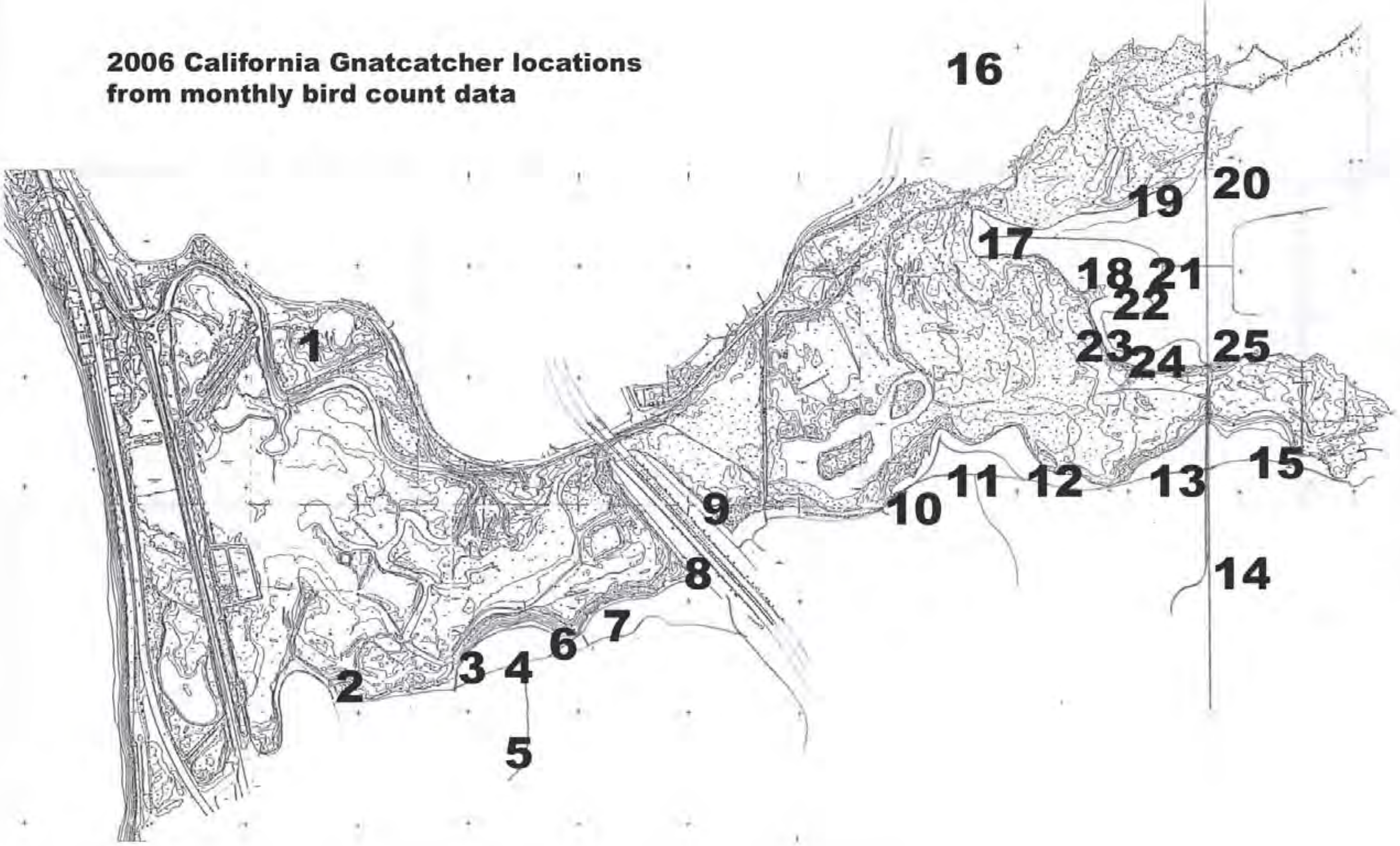
7/10 – pair with empty nest
8/14 – 2

Location #23 – SW Stonebridge mesa – nesting pair
2/13 – 1
3/13 – 1
5/8 – 1
7/10 – adult with nestlings
8/14 – 1
9/11 - 2
10/9 - pair
11/13 - 1
12/11 - 1

Location #24 – S Stonebridge mesa
2/13 – 1
3/13 – 2
4/10 – 1
5/8 – 1
7/10 - 1
8/14 - 1
9/11 - 1
10/9 – 1

Location #25 – SE Stonebridge mesa – pair
7/10 – 1
8/14 – 1
9/11 – 1
10/9 - 2
11/13 - 1
12/11 – pair

2006 California Gnatcatcher locations from monthly bird count data



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2007 California Gnatcatcher sightings from San Elijo Lagoon monthly bird counts (see map)
At least 16 territories estimated within San Elijo Lagoon Ecological Reserve, although surveys were not specifically for California Gnatcatchers and surveys were limited to public access trails (areas of suitable habitat away from public trails were not surveyed, additional pairs were likely not detected from upper slopes around and east of Holmwood Canyon, between Sta Inez and Sta Carina trailheads, the hill adjacent to the north end of Sta Florencia, and to the northwest and northeast of Sta Helena)

Central Basin North
Location #1 – nature center site – pair
1/8 – 4
1/14 – 1
2/21 – 1
3/12 – 2
4/1 – pair observed
4/9 – 1
4/29 – 1
5/14 – 1
6/11 – 1
7/9 - 1
7/29 - 1
9/1 - 1
9/10 - 1
10/1 - 1
10/8 - 1
10/31 - 1
11/12 - 2
12/10 - 2
12/20 - 2

Central Basin South
reported along trail from Rios Ave to I-5, but sites not specified:
3/12 – 4
4/19 – 2
10/8 – 4
12/10 - 6

Location #2 – SE railroad tracks, NW of Rios Ave -
8/13 - 1

Location #3 – N Rios Ave –
11/12 – 2

Location #4 – NW of Holmwood Canyon – likely pair
1/8 – 1
2/12 – 1
11/12 – 3

Location #5 – N Holmwood Canyon –
1/8 – 1
8/13 – 1

Location #6 – S Holmwood Canyon – likely pair
8/13 – 2

Location #7 – NE of Holmwood Canyon – likely pair
1/8 – 2
2/12 – 1
5/14 - 1
8/13 - 3

Location #8 – SE central basin –
1/8 - 1

Location #9 – W Interstate 5 – pair with fledglings
5/14 – 2
7/9 – pair with fledglings
8/13 - 1
11/12 - 2

Location #10 – SW Interstate 5 – pair with fledglings
5/14 – 1
7/9 – pair with fledglings

East Basin South

reported along trail from El Camino Real to I-5, but sites not specified:
2/12 – 4
3/12 – 4
4/9 – 2
5/14 – 3
8/13 - 7
9/16 - 7
10/8 - 14
12/10 - 2

Location #11 – NW of Santa Carina – nesting pair
7/9 – pair feeding nestlings

Location #12 – N of Santa Carina -
11/12 - 2

Location #13 – N Santa Carina – likely pair
6/11 – 2
11/12 – 3

Location #14 – N of Santa Helena – likely pair
11/12 – 2

Location #15 – N Santa Helena -
6/11 – 1
11/12 – 1

East Basin Northeast

Location #16 – Lux drainage area – pair
1/8 – 1 SE of Mira Costa College
2/12 – 1 SW of Mira Costa, E edge of ag fields
5/14 – 1 E of big Torrey Pine, S of school
12/10 – pair SW edge of day school

East Basin East

Location #17 – NW Stonebridge mesa – pair
1/8 – pair
2/12 – 1
3/12 – 1
4/9 – 1
7/9 - pair
9/10 - 1
10/8 - pair
12/10 - 1

Location #18 – NW central Stonebridge mesa – pair
1/8 – 1
2/12 – 1
3/12 – pair
6/11 - 2
7/9 - 2
9/10 - 1
12/10 - 1

Location #19 – N Stonebridge mesa –
1/8 – 1
7/9 – 1
12/10 - 1

Location #20 – NE Stonebridge mesa – pair
2/12 – 2
3/12 – 1
6/11 – pair
9/10 - 1
10/8 - 1

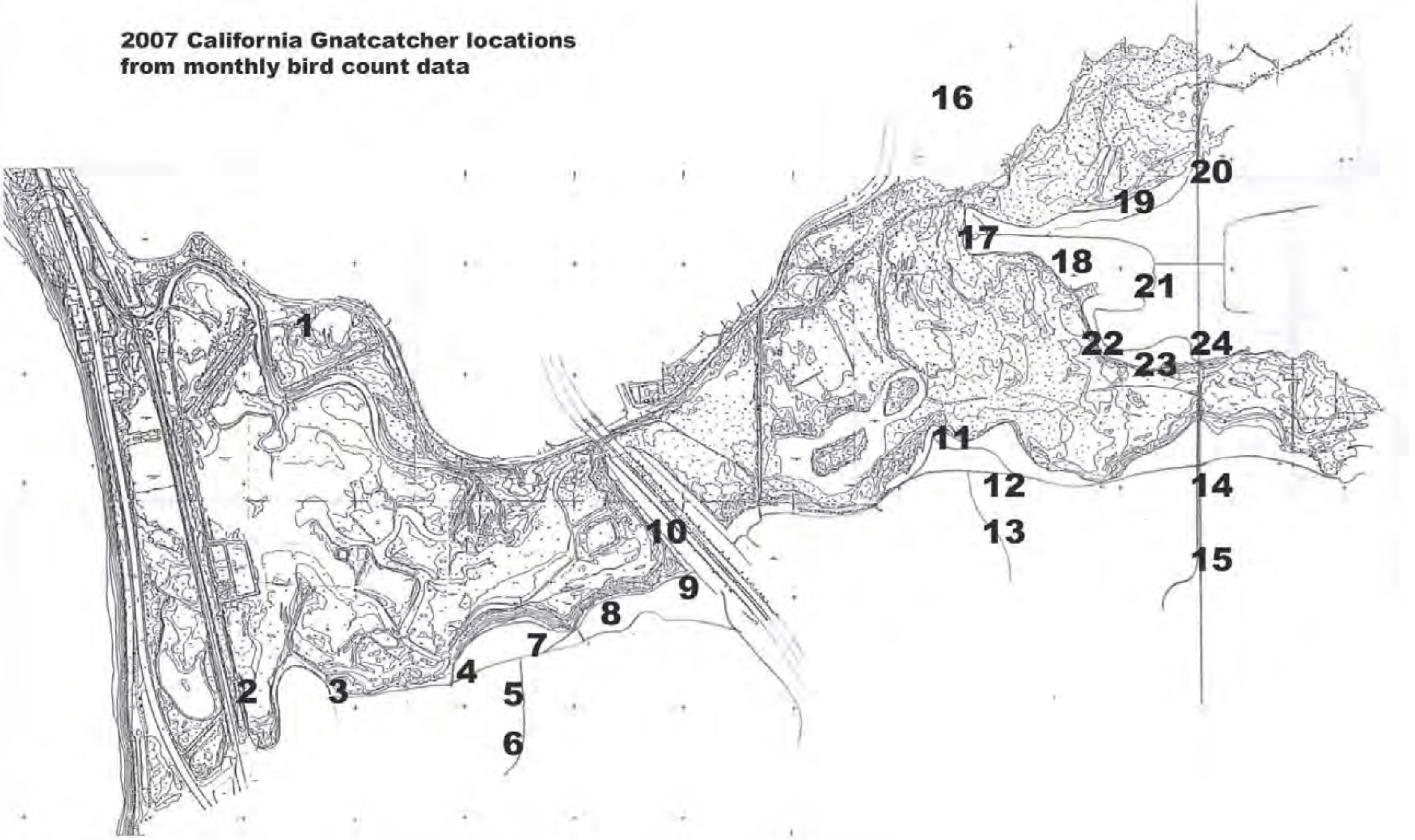
Location #21 – central Stonebridge mesa - pair
2/12 – pair
4/9 – 2
7/9 – 1
9/10 - 1
10/8 - 1

Location #22 – SW Stonebridge mesa -
1/8 – 1
6/11 – 1
7/9 - 1

Location #23 – S Stonebridge mesa – pair
2/12 – pair
3/12 – 1
4/9 - 1

Location #24 – SE Stonebridge mesa – pair
1/8 – 1
2/12 – 1
3/12 – 1
9/10 - 1
10/8 - pair
12/10 – 1

2007 California Gnatcatcher locations from monthly bird count data



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2008 California Gnatcatcher sightings from San Elijo Lagoon monthly bird counts (see map)
At least 18 territories estimated within San Elijo Lagoon Ecological Reserve, although surveys were not specifically for California Gnatcatchers and surveys were limited to public access trails (areas of suitable habitat away from public trails were not surveyed, additional pairs were likely not detected from upper slopes around and east of Holmwood Canyon, between Sta Inez and Sta Carina trailheads, the hill adjacent to the north end of Sta Florencia, and to the northwest and northeast of Sta Helena)

Central Basin North
Location #1 – nature center site –
(2/1/08 demolition & construction activity began at site)
3/10 – 1

Central Basin South
reported along trail from Rios Ave to I-5, but sites not specified:

3/10 – 2	6/9 - 2
4/14 – 1	9/8 - 9

Location #2 – SE railroad tracks, NW of Rios Ave –

1/14 – 3	
4/14 – 1	11/10 - 1

Location #3 – NW of Rios Ave, S peninsula – pair with fledglings

5/12 – 1	
6/9 – pair with fledglings	7/14 - 1

Location #4 – N Rios Ave –

1/14 – 2	11/10 - 1
7/14 – 3	12/8 - 1

Location #5 – NW of Holmwood Canyon –
11/10 - 1

Location #6 – N of Holmwood Canyon – likely pair

1/14 – 1	9/8 - 1
2/11 – 1	10/13 - 1
8/11 – 1	11/10 - 1

Location #7 – N Holmwood Canyon – likely pair
1/14 – 1
2/11 – 1
5/12 – 1
6/9 - 1
11/10 - 1

