



April 22, 2016

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**RE: Final Report for Grant Agreement #5001768 – North County Dunes Restoration (Coastal Species)**

Dear Sarah,

This letter includes the final reporting and submittal of all outstanding deliverables for the North County Dunes Restoration (Coastal Species) Project (Project). The Project was initiated through a grant proposal agreement between the San Diego Association of Governments (SANDAG) and the San Elijo Lagoon Conservancy (SELC) signed on July 19, 2013. The agreement confirmed SELC's submittal of a successful application for TransNet Environmental Mitigation Program (EMP) Regional Habitat Conservation funds.

The Project was designed to accomplish the following objectives:

- reduce threats to and improve the quality of nesting habitat for California least tern (*Sterna antillarum browni*);
- maintain and enhance western snowy plover nesting sites (*Charadrius alexandrinus nivosus*);
- increase frequency and size of Nuttall's acmispson (*Acmispon prostratus*) populations;
- increase frequency and size of additional dune-dependent, special-status species;
- conduct a comprehensive inventory of potential dune habitat restoration sites; and
- develop practical dune habitat restoration and management plans specific to regional conservation needs.

SELC requested funding for a two-year/initial phase of a comprehensive dune habitat restoration program. Accordingly, EMP funds supported site inventories and biological surveys, seed collection, seed bulking and selective plant grow-out, invasive vegetation control, permit development, and site-specific restoration plan development including site prioritization and cost proposals. The results of the Project are intended to inform the development of a second phase, which will include planning and project implementation activities such as pursuing additional access approvals and project permits, soil testing, plant propagule introduction, fence construction, and substrate management. The following

section summarizes work completed for the tasks that comprise the Project Scope of Work per Agreement #5001768.

## **Project Completion – Summaries by Task**

### ***Task 1 – Inventory of Sites***

SELC initiated the selection of 19 potential restoration sites (sites) during the proposal phase of the Project. Site selection was based on a Geographic Information System (GIS) analysis based on historic and current land use data for the region, and habitat suitability for least tern, western snowy plover, Nuttall's acmispson and other special-status dune-dependent species.

All land use and habitat quality database, including rare plant monitoring data and rare plant and invasive plant species GIS data were submitted to Sharon Coe at the San Diego Management and Monitoring Program (SDMMP) during the second quarter of 2015.

### ***Task 2 – Biological Surveys***

Prior to conducting the site surveys, the California Department of Fish and Wildlife California Natural Diversity Database (CNDDDB) and the California Consortium of Herbaria database were queried to identify special-status plant species with the potential to occur within the Project area. Site surveys were conducted by SELC and Kentner Botanical botanists beginning on May 6, 2014. The team evaluated land use, habitat quality, and other essential features to characterize the sites. Site surveys concluded on August 25, 2015. Following the field surveys, the sites were ranked according to project priorities. **Table 1: Survey Sites** lists site locations and approximate acreage of each of the sites surveyed. Figure 1: Survey site locations are depicted in **Figure 1**. The results of the 2014 and 2015 surveys were presented in the *North County Dunes Habitat Restoration Project Botanical Survey Report* [(Kentner Botanical, 2015) (**Attachment A**)].

In addition to botanical surveys, SELC biologists collected invasive species occurrence and avian use data during surveys conducted from 2013 to 2015. All GIS files, photographs and special-status species occurrence data collected during the surveys were coordinated with and submitted to SDMMP. A comprehensive land use and habitat quality database was submitted to SDMMP during the second quarter of 2015. In addition, special-status plant species' occurrence forms were submitted to CNDDDB. The CNDDDB forms are included in the Kentner Botanical report as Attachment A. In total, 598 polygons of 16 species of rare plants and 979 polygons of 51 species of invasive plant were mapped during the 2014 and 2015 surveys.

SELC conducted a comprehensive assessment of the data collected during the surveys to inform restoration site prioritization. A discussion of restoration potential per site is included in **Attachment A** and summarized in **Table 2: Restoration Site Prioritization**.

**Table 1: Survey Sites**

<b>Site<sup>1</sup></b>	<b>Acres</b>
Oceanside, San Luis Rey	3.0
Carlsbad State Beach, Pine to Tamarack	10.7
Carlsbad, Agua Hedionda	4.4
South Carlsbad State Beach, North Terramar	4.1
South Carlsbad State Beach, South Terramar	16.6
South Carlsbad State Beach, 101 Median Strip	12.6
South Carlsbad State Beach, Campground	28.0
South Carlsbad State Beach, North Ponto	6.6
South Carlsbad, Batiquitos W1 and W2	18.6
South Carlsbad, Batiquitos 101 Median Strip	3.5
South Carlsbad State Beach, South Ponto	15.4
Encinitas, Beacon's Beach	2.1
Encinitas, Swami's to Moonlight	19.2
San Elijo State Beach, 101 Median Strip	23.4
San Elijo State Beach, Campground	26.8
San Elijo Lagoon	19.8
Del Mar, North Torrey Pines	58.4
Torrey Pines State Reserve, Penasquitos Lagoon Area	21.8
Torrey Pines State Reserve, Black's Beach	66.2

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<sup>1</sup> Sites listed in order of geographical location from North to South. All sites are located in the north San Diego County in the Cities of Oceanside, Carlsbad or Encinitas.

**Table 2: Restoration Site Prioritization**

Site	Special-Status Plant Species Richness	Invasive Plant Species Richness	Restoration Potential Summary	Completely Inundated at High Tide? <sup>2</sup>	Access?	Current Funding for Implementation?	Rank <sup>3</sup>
Seaside Terrace	2	15	N.A.	N	100%	Y	1
Cardiff Living Shorelines	0	0	N.A.	N	100%	Y	2
Torrey Pines State Reserve, Penasquitos Lagoon Area <sup>4</sup>	10	15	Due to the small size of these areas, there is limited restoration potential. This site may offer restoration opportunities through weed management and the importation of sand to expand the dune into a larger complex.	N	100%	N	2
Torrey Pines State Reserve, Black's Beach	10	15	Although there are many unauthorized trails on the terrace, the vegetation is still dominated by native species, and may serve as an excellent reference site for restoration projects seeking to restore similar coastal bluff habitat elsewhere along the coast.	N	100%	N	2

<sup>2</sup> Sites with complete inundation at high tide were not ranked.

<sup>3</sup> Sites were ranked according to the following system of points:

- Special-status Plant Species Richness = absolute value
- Invasive Plant Species Richness = absolute value
- 100%-51% access = 10 points
- 50% access = 5 points
- <50% access = 0 points
- Current funding = 25 points

<sup>4</sup> The Los Penasquitos Lagoon Foundation is currently proposing restoration for this site.

**Table 2: Restoration Site Prioritization**

Site	Special-Status Plant Species Richness	Invasive Plant Species Richness	Restoration Potential Summary	Completely Inundated at High Tide? <sup>2</sup>	Access?	Current Funding for Implementation?	Rank <sup>3</sup>
South Carlsbad State Beach, Campground	4	20	The beach below the campground is inundated at high tide and provides no real opportunity for coastal dune restoration. Furthermore, although currently sandy, the sand on this beach has been completely replaced by cobble several times in recent decades. The majority of the bluffs below the campground may be too steep for restoration to be practical, but exotics control may be desirable as several highly invasive species such as pampas grass and Saltcedar ( <i>Tamarix</i> sp.) are present. The area of bluffs near the parking area that supports Nuttall's acmispson needs management to ensure the survival of the population.	N	67%	N	3
San Elijo Lagoon	8	13	This area is one of the very few sites in coastal North County where coastal dune rare plant species persist on the beach, and it deserves protection. Weed control, a rope or fence barrier to reduce foot traffic, and re-routing the lifeguard vehicle path are recommended for this site.	N	69%	N	4
South Carlsbad State Beach, South Ponto	8	17	While the site remains an important refuge for rare plants, invasive species control is needed to maintain habitat quality. The sandy beach area to the north is above the high tide level and offers excellent potential habitat for rare dune species, but recreational use likely precludes this area as a potential restoration site.	N	40%	N	5

**Table 2: Restoration Site Prioritization**

Site	Special-Status Plant Species Richness	Invasive Plant Species Richness	Restoration Potential Summary	Completely Inundated at High Tide? <sup>2</sup>	Access?	Current Funding for Implementation?	Rank <sup>3</sup>
South Carlsbad State Beach, North Ponto	3	9	The site contains excellent suitable habitat for coastal dune species, but there is heavy recreational use of the area. While restoration of coastal dunes habitat at this site is certainly possible, it would require fencing and the reduction of the area available for recreation.	N	67%	N	6
South Carlsbad State Beach, 101 Median Strip	2	19	The South Carlsbad State Beach 101 Median Strip area could present some opportunities for restoration. The area is fairly large and it is insulated from foot traffic and other disturbance by its location. There does not appear to be sandy dune substrates present at the site, but that is somewhat difficult to assess due to the heavy <i>Carpobrotus</i> cover. Any dune restoration here would need to avoid sand blowing onto the highway. There are good opportunities for the restoration of coastal salt marsh and coastal scrub habitats at the site.	N	0%	N	7
San Elijo State Beach, 101 Median Strip	3	17	Because the area is narrow and adjacent to both roads and railroad tracks there is little opportunity for coastal dune habitat restoration at this site. However, the site may be suitable for the restoration of maritime scrub habitat and/or the introduction of additional native shrub species.	N	0%	N	8
Del Mar, North Torrey Pines	8	12	Overall the site has high restoration potential and habitat value, and weed management, at a minimum, is recommended.	N	0%	N	8

**Table 2: Restoration Site Prioritization**

Site	Special-Status Plant Species Richness	Invasive Plant Species Richness	Restoration Potential Summary	Completely Inundated at High Tide? <sup>2</sup>	Access?	Current Funding for Implementation?	Rank <sup>3</sup>
South Carlsbad, Batiquitos W1 and W2	4	14	The southern sandy area adjacent to the railroad tracks supports a sizable population of coast woolly-heads, but no Nuttall's acmispon plants were observed there. This site has excellent potential for coastal dune habitat restoration and/or maintenance, as does the sandy area across the channel in the northeast corner of the Survey Site boundary. This area is the best candidate for dunes restoration that was encountered during the rare plant surveys for the NCDHRP.	N	33%	N	9
Encinitas, Beacon's Beach	1	7	The beach area has little potential as a coastal dunes restoration site because of the heavy recreational use and the limited area that remains above the high tide.	N	0%	N	10
South Carlsbad, Batiquitos 101 Median Strip	2	5	Due to its narrowness and location, the Batiquitos 101 Median Strip would be an unlikely candidate for restoration, but the removal of invasive weeds, particularly pampas grass, could be beneficial for the surrounding native habitat.	N	0%	N	11
Carlsbad, Agua Hedionda	3	5	Ecologically, the Agua Hedionda site has excellent potential as a coastal dunes restoration area. The site already supports rare dunes species, and the introduction of loose sand and/or mechanical decompaction of the existing soils would improve the habitat quality. However, the site is located on private property and the owners may have little incentive to undertake such a project.	N	0%	N	12

**Table 2: Restoration Site Prioritization**

Site	Special-Status Plant Species Richness	Invasive Plant Species Richness	Restoration Potential Summary	Completely Inundated at High Tide? <sup>2</sup>	Access?	Current Funding for Implementation?	Rank <sup>3</sup>
Oceanside, San Luis Rey	4	N.A.	Because the site was not included in the original NCDHRP grant proposal, a reduced survey effort was undertaken here in which invasive weeds were not mapped. This site, including the area where the rare plants are located, is an older restoration site, but date of the restoration is not known. While this site has great potential as a coastal dune restoration area, the current mix of species is likely to shade out and displace the rare dune plants currently present as the planted shrubs mature.	N	N	N	13
Carlsbad State Beach, Pine to Tamarack	5	21	Because of the inundation during high tides there is little restoration potential for coastal dune habitat along the beach. However, the sandy berm in the northwest corner of the Tamarack parking area may present some restoration opportunities.	Y	50%	N	N.A.
South Carlsbad State Beach, North Terramar	1	7	Because the beach below the bluffs is completely inundated at high tide there is little opportunity for coastal dune habitat restoration at this site. However, the site may be suitable for the restoration of coastal bluff scrub habitat and/or the introduction of additional native shrub species.	Y	0%	N	N.A.
South Carlsbad State Beach, South Terramar	5	14	Like the other sites in Carlsbad, the inundation of the beach at high tide limits the restoration potential for coastal dune habitat here. The bluff face is terraced or gently sloping in some areas, and may offer excellent opportunities for maritime succulent scrub restoration, as the recreational use and foot traffic is fairly light.	Y	75%	N	N.A.

**Table 2: Restoration Site Prioritization**

Site	Special-Status Plant Species Richness	Invasive Plant Species Richness	Restoration Potential Summary	Completely Inundated at High Tide? <sup>2</sup>	Access?	Current Funding for Implementation?	Rank <sup>3</sup>
Encinitas, Swami's to Moonlight	3	10	Because the beach below the bluffs is completely inundated at high tide there is little opportunity for coastal dune habitat restoration at this site. However, the site may be suitable for the restoration of coastal bluff scrub habitat and/or the introduction of additional native shrub species.	Y	6%	N	N.A.
San Elijo State Beach, Campground	2	15	Because the beach below the bluffs is completely inundated at high tide there is little opportunity for coastal dune habitat restoration at this site. However, the site may be suitable for the restoration of coastal bluff scrub habitat and/or the introduction of additional native shrub species.	Y	75%	N	N.A.



**Figure 1: Survey Site Locations**

### ***Task 3 – Seed Collection and Propagule Development***

Seed collection, storage and processing was initiated during the third quarter of 2013. Seeds for the following species were collected:

- pink sand verbena (*Abronia umbellata*)
- Nuttall’s acmispon
- beach evening primrose (*Camissoniopsis cheiranthifolia*)<sup>5</sup>
- Orcutt’s pincushion (*Chaenactis glabriuscula* var. *orcuttiana*)
- coast wooly-heads (*Nemacaulis denudata* var. *denudate*)

Seeds for the same species were collected again in the third quarter of 2014, and seed bulking was initiated. Seed collection and bulking for these species also occurred during the second quarter of 2015. Seed collection was conducted again during the third quarter of 2015, with an additional species—bladderbod (*Peritoma arborea*)—included in seed collection efforts.

Seeds collected for the same cohort of species in the fourth quarter of 2015 were cleaned, packaged and processed for banking and added to the existing Project collection located at the Rancho Santa Ana Botanic Garden (RSABG) in Claremont, CA. Final seed bulking and propagation occurred at RSABG in March 2016. Please see **Attachment B: Rancho Santa Ana Botanic Garden Documents** for a letter discussing the five year seed collection held and processed at RSABG, and the Contract/Agreement for the work conducted at RSABG during the first quarter of 2016.

### ***Task 4 – Dune Habitat Restoration***

SELC conducted dune habitat restoration activities in the following four locations located in coastal North County, San Diego – South Carlsbad State Beach - North Terramar, South Carlsbad – Batiqitos, the west basin of the San Elijo Lagoon Reserve (SELR), and the South Cardiff Seaside Terrace dune restoration site (Seaside Terrace). Preliminary invasive species removal was initiated in the west basin of the SELR during the third quarter of 2013. This focus of this site was arrow-weed (*Pluchea sericea*) and iceplant (*Carpobrotus edulis*) treatments, and biomass and organic detritus removal (representative site photos are included as Photos **1-11**).

Invasive species management and organic detritus removal was continued in the west basin during the third quarter of 2014. Additionally, restoration efforts were initiated at Seaside Terrace. Efforts included beach sand importation, sand salinity testing, and plot monitoring of recreational impacts on native vegetation. Invasive species management efforts were conducted at Seaside Terrace during the fourth quarter of 2015. Invasive species treatment and biomass/detritus removal in the west basin of the SELER was conducted again during the second quarter of 2015. In addition to arrow-weed and

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<sup>5</sup> Beginning in the third quarter of 2014 seeds for *C. cheiranthifolia* ssp. *suffruticosa* were collected specifically.

iceplant, fennel (*Foeniculum vulgare*), sea rocket (*Cakile maritima*), stock (*Matthiola incana*), non-native sea lavender (*Limonium* spp.), Sahara mustard (*Brassica tournefortii*) and stinkwort (*Dittrichia graveolens*) were also targeted. The following additional invasive species were targeted during the fourth quarter of 2015 – crown daisy (*Glebionis coronarium*) and perennial veldtgrass (*Erharta calycina*). Invasive species management in the west basin of the SELR continued through the duration of the project.



**Photo 1:** Looking northwest across the west basin of the SELR prior to biomass and duff removal (March 2011).



**Photo 2:** Looking northwest across the west basin of the SELR following biomass removal and pending duff removal (March 2011).



**Photo 3:** Looking southeast across the west basin of the SELR prior to biomass and duff removal (March 2011).



**Photo 4:** Looking southeast across the west basin of the SELR following biomass removal and pending duff removal (March 2011).



**Photo 6:** Looking west across the west basin of the SELER following dune habitat restoration (July 2015).



**Photo 7:** Looking northeast across the west basin of the SELER following dune habitat restoration (July 2015).



**Photo 8:** Looking west-northwest across Seaside Terrace following invasive species treatments (February 2016).



**Photo 9:** Red sand-verbena at South Carlsbad – Batiqitos following pampas grass and acacia removal (February 2015).

**Task 5 – Permit Development and Maintenance**

SELC staff and contractors complied with all relevant permit requirements throughout the duration of the Project, as described in the quarterly progress reports. **Table 3: Permit Development** summarizes necessary project permits and statuses for the three sites that draft habitat restoration plans were developed for (See **Task 6 – Site Specific Restoration Plans**).

**Table 2: Permit Development**

Project	Permit Required	Status
Torrey Pines State Beach - Black's Beach Draft Habitat Restoration Plan	CEQA Review (CDPR)	Needed
	Right of Entry (CDPR)	Needed
	Right of Entry (City of San Diego)	Needed
	Coastal Development Permit (CCC)	Needed
Cardiff State Beach Living Shoreline Draft Habitat Restoration Plan	Mitigated Negative Declaration (CDPR)	Acquired
	Right of Entry Permit (CDPR)	Needed
	Coastal Development Permit (SCC)	Needed
	Section 10 & 404 Permit (USACE)	Needed
	401 Certification (Regional Water Quality Control Board)	Needed
	Lease of State Lands (California State Lands Commission)	Needed
Seaside Terrace Draft Habitat Restoration Plan	Categorical Exemption - CEQA (CDPR)	Acquired
	NEPA Compliance - Categorical Exclusion (USFWS)	Acquired
	Right of Entry (CDPR)	Acquired
	Coastal Development Permit (CCC) - Project has been included in SELRP CDP application	In Progress

### ***Task 6 – Site-specific Restoration Plan Development***

Based on the results of the site ranking conducted for Task 2, the following three sites were selected for development of site-specific restoration plans:

- Torrey Pines State Beach - Black's Beach Draft Habitat Restoration Plan
- Cardiff State Beach Living Shoreline Draft Habitat Restoration Plan
- Seaside Terrace Draft Habitat Restoration Plan

The draft habitat restoration plans are included as **Attachments C-E**.

### ***Task 7— Landowner Coordination***

A summary of access permissions relevant to all sites included in the inventory of sites conducted for Task 1 is included in **Appendix A**.

It's been a pleasure working with SANDAG on behalf of the region's coastal dune resources. If you have any questions, please call me at (760) 436-3944.

Sincerely,



Doug Gibson  
Executive Director / Principal Scientist

**Attachment A: North County Dunes Habitat Restoration Project Botanical  
Survey Report (Kentner Botanical)**

**North County Dunes Habitat Restoration Project  
Botanical Survey Report**

**Prepared for:  
San Elijo Lagoon Conservancy**

777 So. Highway 101, Suite 112  
Solana Beach, CA 92075

**Prepared by:  
Kentner Botanical**

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# 1 Introduction

## 1.1 Project description

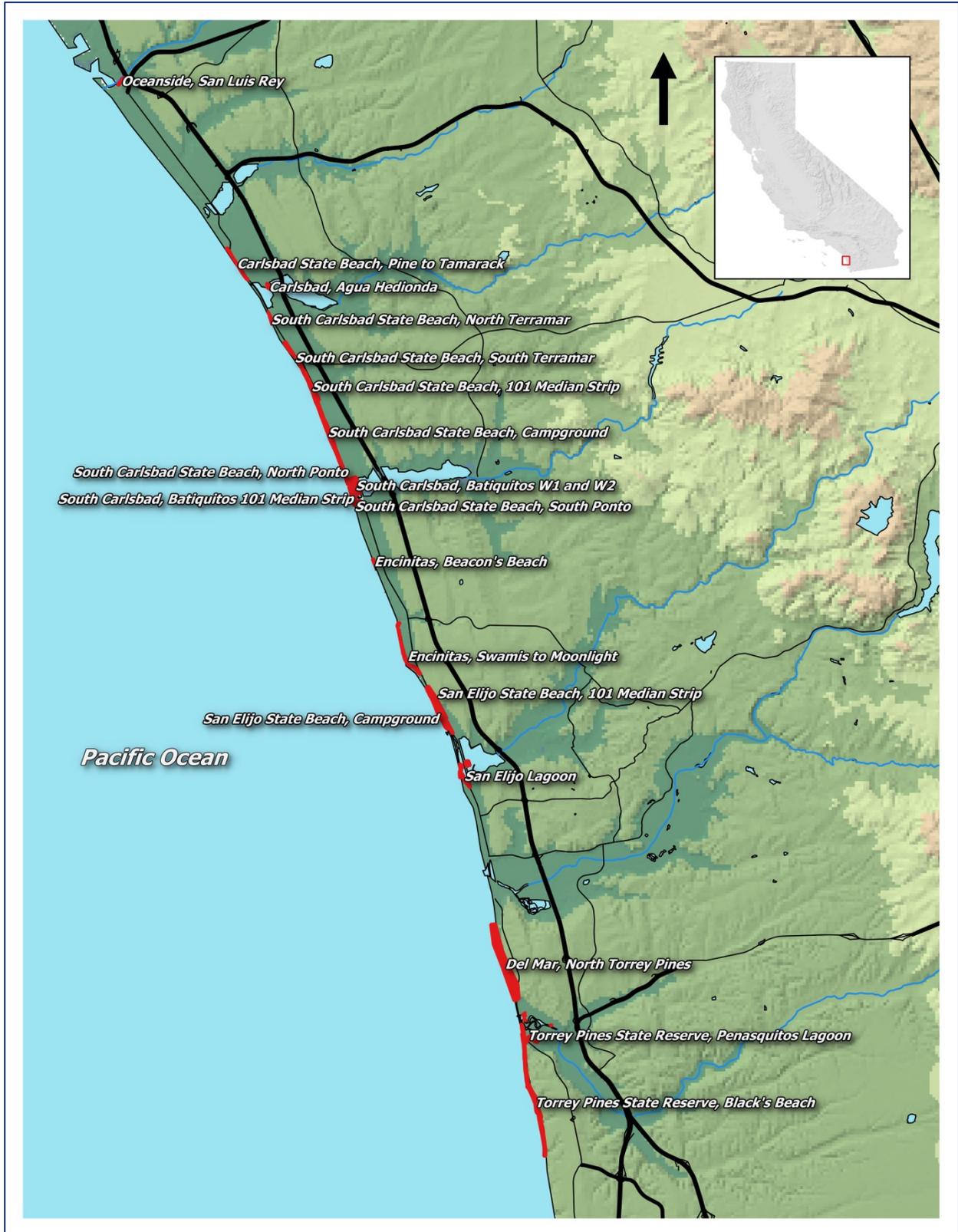
The San Elijo Lagoon Conservancy's (SELCO) North County Dunes Habitat Restoration Project (NCDHRP) seeks to extend the range and increase populations of coastal dune-dependent species in northern San Diego County. The primary targets for management are species included on the San Diego Association of Governments (SANDAG) *TransNet* Environmental Mitigation Program (EMP) Species-Specific Management project list that are dependent on coastal dune habitats: California Least Tern, Western Snowy Plover, and Nuttall's lotus (*a.k.a.* Nuttall's acmispon). Using grant funding provided for the NCDHRP, SELCO is working with project partners and landowners to survey and conduct restoration activities in potential dune habitat between northern Carlsbad and northern La Jolla. The currently funded initial phase of the Project includes site inventories and biological surveys, seed collection and grow-out, invasive vegetation control, permit development, and site-specific restoration plan development, including site prioritization and cost proposals. The results of this project will inform a second phase, which will include intensive restoration activities such as plant propagule introduction, fence construction, and substrate management.

This document reports the results of botanical surveys conducted during 2014 and 2015 at 19 potential restoration sites (Survey Sites) located throughout coastal North County, San Diego. During the surveys, occurrences of rare plants and invasive weeds at each of the 19 Survey Sites were mapped and documented. In addition, monitoring plots were installed at 11 locations for plant species included on the San Diego Management and Monitoring Program's monitoring list (SDMMP 2015a).

## 1.2 Project location and Survey Sites

The project is located along beaches and coastal bluffs at 19 sites in North County spanning the area between the San Luis Rey River in the north to Black's Beach in the south (Figure 1). Because of the heavy concentration of development and human activities in coastal northern San Diego County, only fragments of actual or potential coastal dune habitat currently exist. In the Project grant proposal, SELCO identified about 255 acres of potential habitat for inclusion in the NCDHRP. However, during the course of the botanical surveys, the survey acreage was expanded around some of the original sites where potential habitat was observed, several new sites were added, and several sites were excluded. In total, approximately 361 acres distributed across 19 sites were surveyed for this report. These 19 Survey Sites collectively represent the Project Area. The Survey Sites, their locations, and approximate acreages are listed in order from north to south in Table 1 below. More detailed boundaries for each Survey Site are depicted in the map figures of Appendix B.

The Project Area has a coastal Mediterranean climate with moderate temperatures year-round. Most of the 10.4 inches of average annual precipitation falls during the fall and winter months (U.S. Climate Data 2015). As a consequence, the majority of native annuals found on the coast flower during the winter and spring, although several of the coastal dune species flower well into early summer. Two of the rare native shrubs are drought-deciduous, and are more easily observed and identified during winter and spring. Many rare perennials are observable year-round, and a few members of the sunflower family (Asteraceae) flower during the fall.



**Figure 1.** NCDHRP Survey Site locations (in red).

**Table 1.** Survey Site locations and approximate acreage.

<b>Survey Site</b>	<b>Approx. center (Lat-Lon WGS84)</b>	<b>Acres</b>
Oceanside, San Luis Rey	33.204535, -117.386175	3
Carlsbad State Beach, Pine to Tamarack	33.151338, -117.348597	10.7
Carlsbad, Agua Hedionda	33.144588, -117.338058	4.4
South Carlsbad State Beach, North Terramar	33.135246, -117.337603	4.1
South Carlsbad State Beach, South Terramar	33.124181, -117.329945	16.6
South Carlsbad State Beach, 101 Median Strip	33.115406, -117.3243	12.6
South Carlsbad State Beach, Campground	33.10232, -117.319189	28
South Carlsbad State Beach, North Ponto	33.088794, -117.313319	6.6
South Carlsbad, Batiquitos W1 and W2	33.087162, -117.310661	18.6
South Carlsbad, Batiquitos 101 Median Strip	33.08565, -117.311562	3.5
South Carlsbad State Beach, South Ponto	33.083547, -117.311076	15.4
Encinitas, Beacon's Beach	33.06531, -117.305144	2.1
Encinitas, Swamis to Moonlight	33.039046, -117.295105	19.2
San Elijo State Beach, 101 Median Strip	33.022975, -117.284171	23.4
San Elijo State Beach, Campground	33.022175, -117.284901	26.8
San Elijo Lagoon	33.004359, -117.276515	19.8
Del Mar, North Torrey Pines	32.9493, -117.264775	58.4
Torrey Pines State Reserve, Peñasquitos Lagoon area	32.929055, -117.258163	21.8
Torrey Pines State Reserve, Black's Beach	32.909503, -117.256045	66.2
	<b>Total</b>	<b>361.2</b>

## 2 Methods

### 2.1 Pre-field research

Prior to conducting the botanical surveys, research was conducted to identify rare or special status plant species with potential to occur within the Project Area. For each potentially occurring species, information was compiled on conservation status, distribution, habitat characteristics, flowering time, presence in the Project region, and characteristics used in field identification.

A plant was considered to be of special status if it met one or more of the following criteria:

- Federally or state-listed, proposed, or candidate for listing, as rare, threatened or endangered (CNDDDB 2014a; CNPS 2014; USFWS 2014,); or
- Special Plant as defined by the California Natural Diversity Database (CNDDDB 2014b); or
- Designated by the California Native Plant Society (CNPS) in its online Inventory of Rare and Endangered Plants of California (CNPS 2014).

A species was determined to have potential to occur within the Project Area if its known or expected geographic range includes the Project Area or the vicinity of the Project Area, and if its known or expected habitat is found within or near the Project Area. For the purpose of generating the target list, the Project Area vicinity included the coastal portion of northern San Diego County from the beach to about four miles inland.

A preliminary list of potentially occurring special status plants was derived from several sources including a GIS-based search of rare plant records in the CNDDDB (2014a), a county wide search of the

CNPS Inventory (2014), and a search of collection records in the California Consortium of Herbaria database (CCH 2015). California Rare Plant Rank (CRPR) List 4 species are tracked by county, but not by specific location in the CNPS and CNDDDB databases. Therefore, potentially occurring List 4 species were identified by searching the CNPS Inventory for San Diego County plants known to inhabit coastal dunes, coastal bluff scrub, coastal scrub, and coastal prairie habitats. The search results from each database were compiled into a single table and plants known to be restricted to habitat types that are not present within the Project Area were excluded. However, the list was purposefully kept broad and many species with relatively low probability for occurrence were retained to increase awareness among the surveyors for unexpected rare species.

**Table 2.** Rare plant taxa with the potential to occur in the Project Area.

Taxon	Status Fed/State/CRPR	Flowering period	Habitat and elevation	Potential for occurrence
<i>Abronia maritima</i> Red sand-verbena	--/--/4.2	Feb-Nov	Coastal dunes. 0-100 m.	<b>Present.</b> This species was mapped at six of the 19 Project Survey Sites.
<i>Abronia villosa</i> var. <i>aurita</i> Chaparral sand-verbena	--/--/1B.1	Jan-Sep	Chaparral, Coastal scrub, Desert dunes, sandy. 75-1600 m.	<b>Unlikely.</b> This species typically occurs in more inland habitats away from the immediate coast.
<i>Acmispon prostratus</i> Nuttall's acmispon	--/--/1B.1	Mar-Jun (Jul)	Coastal dunes, Coastal scrub(sandy). 0-10 m.	<b>Present.</b> This species was mapped at seven of the 19 Project Survey Sites.
<i>Adolphia californica</i> California adolphia	--/--/2B.1	Dec-May	Chaparral, Coastal scrub, Valley and foothill grassland, clay. 45-740 m.	<b>Present.</b> This species was mapped at one of the 19 Project Survey Sites.
<i>Agave shawii</i> var. <i>shawii</i> Shaw's agave	--/--/2B.1	Sep-May	Coastal bluff scrub, Coastal scrub. 10-120 m.	<b>Present.</b> Although likely planted, this species was mapped at three of the 19 Project Survey Sites. Planted specimens are present at several other sites.
<i>Ambrosia pumila</i> San Diego ambrosia	FE/--/1B.1	Apr-Oct	Chaparral, Coastal scrub, Valley and foothill grassland, Vernal pools, sandy loam or clay, often in disturbed areas, sometimes alkaline. 20-415 m.	<b>Unlikely.</b> Suitable riparian grassland habitat is not present, and all known occurrences in California are away from the immediate coast.
<i>Aphanisma blitoides</i> Aphanisma	--/--/1B.2	Mar-Jun	Coastal bluff scrub, Coastal dunes, Coastal scrub, sandy. 1-305 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Arctostaphylos glandulosa</i> ssp. <i>crassifolia</i> Del Mar manzanita	FE/--/1B.1	Dec-Jun	Chaparral (maritime, sandy). 0-365 m.	<b>Unlikely.</b> This subspecies is a conspicuous shrub that was not observed during the surveys.
<i>Artemisia palmeri</i> San Diego sagewort	--/--/4.2	(Feb), May-Sep	Chaparral, Coastal scrub, Riparian forest, Riparian scrub, Riparian woodland, sandy, mesic. 15-915 m.	<b>Unlikely.</b> Only marginally suitable habitat is present within the Project Area.
<i>Astragalus tener</i> var. <i>titi</i> Coastal dunes milk-vetch	FE/SE/1B.1	Mar-May	Coastal bluff scrub (sandy), Coastal dunes, Coastal prairie, often vernally mesic areas. 1-50 m.	<b>Unlikely.</b> Although suitable habitat is present, this species was not observed during the surveys. Extremely rare in the county, and does not appear to have been seen since the 1970s.
<i>Atriplex coulteri</i> Coulter's saltbush	--/--/1B.2	Mar-Oct	Coastal bluff scrub, Coastal dunes, Coastal scrub, Valley and foothill grassland, alkaline or clay. 3-460 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Atriplex pacifica</i> South Coast saltscale	--/--/1B.2	Mar-Oct	Coastal bluff scrub, Coastal dunes, Coastal scrub, Playas. 0-140 m.	<b>Present.</b> This species was tentatively mapped at one of the 19 Project Survey Sites. Confirmation of ID is pending.
<i>Baccharis vanessae</i> Encinitas baccharis	FT/SE/1B.1	Aug-Nov	Chaparral (maritime), Cismontane woodland, sandstone. 60-720 m.	<b>Unlikely.</b> This species is known primarily from more inland locations and suitable habitat is not present within the Project Area.