Location #8 – S Holmwood Canyon – likely pair
6/9 – 2 & third farther S
9/8 – 1
10/13 – 2

Location #9 – NE of Holmwood Canyon –
11/10 – 1

Location #10 – SE central basin – likely pair
5/12 – 1
11/10 – 1

Location #11 – W Interstate 5 –
5/12 – 1
6/9 – 1
8/11 – 1
9/8 - 1
10/13 - 1
12/8 - 1

Location #12 – SW Interstate 5 – likely pair
8/11 – 3
10/13 – 1

East Basin South
reported along trail from El Camino Real to I-5, but sites not specified:
2/11 – 2
4/14 – 1
6/9 – 4
8/11 – 8
9/8 - 3
10/13 - 3
11/10 - 6
12/8 - 3

Location #13 – SE Interstate 5 – (likely pair – additional reports from staff of sightings between Sta Inez and Sta Carina)
2/11 – 1
10/13 - 1

Location #14 – NE of Santa Carina – likely pair
7/14 – 1
10/13 – 2

Location #15 – NW of Santa Helena –
10/13 – 1

Location #16 – N Santa Helena – likely pair

1/14 – 2
7/14 – 2

Location #17 – NE of Santa Helena – likely pair
1/14 – 1
7/14 – 1
10/13 – 1

East Basin Northeast

Location #18 – Lux drainage area – pair
9/8 – 1 SW corner of day school
12/8 – pair SW corner of day school

East Basin East

Location #19 – NW Stonebridge mesa – nesting pair
4/14 – 1
5/12 – adult with empty nest

Location #20 – NW central Stonebridge mesa – pair
2/11 – pair
3/10 – 1
4/14 – 2
5/12 - pair
7/14 - 1
9/8 - 1
12/8 - 2

Location #21 – NE Stonebridge mesa – pair
2/11 - 1
4/14 – pair
8/11 - 1

Location #22 – central Stonebridge mesa – pair with fledglings
1/14 – 1
2/11 – 1
3/10 – 1
5/14 - 1
6/9 – adult with fledgling
9/8 - 1
11/10 - 1

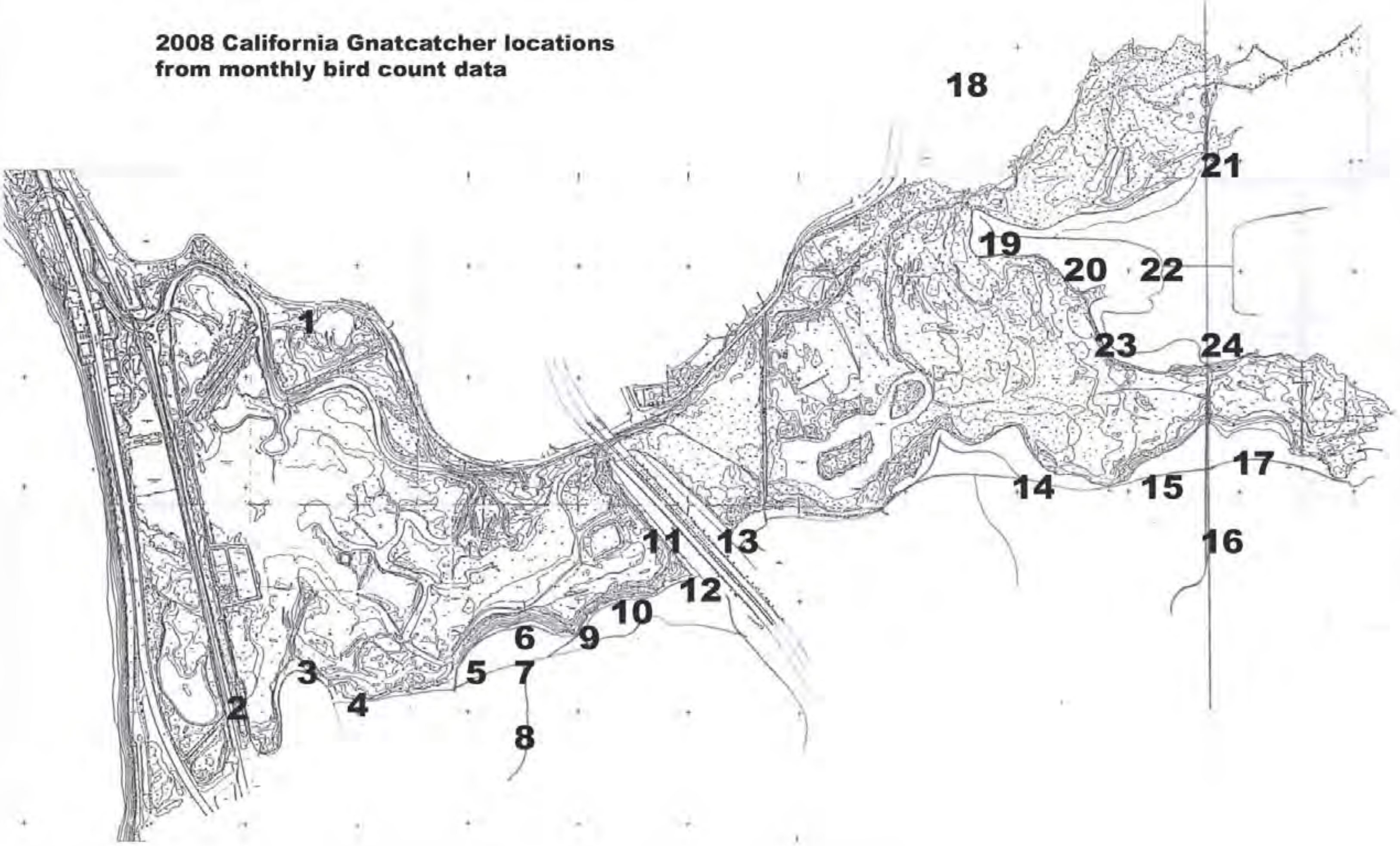
Location #23 – SW Stonebridge mesa – pair
1/14 – pair
2/11 – pair
3/10 – 1
5/12 – 1
7/14 - pair
8/11 - 1
11/10 - 2
12/8 - 1

Location #24 – SE Stonebridge mesa – pair
2/11 – pair
4/14 – pair
5/12 – 1
6/9 – pair
8/11 - 1
9/8 - 1
11/10 - 4

7/14 – 1

12/8 – 2

2008 California Gnatcatcher locations from monthly bird count data



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2009 California Gnatcatcher sightings from San Elijo Lagoon monthly bird counts (see map)
Up to 20 territories estimated within San Elijo Lagoon Ecological Reserve, although surveys were not specifically for California Gnatcatchers and surveys were limited to public access trails (areas of suitable habitat away from public trails were not surveyed, additional pairs were likely not detected from upper slopes around and east of Holmwood Canyon, between Sta Inez and Sta Carina trailheads, the hill adjacent to the north end of Sta Florencia, and to the northwest and northeast of Sta Helena)

Central Basin South
reported along trail from Rios Ave to I-5, but sites not specified:
11/9 – 9

Location #1 – SE railroad tracks, NW of Rios Ave – pair
5/11 – 1
6/9 – pair
12/4 - 1

Location #2 – NW of Rios Ave, S peninsula –
9/14 – 2

Location #3 – N Rios Ave –
1/12 – 2
4/13 – 1
12/14 - 2

Location #4 – NW of Holmwood Canyon – likely pair
3/19 – 1
7/13 – 1
8/10 – 1
10/12 - 1
12/14 - 1

Location #5 – N Holmwood Canyon –
3/9 – 1
6/8 – 1
8/10 - 1

Location #6 – S Holmwood Canyon – likely pair
1/12 – 3
2/9 – 1
5/11 - 2
6/8 - 2
7/13 - 1
10/12 - 2

Location #7 – NE of Holmwood Canyon – likely pair
2/9 – 1
8/10 - 2

4/13 – 1
5/11 – 2
7/13 - 1
9/14 - 1
12/14 - 1

Location #8 – SE central basin –
1/12 – 1
6/8 – 1
9/14 - 1
10/12 - 1

Location #9 – W Interstate 5 –
5/11 – 1
8/10 - 2

Location #10 – SW Interstate 5 – likely pair
1/12 – 1
5/11 – 1
7/13 - 1
12/14 – 1

East Basin South

reported along trail from El Camino Real to I-5, but sites not specified:
1/12 – 3
3/9 – 2
5/11 – 4
7/13 – 5
9/14 - 2
10/12 - 1
11/9 - 4
12/14 - 9

Location #11 – NW of Santa Carina – (likely pair – additional reports from staff of sightings between Sta Inez and Sta Carina)
9/14 – 1

Location #12 – N of Santa Carina –
9/14 – 1

Location #13 – NE of Santa Carina – pair with fledglings
8/10 – pair with 2 fledglings
9/14 – 1
10/12 - 1

Location #14 – NE of Santa Helena – nesting pair
4/13 – pair nest building
8/10 – 1
10/12 – 2

East Basin Northeast

Location #15 – Lux drainage area – pair
1/12 – pair SSE edge of day school
4/3 – male SW corner day school
5/11 – female SW corner day school
6/8 - male ESE of Mira Costa College
11/9 – 2 - 1 W of big Torrey pine, 1 S edge school

East Basin East

Location #16 – NW Stonebridge mesa – pair
2/9 – pair
3/9 – 1
5/11 – 1
6/8 – 1
7/13 - 1
11/9 - 1
12/14 - 1

Location #17 – NW central Stonebridge mesa – pair
2/9 – pair
3/9 – pair
5/11 – pair
7/13 – 1
8/10 - 1
9/14 - 1
10/12 - 2

Location #18 – N Stonebridge mesa –
1/12 – 1
7/13 – 1
11/9 - 1

Location #19 – NE Stonebridge mesa – pair with fledgling
2/9 – 1
4/13 – pair with fledgling
6/8 – 1
7/13 - pair
8/10 - 1

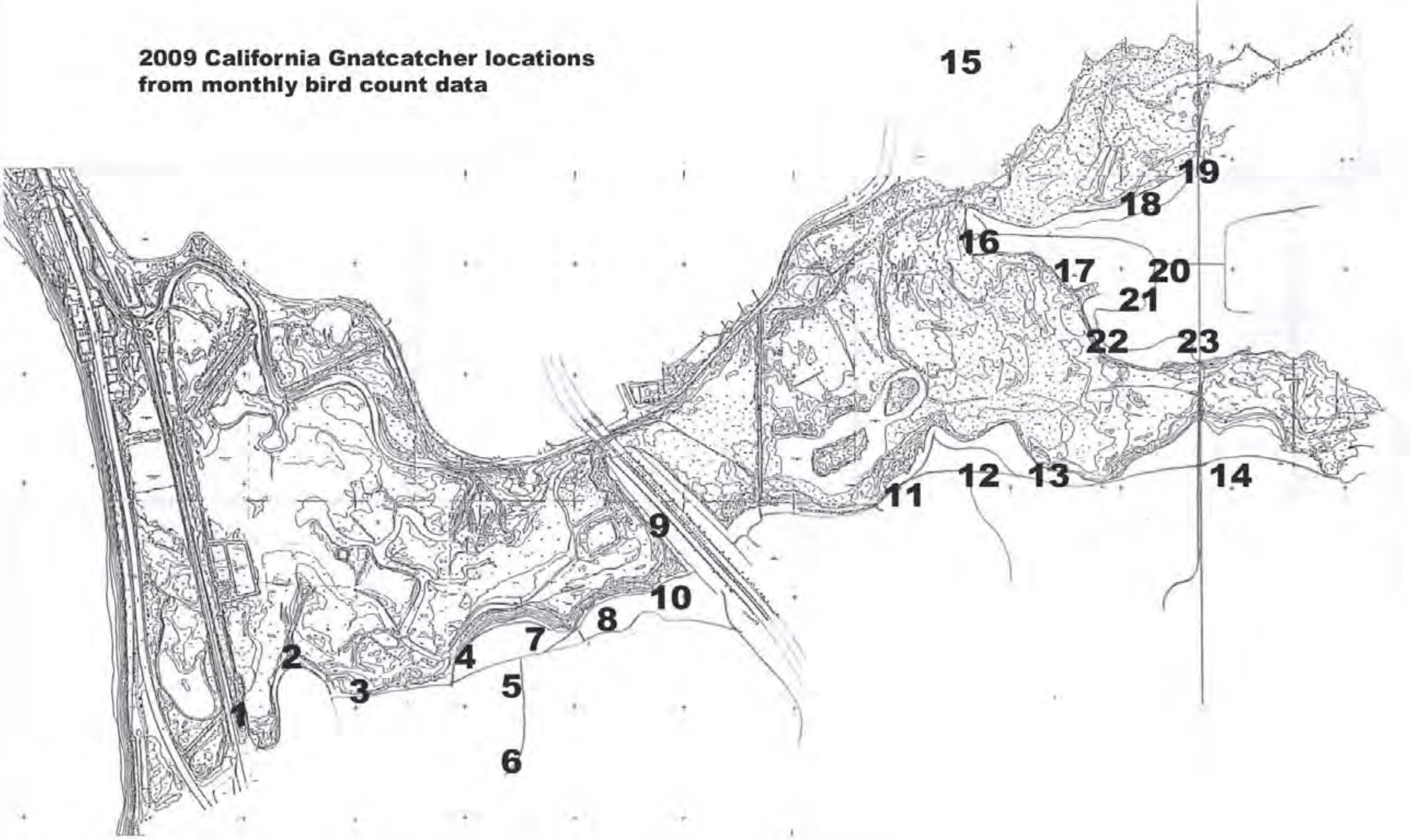
Location #20 – central Stonebridge mesa – pair with fledglings
2/9 – 1
3/9 – 1
4/13 – 1
5/11 – pair with 2 fledglings
9/14 - 1
11/9 - 1

Location #21 – SW central Stonebridge mesa – likely pair
1/12 – 3
2/9 – 1
4/13 – 1
5/11 – 1
7/13 – 1
8/10 - 1
9/14 - 1
11/9 - 1
12/14 - 1

Location #22 – SW Stonebridge mesa – pair with fledglings
1/12 – 2
4/13 – 1
6/8 – pair with 2 fledglings
7/3 – pair
9/14 - 1
10/12 - 2
11/9 - 2

Location #23 – SE Stonebridge mesa – pair
3/9 – pair
4/13 – pair
5/11 – 1
6/8 – pair
8/10 - 1
9/14 - 1
11/9 - 2
12/14 - 1

2009 California Gnatcatcher locations from monthly bird count data



APPENDIX H

CALIFORNIA LEAST TERN AND WESTERN SNOWY PLOVER SURVEY SUMMARY: SAN ELIJO LAGOON AND CARDIFF STATE BEACH

California Least Tern and Western Snowy Plover Summary, 2006
San Elijo Lagoon & Cardiff State Beach
Robert Patton and Shauna Wolf

California Least Terns were observed at San Elijo Lagoon Ecological Reserve and adjacent Cardiff State Beach from at least 27 April through 11 September 2006. A pair was observed in potential nesting area adjacent to the East Basin dike but no nests were found this season. Rain in late May and subsequent flooding of saltpanne likely precluded nesting or possibly destroyed nests before they could be documented. Foraging and roosting birds were observed regularly, with a season maximum of up to 24 on 14 August. Ravens and crows were observed near potential nesting areas most visits, as were tracks of coyote and raccoon. Red-tailed hawks, kestrels, and loose dogs associated with trail-users were seen regularly.

Western Snowy Plovers were observed foraging in the central basin on five occasions in late summer and fall, otherwise all sightings were along Cardiff State Beach where the beach is well used by a variety of shorebirds during the non-nesting season including a flock of snowy plovers. The flock usually consists of 10-25 birds with a maximum of 32 observed on 31 August. The flock roosts approximately 0.8 km south of the lagoon mouth and is infrequently found in other areas. From January to April this year individuals were seen near the lagoon mouth. When disturbed by pedestrians and dogs the plovers usually circle around and are back in their preferred roosting area within a very short amount of time. The reason that they have such a strong preference for that area is unclear. One possibility is that the beach seems to be slightly wider in that area and would provide more roosting area as the tide comes in. Another important feature of this area is that parking along the highway is prohibited there. Even on the busiest days there are noticeably fewer people in the plover roosting area, with most people on the beach staying closer to the parking areas, both along the highway and at the north and south parking lots.

California Least Tern Sightings Summary, 2006
San Elijo Lagoon & Cardiff State Beach

4/27 – 5-7 foraging along beach
4/30 – none seen in area of east basin dike
5/7 – 1 foraging off lagoon mouth
5/8 – 2 along beach, 5 west basin, 1 off Rios, 4 along Pole Rd, 2 east basin, 2 off Stonebridge mesa
5/12 – 2 loafing & 1 in air over saltpanne east of east basin dike, 2 over west basin
5/13 – 3 over beach
5/14 – 1 off nature center site
5/21 – 1 over west basin, 4 foraging off nature center site, 2 loafing adjacent east basin dike
5/28 – 2 foraging east basin; rain flooded potential nesting areas
6/1 – 1 over beach

6/12 – 1 along Pole Rd, 3 over east basin
7/2 – 3 offshore from lagoon mouth, 3 off nature center site, 2 over east basin
7/10 – 1 along beach, 8 over west basin, 4 off Rios
7/23 – 9 off nature center site, adult with fledgling east of east basin dike
7/28 – 12 off lagoon mouth including at least 1 fledgling
8/6 – 2 offshore
8/13 – 2 with 1 fledgling along beach
8/14 – 4 offshore, 16 off nature center site, 4 off Stonebridge mesa
8/20 – 7 with 1 fledging off nature center site
9/11 – 3 along beach

Western Snowy Plover Sightings Summary, 2006
San Elijo Lagoon & Cardiff State Beach

1/9 – 12 along beach
1/28 – 3 at lagoon mouth
1/31 – 2 north of lagoon mouth
2/10 – 4 south beach
2/13 – none seen
2/19 – 3 lagoon mouth
2/24, 3/2 – none seen
3/8 – 11 lagoon mouth
3/13 – 3 along beach
3/19 – 10-18 total, including 10 south beach, 8 lagoon mouth
3/25 – 9 south beach
4/2 – 6 total, including 3 lagoon mouth, 3 south beach
4/6 – 9 south beach
4/10 – 4 along beach
4/15 – 3 south beach, including band combination K-YR (uncertain origin, 1997-1998)
4/27 – 1 south beach
5/7 – none seen
5/13 – 1 south beach
5/21, 25, 6/1, 9 – none seen
7/10 – 3 foraging northwest of Rios Ave
7/23 – 9 foraging south of nature center site
7/28 – 1 in flight along beach
8/6 – none seen
8/13 – 23 south beach, including at least 2 fledglings, bands OW-AY (originally from Salinas State Beach, 2006)
8/14 – 6 foraging northwest of Rios
8/20 – 3 foraging south of nature center site
8/27 – none seen
8/31 – 32 including S-K/M (Camp Pendleton origin)
9/9 – 29 including S-K/M
9/11 – 1 along beach

9/14 – 23 including BB-OG (Oceano Dunes, 2002)
9/21 – 28 south beach
9/27 – 27 south beach
10/5 – 7 south beach
10/15 – 1 south beach
10/19 – none seen
10/26 – 13 south beach
11/13 – 20 south beach, 3 foraging east of Pole Rd
12/11 – 4 south beach

California Least Tern and Western Snowy Plover Summary, 2007
San Elijo Lagoon & Cardiff State Beach
Robert Patton and Shauna Wolf

California Least Terns were observed at San Elijo Lagoon Ecological Reserve and adjacent Cardiff State Beach from at least 29 April through 13 August 2007. No courtship was observed in potential nesting areas and no nests were found this season. Foraging and roosting birds were observed regularly, with a season maximum of 60-75 on 14 May. Ravens and crows were observed near potential nesting areas each visit, as were tracks of coyote and raccoon. Red-tailed hawks, kestrels, and loose dogs associated with trail-users were seen regularly. Management at this site has resulted in a de facto experiment in the fate of least tern and snowy plover nesting sites with no predator control - both species previously nested annually in good numbers and both have abandoned the site in recent years after repeated predation and reproductive failure.

Western Snowy Plovers were observed foraging in the central basin on four occasions in fall, otherwise all sightings were along Cardiff State Beach where the beach is well used by a variety of shorebirds during the non-nesting season including a flock of snowy plovers. The flock usually consists of 10-25 birds with a maximum of 21 observed on 30 August and 12 September. The flock roosts approximately 0.8 km south of the lagoon mouth and is very rarely found in other areas. When disturbed by pedestrians and dogs the plovers usually circle around and are back in their preferred roosting area within a very short amount of time. The reason that they have such a strong preference for that area is unclear. One possibility is that the beach seems to be slightly wider in that area and would provide more roosting area as the tide comes in. Another important feature of this area is that parking along the highway is prohibited there. Even on the busiest days there are noticeably fewer people in the plover roosting area, with most people on the beach staying closer to the parking areas, both along the highway and at the north and south parking lots.

California Least Tern Sightings Summary, 2007
San Elijo Lagoon & Cardiff State Beach

4/29 – 2 CLT central basin; rain last week flooded most of nest area
5/3–5/9 – lagoon inlet channel excavation & draining
5/14 – 40 CLT offshore, 34 central basin, 3 east basin; nest area substrate drying but raptors, raven, & mammal tracks present
6/3 – ncs – 1 CLT
6/11 – CLT - 3 beach, 6 central basin, 1 east basin
7/1 – no CLT
7/9 – CLT – 1 beach, 2 west basin, 6-7 central basin, 1 east basin
7/12 – CSB – 3-5 CLT with 2 fledglings
7/15 – 13 CLT with 1 fledgling roosting west central basin
7/17 – CSB – 3-4 CLT with 3 fledglings
7/27 – CSB – 4 CLT with 1-2 fledglings

7/29 – 7 CLT with 3 fledglings west central basin
8/2 – CSB – 5-6 CLT with 2-3 fledglings
8/13 – 5 CLT offshore, 6-7 central basin
8/19 – CSB – 1 CLT fledgling
8/23 – no CLT

Western Snowy Plover Sightings Summary, 2007
San Elijo Lagoon & Cardiff State Beach

1/8 – no WSP
1/10 – CSB – 5 unb. WSP
1/19 – CSB – 5 unb. WSP
1/25 – CSB – 2-3 unb. WSP
1/31 – CSB – no WSP
2/12 – no WSP
2/16 – CSB – 2 WSP
2/20 – CSB – no WSP
3/2 – CSB – 1 unb. WSP
3/9 – CSB – 4 unb. WSP
3/12 – no WSP
3/15 – CSB – no WSP
3/22 – CSB – no WSP
3/30 – CSB – no WSP
4/9 – 2 WSP on beach
5/3 – CSB – no WSP
5/14 – no WSP
6/3 – no WSP
6/11 – no WSP
6/22 – no WSP
7/1 – no WSP
7/9 – no WSP
7/12 – CSB - 1 WSP
7/15 – no WSP
7/17 – CSB - 1 WSP
7/27 – no WSP
7/29 – no WSP
8/2 – no WSP
8/13 – CSB - 3 WSP
8/19 – CSB - 1 WSP
8/23 – no WSP
8/30 – CSB - 21 WSP, incl. L/Y/L-Y (Oregon), S-K/M (Pendleton), S-X
9/1 – 4 WSP foraging central basin
9/6 – CSB - 7 WSP
9/10 – CSB - 2 WSP; 8 WSP west central basin
9/12 – CSB - 21 WSP, incl. L/O?/L-Y, S-X

9/19 – CSB - 2 WSP
9/27 – CSB - 13 WSP
10/1 – 3 WSP foraging central basin
10/3 – CSB - 8 WSP
10/10 – CSB - 11 WSP
10/19 – CSB - 1 WSP
10/31 – no WSP
11/10 – CSB – 9-12 WSP
12/1 – no WSP

California Least Tern and Western Snowy Plover Site Summaries, 2008
San Elijo Lagoon Ecological Reserve and Cardiff State Beach

Potential foraging, roosting, and nesting sites of the endangered California least tern and western snowy plover at San Elijo Lagoon Ecological Reserve and Cardiff State Beach were checked up to weekly through 2008, with Shauna Wolf conducting surveys along the beach, Robert Patton monitoring potential nesting areas within the lagoon, and Robert Patton, Maryanne Bache, and Susan Welker coordinating volunteers along public access trails to conduct monthly bird counts.

Least terns were observed from 26 April through 11 August foraging throughout the lagoon and nearshore waters and roosting on mudflats in the lagoon. The maximum observed was 12 to 17 on 14 July, including at least one fledgling. No nests were documented this season although courtship feeding by one pair was observed on 2 May and site-selection on 18 May on saltpanne east of the east basin dike. Human footprints, dog tracks, coyote and raccoon tracks were observed in the area, as were raptors and corvids. Rain in late May also flooded the saltpanne area.

Snowy plovers were observed from January through 9 April and from 11 August through December. No breeding activity was documented, most observations were of roosting and/or foraging birds along the beach, and foraging on mudflats in the lagoon was noted on three dates. The pre-breeding maximum was eight on 5 January. The maximum observed in 2008 was 33 on 26 September. Roosting birds included banded individuals originating from MCB Camp Pendleton, Fort Ord, and Moss Landing State Beach.