Taxon	Status Fed/State/CRPR	Flowering period	Habitat and elevation	Potential for occurrence
<i>Berberis nevinii</i> Nevin's barberry	FE/SE/1B.1	Mar-Jun	Chaparral, Cismontane woodland, Coastal scrub, Riparian scrub, sandy or gravelly. 274-825 m.	<b>Unlikely.</b> This species is a conspicuous shrub that was not observed during the surveys.
<i>Bergerocactus emoryi</i> Golden-spined cereus	--/--/2B.2	May-Jun	Closed-cone coniferous forest, Chaparral, Coastal scrub, sandy. 3-395 m.	<b>Unlikely.</b> This species is a conspicuous shrub that was not observed during the surveys.
<i>Calandrinia breweri</i> Brewer's calandrinia	--/--/4.2	Mar-Jun	Chaparral, Coastal scrub, sandy or loamy, disturbed sites and burns. 10-1220 m.	<b>Unlikely.</b> Although habitat is present, this species was not observed during the surveys. It could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Camissoniopsis lewisii</i> Lewis' evening-primrose	--/--/3	Mar-May (Jun)	Coastal bluff scrub, Cismontane woodland, Coastal dunes, Coastal scrub, Valley and foothill grassland, sandy or clay. 0-300 m.	<b>Present.</b> This species was mapped at eight of the 19 Project Survey Sites.
<i>Ceanothus cyaneus</i> Lakeside ceanothus	--/--/1B.2	Apr-Jun	Closed-cone coniferous forest, Chaparral. 235-755 m.	<b>Unlikely.</b> This species is a conspicuous shrub that was not observed during the surveys.
<i>Ceanothus verrucosus</i> Wart-stemmed ceanothus	--/--/2B.2	Dec-May	Chaparral. 1-380 m.	<b>Unlikely.</b> This species is a conspicuous shrub that was not observed during the surveys.
<i>Centromadia parryi</i> ssp. <i>australis</i> Southern tarplant	--/--/1B.1	May-Nov	Marshes and swamps (margins), Valley and foothill grassland (vernally mesic), Vernal pools. 0-480 m.	<b>Unlikely.</b> Although present at the San Dieguito Lagoon, this conspicuous annual herb was not observed during the surveys.
<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i> Orcutt's pincushion	--/--/1B.1	Jan-Aug	Coastal bluff scrub (sandy), Coastal dunes. 0-100 m.	<b>Present.</b> This variety was mapped at three of the 19 Project Survey Sites.
<i>Chloropyron maritimum</i> ssp. <i>maritimum</i> Salt marsh bird's-beak	FE/SE/1B.2	May-Oct	Coastal dunes, Marshes and swamps (coastal salt). 0-30 m.	<b>Unlikely.</b> Although suitable habitat is present, this species was not observed during the survey. Currently known in San Diego only from the southern portion of the coast.
<i>Chorizanthe orcuttiana</i> Orcutt's spineflower	FE/SE/1B.1	Mar-May	Closed-cone coniferous forest, Chaparral (maritime), Coastal scrub, sandy openings. 3-125 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Chorizanthe polygonoides</i> var. <i>longispina</i> Long-spined spineflower	--/--/1B.2	Apr-Jul	Chaparral, Coastal scrub, Meadows and seeps, Valley and foothill grassland, Vernal pools, often clay. 30-1530 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Cistanthe maritima</i> Seaside cistanthe	--/--/4.2	(Feb), Mar- Jun (Aug)	Coastal bluff scrub, Coastal scrub, Valley and foothill grassland, sandy. 5-300 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Comarostaphylis diversifolia</i> ssp. <i>diversifolia</i> Summer holly	--/--/1B.2	Apr-Jun	Chaparral, Cismontane woodland. 30-790 m.	<b>Unlikely.</b> This subspecies is a conspicuous shrub that was not observed during the surveys.
<i>Convolvulus simulans</i> Small-flowered morning-glory	--/--/4.2	Mar-Jul	Chaparral (openings), Coastal scrub, Valley and foothill grassland, clay, serpentinite seeps. 30-700 m.	<b>Unlikely.</b> Suitable habitat is not present and the species was not observed during the surveys. Primarily known inland from the immediate coast in San Diego.
<i>Corethrogyne filaginifolia</i> var. <i>incana</i> San Diego sand aster	--/--/1B.1	Jun-Sep	Coastal bluff scrub, Chaparral, Coastal scrub. 3-115 m.	<b>Possible.</b> Suitable habitat is present. Munz considered it common along sandy slopes facing the sea in SW San Diego County. Variety was subsumed into the species in 2000. Taxonomy questionable.
<i>Corethrogyne filaginifolia</i> var. <i>linifolia</i> Del Mar Mesa sand aster	--/--/1B.1	May-Sep	Coastal bluff scrub, Chaparral (maritime, openings), Coastal scrub, sandy. 15-150 m.	<b>Present.</b> This variety was observed at one of the 19 Project Survey Sites.

Taxon	Status Fed/State/CRPR	Flowering period	Habitat and elevation	Potential for occurrence
<i>Cryptantha wigginsii</i> Wiggins' cryptantha	--/--/1B.2	Feb-Jun	Coastal scrub, often clay. 20-275 m.	<b>Unlikely.</b> Although recently rediscovered in Carlsbad, suitable heavy clay soils are not present in the Project Area.
<i>Cylindropuntia californica</i> var. <i>californica</i> Snake cholla	--/--/1B.1	Apr-May	Chaparral, Coastal scrub. 30-150 m.	<b>Unlikely.</b> This species is a conspicuous shrub that was not observed during the surveys.
<i>Dichondra occidentalis</i> Western dichondra	--/--/4.2	(Jan), Mar-Jul	Chaparral, Cismontane woodland, Coastal scrub, Valley and foothill grassland. 50-500 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Dudleya attenuata</i> ssp. <i>attenuata</i> Orcutt's dudleya	--/--/2B.1	May-Jul	Coastal bluff scrub, Chaparral, Coastal scrub, rocky or gravelly. 3-50 m.	<b>Unlikely.</b> Although suitable habitat is present, this species is only known from the extreme southern portion of the county and Baja California.
<i>Dudleya blochmaniae</i> ssp. <i>blochmaniae</i> Blochman's dudleya	--/--/1B.1	Apr-Jun	Coastal bluff scrub, Chaparral, Coastal scrub, Valley and foothill grassland, rocky, often clay or serpentinite. 5-450 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Dudleya brevifolia</i> Short-leaved dudleya	--/SE/1B.1	Apr-May	Chaparral (maritime, openings), Coastal scrub, Torrey sandstone. 30-250 m.	<b>Unlikely.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs. Suitable habitat was marginal in the Project area.
<i>Dudleya variegata</i> Variegated dudleya	--/--/1B.2	Apr-Jun	Chaparral, Cismontane woodland, Coastal scrub, Valley and foothill grassland, Vernal pools, clay. 3-580 m.	<b>Unlikely.</b> Although this species could be difficult to detect on inaccessible portions of the coastal bluffs, it is only known from areas to the south and east of the Project Area.
<i>Dudleya viscida</i> Sticky dudleya	--/--/1B.2	May-Jun	Coastal bluff scrub, Chaparral, Cismontane woodland, Coastal scrub, rocky. 10-550 m.	<b>Unlikely.</b> This species is a fairly conspicuous perennial that was not observed during the surveys.
<i>Ericameria palmeri</i> var. <i>palmeri</i> Palmer's goldenbush	--/--/1B.1	(Jul), Sep-Nov	Chaparral, Coastal scrub, mesic. 30-600 m.	<b>Unlikely.</b> This variety is a conspicuous shrub that was not observed during the surveys.
<i>Erysimum ammophilum</i> Sand-loving wallflower	--/--/1B.2	Feb-Jun	Chaparral (maritime), Coastal dunes, Coastal scrub, sandy, openings. 0-60 m.	<b>Unlikely.</b> This species is a tall and conspicuous brightly-flowering herb that was not observed during the surveys.
<i>Euphorbia misera</i> Cliff spurge	--/--/2B.2	Dec-Aug (Oct)	Coastal bluff scrub, Coastal scrub, Mojavean desert scrub, rocky. 10-500 m.	<b>Present.</b> This species was mapped at four of the 19 Project Survey Sites.
<i>Ferocactus viridescens</i> San Diego barrel cactus	--/--/2B.1	May-Jun	Chaparral, Coastal scrub, Valley and foothill grassland, Vernal pools. 3-450 m.	<b>Present.</b> This species was mapped at two of the 19 Project Survey Sites.
<i>Frankenia palmeri</i> Palmer's frankenia	--/--/2B.1	May-Jul	Coastal dunes, Marshes and swamps (coastal salt), Playas. 0-10 m.	<b>Unlikely.</b> This species is a fairly conspicuous perennial that was not observed during the surveys. Appears to be restricted to the southern portion of the county.
<i>Harpagonella palmeri</i> Palmer's grapplinghook	--/--/4.2	Mar-May	Chaparral, Coastal scrub, Valley and foothill grassland, clay. 20-955 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Hazardia orcuttii</i> Orcutt's hazardia	FC/ST/1B.1	Aug-Oct	Chaparral (maritime), Coastal scrub, often clay. 80-85 m.	<b>Unlikely.</b> This species is a conspicuous perennial that was not observed during the surveys.
<i>Heterotheca sessiliflora</i> ssp. <i>sessiliflora</i> Beach goldenaster	--/--/1B.1	Mar-Dec	Chaparral (coastal), Coastal dunes, Coastal scrub. 0-1225 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs when not flowering.

Taxon	Status Fed/State/CRPR	Flowering period	Habitat and elevation	Potential for occurrence
<i>Hordeum intercedens</i> Vernal barley	--/--/3.2	Mar-Jun	Coastal dunes, Coastal scrub, Valley and foothill grassland (saline flats and depressions), Vernal pools. 5-1000 m.	<b>Unlikely.</b> Although a few areas of suitable habitat are present in the Project Area, the species was not observed during the surveys.
<i>Isocoma menziesii</i> var. <i>decumbens</i> Decumbent goldenbush	--/--/1B.2	Apr-Nov	Chaparral, Coastal scrub (sandy, often in disturbed areas). 10-135 m.	<b>Unlikely.</b> Although difficult to identify, many <i>Isocoma</i> shrubs were evaluated for subspecies, and this variety was not found to be present within the Project Area.
<i>Iva hayesiana</i> San Diego marsh-elder	--/--/2B.2	Apr-Oct	Marshes and swamps, Playas. 10-500 m.	<b>Present.</b> This species was mapped at one of the 19 Project Survey Sites.
<i>Juncus acutus</i> ssp. <i>leopoldii</i> Southwestern spiny rush	--/--/4.2	(Mar), May-Jun	Coastal dunes (mesic), Meadows and seeps (alkaline seeps), Marshes and swamps (coastal salt). 3-900 m.	<b>Present.</b> This species was mapped at eight of the 19 Project Survey Sites.
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i> Coulter's goldfields	--/--/1B.1	Feb-Jun	Marshes and swamps (coastal salt), Playas, Vernal pools. 1-1220 m.	<b>Unlikely.</b> Although suitable habitat occurs along the margins of the coastal lagoons, this species was not observed within the Project Area.
<i>Lepidium virginicum</i> var. <i>robinsonii</i> Robinson's pepper-grass	--/--/4.3	Jan-Jul	Chaparral, Coastal scrub. 1-885 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Leptosyne maritima</i> Sea dahlia	--/--/2B.2	Mar-May	Coastal bluff scrub, Coastal scrub. 5-150 m.	<b>Present.</b> This species was mapped at eight of the 19 Project Survey Sites.
<i>Lycium californicum</i> California box-thorn	--/--/4.2	(Dec), Mar-Aug	Coastal bluff scrub, Coastal scrub. 5-150 m.	<b>Present.</b> This species was mapped at 15 of the 19 Project Survey Sites.
<i>Microseris douglasii</i> ssp. <i>platycarpha</i> Small-flowered microseris	--/--/4.2	Mar-May	Cismontane woodland, Coastal scrub, Valley and foothill grassland, Vernal pools, clay. 15-1070 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Mucronea californica</i> California spineflower	--/--/4.2	Mar-Jul(Aug),	Chaparral, Cismontane woodland, Coastal dunes, Coastal scrub, Valley and foothill grassland, sandy. 0-1400 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.
<i>Nemacaulis denudata</i> var. <i>denudata</i> Coast woolly-heads	--/--/1B.2	Apr-Sep	Coastal dunes. 0-100 m.	<b>Present.</b> This species was mapped at six of the 19 Project Survey Sites.
<i>Orobancha parishii</i> ssp. <i>brachyloba</i> Short-lobed broomrape	--/--/4.2	Apr-Oct	Coastal bluff scrub, Coastal dunes, Coastal scrub, sandy. 3-305 m.	<b>Possible.</b> This is an inconspicuous species that grows under <i>Isocoma</i> shrubs and could be easily overlooked.
<i>Phacelia ramosissima</i> var. <i>australitoralis</i> south coast branching phacelia	--/--/3.2	Mar-Aug	Chaparral, Coastal dunes, Coastal scrub, Marshes and swamps(coastal salt), sandy, sometimes rocky. 5-300 m.	<b>Possible.</b> <i>Phacelia ramosissima</i> plants collected at the San Elijo Lagoon do not appear to be this rare variety. Confirmation of the identification by San Diego Natural History Museum staff is pending.
<i>Phacelia stellaris</i> Brand's star phacelia	FC/--/1B.1	Mar-Jun	Coastal dunes, Coastal scrub. 1-400 m.	<b>Unlikely.</b> Although small and difficult to detect, this plant was not observed during the surveys, despite excellent germination at nearby reference sites in 2015.
<i>Pinus torreyana</i> ssp. <i>torreyana</i> Torrey pine	--/--/1B.2	N/A	Closed-cone coniferous forest, Chaparral, Sandstone. 75-160 m.	<b>Present</b> This species was mapped at two of the 19 Project Survey Sites.
<i>Quercus dumosa</i> Nuttall's scrub oak	--/--/1B.1	Feb-Apr (Aug)	Closed-cone coniferous forest, Chaparral, Coastal scrub, sandy, clay loam. 15-400 m.	<b>Unlikely.</b> This species is a conspicuous shrub that was not observed during the surveys.
<i>Selaginella cinerascens</i> Ashy spike-moss	--/--/4.1	N/A	Chaparral, Coastal scrub. 20-640 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs.

Taxon	Status <small>Fed/State/CRPR</small>	Flowering period	Habitat and elevation	Potential for occurrence
<i>Senecio aphanactis</i> Chaparral ragwort	--/--/2B.2	Jan-Apr	Chaparral, Cismontane woodland, Coastal scrub, sometimes alkaline. 15-800 m.	<b>Possible.</b> Although this species was not observed, it could be difficult to detect on inaccessible portions of the coastal bluffs
<i>Suaeda esteroa</i> Estuary seablite	--/--/1B.2	May-Oct (Jan)	Marshes and swamps (coastal salt). 0-5 m.	<b>Unlikely.</b> This species is a conspicuous shrub that was not observed during the surveys.
<i>Suaeda taxifolia</i> Woolly seablite	--/--/4.2	Jan-Dec	Coastal bluff scrub, Coastal dunes, Marshes and swamps (margins of coastal salt). 0-50 m.	<b>Present.</b> This species was mapped at six of the 19 Project Survey Sites.
<i>Viguiera laciniata</i> San Diego County viguiera	--/--/4.2	Feb-Jun (Aug)	Chaparral, Coastal scrub. 60-750 m.	<b>Unlikely.</b> This species is a conspicuous shrub that was not observed during the surveys.

**Table Sources:**

California Native Plant Society 2014; California Natural Diversity Database 2014; Consortium of California Herbaria 2014.

<sup>1</sup> **Conservation status abbreviations:**

U.S. Fish and Wildlife Service designations:

- FE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
- FT Threatened: Any species likely to become endangered within the foreseeable future.

California Department of Fish and Wildlife designations:

- SE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
- ST Threatened: Any species likely to become endangered within the foreseeable future.
- SR Rare: Any species not currently threatened with extinction, but in such small numbers throughout its range that it may become endangered if its present environment worsens.

California Native Plant Society designations:

- 1B Plants rare, threatened or endangered in California and elsewhere.
- 2 Plants rare, threatened or endangered in California, but more common elsewhere.
- 3 Plants for which more information is needed – a review list.
- 4 Plants of limited distribution – a watch list.

California Native Plant Society threat categories:

- .1 Seriously endangered in California.
- .2 Fairly endangered in California.
- .3 Not very endangered in California.

<sup>2</sup> **Occurrence potential definitions:**

- Present: Species observed on the site.
- Likely: Species not observed on the site, but reasonably certain to occur on the site.
- Possible: Species not observed on the site, but conditions suitable for occurrence.
- Unlikely: Species not observed on the site, conditions marginal for occurrence.

## 2.2 Reference site visits

Reference sites for selected rare plant species were visited prior to the surveys. The purpose of these visits is to verify that the target plants are in identifiable condition during the surveys, and to familiarize the surveyors with target species and their habitat. Reference sites for 43 of the targeted rare plant taxa were visited in 2014 in 2015, although not all taxa were visited in each year. More than one reference population was visited for several of the taxa. The reference sites visited for each taxon, and the dates and condition of the plants observed are presented in Table 3 below.

**Table 3.** List of rare plant reference sites visited.

Taxon	Date	Personnel <sup>1</sup>	Condition	Location
Aphanisma	3/27/15	KM	Vegetative and flowering.	Near CNDDB EO #35 (new location).
Ashy spike-moss	2/25/2015, 1/10/15	EK, KM	Vegetative and with strobili.	Encinitas and Peñasquitos Canyon.
Beach goldenaster	4/28/15	KM	Flowering.	Torrey Pines State Natural Reserve.
Blochman's dudleya	1/26/15	EK, KM	Vegetative.	CNDDB EO #31.
Brand's star phacelia	1/14/2015	EK	Vegetative and flowering.	Camp Pendleton.
California adolphia	1/10/15	KM	Flowering.	CNDDB EO #119.
California box-thorn	1/26/15	EK, KM	Vegetative.	Carlsbad.
Chaparral sand-verbena	5/13/2015	EK	Flowering.	Camp Pendleton.
Cliff spurge	1/26/15	EK, KM	Vegetative.	Carlsbad.
Coast woolly-heads	1/26/15	EK, KM	Many seedlings.	CNDDB EO #34.
Coulter's saltbush	4/14/14, 1/26/15	DV, EK, KM	Vegetative.	Oceanside.
Decumbent goldenbush	Several dates 2014, 2015	EK	Flowering.	Camp Pendleton.
Del Mar manzanita	Several dates 2014, 2015	EK, KM	Flowering and Vegetative.	Mira Mar NAS, CNDDB EO #67 and #70.
Encinitas baccharis	1/31/15	KM	Vegetative.	CNDDB EO #15.
Estuary seablite	2/11/15	KM	Vegetative.	Borderfield State Park.
Golden-spined cereus	2/11/15	KM	Vegetative.	CNDDB EO #35.
Lewis' evening-primrose	5/6/14	EK	Flowering and fruiting.	San Elijo Lagoon.
Long-spined spineflower	3/22/15	KM	Flowering.	Peñasquitos Canyon.
Nuttall's acmispou	1/26/15	EK, KM	Flowering, vegetative, and seedlings.	CNDDB EO #12.
Nuttall's scrub oak	1/10/15	KM	Vegetative.	Peñasquitos Canyon.
Orcutt's hazardia	2/21/15	KM	Vegetative.	CNDDB EO #5.
Orcutt's pincushion	Several dates 2014, 2015	EK, KM	Flowering.	San Elijo Lagoon.
Orcutt's spineflower	3/22/15	KM	Flowering.	CNDDB EO #16.
Palmer's grapplinghook	2/21/15	KM	Flowering and fruiting.	San Elijo Lagoon.
Red sand-verbena	1/30/15	EK, KM	Vegetative.	Black's Beach.
San Diego barrel cactus	Several dates 2014, 2015	EK, KM	Vegetative.	CNDDB EO #18.
San Diego County viguiera	4/16/2015	EK	Flowering.	Camp Pendleton.
San Diego marsh-elder	1/10/15	KM	Vegetative.	CNDDB EO #100.
San Diego sagewort	1/10/15	KM	Vegetative.	Peñasquitos Canyon.
Sand-loving wallflower	4/1/2015	EK	Flowering.	Camp Pendleton.
Sea dahlia	1/30/15	KM	Vegetative.	CNDDB EO #12.
Seaside cistanthe	4/14/2014, 1/26/15	DV, EK, KM	Vegetative.	Oceanside.
Shaw's agave	1/26/15	EK, KM	Vegetative.	Carlsbad.
Small-flowered microseris	2/21/15, 3/26/2015,	KM, EK	Flowering and fruiting.	Camp Pendleton, San Elijo Lagoon.
Small-flowered morning-glory	2/21/15, 3/21/15	KM	Flowering and fruiting.	San Elijo Lagoon.
Snake cholla	3/27/15	KM	Vegetative.	CNDDB EO #13.
Southwestern spiny rush	1/26/15	EK, KM	Fruiting.	Batiquitos Lagoon.
Sticky dudleya	4/30/2014	EK	Vegetative.	Camp Pendleton.
Summer holly	2/01/15	KM	Vegetative, flowering.	CNDDB EO #67.
Vernal barley	3/26/2015	EK	Flowering.	Camp Pendleton.
Wart-stemmed ceanothus	2/25/15	EK	Vegetative.	Encinitas.
Western dichondra	4/28/14, 3/31/15	EK	Vegetative.	Camp Pendleton.
Woolly seablite	1/26/15	EK, KM	Vegetative.	Carlsbad.

<sup>1</sup>DV = David Varner, MS; EK = Ed Kentner, PhD; KM = Keir Morse, MS.

### 2.3 Botanical surveys

Botanical surveys of the Project Area generally following the guidelines provided by CNPS (2001), the California Department of Fish and Wildlife (CDFW 2009), and the United States Fish and Wildlife Service (USFWS 1996) were conducted during the spring and summer of 2014 and 2015. Winter rainfall was particularly poor for the germination and growth of annual plant species in 2014, leading to a survey and mapping effort emphasizing shrub and perennial rare plant taxa. Due to more favorable winter rainfall in

2015, rare annual species were more abundant, and drought deciduous species such as California box-thorn (*Lycium californicum*) were much more vigorous and more easily seen on high cliff faces than in 2014. The mapping effort in 2015 therefore expanded on the 2014 baseline mapping, adding many observations of both annual and perennial species. The survey dates and personnel for each Survey Site within the Project Area are presented in Table 4.

**Table 4.** Survey dates and personnel.

Survey Site	Survey Date	Personnel <sup>1</sup>
Oceanside, San Luis Rey	3/24/2015	EK, KM
Carlsbad State Beach, Pine to Tamarack	7/17/2014, 3/24/2015, 3/25/2015	EK, KM
Carlsbad, Agua Hedionda	3/24/2015	EK, KM
South Carlsbad State Beach, North Terramar	5/6/2014, 3/19/2015	EK, KM
South Carlsbad State Beach, South Terramar	6/3/2014, 3/19/2015	EK, KM
South Carlsbad State Beach, 101 Median Strip	6/23/2014, 3/19/2015	EK
South Carlsbad State Beach, Campground	6/2/2014, 7/14/2014, 3/20/2015, 3/23/2015, 3/24/2015, 6/19/2015	EK
South Carlsbad State Beach, North Ponto	5/6/2014, 3/20/2015, 3/25/2015	EK, KM
South Carlsbad, Batiquitos W1 and W2	2/5/2015, 3/20/2015	EK, KM, DV
South Carlsbad, Batiquitos 101 Median Strip	3/25/2015	KM
South Carlsbad State Beach, South Ponto	5/29/2014, 3/18/2015, 3/25/2015	EK, KM
Encinitas, Beacon's Beach	5/21/2014, 4/28/2015	EK, DV
Encinitas, Swamis to Moonlight	5/21/2014, 2/27/2015	FL, KM
San Elijo State Beach, 101 Median Strip	5/21/2014, 2/23/2015	FL, KM
San Elijo State Beach, Campground	5/21/2014, 2/25/2015, 2/27/2015	FL, KM
San Elijo Lagoon	5/21/2014, 2/27/2015, 3/17/2015, 3/20/2015, 3/25/2015, 5/22/2015	EK, KM, DV
Del Mar, North Torrey Pines	4/30/2015, 8/25/2015	KM
Torrey Pines State Reserve, Penasquitos Lagoon	5/21/2014, 6/9/2014, 2/3/2015, 3/16/2015, 3/20/2015	EK, KM, DV, FL
Torrey Pines State Reserve, Black's Beach	5/21/2014, 5/30/2014, 1/30/2015, 2/3/2015	EK, KM, FL

<sup>1</sup>DV = David Varner, MS; EK = Ed Kentner, PhD; FL = Frank Landis, PhD; KM = Keir Morse, MS.

Pedestrian surveys of each Survey Site were conducted during which the rare plant species and invasive weeds encountered were mapped. Inaccessible areas, primarily steep bluff faces where walking was not safe, were surveyed as best as possible using binoculars. In 2014, rare plants and weeds were mapped using a handheld Garmin GPS unit, and the data transferred to GIS. In 2015, GPS-enabled field computers with GIS software and high resolution aerial imagery were used to refine and add to the 2014 baseline map. Large polygons of rare plant or weed occurrences were hand drawn in the field, and smaller populations and single plants were recorded directly as points using the field computer's GPS position. For each point and polygon, the species identification, actual or approximate number of plants present (exact counts were where possible; estimated numbers for very large populations), and any additional observations or comments were recorded directly into GIS shape files in the field. For point observations, the approximate radius of the occupied area around the point center was also recorded.

A list of all vascular plant species encountered at each Survey Site was recorded during the surveys, with the exception of two Survey Sites, "San Luis Rey" and "Agua Hedionda", where the focus was primarily on San Diego Management Strategic Plan (MSP) Plot data collection (see below), and lists were not compiled. Complete species lists for the other 17 Survey Sites are provided in Appendix A.

## 2.4 MSP plot data collection

San Diego Management and Monitoring Program (SDMMP) is an organization seeking to provide a coordinated approach to management and biological monitoring of conserved lands in San Diego (SDMMP 2015b). To assist in SDMMP's 2014 and 2015 objectives for surveying and evaluating existing occurrences of rare plant species, ten standardized MSP plots for Nuttall's acmispon (*Acmispon prostratus*) and one plot for Shaw's agave (*Agave shawii*) were installed within the Project Area. Plot data were collected onto standardized forms following the protocol provided by SDMMP (2015a). These data were then entered into a provided Excel spreadsheet for submission to SDMMP.

## 3 Results and Discussion

### 3.1 Rare Plant Results

Seventeen species of rare plants were observed during the surveys (Table 5). A summary matrix showing which rare plant taxa were mapped at each of the 19 Survey Sites is presented in Table 6. The rarity rankings for each of these taxa can be found in Table 2. Brief descriptions of each of the mapped rare plants are provided below, and more detailed information regarding the observations at each Survey Site are provided in Section 3.3. Maps depicting rare plant and invasive weed occurrences at each Survey Site are presented in Appendix B. CNDDDB field forms for rare plants on Lists 1 and 2 are provided in Appendix C. Occurrence information for species with CRPR List 4 ranks will be submitted to CNDDDB electronically as GIS shape files.

**Table 5.** Rare plants mapped within the NCDHRP Project Area.

Common name	Scientific name	No. of Survey Sites	No. of mapped features	Est. No. of plants
California adolphia	<i>Adolphia californica</i>	1	2	54
California box-thorn	<i>Lycium californicum</i>	15	213	1,581
Cliff spurge	<i>Euphorbia misera</i>	4	14	538
Coast woolly-heads	<i>Nemacaulis denudata</i> var. <i>denudata</i>	6	23	565,997
Del Mar Mesa sand aster	<i>Corethrogyne filaginifolia</i> var. <i>linifolia</i>	1	2	8
Lewis' evening-primrose	<i>Camissoniopsis lewisii</i>	8	23	3,374
Nuttall's acmispon	<i>Acmispon prostratus</i>	7	47	64,176
Orcutt's pincushion	<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i>	3	18	3,862
Red sand-verbena	<i>Abronia maritima</i>	6	32	138
San Diego barrel cactus	<i>Ferocactus viridescens</i>	2	36	178
San Diego marsh-elder	<i>Iva hayesiana</i>	1	2	15
Sea dahlia	<i>Leptosyne maritima</i>	8	35	868
Shaws agave	<i>Agave shawii</i> var. <i>shawii</i>	3	8	15
South Coast saltscale	<i>Atriplex pacifica</i>	1	1	1
Southwestern spiny rush	<i>Juncus acutus</i> subsp. <i>leopoldii</i>	8	84	1,319
Torrey Pine	<i>Pinus torreyana</i> subsp. <i>torreyana</i>	2	37	68
Woolly seablite	<i>Suaeda taxifolia</i>	6	27	162

**Table 6.** Rare plant by Survey Site occurrence matrix.

Survey Site	California adolphia	California box-thorn	Cliff spurge	Coast woolly-heads	Del Mar Mesa sand aster	Lewis' evening-primrose	Nuttall's acmispon	Orcutt's pincushion	Red sand-verbena	San Diego barrel cactus	San Diego marsh-elder	Sea dahlia	Shaw's agave <sup>1</sup>	South Coast saltscale	Southwestern spiny rush	Torrey Pine	Woolly seablite
Oceanside, San Luis Rey				X		X	X				X						
Carlsbad State Beach, Pine to Tamarack		X	X						X			X	X				
Carlsbad, Agua Hedionda				X		X	X										
South Carlsbad State Beach, North Terramar		X															
South Carlsbad State Beach, South Terramar		X	X									X	X				X
South Carlsbad State Beach, 101 Median Strip		X				X											
South Carlsbad State Beach, Campground		X					X							X			X
South Carlsbad State Beach, North Ponto		X				X											X
South Carlsbad, Batiquitos W1 and W2		X		X		X		X									
South Carlsbad, Batiquitos 101 Median Strip						X									X		
South Carlsbad State Beach, South Ponto				X		X	X	X	X		X				X	X	
Encinitas, Beacon's Beach		X															
Encinitas, Swamis to Moonlight		X									X				X		
San Elijo State Beach, 101 Median Strip	X	X													X		
San Elijo State Beach, Campground		X													X		
San Elijo Lagoon		X	X	X		X	X	X			X				X		
Del Mar, North Torrey Pines		X			X			X	X		X				X	X	X
Torrey Pines State Reserve, Penasquitos Lagoon		X		X		X	X		X	X	X	X			X		X
Torrey Pines State Reserve, Black's Beach		X	X						X	X	X						X

<sup>1</sup>Includes mapped occurrences only, some planted sites omitted.

**California adolphia (*Adolphia californica*)**

California adolphia is a deciduous shrub in the buckthorn family (Rhamnaceae) with stout, thorn-like twigs. It reaches a height of about 1.5 m (Baldwin 2012), and is found in chaparral, coastal scrub and grassland communities at elevations between 45 and 740 m. California adolphia has no State or Federal listing status, but is included on CRPR List 2B.1, indicating that it is seriously endangered in California, but more common elsewhere (CNPS 2014).



California adolphia is restricted to coastal San Diego County and adjacent Baja California, Mexico. In California, It is threatened by urbanization, road construction, non-native plants, and grazing (CNPS 2014). It was found at just

one of the Project Survey Sites, the San Elijo State Beach 101 Median Strip in Encinitas (Table 6). Observations for this occurrence are provided in Section 3.3 below.



**California box-thorn (*Lycium californicum*)**

California box-thorn is a drought-deciduous shrub in the potato family (Solanaceae) with small succulent leaves and thorn-like branches (Baldwin 2012). It is found in coastal scrub and coastal bluff scrub communities at elevations between sea level and 150 m. California box-thorn has no State or Federal listing status, but is included on CRPR List 4.2, a watch list (CNPS 2014).

California box-thorn occurs on the Channel Islands, in coastal southern California from San Diego north to Santa Barbara County, and in adjacent Baja California, Mexico. It is also reported to occur on Guadalupe Island, and Sonora, Mexico (CNPS 2014). It is the most frequently encountered rare plant within the Project Area, and was mapped at 15 of the 19 Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.

**Cliff spurge (*Euphorbia misera*)**

Cliff spurge is a drought-deciduous shrub in the spurge family (Euphorbiaceae) reaching about one meter in height with thorn-like branches and white milky sap (Baldwin 2012). It is found in coastal scrub, coastal bluff scrub, and Mojave Desert scrub communities at elevations between sea level and 500 m. Cliff spurge has no State or Federal listing status, but is included on CRPR List 2B.2, indicating that it is fairly endangered in California, but more common elsewhere (CNPS 2014)



Cliff spurge is known primarily from coastal southern California, adjacent Baja California, Mexico, and on several of the Channel Islands, but at least one disjunct population is known from the desert near Palm Springs (CCH 2015). It is threatened by development and non-native plants (CNPS 2014). Cliff spurge was mapped at four of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.

**Coast woolly-heads (*Nemacaulis denudata* var. *denudata*)**

Coast woolly-heads is a prostrate to decumbent annual herb in the knotweed family (Polygonaceae) with small white to rose flowers born on a sprawling inflorescence. The plants may be only a few centimeters, or up to 80 cm in diameter (Baldwin 2012). It is found in coastal dunes and sandy areas at elevations from sea level up to about 100 m. Coast woolly heads has no State or Federal listing status, but is included on CRPR List 1B.2, indicating that it is fairly endangered in California.