California least tern sightings, 2008
4/26 – 1 along beach
5/2 – 2 foraging east basin then courtship feeding on western saltpanne; 1 foraging and 3 roosting SW of nature center site
5/9 – 4 along beach
5/12 – 2 foraging off Stonebridge mesa, 1 off Rios, 5 along beach
5/16 – 3 along beach
5/18 – pair site-selecting east of east basin dike
6/9 – 1 off nature center site, 1 off Rios, 1 over west basin, 6 along beach
6/28 – 3 off nature center site
7/14 – adult with fledgling off Stonebridge mesa, 2 over east basin dike, 2 off nature center site, 3 off Rios, 3 along pole rd, 5 along beach
7/27 – 5 off nature center site
8/11 – 2 off Sta Carina, 4 off pole rd, 3 along beach

Western snowy plover sightings, 2008
1/5 – 7 south of restaurants, 1 at lagoon mouth (8 total)
1/11 – 2 south of restaurants
1/22 – 4 south of restaurants
2/1 – 1 foraging southwest of nature center site
2/8 – 6 south of restaurants
2/14, 22 – survey rained out
3/1 – none seen
3/7 – 5 south of restaurants
3/13 – none seen
3/21 – 1 south of restaurants
3/28 – 4 south of restaurants
4/4 – 3 south of restaurants
4/9 – 3 south of restaurants
4/18, 26, 30, 5/9, 16, 25, 6/27, 7/20, 25, 8/1, 10 – none seen
8/11 – 6 foraging north of Holmwood Cyn, 2 off pole rd
8/14 – 15 south of restaurants, including at least 4 fledglings
8/21 – 14 south of restaurants, including at least 4 fledglings
8/28 – 3 south of restaurants, including at least 1 fledgling
9/2 – 4 south of restaurants, including at least 1 fledgling
9/8 – 10 foraging off pole rd
9/9 – 12 south of restaurants
9/20 – 27 south of restaurants
9/26 – 33 south of restaurants
10/4 – 26 south of restaurants
10/10 – 15 south of restaurants
10/13 – 8 along beach
10/17 – 21 south of restaurants
10/24 – 5 south of restaurants
11/10 – 8 along beach
12/8 – 20 along beach

Bands observed:
BS-WG – obs. 3/21, unknown origin
OL-GL – obs. 8/21, originally Fort Ord 08
PB-RL – obs. 8/14, originally Moss Landing State Beach 08
S-K/M – obs. 2 on 8/14, 1 on 9/26, originally Camp Pendleton

California Least Tern and Western Snowy Plover Site and Project Summaries, 2009

Reported to USFWS and CDFG, Jan. 2010

By Robert Patton

San Elijo Lagoon and Cardiff State Beach

Potential foraging, roosting, and nesting sites of the endangered California least tern and western snowy plover at San Elijo Lagoon Ecological Reserve and Cardiff State Beach were checked up to weekly through 2009, with Shauna Wolf conducting surveys along the beach, Robert Patton monitoring potential nesting areas within the lagoon, and Robert Patton, Maryanne Bache, and Susan Welker coordinating volunteers along public access trails to conduct monthly bird counts.

Least terns were observed from 27 April through 10 August foraging throughout the lagoon and nearshore waters and roosting on mudflats in the lagoon. The maximum observed was 15 to 17 on 13 July. No nests were documented this season and no on-ground tern or plover activity observed on saltpanne east of the east basin dike or in other potential nesting areas. Human footprints, dog tracks, coyote and raccoon tracks were observed in the area, as were raptors and corvids.

Snowy plovers were observed on 12 January, 9 February, and 24 February through 11 April; and from 13 July through November. No breeding activity was documented, most observations were of roosting and/or foraging birds along the beach, and foraging on mudflats in the lagoon was noted on four dates. The pre-breeding maximum was 23 on 12 January. The maximum observed was 38 on 22 September. Roosting birds included banded individuals originating from Naval Radio Receiving Facility, Naval Amphibious Base Coronado, MCB Camp Pendleton, Bolsa Chica, Vandenberg AFB, Salinas NWR, and Moss Landing salt ponds.

- see also Wolf, S. 2009. Western snowy plover (*Charadrius alexandrinus nivosus*) and California least tern (*Sternula antillarum browni*) status at California Department of Parks and Recreation sites in San Diego County, October 16, 2008 through October 16, 2009. Unpubl. rept. to CDPR, San Diego, CA. 40pp.

2009 California least tern sightings, San Elijo Lagoon Ecological Reserve and Cardiff State Beach

4/27 – 1 off Nature Center site
5/11 – 1 foraging NE of Sta Carina, 2 NW of Sta Carina, 10 offshore
5/15 – 1 off Stonebridge mesa, at least1 offshore
6/8 – 1 offshore
7/13 – 2 NW of Rios, 15 offshore
7/23 – 1 fledgling along beach
8/10 – 5 offshore

2009 western snowy plover sightings, San Elijo Lagoon Ecological Reserve and Cardiff State Beach

1/6 – none seen

1/12 – 23 foraging & roosting along beach S of restaurants
1/15, 23, 29, 2/2 – none seen
2/9 – 5 on S beach
2/19 – none seen
2/24 – 13 on S beach
3/3 – 15 on S beach
3/13 – 13-17 on S beach
3/29 – survey aborted due to wind
4/2 – 5 on S beach
4/11 – 1 on S beach
4/17, 26, 5/1, 17, 6/22 – none seen
7/13 – 1 foraging W central basin
7/23 – 3 adults & 1 fledgling on S beach (4 total)
7/31 – 6 adults & 5 fledglings roosting N of Seaside parking lot (11 total)
8/6 - 7 adults & 2 fledglings roosting N of Seaside parking lot (9total)
8/10 – 20 foraging W central basin
8/14 - 6 adults & 4 fledglings roosting N of Seaside parking lot (10 total)
8/21 – 20-22 roosting N of Seaside parking lot
8/28 – none seen
9/4 – 31 roosting N of Seaside parking lot
9/11 – 36 roosting N of Seaside parking lot
9/14 – 10 foraging N of Rios
9/18 – 19 roosting N of Seaside parking lot
9/22 – 38 roosting N of Seaside parking lot
10/2 – 32-34 roosting N of Seaside parking lot
10/8 – 11 roosting N of Seaside parking lot
10/16 – none seen
10/29 – 19 roosting N of Seaside parking lot
11/9 – 35 foraging W central basin; later 2 roosting N of Seaside parking lot
11/20 – 25 roosting N of Seaside parking lot

Bands observed:
NW-RG – obs. 9/22, originally Vandenberg AFB 09
OO-YB – obs. 9/22, originally Salinas NWR 09
WP-RY – obs. 7/31, originally Moss Landing 09
YN-BG – obs. 10/8, originally captive-reared Bolsa Chica 09
YN-YR – obs. 9/4 & 11, originally captive-reared Bolsa Chica 08
S-F/K – obs.10/2, originally Naval Radio Receiving Facility 09
S-K/M – 1-3 obs. 7/31-10/8, originally Camp Pendleton
S-X – 1-2 obs. 2/24, 3/3, 19, 8/14, originally undetermined San Diego area
X-S – obs. 10/2, originally undetermined San Diego area (likely Tijuana Estuary)

APPENDIX I

BELDING'S SAVANNAH SPARROW SURVEY, SAN ELIJO LAGOON ECOLOGICAL RESERVE

Belding's savannah sparrow survey, San Elijo Lagoon Ecological Reserve, 2006

Conducted 8 and 12 May 2006 by Robert Patton and Maryanne Bache.
All observed savannah sparrows were mapped with annotations indicating behavior, including but not limited to pairing, singing, posting/perching, chasing, foraging, and flying. Care was taken to exclude song sparrows and non-Belding subspecies, and to distinguish between adults and fledglings. Pairs included those observed nest building and feeding young. Many birds were observed demonstrating multiple behaviors, but final tallies were based on the behavior most indicative of territoriality. For example, if a bird was observed flying, then posting, then singing, it was categorized as singing. All individuals observed involved in chases were seen to eventually pair, post, or sing, so chase does not appear as a category in the final tally. Birds observed in flight or foraging were not included in pair estimates since they likely were mates of those observed displaying territorial behaviors.

Pair estimates were based on apparent territories as indicated by behavior. Since posted, foraging, and flying individuals may represent mates of individuals singing, minimum pair estimates were derived from the number of observed pairs and the number observed singing. In areas where none were observed singing, half of the number of observed posted individuals was used for the minimum pair estimate. Maximum pair estimates were derived from the number of observed pairs, number singing, and number posted.

227 individual Belding's savannah sparrows were recorded, including 50 observed pairs. 123 to 152 breeding pairs/territories were estimated to be present.

A recent comparison of GIS habitat mapping data from 2002 and 2005 indicated that up to 30 percent of the tidal mudflats of the central basin had been replaced by encroaching saltmarsh. This is reflected in this survey's increase in Belding's savannah sparrow numbers and particularly in increased distribution and density in the central basin.

Summary by location:

West Basin – 38 individuals, 24-26 estimated pairs
Based on observations of
7 pairs (14 individuals)
17 singing
2 posted
4 foraging
1 fledgling (begging)

Central Basin – 159 individuals, 81-105 estimated pairs
Based on
- Central Basin West – 60 individuals, 35-40 estimated pairs
  - Based on observations of
  - 13 pairs (26 individuals)
  - 2 family groups (7 individuals)
  - 20 singing
  - 5 posted
  - 2 foraging
- Central Basin North – 56 individuals, 28-39 estimated pairs
  - Based on observations of
  - 10 pairs (20 individuals)
  - 1 family group (3 individuals)
  - 17 singing
  - 11 posted
  - 3 foraging
  - 2 flying
- Central Basin South – 43 individuals, 18-26 estimated pairs
  - Based on observations of
  - 7 pairs (14 individuals)
  - 2 family groups (7 individuals)
  - 1 singing
  - 16 posted
  - 5 foraging

East Basin – 30 individuals, 18-21 estimated pairs
- Based on observations of
- 8 pairs (16 individuals)
- 10 singing
- 3 posted
- 1 foraging

San Elijo Lagoon

Belding's savannah sparrow survey 5/8/06 & 5/12/06

PR = pair
S = singing
P = posted/perched
F = foraging
FL = fledgling

Belding’s Savannah Sparrow Survey, San Elijo Lagoon Ecological Reserve, 2009

Conducted 10 and 14 April 2009 by Robert Patton and Monica Alfaro.
All observed savannah sparrows were mapped with annotations indicating behavior, including but not limited to pairing, singing, posting/perching, chasing, foraging, and flying. Care was taken to exclude song sparrows and non-Belding subspecies, and to distinguish between adults and fledglings. Pairs included those observed nest building and feeding young. Many birds were observed demonstrating multiple behaviors, but final tallies were based on the behavior most indicative of territoriality. For example, if a bird was observed flying, then posting, then singing, it was categorized as singing. All individuals observed involved in chases were seen to eventually pair, post, or sing, so chase does not appear as a category in the final tally. Birds observed in flight or foraging were not included in pair estimates since they likely were mates of those observed displaying territorial behaviors.

Pair estimates were based on apparent territories as indicated by behavior. Since posted, foraging, and flying individuals may represent mates of individuals singing, minimum pair estimates were derived from the number of observed pairs and the number observed singing. In areas where none were observed singing, half of the number of observed posted individuals was used for the minimum pair estimate. Maximum pair estimates were derived from the number of observed pairs, number singing, and number posted.

222 individual Belding’s savannah sparrows were recorded. Sightings included 47 observed pairs, 44 singing individuals, 62 posted, and 22 foraging. 122 to 136 breeding pairs/territories were estimated to be present. At least 91 territories/pairs were confirmed by observed pairs and singing individuals and up to 153 were possible if all posted individuals represented separate territories.

Survey conditions were less than optimal due to precipitation the previous night/early morning, continuing cool and overcast conditions, and increasing wind late in the morning (at which point survey was aborted and rescheduled). Such conditions may have depressed singing and more visible behaviors. Monitors also noted increasing freshwater vegetation encroaching in areas of the east basin where saltmarsh habitat had previously been suitable and Belding’s savannah sparrows had been noted on surveys of previous years. Song sparrows appear to have displaced savannah sparrows in most such areas, particularly along the two creek drainages and west southwest of the Stonebridge mesa.

Comparison of GIS habitat mapping data from 2002 and 2005 indicated that up to 30 percent of the tidal mudflats of the central basin had been replaced by encroaching saltmarsh. This was reflected in the 2006 survey’s increase in Belding’s savannah sparrow numbers and particularly in increased distribution and density in the central basin. Total numbers in 2009 were remarkably similar to those of 2006 but distribution had shifted with notably fewer birds in the west basin (27 individuals in 2009, 38 in 2006) and northern central basin (29 individuals in 2009, 56 in 2006), and more concentrated in the western central basin (85 individuals in 2009, 60 in 2006).

Summary by location:

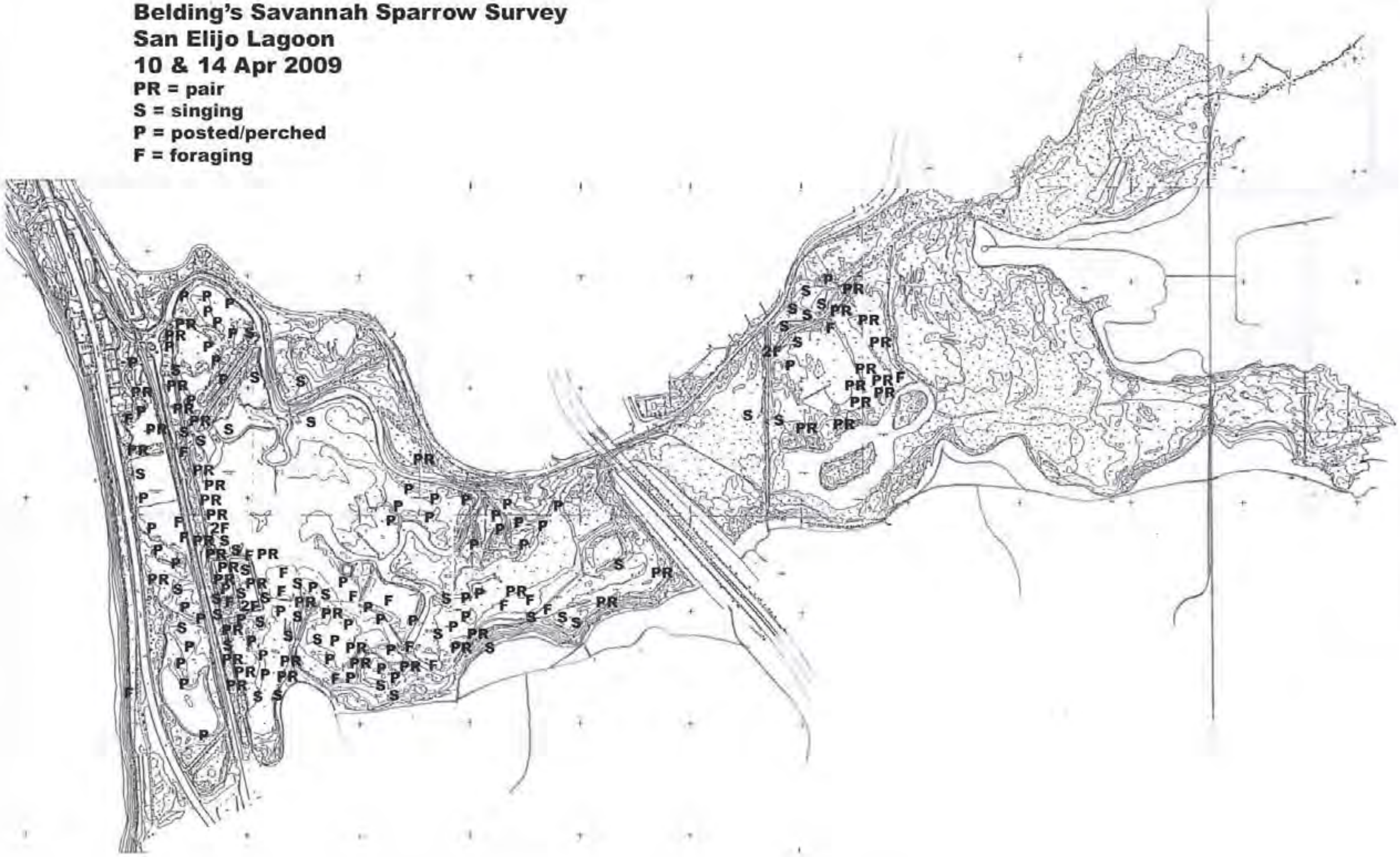
West Basin – 27 individuals, 14-19 estimated pairs
- Based on observations of
- 4 pairs (8 individuals)
- 3 singing
- 12 posted
- 4 foraging