Coast woolly-heads is known to occur in coastal southern California north to San Luis Obispo County, Santa Catalina Island, and Baja California, Mexico. Populations in California have been much reduced by

coastal development (CNPS 2014). It was mapped at six of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.

**Del Mar Mesa sand aster (*Corethrogyne filaginifolia* var. *linifolia*)**

Del Mar Mesa sand aster is a perennial herb in the sunflower family (Asteraceae) that is distinguished from more common varieties of the species by its nonglandular and tomentose involucre (Munz and Keck 1973). Although this variety of *Corethrogyne filaginifolia* is no longer taxonomically recognized as distinct in The Jepson Manual 2<sup>nd</sup> Edition (Baldwin 2012), it is recognized by CNPS and is covered under the San Diego MSCP (City of San Diego 2015). Del Mar Mesa sand aster has no State or Federal listing status, but is included on CRPR List 1B.1, indicating that it is seriously endangered in California (CNPS 2014).



Del Mar Mesa sand aster is known from only a small area around Del Mar and Encinitas in coastal San Diego county, although there are reports of the variety as far north as Oceanside (CNDDDB 2015). Del Mar Mesa sand aster may be difficult to distinguish from the more common *C. f. var. filaginifolia*, and experts from the San Diego Natural History Museum (SDNHM) have not recognized any of the more northern reports as the rare variety (SDNHM 2015). Del Mar Mesa sand aster was mapped only at the North Torrey Pines Survey Site in Del Mar (Table 6). Observations for this site are provided in Section 3.3 below.



**Lewis' evening-primrose (*Camissoniopsis lewisii*)**

Lewis' evening-primrose is an annual herb in the evening-primrose family (Onagraceae). It can be quite difficult to distinguish from other members of its genus, and inspection of the pollen grains under high magnification is typically required for positive identification (Baldwin 2012). It is found in coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland on sandy or clay soils at elevations below 300 m. Lewis' evening-primrose has no State or Federal listing status, but is included on CRPR List 3, indicating that more information is needed regarding the distribution and rarity of this taxon (CNPS 2014).

Lewis' evening-primrose is known from Baja California, Mexico and locations throughout San Diego, Orange, and Los Angeles counties where it is possibly threatened by erosion and recreational activities (CNPS 2014). It was mapped at eight of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.

**Nuttall's acmispon (*Acmispon prostratus*)**

Nuttall's acmispon is an annual herb in the pea family (Fabaceae) with prostrate or ascending stems and yellow and red flowers born on short peduncles (Baldwin 2012). It is known from beaches, coastal dunes and coastal scrub habitats at elevations typically less than 10 m. Nuttall's acmispon has no State or Federal listing status, but is included on CRPR List 1B.1, indicating that it is seriously endangered in California (CNPS 2014).



Nuttall's acmispon is restricted to coastal San Diego County and adjacent Baja

California, Mexico where it is threatened by development, trampling, non-native plants, and military activities (CNPS 2014). It was mapped at seven of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.



**Orcutt's pincushion (*Chaenactis glabriuscula* var. *orcuttiana*)**

Orcutt's pincushion is an annual herb in the sunflower family with bright yellow heads and fleshy, generally twice-pinnately compound leaves (Baldwin 2012). It is found in coastal dunes and coastal bluff scrub at elevations from sea level to about 100 m. Orcutt's pincushion has no State or Federal listing status, but is included on CRPR List 1B.1, indicating that it is seriously endangered in California (CNPS 2014).

Orcutt's pincushion is known to occur in Baja California, Mexico, and in Los Angeles, San Diego, and Ventura Counties where it is threatened by development and recreation. It is presumed to be extirpated from Orange County (CNPS 2014). Plants in the Project Area seem to intergrade with the more common variety *C. g.* var. *glabriuscula* at sites more than just a few hundred meters away from the immediate coast (EK, KM personal observations; FNA 1993). Efforts were made to map only populations in which the majority of plants displayed the morphology of *C. g.* var. *orcuttiana*. Orcutt's pincushion was mapped at three of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.

**Red sand-verbena (*Abronia maritima*)**

Red sand-verbena is a sprawling perennial herb in the four o'clock family (Nyctaginaceae) that flowers from February through November (Baldwin 2012). It is found on coastal sand dunes at elevations from sea level to about 100 m. Red sand-verbena has no State or Federal listing status, but is included on CRPR List 4.2, a watch list (CNPS 2014).



Red sand-verbena is endemic to California and Baja California, Mexico, where it occurs on many of the channel islands and in coastal dunes from northern Baja north to San Luis Obispo County (CNPS 2014). In San Diego, coastal erosion and trampling have reduced the available habitat for this species, and it has become quite uncommon (Ed Kentner personal observation). Red sand-verbena was mapped at six of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.



**San Diego barrel cactus (*Ferocactus viridescens*)**

San Diego barrel cactus is a stem-succulent member of the cactus family (Cactaceae) with columnar stems typically wider than tall (Baldwin 2012). It is found in chaparral, coastal scrub, and grassland, communities at elevations between sea level and 450 m. San Diego barrel cactus has no State or Federal listing status, but is included on CRPR List 2B.1, indicating that it is seriously endangered in California, but more common elsewhere (CNPS 2014).

San Diego barrel cactus is endemic to San Diego county and northern Baja

California, Mexico. In California it is seriously threatened by urbanization, vehicles, horticultural collecting, agriculture, and non-native plants (CNPS 2014). It was mapped at two of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.

**San Diego marsh-elder (*Iva hayesiana*)**

San Diego marsh-elder is a perennial herb or subshrub in the sunflower family with sprawling to erect stems less than one meter tall (Baldwin 2012). It is known to occur along stream banks, in alkaline flats and depressions, and in marshes and swamps at elevations between 10 and 500 m (Baldwin 2012; CNPS 2014). San Diego marsh-elder has no State or Federal listing status, but is included on CRPR List 2B.2, indicating that it is fairly endangered in California, but more common elsewhere (CNPS 2014).



San Diego marsh-elder is restricted to San Diego and Orange Counties and adjacent Baja California, Mexico (CCH 2015; CNPS 2014). In California it is threatened by waterway channelization, coastal development, vehicles, and non-native plants (CNPS 2014). San Diego marsh-elder was mapped at one of the 19 Project Survey Sites, San Luis Rey in Oceanside (Table 6). Observations for this site are provided in Section 3.3 below.

**Sea dahlia (*Leptosyne maritima*)**

Sea dahlia is a perennial herb in the sunflower family with showy yellow flower heads and pinnately lobed leaves (Baldwin 2012). It is typically found growing on coastal bluffs (CNPS 2014) at elevations below 150 m. Sea dahlia has no State or Federal listing status, but is included on CRPR List 2B.2, indicating that it is fairly endangered in California, but more common elsewhere (CNPS 2014).



Sea dahlia is known only from San Diego County and adjacent Baja California, Mexico. Threats to this species include erosion, recreation, and non-native plants (CNPS 2014). It was mapped at eight of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.



**Shaw's agave (*Agave shawii* var. *shawii*)**

Shaw's agave is a shrub-like succulent perennial in the century plant family (Agavaceae) that produces dense, clustered basal rosettes often more than a meter tall. It is currently found on coastal bluffs, but historically was found on nearby foothills and mesas (Baldwin 2012). Shaw's agave has no State or Federal listing status, but is included on CRPR List 2B.1, indicating that it is seriously endangered in California, but more common elsewhere (CNPS 2014).

Shaw's agave is known from coastal San Diego County and adjacent Baja California, Mexico. However, many, if not all, of the current San Diego populations have been planted. Threats include coastal development, low recruitment, and historically, horticultural collection (CNPS 2014). Shaw's agave was mapped at three of

the 19 Project Survey Sites (Table 6), although it is likely that each of these occurrences are the results of transplantation. Observations for each of these Survey Sites are provided in Section 3.3 below.

**South Coast saltscale (*Atriplex pacifica*)**

South Coast saltscale is an annual herb in the goosefoot family (Chenopodiaceae) with prostrate to decumbent stems less than 0.5 m tall, and tiny fruit bracts less than 1.5 mm wide (Baldwin 2012). It is found on dunes, playas, and in coastal bluff scrub at elevations below 140 m. South Coast saltscale has no State or Federal listing status, but is included on CRPR List 1B.2, indicating that it is fairly endangered in California (CNPS 2014).



South Coast saltscale is known from southern California, Arizona, Baja California, and Sonora, Mexico. In California, many known occurrences are extirpated, and most of the Channel Islands contain only a few occurrences each. It has been greatly reduced by urbanization on the mainland (CNPS 2014). Annual *Atriplex* species are notoriously difficult to identify, and confirmation of the plant found in the Project Area by botanists at the San Diego Natural History Museum is pending. South Coast saltscale was mapped at one of the 19 Project Survey Sites, the South Carlsbad State Beach Campground (Table 6). Observations for this site are provided in Section 3.3 below.



**Southwestern spiny rush (*Juncus acutus* subsp. *leopoldii*)**

Southwestern spiny rush is a perennial herb in the rush family (Juncaceae) that produces a dense rosette of sharp pointed leaves up to 1.4 m high (Baldwin 2012). It is found in mesic areas of coastal dunes, meadows and seeps, and in coastal salt marshes at elevations below 900 m (CNPS 2014). Southwestern spiny rush has no State or Federal listing status, but is included on CRPR List 4.2, a watch list.

Southwestern spiny rush occurs in California, Arizona, Nevada, Baja California, and South America. In California it is known primarily from coastal and inland sites from San Diego County north to San Luis Obispo County, but there are also reliable records for this species from the Sonoran Desert as well as the Transverse Ranges (CCH 2015). It was mapped at eight of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.

### **Torrey Pine (*Pinus torreyana* subsp. *torreyana*)**

Torrey Pine is a medium-sized tree in the pine family (Pinaceae) reaching up to 23m in height (Baldwin 2012). It occurs on sandstone bluffs in stands where it is the dominant species and in coastal chaparral habitats (CNPS 2014). Torrey pine has no State or Federal listing status, but is included on CRPR List 1B.2, indicating that it is fairly endangered in California (CNPS 2014).



Torrey Pine occurs naturally only at Torrey Pines State Reserve in La Jolla, and on nearby private property, but a closely related subspecies, Santa Rosa Island Torrey pine (*P. torreyana* subsp. *insularis*) occurs on Santa Rosa Island (Baldwin 2012; CNPS 2014). It is Threatened by development, and has been seriously attacked by the five-spined bark beetle at Torrey Pines SR (CNPS 2014). Native trees were mapped at one of the 19 Project Survey Sites, North Torrey Pines in Del Mar (Table 6), although there are many trees on the bluffs above the Black's Beach Survey Site that were not mapped. A planted specimen was also mapped at South Carlsbad State Beach near the South Ponto parking area. Observations for North Torrey Pines are provided in Section 3.3 below.

### **Woolly seablite (*Suaeda taxifolia*)**

Woolly seablite is a subshrub to shrub in the goosefoot family that can reach a height of about 1.5 m (Baldwin 2012). It grows along coastal bluffs and the margins of salt marshes at elevations below 50 m (CNPS 2014). Woolly seablite has no State or Federal listing status, but is included on CRPR List 4.2, a watch list.



Woolly seablite ranges from California to Baja California, Mexico, and is found on many of the Channel Islands and on Guadalupe Island in Mexico. In California, it occurs along the coast from San Diego to San Luis Obispo County (CNPS 2014). Woolly seablite was mapped at six of the 19 Project Survey Sites (Table 6). Observations for each of these Survey Sites are provided in Section 3.3 below.

## **3.2 Invasive Weed Results**

Non-native invasive weeds are prevalent throughout coastal North County, and many of the Survey Sites are now dominated by non-native species. Notable exceptions where native species currently dominate include actively managed areas such as the San Elijo and Batiquitos lagoons, and protected natural areas such as Torrey Pines State Reserve. Even at sites with active weed control, invasive weeds are often present and threaten to displace native plants without continued management.

The weed mapping that was conducted during the botanical surveys focused on weed species known to have adverse effects on natural ecosystems and/or species for which management action is feasible. Some invasive weeds, such as weedy annual grasses and "iceplants" (*Mesembryanthemum* spp.), occur so frequently that mapping them was not practical. The presence of these ubiquitous weeds was noted on the species list for each Survey Site where they were observed, but individual infestations were generally not mapped. Hottentot fig (*Carpobrotus* spp.) and sea rocket (*Cakile maritima*) occur throughout the beaches and coastal bluffs, often in great abundance. At some Survey Sites these species

were mapped, and at others they were so abundant that mapping was not attempted, and their presence was simply noted.

Fifty-one species of invasive weeds were mapped during the survey (Table 7). A few of these weeds were mapped at the generic level because infestations could not be reliably identified to a single species at the time of the surveys. For example, *Carpobrotus edulis* and *C. chilensis* plants were not mapped separately because flowers are required for positive identification, the species hybridize, and they are ecologically equivalent in the region. For similar reasons, species of *Salsola*, *Tamarix*, *Acacia*, and *Melaleuca* were also mapped at the generic level, although more than one species of each could be present. A summary matrix showing which invasive weed taxa were mapped at each of the 19 Survey Sites is presented in Table 8.

**Table 7.** Invasive weeds mapped within the NCDHRP Project Area.

Common name	Scientific name	Rating <sup>1</sup>	Noxious rating <sup>2</sup> (Fed/State)
Acacia	<i>Acacia</i> sp.	Watch List	-- / --
Red apple iceplant	<i>Aptenia cordifolia</i>	Watch List	-- / --
Giant reed	<i>Arundo donax</i>	High (A,B,A)	-- / SNW
African asparagus fern	<i>Asparagus asparagoides</i>	Moderate (B,B,D)	-- / --
Onion weed	<i>Asphodelus fistulosus</i>	Moderate (B,A,C)	-- / SNW
Fivehook bassia	<i>Bassia hyssopifolia</i>	Limited (C,C,B)	-- / --
False-brome	<i>Brachypodium distachyon</i>	Moderate (B,B,B)	-- / --
Saharan mustard	<i>Brassica tournefortii</i>	High (A,A,B)	-- / --
Ripgut brome	<i>Bromus diandrus</i>	Moderate (B,B,A)	-- / --
European searocket	<i>Cakile maritima</i>	Limited (C,B,B)	-- / --
Hottentot fig	<i>Carpobrotus</i> sp.	High (A,B,A)	-- / --
Tocalote	<i>Centaurea melitensis</i>	Moderate (B,B,B)	-- / SNW
Pampas grass	<i>Cortaderia selloana</i>	High (A,A,B)	-- / --
Artichoke thistle	<i>Cynara cardunculus</i>	Moderate (B,B,B)	-- / SNW
Bermuda grass	<i>Cynodon dactylon</i>	Moderate (B,B,B)	-- / --
Umbrella plant	<i>Cyperus involucreatus</i>	Not rated	-- / --
Flix weed	<i>Descurainia sophia</i>	Limited (C,B,B)	-- / --
Longflowered veldtgrass	<i>Ehrharta longiflora</i>	Moderate (B,B,C)	-- / --
Spiny emex	<i>Emex spinosa</i>	Moderate (B,B,D)	FNW / --
Petty spurge	<i>Euphorbia peplus</i>	Not rated	-- / --
Fennel	<i>Foeniculum vulgare</i>	High (A,B,A)	-- / --
Crowndaisy	<i>Glebionis coronaria</i>	Moderate (B,B,B)	-- / --
Shortpod mustard	<i>Hirschfeldia incana</i>	Moderate (B,B,A)	-- / --
Iris	<i>Iris</i> sp.	Not rated	-- / --
Canary Island sea lavender	<i>Limonium perezii</i>	Watch List	-- / --
Algerian sea lavender	<i>Limonium ramosissimum</i>	Limited (C,C,D)	-- / --
Statice	<i>Limonium sinuatum</i>	Not rated	-- / --
Sweet alyssum	<i>Lobularia maritima</i>	Limited (C,B,B)	-- / --
Crocea iceplant	<i>Malephora crocea</i>	Watch List (D,C,C)	-- / --
Cheeseweed	<i>Malva parviflora</i>	Not rated	-- / --
Stock	<i>Matthiola incana</i>	Not rated	-- / --
Bottlebrush	<i>Melaleuca</i> sp.	Not rated	-- / --
Small melilot	<i>Melilotus indicus</i>	Watch List	-- / --
Crystalline iceplant	<i>Mesembryanthemum crystallinum</i>	Moderate (B,B,C)	-- / --

Common name	Scientific name	Rating <sup>1</sup>	Noxious rating <sup>2</sup> (Fed/State)
Slenderleaf iceplant	<i>Mesembryanthemum nodiflorum</i>	Watch List	-- / --
Ngaio tree	<i>Myoporum laetum</i>	Moderate (B,B,B)	-- / --
Prostrate Myoporum	<i>Myoporum parvifolium</i>	Not rated	-- / --
Myoporum	<i>Myoporum</i> sp.	Not rated	-- / --
Tree tobacco	<i>Nicotiana glauca</i>	Moderate (C,B,B)	-- / --
Nopales	<i>Opuntia ficus-indica</i>	Not rated	-- / --
Bermuda-buttercup	<i>Oxalis pes-caprae</i>	Moderate (B,B,B)	-- / --
Seashore paspalum	<i>Paspalum vaginatum</i>	Watch List	-- / --
Fountain Grass	<i>Pennisetum setaceum</i>	Moderate (B,B,B)	-- / --
Canary Island date palm	<i>Phoenix canariensis</i>	Limited (C,B,D)	-- / --
Wild radish	<i>Raphanus sativus</i>	Limited (C,C,B)	-- / --
Castor bean	<i>Ricinus communis</i>	Limited (C,B,B)	-- / --
Russian thistle	<i>Salsola</i> sp.	Limited (C,B,B)	-- / SNW
London rocket	<i>Sisymbrium irio</i>	Moderate (B,B,A)	-- / --
Sow thistle	<i>Sonchus asper</i>	Watch List (D,B,B)	-- / --
Saltcedar	<i>Tamarix</i> sp.	High (A,A,A)	-- / SNW
Mexican fan palm	<i>Washingtonia robusta</i>	Moderate (B,B,C)	-- / --

<sup>1</sup>Cal-IPC (2015) ratings:

High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure.

Moderate – These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure.

Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score.

<sup>1</sup>Cal-IPC Scores (Impact, Invasiveness, Distribution):

A = Severe

B = Moderate

C = Limited

<sup>2</sup> Federal (USDA 2012) and State (CDFA 2014) Noxious weed ratings:

FNW = Federal Noxious Weed

SNW = State Noxious Weed

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### 3.3 MSP Plot Results

Standardized MSP Plot data was recorded at 11 locations in 2015, ten plots at Nuttall’s acmispon populations, and one plot for Shaw’s agave at South Carlsbad State Beach (Table 9). The plot locations are depicted in the maps of Appendix B. With the exception of one plot at the San Elijo Lagoon (ACPR\_7SELA018-1) which was first installed in 2014 and re-recorded in 2015, all of the plots installed represent newly established permanent monitoring sites. The “Plot ID” names provided in Table 9 are derived from the occurrence codes assigned by the MSP program. In cases where the plots correspond to newly discovered populations, such as the Nuttall’s acmispon population at the north end of South Carlsbad State Beach, a temporary plot ID was assigned in the field. An occurrence code will likely be assigned by MSP based on the survey results and plot data present here, and the Plot ID provided below may change to reflect the revised name. At several sites where Nuttall’s acmispon occurs on both sides of Hwy 101, the plot ID’s were assigned “-1” and “-2” suffixes according to instructions provided by MSP (Kristine Preston personal communication with Keir Morse), with “-1” representing the east side of Hwy 101 and “-2” representing the west side.

**Table 9.** MSP Plot locations.

Location	Plot ID	Species	Latitude	Longitude
San Luis Rey	ACPR_7SLRR017	Nuttall’s acmispon	33.2051	-117.385668
Agua Hedionda	ACPR_7AHLA001	Nuttall’s acmispon	33.144785	-117.338344
South Terramar	AGSH_SCSB001	Shaw’s agave	33.123989	-117.329478
South Carlsbad SB	ACPR_7SCSB001	Nuttall’s acmispon	33.113622	-117.324194
Batiquitos Lagoon	ACPR_7BALA020-1	Nuttall’s acmispon	33.086037	-117.310816
Batiquitos Lagoon	ACPR_7BALA020-2	Nuttall’s acmispon	33.083279	-117.311541
San Elijo Lagoon	ACPR_7SELA018-1	Nuttall’s acmispon	33.005705	-117.277714
San Elijo Lagoon	ACPR_7SELA018-2	Nuttall’s acmispon	33.003316	-117.277997
Torrey Pines	ACPR_7TPSR023	Nuttall’s acmispon	32.934506	-117.258929
Torrey Pines	ACPR_7TPSR019-2	Nuttall’s acmispon	32.929174	-117.259128
Torrey Pines	ACPR_7TPSR019-1	Nuttall’s acmispon	32.928866	-117.259715

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### 3.4 Results for Individual Survey Sites

Brief descriptions of the 19 individual Survey Sites, and summaries of the rare plant and invasive weed survey results for each site are presented below. The mapping results are presented in Appendix B.

#### 3.4.1 Oceanside, San Luis Rey

The San Luis Rey Survey Site, located near the mouth of the San Luis Rey River in Oceanside (Appendix B, Map 1), was surveyed for rare plants incidentally to MSP plot data collection for Nuttall's acmispon. Because the site was not included in the original NCDHRP grant proposal, a reduced survey effort was undertaken here in which invasive weeds were not mapped.

The Survey Site, including the area where the rare plants are located, is an older restoration site, but date of the restoration is not known. The site is composed of sandy soils surrounding the mouth of the San Luis Rey River about 500 m inland from the beach. Unfortunately, the site has been "restored" using a mixture of coastal sage scrub species that is inappropriate for the location and sandy soils present. The area was once most likely a coastal back dune, but has been planted to *Encelia californica*, *Eriogonum fasciculatum*, *Salvia mellifera*, and *Artemisia californica*. The abandoned irrigation lines have not been removed. While this site has great potential as a coastal dune restoration area, the current mix of species is likely to shade out and displace the rare dune plants currently present as the planted shrubs mature. A summary of the rare plants mapped at San Luis Rey is presented in Table 10 below.

**Table 10.** San Luis Rey mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Acmispon prostratus</i>	Nuttall's acmispon	5	81
<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose	1	1,000
<i>Iva hayesiana</i>	San Diego marsh-elder	2	15
<i>Nemacaulis denudata</i> var. <i>denudata</i>	Coast woolly-heads	1	1

#### 3.4.2 Carlsbad State Beach, Pine Street to Tamarack Street

The Pine Street to Tamarack Street Survey Site (Appendix B, Maps 2-3) consists almost entirely of coastal bluffs with paved walkways above and below the bluff face. Except for perhaps some very small areas adjacent to the sea wall, the beach here is inundated during the highest tides and is not vegetated. Although heavily invaded by invasive weeds, a good number of native maritime succulent scrub species such as *Lycium californicum* and *Cylindropuntia prolifera* persist on the bluffs here.

In 2015, a partial restoration of the site was undertaken in which several species of rare plants were planted including Shaw's agave, cliff spurge, and sea dahlia. Because of the inundation during high tides there is little restoration potential for coastal dune habitat along the beach. However, the sandy berm in the northwest corner of the Tamarack parking area may present some restoration opportunities. A summary of the rare plants and invasive weeds mapped at Pine Street to Tamarack Street is presented in Table 11 below.

**Table 11.** Pine Street to Tamarack Street mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Abronia maritima</i>	Red sand-verbena	4	4
<i>Agave shawii</i> var. <i>shawii</i>	Shaw's agave	5	10
<i>Euphorbia misera</i>	Cliff spurge	10	27
<i>Leptosyne maritima</i>	Sea dahlia	3	11
<i>Lycium californicum</i>	California box-thorn	25	84
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	1	1
<i>Arundo donax</i>	Giant reed	18	25
<i>Bromus diandrus</i>	Ripgut brome	1	0
<i>Cakile maritima</i>	European searocket	4	20,200
<i>Carpobrotus</i> sp.	Hottentot fig	11	43
<i>Cortaderia selloana</i>	Pampas grass	1	1
<i>Cyperus involucreatus</i>	Umbrella plant	3	23
<i>Emex spinosa</i>	Spiny emex	2	16
<i>Limonium perezii</i>	Canary Island sea lavender	21	873
<i>Limonium ramosissimum</i>	Algerian sea lavender	1	200
<i>Malephora crocea</i>	Crocea iceplant	3	32
<i>Malva parviflora</i>	Cheeseweed	1	2
<i>Matthiola incana</i>	Stock	1	200
<i>Mesembryanthemum crystallinum</i>	Crystalline iceplant	1	300
<i>Myoporum laetum</i>	Ngaio tree	9	13
<i>Myoporum parvifolium</i>	Prostrate myoporum	1	1
<i>Nicotiana glauca</i>	Tree tobacco	2	3
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	1	200
<i>Phoenix canariensis</i>	Canary Island date palm	1	1
<i>Ricinus communis</i>	Castor bean	4	4
<i>Sisymbrium irio</i>	London rocket	1	10

### 3.4.3 Carlsbad, Agua Hedionda Lagoon

The Agua Hedionda Lagoon Survey Site (Appendix B, Map 4) was surveyed for rare plants incidentally to MSP plot data collection for Nuttall's acmispon at CNDDDB Element Occurrence number 42. This site was not included in the original NCDHRP proposal, but was added due to the reports of rare dune species there. The area surveyed is a sparsely vegetated level area between the fish hatchery and the railroad tracks. Although the soils are compacted and vegetation is dominated by invasive weeds, this site supports a small population of Nuttall's acmispon, and a larger population of coast woolly-heads. The abundance of stunted deerweed (*Acmispon glaber*) makes it somewhat challenging to find the Nuttall's acmispon, and the number of plants there may be underestimated.

Ecologically, the Agua Hedionda site has excellent potential as a coastal dunes restoration area. The site already supports rare dunes species, and the introduction of loose sand and/or mechanical decompaction of the existing soils would improve the habitat quality. However, the site is located on private property and the owners may have little incentive to undertake such a project. A summary of the rare plants and invasive weeds mapped at Agua Hedionda is presented in Table 12.

**Table 12.** Agua Hedionda Lagoon mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Acmispon prostratus</i>	Nuttall's acmispon	7	23
<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose	3	800
<i>Nemacaulis denudata</i> var. <i>denudata</i>	Coast woolly-heads	3	900
<b>Invasive Weeds</b>			
<i>Carpobrotus</i> sp.	Hottentot fig	1	45
<i>Glebionis coronaria</i>	Crowndaisy	1	1,000
<i>Hirschfeldia incana</i>	Shortpod mustard	1	50
<i>Limonium perezii</i>	Canary Island sea lavender	5	62
<i>Ricinus communis</i>	Castor bean	1	7

### 3.4.4 South-Carlsbad State Beach, North Terramar

The North Terramar Survey Site (Appendix B, Map 5) consists of the small strip of low coastal bluffs directly in front of the Encina power generation facility. Although a few native species persist here, most notably California box-thorn, the invasive weeds Hottentot fig and Canary Island sea lavender (*Limonium perezii*) now occupy most of the site. The site is heavily used for recreation, and there is generally heavy foot traffic and a number of trails through the *Carpobrotus* to the beach.

Because the beach below the bluffs is completely inundated at high tide there is little opportunity for coastal dune habitat restoration at this site. However, the site may be suitable for the restoration of coastal bluff scrub habitat and/or the introduction of additional native shrub species. A summary of the rare plants and invasive weeds mapped at North Terramar is presented in Table 13 below.

**Table 13.** North Terramar mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Lycium californicum</i>	California box-thorn	12	19
<b>Invasive Weeds</b>			
<i>Arundo donax</i>	Giant reed	1	1
<i>Cakile maritima</i>	European searocket	1	1,000
<i>Carpobrotus</i> sp.	Hottentot fig	1	200
<i>Emex spinosa</i>	Spiny emex	3	200
<i>Limonium perezii</i>	Canary Island sea lavender	3	502
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	1	1,000
<i>Raphanus sativus</i>	Wild radish	1	50

### 3.4.5 South-Carlsbad State Beach, South Terramar

The South Terramar Survey Site (Appendix B, Maps 6-7) is composed primarily of coastal bluffs with a small area of bluff top / coastal mesa in northernmost portion of the site. The bluff top area is vegetated nearly exclusively with Hottentot fig and the shear bluffs below it are mostly barren. Farther to the

south, the bluffs are less vertical and support a good number of native species despite significant invasion by non-native weeds. Several rare plant species occur here, but the introduction of Shaw's agave and *Pachycereus* cactus at the site may call into question whether or not the nearby cliff spurge has also been introduced. However, there is abundant California box-thorn that appears to be native.

Like the other sites in Carlsbad, the inundation of the beach at high tide limits the restoration potential for coastal dune habitat here. The bluff face is terraced or gently sloping in some areas, and may offer excellent opportunities for maritime succulent scrub restoration, as the recreational use and foot traffic is fairly light. A summary of the rare plants and invasive weeds mapped at South Terramar is presented in Table 14 below.

**Table 14.** South Terramar mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Agave shawii</i> var. <i>shawii</i>	Shaw's agave	1	1
<i>Euphorbia misera</i>	Cliff spurge	1	9
<i>Leptosyne maritima</i>	Sea dahlia	1	1
<i>Lycium californicum</i>	California box-thorn	51	244
<i>Suaeda taxifolia</i>	Woolly seablite	2	24
<b>Invasive Weeds</b>			
<i>Arundo donax</i>	Giant reed	4	4
<i>Brassica tournefortii</i>	Saharan mustard	1	20
<i>Cakile maritima</i>	European searocket	8	2,100
<i>Carpobrotus</i> sp.	Hottentot fig	5	1,701
<i>Cortaderia selloana</i>	Pampas grass	1	1
<i>Emex spinosa</i>	Spiny emex	2	100
<i>Limonium perezii</i>	Canary Island sea lavender	5	32
<i>Malephora crocea</i>	Crocea iceplant	3	1,099
<i>Nicotiana glauca</i>	Tree tobacco	15	54
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	2	30
<i>Ricinus communis</i>	Castor bean	2	2
<i>Salsola</i> sp.	Russian thistle	1	50
<i>Tamarix</i> sp.	Saltcedar	4	4
<i>Washingtonia robusta</i>	Mexican fan palm	1	1

### 3.4.6 South Carlsbad State Beach, 101 Median Strip

The South State Beach Carlsbad 101 Median Strip Survey Site (Appendix B, Maps 7-9) consists of two areas, the main Hwy 101 median between Island Way and Solamar Drive and the strip of vacant land between Hwy 101 and Surfside Lane, north of Island Way. This second area is a restoration site that was successfully restored to coastal sage scrub, but the defunct irrigation pipes have been left behind. The main Hwy 101 median area is heavily invaded by *Carpobrotus* to the extent that it now forms a solid carpet covering most of the area, although a few native shrubs persist. Several other particularly invasive species such as Pampas grass (*Cortaderia selloana*) and Saharan mustard (*Brassica tournefortii*) have established as well. A small area of salt marsh vegetation dominated by saltgrass (*Distichlis spicata*) but partially invaded by *Carpobrotus* occurs at the mouth of Encinas Creek.

The South Carlsbad State Beach 101 Median Strip area could present some opportunities for restoration. The area is fairly large and it is insulated from foot traffic and other disturbance by its location. There does not appear to be sandy dune substrates present at the site, but that is somewhat difficult to assess due to the heavy *Carpobrotus* cover. Any dune restoration here would need to avoid sand blowing onto the highway. There are good opportunities for the restoration of coastal salt marsh and coastal scrub habitats at the site. A summary of the rare plants and invasive weeds mapped at the South Carlsbad State Beach 101 Median Strip is presented in Table 15.

**Table 15.** South Carlsbad State Beach 101 Median Strip mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose	2	16
<i>Lycium californicum</i>	California box-thorn	2	2
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	2	2
<i>Asphodelus fistulosus</i>	Onion weed	1	25
<i>Brassica tournefortii</i>	Saharan mustard	7	1,342
<i>Carpobrotus</i> sp.	Hottentot fig	1	1
<i>Centaurea melitensis</i>	Tocalote	1	100
<i>Cortaderia selloana</i>	Pampas grass	8	10
<i>Emex spinosa</i>	Spiny emex	5	495
<i>Euphorbia peplus</i>	Petty spurge	1	1
<i>Foeniculum vulgare</i>	Fennel	3	26
<i>Glebionis coronaria</i>	Crowndaisy	2	170
<i>Limonium perezii</i>	Canary Island sea lavender	8	49
<i>Malephora crocea</i>	Crocea iceplant	5	9
<i>Myoporum laetum</i>	Ngaio tree	2	8
<i>Nicotiana glauca</i>	Tree tobacco	1	1
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	4	665
<i>Phoenix canariensis</i>	Canary Island date palm	1	1
<i>Ricinus communis</i>	Castor bean	3	3
<i>Salsola</i> sp.	Russian thistle	4	280
<i>Washingtonia robusta</i>	Mexican fan palm	1	1

### 3.4.7 South Carlsbad State Beach, Campground

The South Carlsbad State park Campground Survey Site (Appendix B, Maps 8-14) includes the beach coastal bluffs below the campground, the strip of low bluffs and beach north of the campground to Encinas Creek, and the narrow strip of vegetation on the east side of the campground adjacent to Hwy 101. The bluffs are steep and actively eroding, and in most areas, either barren or heavily invaded by non-natives. However, sizable populations of California box-thorn and scattered woolly seablite are present. A previously undocumented occurrence of Nuttall's acmispon was found on the bluffs just below the parking area at the north end of the Survey Site. This population is threatened by foot traffic and invasive weeds, and may not persist without management.