Central Basin – 159 individuals, 90-98 estimated pairs
- Based on
- Central Basin West – 85 individuals, 47-52 estimated pairs
  - Based on observations of
  - 23 pairs (46 individuals)
  - 20 singing
  - 12 posted
  - 7 foraging
- Central Basin North – 29 individuals, 21-23 estimated pairs
  - Based on observations of
  - 1 pair (2 individuals)
  - 4 singing
  - 23 posted
- Central Basin South – 45 individuals, 22-23 estimated pairs
  - Based on observations of
  - 8 pairs (16 individuals)
  - 9 singing
  - 12 posted
  - 8 foraging

East Basin – 36 individuals, 18-19 estimated pairs
- Based on observations of
- 11 pairs (22 individuals)
- 8 singing
- 3 posted
- 3 foraging

Belding's Savannah Sparrow Survey
San Elijo Lagoon
10 & 14 Apr 2009

PR = pair
S = singing
P = posted/perched
F = foraging



APPENDIX J

LIGHT-FOOTED CLAPPER RAIL SIGHTINGS FROM SAN ELIJO LAGOON MONTHLY BIRD COUNTS

Compilation of monthly bird count data, 2006
San Elijo Lagoon Ecological Reserve
Light-footed Clapper Rail

Summary by location of sightings and spontaneous calling recorded January through May, 2006 (see map):

1 – pair, north end Rios Ave. – duet 1/9/06, observation 3/13/06
2 – individual, SE nature center site – observation 5/12/06, kekking & kek-burr 5/14/06
3 – individual, east central basin – kekking 1/9/06
4 – individual, NE I-5, calling 2/13/06
5 – individual, SE I-5, calling 2/13/06
6 – pair, SW dike, duet 1/9/06 & 5/8/06, observation 5/8/06
7 – individual, SE dike, calling 2/13/06
8 – individual, south of islands, calling 2/13/06
9 – individual, NW Sta Carina, calling 2/13/06
10 – pair, NE of islands, duet 5/8/06
11 – individual, N of Sta Carina, calling 2/13/06 & 4/10/06
12 – pair, NE Sta Carina, kekking 2/13/06 & 4/10/06, duet 5/8/06
13 – individual, NW of Sta Helena, calling 2/13/06
14 – individual, N of Sta Helena, kekking 4/10/06
15 – individual, NE of Sta Helena, calling 2/13/06
16 – individual, SW of Stonebridge, kek-burr 4/10/06, clappering 5/8/06
17 – individual, W of Stonebridge, kekking 1/9/06 & 3/13/06, kek-burr 4/10/06 & 5/8/06
18 – pair, NW Stonebridge, kekking 1/9/06, 2/13/06, & 3/13/06, duet 4/10/06
19 – pair, west Escondido Cr, kekking 1/9/06 & 2/13/06, duet 3/13/06 & 4/10/06
20 – pair, N Stonebridge Escondido Cr, duet 4/10/06 & 5/8/06
21 – individual, NW power lines, clappering 5/8/06

"Calling" indicates vocalization not described at the time. Additional sightings were neither described nor mapped by participants:
2 east basin south 1/9/06
4 central basin south 3/13/06
4 east basin south 3/13/06
1 east basin south 4/10/06

Richard Zembal reported that call playback surveys indicated 12 pairs present, although Escondido Creek was not included. The three pairs documented by monthly surveys along Escondido Creek would thus bring the total to 15 pairs.

It is possible that individuals at locations 4 & 5 were part of the pair documented at location 6, similar situation may exist for locations 9, 10, and 11, for 12 and 13, and for 14 and 15.

Compiled by Robert Patton, 5/14/06

San Elijo Lagoon

Spring 2006 compilation of

Light-footed Clapper Rail locations

2007 Light-footed Clapper Rail sightings from monthly bird counts (see map):

Location #1 – SE nature center site –
1/17/07 spontaneous kekking
3/12/07 spontaneous kekking
4/1/07 duet
4/9/07 spontaneous kekking
4/29/07 spontaneous kekking

2 – N of Rios Ave –
4/9/07 spontaneous kekking

3 – SW east basin dike –
2/12/07 spontaneous kekking
4/9/07 spontaneous kekking

4 – SE east basin dike –
4/9/07 spontaneous kekking

5 – NW of Stonebridge mesa/W Escondido Cr –
4/9/07 spontaneous kekking
5/14/07 spontaneous kekking

6 – S of NW Stonebridge mesa -
7/9/07 spontaneous kekking

7 – W of Stonebridge mesa –
1/8/07 spontaneous kekking
2/12/07 spontaneous kekking
3/12/07 spontaneous kekking
4/9/07 kek-bur
6/11/07 spontaneous kekking

8 – W of SW Stonebridge mesa/N of Sta Carina -
6/11/07 spontaneous kekking

9 – NE of Sta Carina –
(1/8/07 spontaneous kekking reported in 2 locations between I-5 & El Camino Real, but sites not specified)
4/9/07 observed preening on edge of reeds
6/11/07 spontaneous kekking
7/9/07 spontaneous kekking

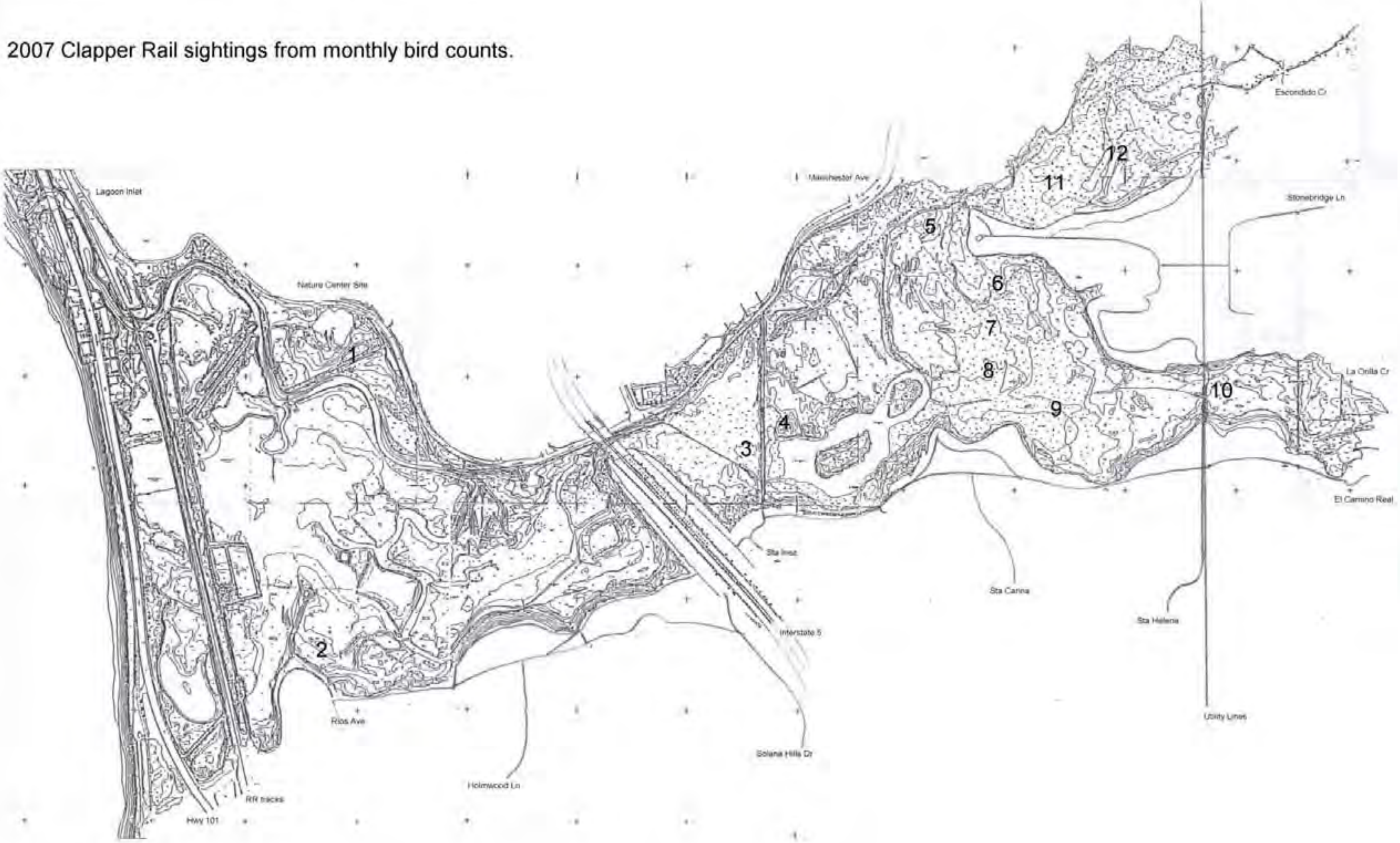
10 – N of Sta Helena/E of powerlines S of Stonebridge mesa -
(1/8/07 spontaneous kekking reported in 2 locations between I-5 & El Camino Real, but sites not specified)

4/9/07 spontaneous kekking
6/11/07 spontaneous kekking

11 – N of Stonebridge mesa/Escondido Cr –
3/12/07 spontaneous kekking
4/9/07 kek-bur
5/14/07 spontaneous kekking
6/11/07 spontaneous kekking
7/9/07 spontaneous kekking

12 – N of Stonebridge, E of treeline/W of powerlines, Escondido Cr
2/12/07 spontaneous kekking

2007 Clapper Rail sightings from monthly bird counts.



2008 Light-footed Clapper Rail sightings from monthly bird counts (see map):

Location #1 – E of RR trestle -
2/1 spontaneous kekking

2 – SW of nature center site –
7/27 spontaneous kek-bur
9/4 spontaneous kekking
9/8 visual observation
10/3 spontaneous duet
12/3 spontaneous duet

3 – N of old treatment plant –
7/14 visual observation of 2

4 – mid-central basin –
8/11 visual observation of 3

5 – N of Rios Ave –
7/14 visual observation W of peninsula
9/8 visual observation of 2 – one on each side of peninsula
10/13 visual observation of 2 on E side of peninsula, 3rd calling

(9/8 spontaneous kekking reported in 3 locations along utility road NW of Rios Ave, but sites not specified
12/8 spontaneous kekking reported in 2 locations between I-5 & Rios Ave, but sites not specified)

6 – SW east basin dike –
3/10 spontaneous duet
4/14 spontaneous kekking

7 – NW of Sta Carina
7/14 spontaneous duet

8 – NW of Stonebridge mesa/W Escondido Cr –
5/12 spontaneous duet NE of NW tip of mesa
7/8 “heard” NE of NW tip of mesa
9/10 spontaneous duet W of NW tip of mesa
11/10 spontaneous duet W of NW tip of mesa

9 – N of Stonebridge mesa/Escondido Cr (west of row of willows)
4/14 spontaneous duet
7/14 spontaneous kekking
9/8 spontaneous kek-bur
11/10 spontaneous kekking

10 – S of NW Stonebridge mesa -
7/14 spontaneous clappering
11/10 spontaneous duet
12/8 spontaneous duet

11 – W of Stonebridge mesa –
2/11 spontaneous clappering
4/14 spontaneous kekking
5/12 spontaneous clappering
7/14 visual observation, 2nd kekking
12/8 spontaneous duet

12 – SW of SW Stonebridge mesa -
8/11 visual observation of 2, 3rd kekking
9/8 visual observation of 2
10/13 “heard 2”
11/10 spontaneous kekking