The strip adjacent to the highway is primarily composed of introduced landscaping plants such as *Acacia* and Bottlebrush (*Melaleuca* sp.) and invasive weeds, but a few native shrub species persist. Unexpectedly, this area is where a single individual of South Coast saltscale (*Atriplex pacifica*) was

mapped during the survey. A small voucher from this plant has been deposited at the SDNHM herbarium (EK #439), and awaits confirmation.

The beach below the campground is inundated at high tide and provides no real opportunity for coastal dune restoration. Furthermore, although currently sandy, the sand on this beach has been completely replaced by cobble several times in recent decades. The majority of the bluffs below the campground may be too steep for restoration to be practical, but exotics control may be desirable as several highly invasive species such as pampas grass and Saltcedar (*Tamarix* sp.) are present. The area of bluffs near the parking area that supports Nuttall's acmispon needs management to ensure the survival of the population. A summary of the rare plants and invasive weeds mapped at the South Carlsbad State Beach Campground is presented in Table 16.

**Table 16.** South Carlsbad State Beach Campground mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Acmispon prostratus</i>	Nuttall's acmispon	1	100
<i>Atriplex pacifica</i>	South Coast saltscale	1	1
<i>Lycium californicum</i>	California box-thorn	40	182
<i>Suaeda taxifolia</i>	Woolly seablite	2	4
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	11	14
<i>Aptenia cordifolia</i>	Red apple iceplant	2	2
<i>Arundo donax</i>	Giant reed	7	7
<i>Cakile maritima</i>	European searocket	13	21,800
<i>Carpobrotus</i> sp.	Hottentot fig	24	46
<i>Cortaderia selloana</i>	Pampas grass	5	5
<i>Cynodon dactylon</i>	Bermuda grass	1	50
<i>Emex spinosa</i>	Spiny emex	2	20
<i>Limonium perezii</i>	Canary Island sea lavender	3	86
<i>Malephora crocea</i>	Crocea iceplant	2	31
<i>Melaleuca</i> sp.	Bottlebrush	9	9
<i>Mesembryanthemum nodiflorum</i>	Slenderleaf iceplant	1	500
<i>Myoporum laetum</i>	Ngaio tree	18	26
<i>Myoporum parvifolium</i>	Prostrate Myoporum	1	1
<i>Nicotiana glauca</i>	Tree tobacco	6	17
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	1	150
<i>Paspalum vaginatum</i>	Seashore paspalum	1	1
<i>Ricinus communis</i>	Castor bean	9	27
<i>Salsola</i> sp.	Russian thistle	5	310
<i>Tamarix</i> sp.	Saltcedar	13	13

### 3.4.8 South Carlsbad State Park, North Ponto

The North Ponto Survey Site (Appendix B, Maps 14-15) includes the open beach at the north end of the South Carlsbad State Beach campground and a limited portion of the adjacent Hwy 101 median strip. There are low bluffs with a few California box-thorn in the north, but the majority of the Survey Site is composed of open beach.

Unlike most of the beaches surveyed, a good portion of the beach at North Ponto is above the high tide level and is rarely, if ever, inundated by sea water. The site contains excellent suitable habitat for coastal dune species, but there is heavy recreational use and trampling, and no rare dunes species were observed here. While restoration of coastal dunes habitat at this site is certainly possible, it would require fencing and the reduction of the area available for recreation. A summary of the rare plants and invasive weeds mapped at the North Ponto is presented in Table 17.

**Table 17.** North Ponto mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose	2	100
<i>Lycium californicum</i>	California box-thorn	2	5
<i>Suaeda taxifolia</i>	Woolly seablite	1	1
<b>Invasive Weeds</b>			
<i>Cakile maritima</i>	European searocket	2	3,200
<i>Carpobrotus</i> sp.	Hottentot fig	6	132
<i>Emex spinosa</i>	Spiny emex	1	10
<i>Foeniculum vulgare</i>	Fennel	2	13
<i>Limonium perezii</i>	Canary Island sea lavender	7	60
<i>Limonium sinuatum</i>	Statice	3	115
<i>Malephora crocea</i>	Crocea iceplant	1	1
<i>Nicotiana glauca</i>	Tree tobacco	1	1
<i>Salsola</i> sp.	Russian thistle	1	35

### 3.4.9 South Carlsbad, Batiquitos W1 and W2

The Batiquitos W1 and W2 Survey Site (Appendix B, Maps 15-16) consists of two areas of created habitat ("W1" and "W2"), and the sandy shores across the lagoon from these sites on the west side of the railroad tracks. The W1 and W2 areas are managed for California least tern nesting habitat by the California Department of Fish and Wildlife (CDFW). The management includes vegetation control in which plant species that are more than about 20 cm tall are manually removed or treated with herbicide (Warren Wong CDFW personal communication). CDFW staff are aware of the rare plant species at the sites and take care to avoid damage to the Nuttall's acmispon and coast woolly-heads populations in the nesting areas. Red sand-verbena is controlled in accordance to management objectives for least tern, but is not removed.

The southern sandy area adjacent to the railroad tracks supports a sizable population of coast woolly-heads, but no Nuttall's acmispon plants were observed there. This site has excellent potential for coastal dune habitat restoration and/or maintenance, as does the sandy area across the channel in the northeast corner of the Survey Site boundary. At the time of the survey, *Carpobrotus* plants were spreading throughout the southern sandy area, and threaten to eliminate the dune habitat currently occupied by *Nemacaulis*. This area is the best candidate for dunes restoration that was encountered during the rare plant surveys for the NCDHRP. A summary of the rare plants and invasive weeds mapped at Batiquitos W1 and W2 is presented in Table 18.

**Table 18.** Batiquitos W1 and W2 mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Abronia maritima</i>	Red sand-verbena	16	55
<i>Acmispon prostratus</i>	Nuttall's acmispon	16	63
<i>Lycium californicum</i>	California box-thorn	2	2
<i>Nemacaulis denudata var. denudata</i>	Coast woolly-heads	6	111,060
<b>Invasive Weeds</b>			
<i>Arundo donax</i>	Giant reed	1	1
<i>Bassia hyssopifolia</i>	Fivehook bassia	1	100
<i>Carpobrotus sp.</i>	Hottentot fig	3	121
<i>Descurainia sophia</i>	Flix weed	1	100
<i>Emex spinosa</i>	Spiny emex	3	26
<i>Hirschfeldia incana</i>	Shortpod mustard	1	10
<i>Limonium sinuatum</i>	Statice	2	2
<i>Melaleuca sp.</i>	Bottlebrush	3	3
<i>Myoporum parvifolium</i>	Prostrate Myoporum	1	1
<i>Nicotiana glauca</i>	Tree tobacco	3	19
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	1	20
<i>Pennisetum setaceum</i>	Fountain grass	4	276
<i>Ricinus communis</i>	Castor bean	3	10
<i>Salsola sp.</i>	Russian thistle	3	45

**3.4.10 South Carlsbad, Batiquitos 101 Median Strip**

The Batiquitos 101 Median Strip Survey Site (Appendix B, Maps 15-16) consists of a linear depression between the northbound and southbound lanes of the divided highway. Although the soil is composed of sand, it has been stabilized by a dense mat of Hottentot fig that covers most of the area, leaving little, if any, dune habitat available for native species. Southwestern spiny rush is abundant, as the depression between the lanes seems to create mesic conditions favorable for it.

Due to its narrowness and location, the Batiquitos 101 Median Strip would be an unlikely candidate for restoration, but the removal of invasive weeds, particularly pampas grass, could be beneficial for the surrounding native habitat. A summary of the rare plants and invasive weeds mapped within the Batiquitos Hwy 101 median is presented in Table 19.

**Table 19.** Batiquitos 101 Median Strip mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose	1	25
<i>Juncus acutus</i> subsp. <i>leopoldii</i>	Southwestern spiny rush	13	52
<b>Invasive Weeds</b>			
<i>Carpobrotus</i> sp.	Hottentot fig	1	200
<i>Cortaderia selloana</i>	Pampas grass	3	3
<i>Limonium perezii</i>	Canary Island sea lavender	3	52
<i>Limonium ramosissimum</i>	Algerian sea lavender	1	1
<i>Myoporum laetum</i>	Ngaio tree	3	3

### 3.4.11 South Carlsbad State Park, South Ponto

The South Ponto Survey Site (Appendix B, Maps 15-16) includes open sandy beach to the north, a roped-off rare plant area in a sandy depression, the margins of a riparian wetland, and the disturbed bluff tops and bluffs to the south. The sandy beach is heavily used for recreation, and is essentially devoid of vegetation. The roped-off rare plant area supports sizable populations of both coast woolly-heads and Nuttall's acmispon as well as red sand-verbena, Lewis' evening-primrose and scattered southwestern spiny rush. Many species of invasive weeds, including saltcedar and Hottentot fig are present within the rare plant area, and should be controlled. Another, smaller roped-off area to the north is in disrepair, and the downed fencing has resulted in the trampling of vegetation. The wetland areas support many clumps of southwestern spiny rush. A newly discovered occurrence of Orcutt's pincushion was found on the bluff tops, with the plants concentrated in two major areas, near the compass rosette mosaic and seating area, and in the formerly excavated area to the southeast, closer to the highway. Many weeds occur through the bluff top, and Canary Island sea lavender is particularly abundant, and seems to have been planted.

The South Ponto Survey Site contains one of the few areas in North County where an enclosure has been established to protect coastal dune rare plant species. While the site remains an important refuge for rare plants, invasive species control is needed to maintain habitat quality. The sandy beach area to the north is above the high tide level and offers excellent potential habitat for rare dune species, but recreational use likely precludes this area as a potential restoration site. The majority of the bluff top area is private property that has been proposed for development. However, the area around the compass rosette mosaic is State Parks property where weed control measures could be undertaken to benefit the Orcutt's pincushion population. The plants near the mosaic are morphologically identical to the published descriptions of the rare variety and warrant protection. A voucher was collected for deposit at the SNHM herbarium. A summary of the rare plants and invasive weeds mapped at South Ponto is presented in Table 20.

**Table 20.** South Ponto mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Abronia maritima</i>	Red sand-verbena	1	1
<i>Acmispon prostratus</i>	Nuttall's acmispon	7	671
<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose	5	280
<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i>	Orcutt's pincushion	4	1,244
<i>Juncus acutus</i> subsp. <i>leopoldii</i>	Southwestern spiny rush	11	50
<i>Leptosyne maritima</i>	Sea dahlia	1	10
<i>Nemacaulis denudata</i> var. <i>denudata</i>	Coast woolly-heads	4	250,521
<i>Pinus torreyana</i> <sup>1</sup>	Torrey Pine	1	1
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	7	18
<i>Cakile maritima</i>	European searocket	7	336
<i>Carpobrotus</i> sp.	Hottentot fig	40	1,106
<i>Cortaderia selloana</i>	Pampas grass	3	4
<i>Cynodon dactylon</i>	Bermuda grass	1	100
<i>Emex spinosa</i>	Spiny emex	3	85
<i>Limonium perezii</i>	Canary Island sea lavender	10	640
<i>Melaleuca</i> sp.	Bottlebrush	15	27
<i>Melilotus indicus</i>	Small melilot	1	100
<i>Myoporum laetum</i>	Ngaio tree	1	1
<i>Nicotiana glauca</i>	Tree tobacco	5	18
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	5	162
<i>Pennisetum setaceum</i>	Fountain grass	2	6
<i>Phoenix canariensis</i>	Canary Island date palm	1	1
<i>Raphanus sativus</i>	Wild radish	1	20
<i>Ricinus communis</i>	Castor bean	1	1
<i>Tamarix</i> sp.	Saltcedar	5	9

<sup>1</sup>Planted.

### 3.4.12 Encinitas, Beacon's Beach

The Beacon's Beach Survey Site (Appendix B, Map 17) includes the bluff face and beach immediately below the beach access parking lot at the top of the bluff. An unpaved switchback trail leads from the parking area to the beach and bisects the Survey Site. The bluff face here has a long history of recreation use, and appears to have had some management for erosion control in the past. The vegetation on the bluff is currently dominated by non-native species. The beach is heavily used for recreation and is inundated during the highest tides, and as a consequence, is unvegetated.

The Beacon's Beach bluffs are a good candidate for the introduction of native coastal bluff scrub species. Restoration here could help to stabilize the bluffs and would not impact recreational use, as foot traffic is currently confined to the designated trail. The beach area has little potential as a coastal dunes restoration site because of the heavy recreational use and the limited area that remains above the high tide. A summary of the rare plants and invasive weeds mapped at Beacon's Beach is presented in Table 21

**Table 21.** Beacon’s Beach mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Lycium californicum</i>	California box-thorn	1	2
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	2	2
<i>Arundo donax</i>	Giant reed	1	5
<i>Cakile maritima</i>	European searocket	2	300
<i>Carpobrotus</i> sp.	Hottentot fig	2	2
<i>Limonium perezii</i>	Canary Island sea lavender	3	13
<i>Limonium sinuatum</i>	Statice	3	22
<i>Mesembryanthemum crystallinum</i>	Crystalline iceplant	1	1

### 3.4.13 Encinitas, Swamis to Moonlight

The Swamis to Moonlight Survey Site (Appendix B, Maps 18-21) consists almost entirely of coastal bluffs. The entire beach here is inundated during the highest tides and is not vegetated. Although a few native species persist here, most notably sea dahlia, a plethora of invasive weeds including Hottentot fig, Canary Island sea lavender, and acacia now occupy most of the site.

Because the beach below the bluffs is completely inundated at high tide there is little opportunity for coastal dune habitat restoration at this site. However, the site may be suitable for the restoration of coastal bluff scrub habitat and/or the introduction of additional native shrub species. A summary of the rare plants and invasive weeds mapped at the Swami’s to Moonlight Survey Site is presented in Table 22.

**Table 22.** Swamis to Moonlight mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Juncus acutus</i> subsp. <i>leopoldii</i>	Southwestern spiny rush	2	104
<i>Leptosyne maritima</i>	Sea dahlia	13	84
<i>Lycium californicum</i>	California box-thorn	4	12
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	11	145
<i>Arundo donax</i>	Giant reed	1	1
<i>Carpobrotus</i> sp.	Hottentot fig	5	180
<i>Cortaderia selloana</i>	Pampas grass	1	1
<i>Limonium perezii</i>	Canary Island sea lavender	2	55
<i>Limonium ramosissimum</i>	Algerian sea lavender	1	1
<i>Myoporum laetum</i>	Ngaio tree	2	3
<i>Myoporum parvifolium</i>	Prostrate Myoporum	2	25
<i>Nicotiana glauca</i>	Tree tobacco	3	3
<i>Washingtonia robusta</i>	Mexican fan palm	4	25

### 3.4.14 San Elijo State Beach, 101 Median Strip

The San Elijo Beach 101 Median Strip Survey Site (Appendix B, Maps 22-24) is a narrow strip of land between Hwy 101 and San Elijo Avenue with a railroad corridor and walking trail passing through its length. Much of this area is lightly sloped with short steep sections adjacent to the railroad tracks. The area has scattered maritime succulent scrub and chaparral species including California adolphia, California box-thorn, chaparral prickly pear (*Opuntia oricola*), laurel sumac (*Malosma laurina*), and lemonade berry (*Rhus integrifolia*). Although native species persist here, much of the area is dominated by invasive weeds including Hottentot fig, Canary Island sea lavender, Algerian sea lavender (*Limonium ramosissimum*), crowndaisy (*Glebionis coronaria*), statice (*Limonium sinuatum*), acacia, and many others.

Because the area is narrow and adjacent to both roads and railroad tracks there is little opportunity for coastal dune habitat restoration at this site. However, the site may be suitable for the restoration of maritime scrub habitat and/or the introduction of additional native shrub species. A summary of the rare plants and invasive weeds mapped at the San Elijo State Beach 101 Median Strip Survey Site is presented in Table 23.

**Table 23.** San Elijo State Beach, 101 Median Strip mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Adolphia californica</i>	California adolphia	2	54
<i>Juncus acutus</i> subsp. <i>leopoldii</i>	Southwestern spiny rush	1	1
<i>Lycium californicum</i>	California box-thorn	4	5
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	17	264
<i>Arundo donax</i>	Giant reed	1	5
<i>Asparagus asparagoides</i>	African asparagus fern	2	2
<i>Brassica tournefortii</i>	Saharan mustard	5	550
<i>Carpobrotus</i> sp.	Hottentot fig	9	1,440
<i>Foeniculum vulgare</i>	Fennel	5	32
<i>Glebionis coronaria</i>	Crowndaisy	6	1,630
<i>Limonium perezii</i>	Canary Island sea lavender	3	45
<i>Limonium ramosissimum</i>	Algerian sea lavender	1	1
<i>Limonium sinuatum</i>	Statice	14	2,130
<i>Malva parviflora</i>	Cheeseweed	1	1,000
<i>Myoporum laetum</i>	Ngaio tree	2	2
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	3	350
<i>Pennisetum setaceum</i>	Fountain grass	6	99
<i>Phoenix canariensis</i>	Canary Island date palm	1	1
<i>Raphanus sativus</i>	Wild radish	7	690
<i>Ricinus communis</i>	Castor bean	7	22

### 3.4.15 San Elijo State Beach, Campground

The San Elijo State Beach Campground Survey Site (Appendix B, Maps 22-24) consists almost entirely of coastal bluffs below the campground and beach parking. The entire beach here is inundated during the highest tides and is not vegetated. Although a few native species persist here, most notably

southwestern spiny rush growing in seeps, a plethora of invasive weeds including Hottentot fig, pampas grass, Ngaio tree (*Myoporum laetum*), and acacia now occupy most of the site.