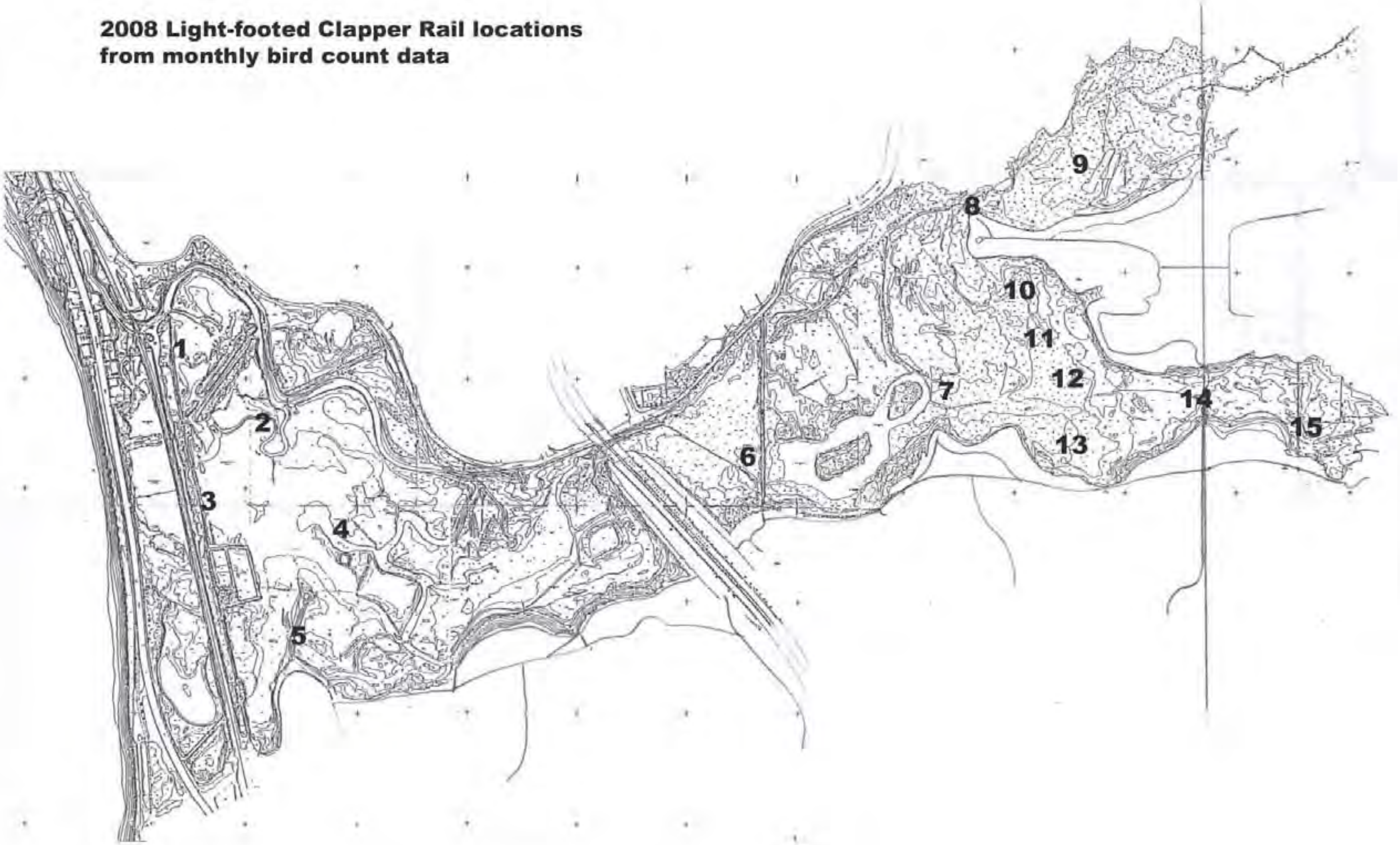
13 – NE of Sta Carina –
2/11 “heard”
7/14 spontaneous kek-bur
9/8 “heard”

14 - N of Sta Helena/W of powerlines S of Stonebridge mesa -
2/11 spontaneous kekking
4/14 spontaneous kekking

15 - NE of Sta Helena/E of powerlines S of Stonebridge mesa -
1/14 spontaneous clappering

(4/14 spontaneous kekking reported in 3 locations between I-5 & El Camino Real, but sites not specified
11/10 spontaneous kekking reported in 3 locations between I-5 & El Camino Real, but sites not specified
12/8 spontaneous kekking reported in 1 location between I-5 & El Camino Real, but sites not specified)

2008 Light-footed Clapper Rail locations from monthly bird count data



2009 Light-footed Clapper Rail sightings from monthly bird counts (see map):

Location #1 – E of RR trestle -
9/14 spontaneous kekking

2 – SW of nature center site –
1/1 spontaneous kekking
2/27 spontaneous kekking
6/1 visual observation
8/10 visual observation
9/14 “heard”

3 – mid-central basin –
4/13 “calling” from 2 locations
4/14 spontaneous kek-bur
8/11 “calling”
11/9 spontaneous kekking

4 – N of Rios Ave –
1/12 visual observation E of peninsula
6/8 visual observation E of peninsula
7/13 visual observation of 2 to E of peninsula
(8/10 reported 7 along utility road NW of Rios Ave, but sites not specified)
9/14 “heard” one on each side of peninsula
(10/12 reported 2 along utility road NW of Rios Ave, but sites not specified)

5 – NE of Rios Ave –
9/14 “heard”

6 – SW east basin dike –
1/12 spontaneous kekking
3/29 spontaneous kekking
8/10 spontaneous kekking

7 – SE east basin dike –
1/12 spontaneous kekking
3/29 spontaneous duet
9/14 visual observation

8 – E of E east basin dike/N of islands –
4/14 spontaneous kek-bur

9 – NW of Stonebridge mesa/W Escondido Cr (W of NW tip of mesa) –
8/10 spontaneous kekking
11/9 spontaneous kek-bur

10 – N of NW Stonebridge mesa/W Escondido Cr (NE of NW tip of mesa) –
1/12 spontaneous kek-bur
5/11 clappering then visual observation
5/16 spontaneous kek-bur
8/10 spontaneous kekking
9/14 spontaneous kekking

11 – N of Stonebridge mesa/Escondido Cr (west of row of willows)
2/19 spontaneous duet
9/14 spontaneous kek-bur
11/9 spontaneous kekking

12 – W of powerlines N of Stonebridge mesa/Escondido Cr -
2/9 spontaneous kek-bur
4/13 visual observation

13 – S of NW Stonebridge mesa –
1/12 "calling"
2/9 "calling"
3/9 spontaneous duet
4/13 spontaneous duet
5/11 spontaneous duet
5/15 spontaneous kekking
7/13 spontaneous kekking
8/10 spontaneous kek-bur

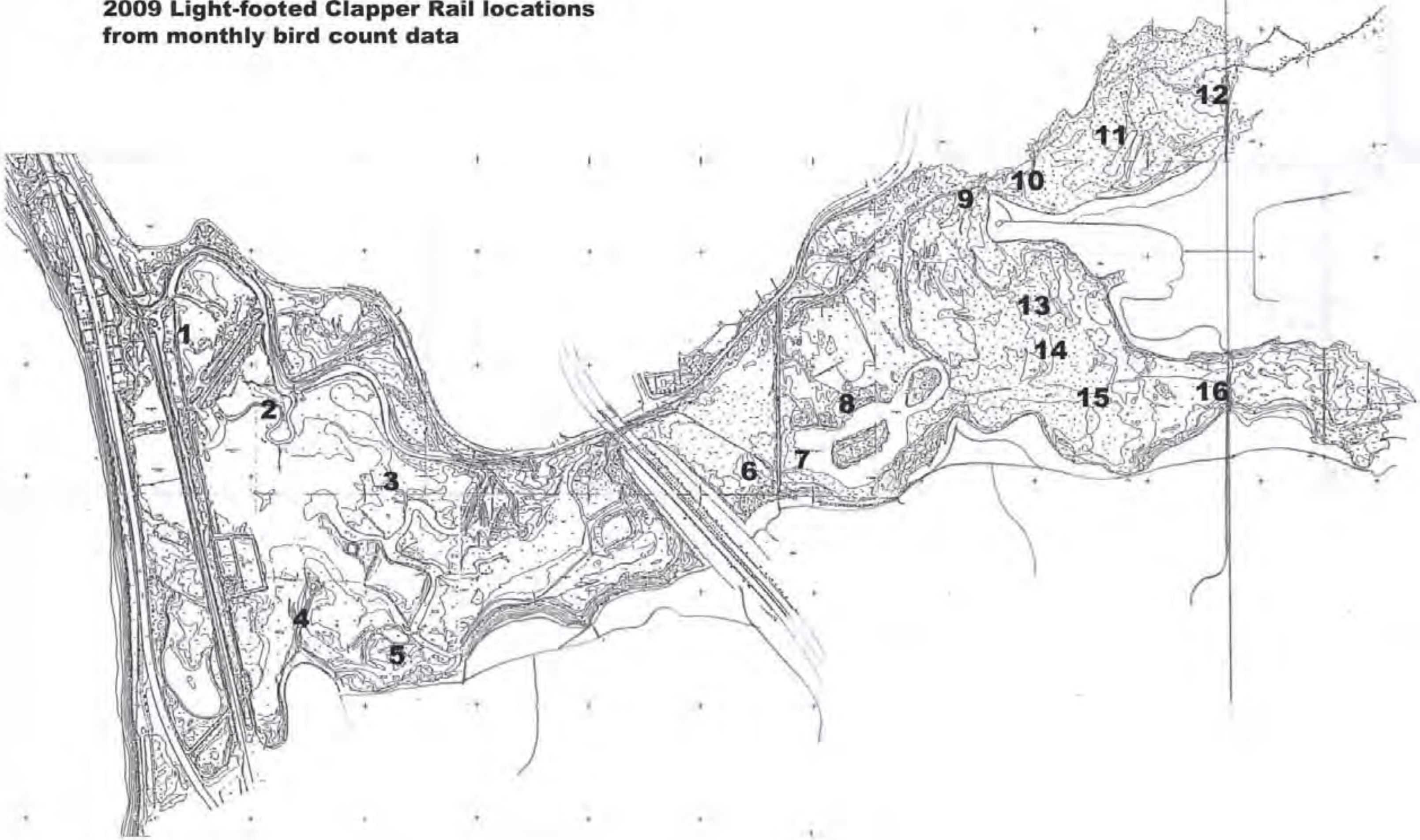
14 – W of Stonebridge mesa –
1/12 "calling"
2/9 "calling"
3/9 spontaneous clappering
4/13 spontaneous kekking
4/14 spontaneous kekking
5/11 spontaneous clappering
5/15 spontaneous kekking
6/8 spontaneous clappering
7/13 spontaneous kekking

15 – SW of SW Stonebridge mesa/NE of Sta Carina -
5/11 spontaneous kek-bur
6/8 spontaneous duet
8/10 spontaneous kekking

16 - N of Sta Helena/W of powerlines S of Stonebridge mesa -
3/9 spontaneous kekking

(5/15 spontaneous kekking reported in 1 location between I-5 & El Camino Real, but site not specified)

2009 Light-footed Clapper Rail locations from monthly bird count data



APPENDIX K

2013 LIGHT-FOOTED CLAPPER RAIL MANAGEMENT, STUDY, AND PROPAGATION IN CALIFORNIA

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

Richard Zembal, Susan M. Hoffman, and John Konecny
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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		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
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		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	
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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Master Bird Banding Permit No. 22420, Federal Fish and Wildlife Permit No. TE839480, and a Scientific Collecting Permit and Memorandum of Understanding issued by the California Department of Fish and Game to Richard Zembal. Funding for this project was provided by the U. S. Fish and Wildlife Service Grant-in-Aid for threatened and endangered species program (Section 6). This report is dedicated to the memory of Loren Hays whose encouragement and insight helped keep the senior author involved in the rail efforts.

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APPENDIX L

2010 ENDANGERED SPECIES UPDATE

San Elijo Lagoon and Adjacent Areas, Avian Endangered Species Update, 2010

Draft compiled by R. Patton

Light-footed Clapper Rail

R. Zembal reported that surveys conducted using call-playback in spring documented 15 breeding pairs and additional non-paired individuals (Zembal, R., S.M. Hoffman, and J. Konecny. 2010. Status and Distribution of the Light-footed Clapper Rail in California, 2010. California Department of Fish and Game, Wildlife Management, Nongame Wildlife Unit Report, 2010-01. Sacramento, CA 20pp.). Distribution included 11 pairs in the central basin and four pairs in the east basin with additional un-paired individuals along Escondido Creek. The carcass of one of the captive-reared rails released in 2009 was recovered after being depredated in 2010.

See attached map compiled from results of monthly bird counts. Individuals were observed and/or heard calling from at least 23 locations in each of the three basins and along Escondido Creek. Dueting pairs were detected to the NW of Rios Ave, between Rios Ave and the nature center site, NE of Rios Ave, SW of Manchester Ave and Ocean Cove, NNE of Santa Carina, NE of Santa Carina, SW of the eastern mesa, and north of the eastern mesa. Multiple individuals were observed together SE of Las Olas, along the channel at the nature center site, NW of Rios Ave, and east of Rios Ave. Chicks were also observed NW of Rios Ave.

Western Snowy Plover

Observed numbers:

1/11/10	7	roosting on beach
1/16	10	roosting on beach; including bands S-K/L
1/20	9	roosting on beach
1/27	0	
2/3	0	
2/8	3	roosting on beach
2/9	0	
2/18	0	
2/25	0	
3/1	0	
3/8	4	foraging on mudflats WSW of nature center site
4/12	0	
4/15	0	
5/2	0	
5/10	0	
5/21	0	
5/22	0	
6/14	0	
6/28	0	
7/12	0	
7/16	0	
7/22	0	
7/30	5	roosting on beach; including 3 fledglings, including band S-X
8/6	34	roosting on beach; including 9 fledglings; including bands S-K/M, S-R/K, 3 fledglings S-X
8/9	12	5 roosting on beach, 7 foraging on mudflats WSW of nature center site
8/13	18	roosting on beach; including 2 fledglings; including bands YS-GW, S-K/M, fledgling S-X
8/20	23	roosting on beach; including 2 fledglings; including bands WY-OA, S-K/M

8/27	31	roosting on beach; including 11 fledglings; including bands YA-AA, S-K/M
9/3	28	roosting on beach; including 4 fledglings; including bands S-K/M
9/10	21	roosting on beach; including 2 fledglings; including bands S-K/M
9/13	33	roosting on beach; including 3 fledglings; including bands S-K/M
9/20	1	roosting on beach
9/30	0	(cancelled due to weather)
10/10	17	roosting on beach; including bands S-K/L, S-X
10/11	9	8 roosting on beach, 1 foraging on mudflats WSW of nature center site
10/15	27	roosting on beach; including bands S-K/M, S-X
10/22	11	roosting on beach; including bands S-K/M
11/8	1	roosting on old roadbed north of Seaside parking lot gate
11/16	0	
12/13	22	roosting on beach

Bands observed and site of origin:

S-K/L	1/16, 10/10	Naval Amphibious Base, Coronado, ocean-facing beach
S-K/M	8/6-9/13, 10/15-22	MCB Camp Pendleton
S-R/K	8/6	Batiquitos Lagoon
S-X	7/30-8/13, 10/10-15	San Diego County unspecified sites, included both adults and fledglings
WY-OA	8/20	Moss Landing Salt Ponds fledgling
YA-AA	8/27	Salinas State Beach fledgling
YS-GW	8/13	originally YN-GW but lost color tape; Bolsa Chica captive-reared fledgling

(bands read top then bottom, left-right; colors: A= aqua, B=blue, G=green, K=black, L=lime, M=mauve, N=tan, O=orange, R=red, S=metal service band, W=white, Y=yellow, X=no bands on that leg)

Excerpt from "California Least Tern and Western Snowy Plover Site and Project Summaries, 2010: San Elijo Lagoon Ecological Reserve, San Diego County Regional Airport Authority, San Diego Unified Port District, San Diego National Wildlife Refuge Complex, and Border Field State Park Sites", unpublished report by R. Patton to USFWS and CDFG, Jan. 2011:

Potential foraging, roosting, and nesting sites of the endangered California least tern and western snowy plover at San Elijo Lagoon Ecological Reserve and Cardiff State Beach were checked up to weekly through 2010, with Shauna Wolf conducting surveys along the beach, Robert Patton monitoring potential nesting areas within the lagoon, and Robert Patton, Maryanne Bache, and Susan Welker coordinating volunteers along public access trails to conduct monthly bird counts.

Snowy plovers were observed from 11 to 20 January, 8 February, and 8 March; and from 30 July through November. No breeding activity was documented, most observations were of roosting and/or foraging birds along the beach, and foraging on mudflats in the lagoon was noted on three dates. The pre-breeding maximum was 10 on 16 January. The maximum observed was 33 on 13 September. Roosting birds included banded individuals originating from Naval Amphibious Base Coronado, MCB Camp Pendleton, Bolsa Chica, Salinas State Beach, and Moss Landing salt ponds.

Excerpt from "Western Snowy Plover (*Charadrius alexandrinus nivosus*) and California least tern (*Sternula antillarum browni*) status at California Department of Parks and Recreation sites in San Diego County, October 17, 2009 through October 15, 2010", unpublished report by S. Wolf to CDPR, Dec. 2010:

Cardiff State Beach

There is no suitable nesting habitat for any bird species on this beach. However, the beach is well used by a variety of shorebirds during the non-nesting season, including a flock of WSP. The size of the flock varied between one and 34 birds. The maximum of 34 was observed August 6, 2010 (Appendix A), which is a slight decrease from the maximum of 38 recorded in 2009. The flock roosts approximately 0.8 km south of the San Elijo Lagoon mouth and is very rarely found in other areas. When disturbed by pedestrians and dogs the WSP usually circle around and are back in their preferred roosting area within a very short amount of time. The reason that the WSP have such a strong preference for that area is unclear, although there are two possible factors. One possibility is that the beach seems to be slightly wider in that area and would provide more roosting area as the tide comes in. Another important feature of this area is that parking along the highway is prohibited there. Even on the busiest days there are noticeably fewer people in the WSP roosting area, with most people on the beach staying closer to the parking areas, both along the highway and at the north and south parking lots. The second favorite roost area this year appears to be the dirt and cobble area that was created when the south parking lot was re-designed in 2006/2007. This area has quite a few footprints, but people usually just walk through and don't stay there.

There were CLT observed on only one survey, which was the same as in 2009, but a decrease from 2008 when there were three surveys with CLT observed. There were fewer surveys in May in both 2010 and 2009 compared to 2008, and since two of the 2008 sightings were in May that could explain the difference. No banded CLT were observed.

This is the only site where dogs are allowed. All dogs are supposed to be leashed, but the percentage of dogs that were leashed varied widely. During most surveys the majority of dogs were leashed. However, there were also a number of people that would leash their dog when the monitor or lifeguard was nearby, and unleash their dog again once the monitor or lifeguard was farther away. In general a higher percentage of dogs tend to be leashed when the beach is the busiest. A lower percentage tend to be leashed when there are fewer people on the beach and at times when people don't expect there to be any enforcement, such as early morning or in the evening. Kitesurfers were observed during two surveys (Table 1). In both cases they appeared to stay at the south end of the south beach.

California Least Tern

Observed numbers:

(see above western snowy plover for all survey dates)

5/2/10	1	foraging
6/14	15-19	15 along beach, 4 over east basin
6/28	1	fledgling foraging over south end of west basin
7/12	7-9	5 along beach, 1 off Rios, 2-3 over east basin
8/9	1	fledgling off Rios

Excerpt from "California Least Tern and Western Snowy Plover Site and Project Summaries, 2010: San Elijo Lagoon Ecological Reserve, San Diego County Regional Airport Authority, San Diego Unified Port District, San Diego National Wildlife Refuge Complex, and Border Field State Park Sites", unpublished report by R. Patton to USFWS and CDFG, Jan. 2011:

Potential foraging, roosting, and nesting sites of the endangered California least tern and western snowy plover at San Elijo Lagoon Ecological Reserve and Cardiff State Beach were checked up to weekly through 2010, with Shauna Wolf conducting surveys along the beach, Robert Patton monitoring potential nesting areas within the lagoon, and Robert Patton, Maryanne Bache, and Susan Welker coordinating volunteers along public access trails to conduct monthly bird counts.

Least terns were observed in very limited numbers from 2 May through 10 August foraging throughout the lagoon and nearshore waters and roosting on mudflats in the lagoon. The maximum observed was 15 to 19 on 14 June. No nests were documented this season and no on-ground tern or plover activity observed on saltpanne east of the east basin dike or in other potential nesting areas. Human footprints, dog tracks, coyote and raccoon tracks were observed in the area, as were raptors and corvids.

Southwestern Willow Flycatcher

One was reported along the La Orilla Trail west of El Camino Real 5/15/10 and was likely migrating through the area.

California Gnatcatcher

See attached map compiled from results of monthly bird counts. Individuals were observed and/or heard calling from at least 35 locations in the central and east basins. Nesting was confirmed with an incubating bird visible from the trail east of Rios Ave and observations of adults feeding fledglings. Additional pairs were undoubtedly not documented since no focused surveys were conducted nor were areas away from public trails accessed.

Least Bell's Vireo

Individuals were reported singing in the willows of the nature center site on 3/24/10; near Escondido Creek, ESE of Mira Costa College on 7/12/10; and NE of the Rios Ave trailhead on 8/9/10. The lack of detected singing through the majority of the nesting season indicates each of these were likely migrating through the area.

Belding's Savannah Sparrow

Monthly bird counts yielded minimum numbers of observed individuals within subareas of the lagoon. Additional birds were present but not documented since no focused surveys were conducted nor were areas away from public trails accessed. The peak numbers in April and May included observations of fledglings.

(WB=west basin, CBW=central basin west, CBN=central basin north, CBS=central basin south, EBN=east basin north, EBS=east basin south)

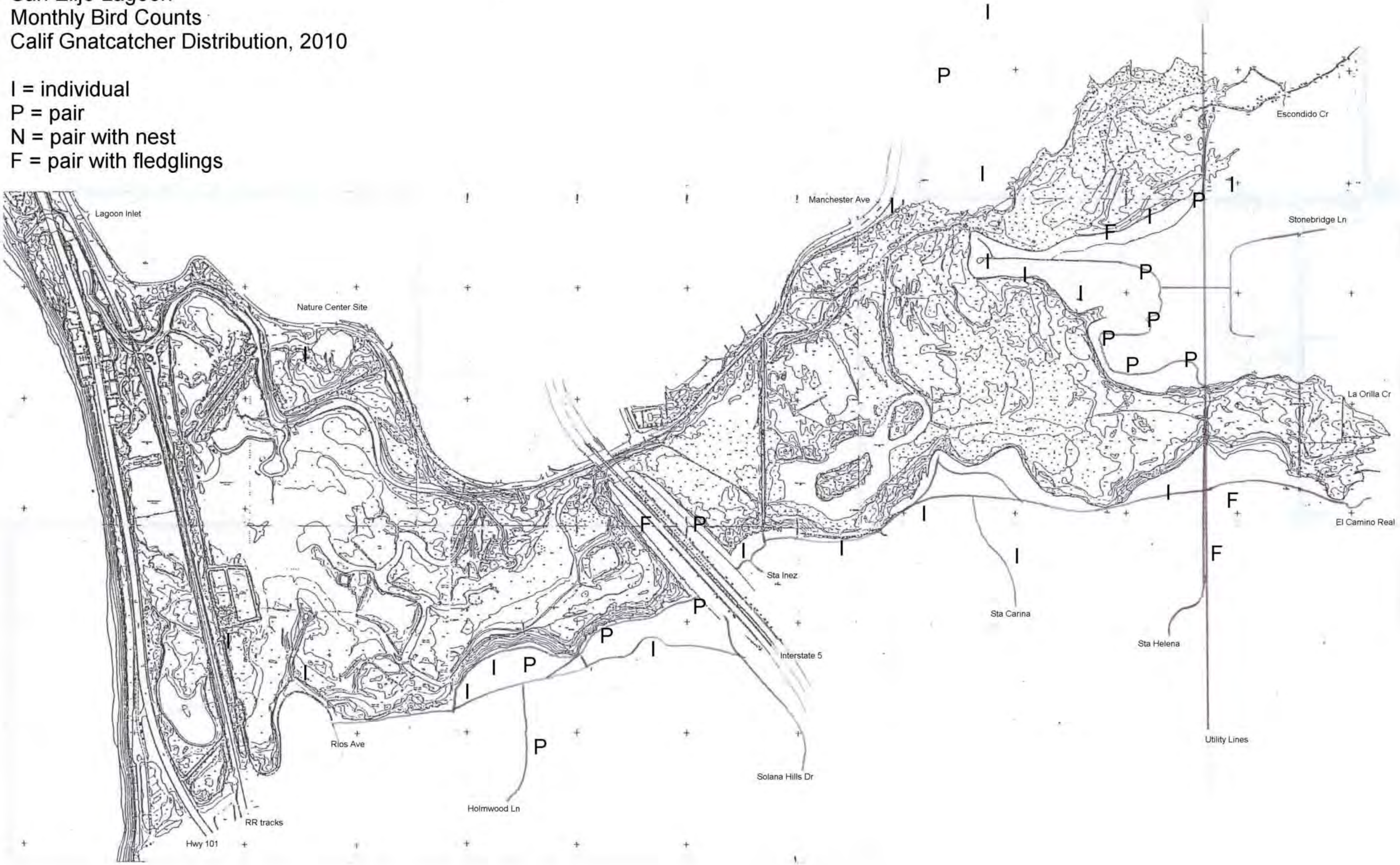
	WB	CBW	CBN	CBS	EBN	EBS
1/11	10	31	18	3	5	2
2/8	10	22	0	8	3	0
3/8	10	28	2	1	9	0
4/12	7	40	7	23	13	0
5/10	7	39	5	12	15	0
6/14	15	15	1	12	22	0
7/12	10	4	5	25	4	0
8/9	6	15	0	8	4	0
9/13	7	9	0	12	8	0
10/11	10	23	0	6	8	0
11/8	5	10	0	2	3	0
12/13	3	12	5	7	13	0

San Elijo Lagoon
Monthly Bird Counts
Clapper Rail Distribution, 2010

I = individual
P = pair
F = pair with chicks or fledglings

San Elijo Lagoon
Monthly Bird Counts
Calif Gnatcatcher Distribution, 2010

I = individual
P = pair
N = pair with nest
F = pair with fledglings



APPENDIX M

2011 ENDANGERED SPECIES UPDATE

San Elijo Lagoon and Adjacent Areas, Avian Endangered Species Update, 2011

Draft compiled by R. Patton

Light-footed Clapper Rail

See attached map compiled from results of monthly bird counts. Individuals were observed and/or heard calling from at least 23 locations in each of the three basins and along Escondido Creek. A rail was observed as far upstream as the La Bajada bridge on 5 July.

Excerpt from Zembal, R., S.M. Hoffman, J. Konecny, L. Conrad, C. Gailband, and M. Mace. 2011. Light-footed Clapper Rail Management, Study, and Propagation in California, 2011. California Department of Fish and Game, Wildlife Management, Nongame Wildlife Unit Report, 2011-02. Sacramento, CA 29pp.:

The San Elijo Lagoon subpopulation was back up to its record high level of 15 nesting pairs in 2010 and 2011. 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 particularly inland of the weir during high rainfall years. Ten of the vocalizing rails detected in 2011 were in fresh water marsh growth along the lagoon edges and Escondido Creek and 5 were in salt marsh habitat. Of the total, 7 pairs were in the east basin including 2 in the northeast along the creek and 8 pairs were in the Central Basin. San Elijo received an augmentation of 8 captive-bred rails in 2004, 5 in 2006, 4 in 2007, and 16 in 2009 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.

Western Snowy Plover

Observed numbers:

1/10/11	20	roosting on beach
1/20	9-10	along beach
1/28	12	roosting on beach
2/4	22	roosting on beach
2/11	4	roosting on beach
2/14	26	along beach
2/5	18-20	along beach
2/25	0	survey cancelled due to weather
3/3	29	roosting on beach
3/10	23	roosting on beach
3/14	25	along beach
3/18	10	roosting on beach
3/22	19	roosting on beach
3/31	15	roosting on beach
4/7	11	roosting on beach
4/11	7	along beach
4/15	6	roosting on beach
4/27	0	
5/5	0	
5/9	0	
5/13	0	
5/25	0	
6/12	0	
6/13	0	
6/29	0	
7/8	0	

7/11	0	
7/14	0	
7/22	18	roosting on beach
7/27	29	roosting on beach
8/4	30	roosting on beach
8/8	32	along beach
8/12	40-44	along beach
8/19	31+	along beach
8/26	52	roosting on beach
9/1	38	roosting on beach
9/5	62	roosting on beach
9/12	42-43	42 along beach, 1 foraging on west basin mudflats
9/16	62	roosting on beach
9/23	64	roosting on beach
9/29	76-86	along beach
10/6	57	roosting on beach
10/10	52	along beach
10/14	54	roosting on beach
11/14	11	along beach
11/28	30	roosting on beach
12/11	26	roosting on beach
12/12	7	along beach

Bands observed and site of origin:

BR-YN	7/27-29	Bolsa Chica captive-reared 2011
LY-GO	9/29	Reservation Rd (N of Ft Ord) 2011
NB-BW	8/26	Vandenberg AFB 2006
OO-RO	7/22	Salinas NWR 2011
S-K/L	8/12, 10/14, 11/28	Naval Amphibious Base, Coronado, ocean-facing beach prior to 2011
S-K/M	1/28, 3/3-31, 7/27-10/14	MCB Camp Pendleton prior to 2009
S-R/K	3/3-10, 8/12-9/16	Batiquitos Lagoon 2010
S-X	1/28, 2/15, 3/10-31, 4/15, 7/22-10/14, 11/28, 12/11	San Diego County unspecified sites, included both adults and fledglings, up to 2 each with maximum 5 together at once
VG-BG	8/26	Oceano Dunes 2011

(bands read top then bottom, left-right; colors: B=blue, G=green, K=black, L=lime, M=mauve, N=tan, O=orange, R=red, S=metal service band, W=white, Y=yellow, X=no bands on that leg)

Excerpt from "California Least Tern and Western Snowy Plover Site and Project Summaries, 2011: San Elijo Lagoon Ecological Reserve, San Diego County Regional Airport Authority, San Diego Unified Port District, San Diego National Wildlife Refuge Complex, and Border Field State Park Sites", unpublished report by R. Patton to USFWS, Jan. 2012:

Potential foraging, roosting, and nesting sites of the endangered California least tern and western snowy plover at San Elijo Lagoon Ecological Reserve and Cardiff State Beach were checked up to weekly through 2011, with Shauna Wolf conducting surveys along the beach, Robert Patton and Maryanne Bache monitoring potential nesting areas within the lagoon, and coordinating volunteers along public access trails to conduct monthly bird counts.

Snowy plovers were observed from January through mid-April and from late July through December. No breeding activity was documented, most observations were of roosting and/or foraging birds along the beach, and foraging on mudflats in the lagoon was noted on one date. The pre-breeding maximum was 29 on 3 March. The maximum observed was 76 to 86 on 29 September. Roosting birds included banded individuals originating from Naval Amphibious Base Coronado, Batiquitos Lagoon, MCB Camp Pendleton, Bolsa Chica, Vandenberg AFB, Oceano Dunes, Reservation Rd (Ft Ord/Monterey), and Salinas NWR.

Excerpt from "Western Snowy Plover (*Charadrius nivosus nivosus*) and California least tern (*Sternula antillarum browni*) status at California Department of Parks and Recreation sites in

San Diego County, October 18, 2010 through October 15, 2011", unpublished report by S. Wolf to CDPR, Nov. 2011:

Cardiff State Beach

There is no suitable nesting habitat for any bird species on this beach. However, the beach is well used by a variety of shorebirds during the non-nesting season, including a flock of WSP. The size of the WSP flock varied between one and 76 birds. The maximum of 76 was observed September 29, 2011 (Appendix A), which is twice as many as the previous high of 38 on September 22, 2009. It is possible that there were up to 86 WSP on September 29, 2011, but they were not observed in one group and the WSP were moving around between two groups making it possible that a few were double-counted. The WSP were very late returning to TPSR this year, so it is possible that the flock at CSB was a combination of birds that normally winter at CSB & TPSR. In the past the flock roosted on the beach approximately 0.8 km south of the San Elijo Lagoon mouth and was very rarely found in other areas. However, in 2011 the flock was more frequently found roosting on a cobble/dirt shelf that was created when the old parking lot was torn up and re-designed in 2006/2007. It is unknown why the WSP changed their preferred roosting area. There does not appear to be any less human disturbance on the cobble/dirt shelf than there is on the beach.

There were CLT observed on only one survey, which was the same as in 2009 & 2010, but a decrease from 2008 when there were three surveys with CLT observed. No banded CLT were observed.

This is the only site where dogs are allowed. All dogs are supposed to be leashed, but the percentage of dogs that were leashed varied widely. During most surveys the majority of dogs were leashed. However, there were also a number of people that would leash their dog when the monitor or lifeguard was nearby, and unleash their dog again once the monitor or lifeguard was farther away. In general a higher percentage of dogs tend to be leashed when the beach is the busiest. A lower percentage tend to be leashed when there are fewer people on the beach and at times when people don‟t expect there to be any enforcement, such as early morning or in the evening.

On February 25, 2011 the survey was canceled due to wind. While the monitor was at the site three kitesurfers were observed (Table 1). Two were setting up at the north beach and the third was surfing along the south beach. Kitesurfers were not observed during any other surveys.

California Least Tern

Observed numbers:

(see above western snowy plover for all survey dates)

6/12/11	2-3	2 foraging in south west basin, 1 in east basin
7/11	5-7	1 along beach, 1 foraging west basin, 2 over east basin dike, 3 foraging north of Sta Helena-Sta Carina
7/22	1	1 fledgling along beach
8/8	2	2 along beach

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Least terns were observed in very limited numbers and only relatively late in the season this year. Two to three were reported on 12 June and five to seven on 11 July foraging throughout the lagoon and nearshore waters and roosting on mudflats in the lagoon. One fledgling was observed along the beach on 22 July and two adults on 8 August. No nests were documented this season and no on-ground tern or plover activity observed on saltpanne east of the east basin dike or in other potential nesting areas. Human footprints, dog tracks, coyote and raccoon tracks were observed in the area, as were raptors and corvids.

On 8 August, a raven was observed depredating avocet eggs on the saltpanne adjacent to the east basin dike in the area where terns and plovers last nested.

Southwestern Willow Flycatcher

None were reported within the Reserve this season.

California Gnatcatcher

See attached map compiled from results of monthly bird counts. Individuals were observed and/or heard calling from at least 35 locations in all three basins. Additional pairs were undoubtedly not documented since no focused surveys were conducted nor were areas away from public trails accessed.

Least Bell's Vireo

A Bell's vireo was first recorded singing this season in willows adjacent to Manchester Ave to the ESE of the nature center site on 11 April. On 9 May, one was singing along the La Orilla trail just west of El Camino Real, and three were singing in the riparian scrub adjacent to Escondido Creek and the Lux Canyon drainage. Nesting in the latter area was likely, with three continuing to sing there on 13 June and one remaining and still vocal on 11 July.

Belding's Savannah Sparrow

Monthly bird counts yielded minimum numbers of observed individuals within subareas of the lagoon. Additional birds were present but not documented since no focused surveys were conducted nor were areas away from public trails accessed. Monitoring of a dune restoration project in the SW portion of the west basin demonstrated the difference in detections of savannah sparrows using the monthly count versus a focused count – seven were reported in the west basin for the 13 June monthly count, but 18 were documented adjacent to the remnant dunes on 11 June and 14 on 24 June.

The peak numbers in June included observations of fledglings. Relatively high numbers in some subareas in September and October are suspected to possibly include individuals of migrant subspecies not differentiated from Belding's.

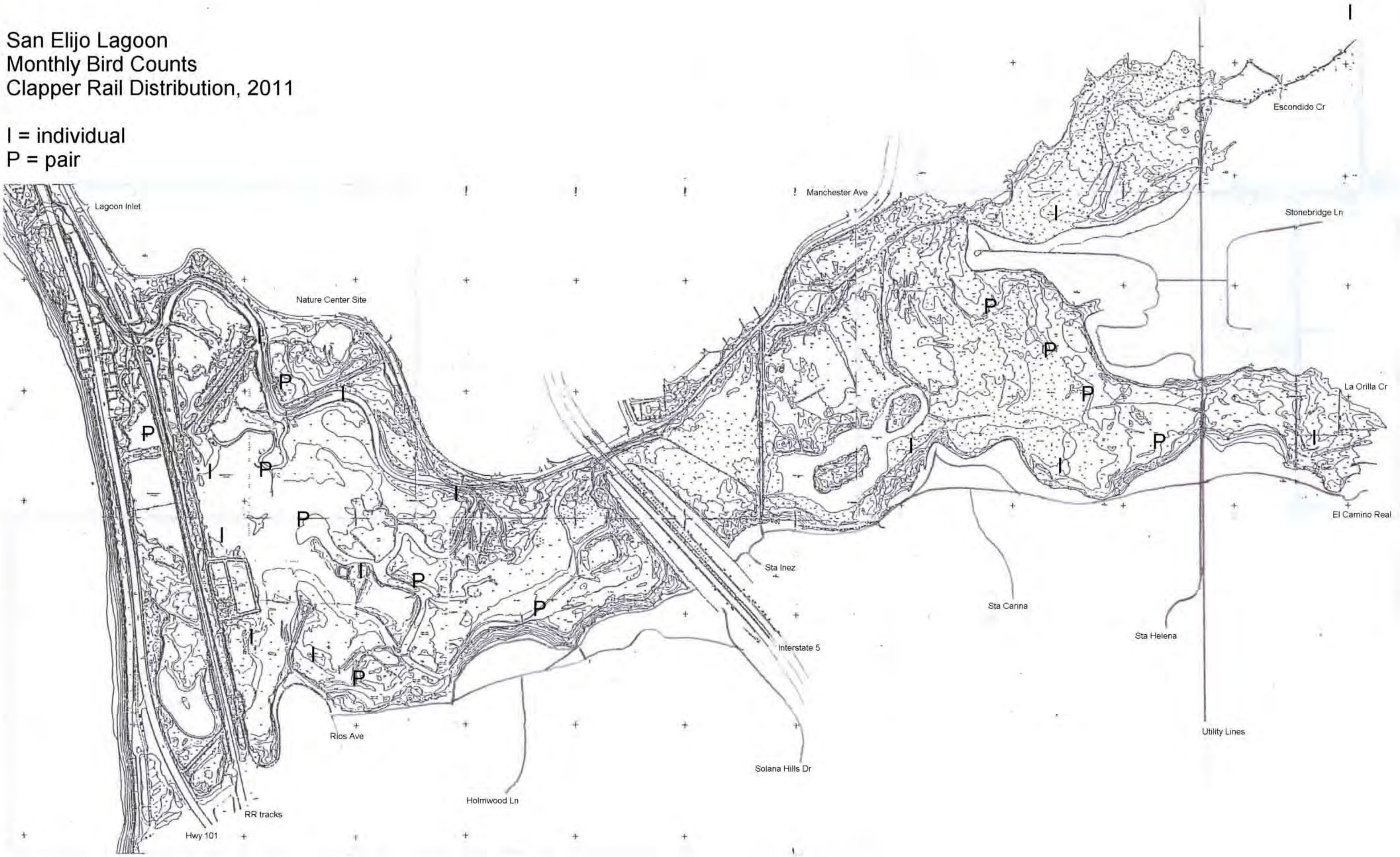
On 11 July, two brown-headed cowbird fledglings were observed begging from a Belding's adult along the Rios trail.

(WB=west basin, CBW=central basin west, CBN=central basin north, CBS=central basin south, EBN=east basin north, EBS=east basin south)

	WB	CBW	CBN	CBS	EBN	EBS
1/10	7	18	4	4	8	0
2/14	8	25	1	1	5	0
3/14	6	40	0	5	9	7
4/11	7	21	8	4	4	1
5/9	10	20	6	5	13	0
6/13	7	40	17	17	4	0
7/11	13	32	4	14	4	0
8/8	10	22	3	2	12	0
9/12	10	12	3	22	4	1
10/10	12	40	2	3	15	0
11/14	2	11	5	0	3	0
12/12	2	15	2	22	7	0

San Elijo Lagoon
Monthly Bird Counts
Clapper Rail Distribution, 2011

I = individual
P = pair



San Elijo Lagoon
Monthly Bird Counts
Calif Gnatcatcher Distribution, 2011

I = individual
P = pair
F = pair with fledglings