Because the beach below the bluffs is completely inundated at high tide there is little opportunity for coastal dune habitat restoration at this site. However, the site may be suitable for the restoration of coastal bluff scrub habitat and/or the introduction of additional native shrub species. A summary of the rare plants and invasive weeds mapped at the San Elijo State Beach Campground is presented in Table 24.

**Table 24.** San Elijo State Beach, Campground mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Juncus acutus</i> subsp. <i>leopoldii</i>	Southwestern spiny rush	8	63
<i>Lycium californicum</i>	California box-thorn	1	2
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	23	29
<i>Aptenia cordifolia</i>	Red apple iceplant	1	1
<i>Arundo donax</i>	Giant reed	1	1
<i>Brassica tournefortii</i>	Saharan mustard	1	50
<i>Carpobrotus</i> sp.	Hottentot fig	11	1,642
<i>Cortaderia selloana</i>	Pampas grass	27	71
<i>Myoporum laetum</i>	Ngaio tree	27	69
<i>Nicotiana glauca</i>	Tree tobacco	10	84
<i>Opuntia ficus-indica</i>	Nopales	1	3
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	3	220
<i>Pennisetum setaceum</i>	Fountain grass	3	12
<i>Phoenix canariensis</i>	Canary Island date palm	1	1
<i>Salsola</i> sp.	Russian thistle	1	4
<i>Tamarix</i> sp.	Saltcedar	13	44
<i>Washingtonia robusta</i>	Mexican fan palm	8	11

### 3.4.16 San Elijo Lagoon

The San Elijo Lagoon Survey Site (Appendix B, Maps 25-26) consists of four subareas: the beach west of Hwy 101 and north of the Seaside parking lot, the southwestern shore of the San Elijo Lagoon just east of Hwy 101, the “Gateway” property south of the lagoon and east of the highway, and the area around a former evaporation pond on the east side of the railroad tracks. A summary of the rare plants and invasive weeds mapped across all of the sites at the San Elijo Lagoon is presented in Table 25.

The beach area just north of the Seaside parking lot is above the high tide level and, currently supports a large population of Nuttall’s acmispon and a few small patches of coast woolly-heads. Recreational use is heavy in this area and lifeguard vehicles were observed driving through the rare plant populations during the survey. Patches of Hottentot fig and Canary Island sea lavender occur throughout the area, and threaten to displace the rare plant habitat without management. This area is one of the very few sites in coastal North County where coastal dune rare plant species persist on the beach, and it deserves protection. Weed control, a rope or fence barrier to reduce foot traffic, and re-routing the lifeguard vehicle path are recommended for this site.

The western shore of the lagoon on the east side of the highway is an area that is actively managed for native habitat by SELC. Habitat restoration and weed control are ongoing at the site. The sandy dune area supports very large populations of Nuttall's acmispon and coast woolly-heads, while the more upland area adjacent to the road supports a large population of Orcutt's pincushion and additional patches of Nuttall's acmispon and coast woolly-heads. Other rare plants found here include Lewis' evening primrose and southwestern spiny rush.

On the east side of the railroad tracks at the San Elijo Lagoon Survey Site is a series of three evaporation or settling ponds. The ponds are surrounded by a raised margin that has been planted to native species in a past restoration effort. There is a small, flat, raised area in the southwest corner which may have been a building site. The surrounding area and the ponded areas within the berms are coastal salt marsh vegetation, with unvegetated mud flats in portions of the ponds. The rare plants mapped here were planted, and include sea dahlia, California box-thorn, southwestern spiny rush, and cliff spurge. Lewis' evening-primrose occurs in the area as well, but was most likely not planted. While not a coastal dune site, the area may be suitable for the creation of coastal dunes by filling the ponds with sand. The site was not surveyed for weeds because SELC monitors and treats the invasive plants here, and has mapped the weeds separately.

The Gateway property was recently acquired by SELC and is an open space area with remnant coastal sage scrub vegetation. Rare plants observed here includes a patch of about 300 Orcutt's pincushion and scattered Lewis' evening-primrose. The Orcutt's pincushion here is variable, but most of the plants observed are closer in morphology to the rare variety than they are to *Chaenactis glabriuscula* var. *glabriuscula*. Weed mapping was not undertaken at this site because SELC has done so separately.

**Table 25.** San Elijo Lagoon mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Acmispon prostratus</i>	Nuttall's acmispon	7	62,841
<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose	8	1,150
<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i>	Orcutt's pincushion	3	2,556
<i>Euphorbia misera</i>	Cliff spurge	1	1
<i>Juncus acutus</i> subsp. <i>leopoldii</i>	Southwestern spiny rush	24	329
<i>Leptosyne maritima</i>	Sea dahlia	6	167
<i>Lycium californicum</i>	California box-thorn	10	13
<i>Nemacaulis denudata</i> var. <i>denudata</i>	Coast woolly-heads	6	201,365
<b>Invasive Weeds</b>			
<i>Asparagus asparagoides</i>	African asparagus fern	1	1
<i>Brassica tournefortii</i>	Saharan mustard	3	31
<i>Bromus diandrus</i>	Ripgut brome	1	50
<i>Cakile maritima</i>	European searocket	1	150
<i>Carpobrotus</i> sp.	Hottentot fig	11	307
<i>Glebionis coronaria</i>	Crowndaisy	2	250
<i>Hirschfeldia incana</i>	Shortpod mustard	1	35
<i>Limonium perezii</i>	Canary Island sea lavender	2	36
<i>Limonium sinuatum</i>	Statice	4	125

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<i>Lobularia maritima</i>	Sweet alyssum	1	50
<i>Nicotiana glauca</i>	Tree tobacco	3	7
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	2	30
<i>Sonchus asper</i>	Sow thistle	3	75

### 3.4.17 Del Mar, North Torrey Pines

The North Torrey Pines Survey Site (Appendix B, Maps 27-31) consists of a long stretch of coastal bluffs with a coastal mesa at the southern end. The entire beach here is inundated during the highest tides and is not vegetated. There is therefore little opportunity for coastal dune habitat restoration at this site.

The coastal mesa supports several rare plants including Orcutt's pincushion, Del Mar Mesa sand aster, California box thorn, and Torrey Pine. The mesa currently has significant amounts of established native vegetation, but Hottentot fig is present and threatens to displace the natives. Another threat to the rare plants here is the large number of foot trails through the vegetation. A reduction of these trails through fencing or roping could benefit the rare plants. However, the active disturbance around some of the trails may be helping the Orcutt's pincushion persist. Overall the site has high restoration potential and habitat value, and weed management, at a minimum, is recommended.

The coastal bluffs have scattered native plants including significant amounts of southwestern spiny rush along seeps. Most of the area above the bluff and along the railroad track is dominated by the invasive weeds Hottentot fig and Canary Island sea lavender. However, with a major weed eradication effort, the site may be suitable for the restoration of coastal bluff scrub habitat and/or the introduction of additional native shrub species. A summary of the rare plants and invasive weeds mapped at the North Torrey Pines Survey Site is presented in Table 26.

**Table 26.** North Torrey Pines mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Abronia maritima</i>	Red sand-verbena	3	3
<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i>	Orcutt's pincushion	11	62
<i>Corethrogyne filaginifolia</i> var. <i>linifolia</i>	Del Mar Mesa sand aster	2	8
<i>Juncus acutus</i> subsp. <i>leopoldii</i>	Southwestern spiny rush	12	555
<i>Leptosyne maritima</i>	Sea dahlia	2	10
<i>Lycium californicum</i>	California box-thorn	9	28
<i>Pinus torreyana</i>	Torrey Pine	36	67
<i>Suaeda taxifolia</i>	Woolly seablite	1	2
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	4	4
<i>Arundo donax</i>	Giant reed	5	47
<i>Brachypodium distachyon</i>	False brome		1,000
<i>Carpobrotus</i> sp.	Hottentot fig	1	5,100
<i>Cortaderia selloana</i>	Pampas grass	8	71
<i>Limonium perezii</i>	Canary Island sea lavender	1	10,000

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<i>Myoporum laetum</i>	Ngaio tree	5	9
<i>Nicotiana glauca</i>	Tree tobacco	3	18
<i>Pennisetum setaceum</i>	Fountain Grass	2	2
<i>Phoenix canariensis</i>	Canary Island date palm	1	1
<i>Tamarix</i> sp.	Saltcedar	6	20
<i>Washingtonia robusta</i>	Mexican fan palm	1	1

### 3.4.18 Torrey Pines State Reserve, Peñasquitos Lagoon Area

The Torrey Pines State Reserve Peñasquitos Lagoon Survey Site (Appendix B, Maps 32-35) consists of several sites around the Peñasquitos Lagoon and the Torrey Pines State Reserve entrance.

Near the entrance and parking area of Torrey Pines State Reserve, the rare plant Nuttall's acmispon is present in small patches in remnant sandy flats. Scattered plants of woolly seablite and California box-thorn occur here as well. Due to the small size of these areas, there is limited restoration potential. However, some areas are roped-off, and applying this protection to additional rare plants areas may be desirable. Some significant invasive weeds in the area include longflowered veldtgrass (*Ehrharta longiflora*), Bermuda-buttercup (*Oxalis pes-caprae*), and spiny emex (*Emex spinosa*).

Across Highway S21 from this site is a terrace above the lagoon with significant amounts of the rare plants San Diego barrel cactus, California box-thorn, and scattered patches of sea dahlia. Suppression of the invasive longflowered veldtgrass and nearby Hottentot fig in this area should be an important management priority.

Just north of this terrace is a slightly upland area along the west side of the lagoon. There is a small existing dune here harboring the rare plants Nuttall's acmispon and coast woolly-heads. Invasive plants including longflowered veldtgrass, Hottentot fig, and Canary Island sea lavender surround the dune. The native shrub arrowweed (*Pluchea sericea*) is creeping onto the dune and may reduce or displace the habitat available for rare dune species. This site may offer restoration opportunities through weed management and the importation of sand to expand the dune into a larger complex.

Several small dunes occur just south of the Torrey Pines State Beach parking lot and along the west edge of the lagoon outlet. These dunes harbor the rare plants Nuttall's acmispon, coast woolly-heads, and Lewis evening-primrose. At the time of the survey, few invasive weeds were observed, although small patches of Hottentot fig and Bermuda-buttercup were present. The dunes at this site may be susceptible to loss via erosion due to their location at the edge of the lagoon outlet.

**Table 27.** Peñasquitos Lagoon Area mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Abronia maritima</i>	Red sand-verbena	2	2
<i>Acmispon prostratus</i>	Nuttall's acmispon	5	397
<i>Agave shawii</i> var. <i>shawii</i>	Shaw's agave	2	4
<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose	1	3

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<i>Ferocactus viridescens</i>	San Diego barrel cactus	34	163
<i>Juncus acutus</i> subsp. <i>leopoldii</i>	Southwestern spiny rush	13	165
<i>Leptosyne maritima</i>	Sea dahlia	4	183
<i>Lycium californicum</i>	California box-thorn	22	495
<i>Nemacaulis denudata</i> var. <i>denudata</i>	Coast woolly-heads	3	2,150
<i>Suaeda taxifolia</i>	Woolly seablite	4	15
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	2	6
<i>Cakile maritima</i>	European searocket	1	3
<i>Carpobrotus</i> sp.	Hottentot fig	9	1,268
<i>Cynara cardunculus</i>	Artichoke thistle	1	50
<i>Ehrharta longiflora</i>	Longflowered veldtgrass	13	16,818
<i>Emex spinosa</i>	Spiny emex	1	50
<i>Foeniculum vulgare</i>	Fennel	8	51
<i>Iris</i> sp.	Iris	1	1
<i>Limonium perezii</i>	Canary Island sea lavender	6	37
<i>Myoporum laetum</i>	Ngaio tree	2	2
<i>Nicotiana glauca</i>	Tree tobacco	1	1
<i>Opuntia ficus-indica</i>	Nopales	1	20
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	6	1,215
<i>Ricinus communis</i>	Castor bean	1	3
<i>Salsola</i> sp.	Russian thistle	1	9

### 3.4.19 Torrey Pines State Reserve, Black's Beach

The Black's Beach Survey Site (Appendix B, Maps 35-42) is limited to the beach and base of the coastal bluffs within Torrey Pines State Reserve from just north of the glider port to the lower parking lot and park entrance at North Torrey Pines Road. The surveys were performed from the beach and bluff-base, and no attempt was made to access the Survey Site from the top. Because of the limited visibility from below, there are likely additional unmapped rare plants on the higher portions of the bluff within the Survey Site boundary.

In the southern portion of the Survey Site, the beach is above the high tide level and supports coastal dune habitat with a large dispersed population of red sand-verbena and patches of woolly seablite. Farther to the north, the water rises to the base of the bluffs during high tide, and no coastal dune habitat is present. California box-thorn is abundant and scattered on the bluffs along the entire length of the Survey Site with the exception of the unvegetated sheer cliffs to the north. The most significant area for rare plants is an elevated terrace near the base of the bluff near the middle of the Survey Site. This area supports a large populations of cliff spurge and California box-thorn and a patch of San Diego barrel cactus. Although there are many unauthorized trails on the terrace, the vegetation is still dominated by native species, and may serve as an excellent reference site for restoration projects seeking to restore similar coastal bluff habitat elsewhere along the coast. A summary of the rare plants and invasive weeds mapped at the Black's Beach Survey Site is presented in Table 28.

**Table 28.** Black's Beach mapping results summary.

Scientific name	Common name	No. of Mapped Features	Est. No. of Plants
<b>Rare Plants</b>			
<i>Abronia maritima</i>	Red sand-verbena	6	73
<i>Euphorbia misera</i>	Cliff spurge	2	501
<i>Ferocactus viridescens</i>	San Diego barrel cactus	2	15
<i>Leptosyne maritima</i>	Sea dahlia	5	402
<i>Lycium californicum</i>	California box-thorn	28	486
<i>Suaeda taxifolia</i>	Woolly seablite	17	116
<b>Invasive Weeds</b>			
<i>Acacia</i> sp.	Acacia	1	1
<i>Arundo donax</i>	Giant reed	7	13
<i>Carpobrotus</i> sp.	Hottentot fig	15	366
<i>Cortaderia selloana</i>	Pampas grass	2	2
<i>Cynodon dactylon</i>	Bermuda grass	2	24
<i>Emex spinosa</i>	Spiny emex	1	25
<i>Foeniculum vulgare</i>	Fennel	3	36
<i>Limonium perezii</i>	Canary Island sea lavender	2	2
<i>Myoporum laetum</i>	Ngaio tree	1	1
<i>Nicotiana glauca</i>	Tree tobacco	4	9
<i>Oxalis pes-caprae</i>	Bermuda-buttercup	12	5,285
<i>Ricinus communis</i>	Castor bean	3	3
<i>Salsola</i> sp.	Russian thistle	3	12
<i>Tamarix</i> sp.	Saltcedar	1	5

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# Appendix A

## Vascular Plant Species Observed<sup>1</sup>

<sup>1</sup>Taxonomy and nomenclature follows Baldwin 2012.  
Plants marked with an asterisk (\*) are not native to California.

Family	Scientific name	Common name	Carlsbad State Beach, Pine to Tamarack	Carlsbad State Beach, North Tamarack	Carlsbad State Beach, South Tamarack	South Carlsbad 101 Median Strip	Carlsbad State Beach, Campground	Carlsbad State Beach, North Ponto	South Carlsbad, Batiqitos W1 and W2	South Carlsbad, Batiqitos 101 Median Strip	Carlsbad State Beach, South Ponto	Encinitas, Beacon's Beach	Encinitas, Swamis to Moonlight	San Elijo State Beach, 101 Median Strip	San Elijo State Beach, Campground	San Elijo Lagoon	Del Mar, North Torrey Pines	Torrey Pines State Reserve, Peñasquitos Lagoon	Torrey Pines State Reserve, Black's Beach
<b>Ferns</b>																			
<b>Pteridaceae (Maidenhair Fern family)</b>																			
	<i>Adiantum</i> sp.	Maidenhair fern															X		
<b>Gymnosperms</b>																			
<b>Cupressaceae (Cypress family)</b>																			
	<i>Hesperocyparis macrocarpa</i>	Monterey cypress			X														
<b>Pinaceae (Pine family)</b>																			
	<i>Pinus torreyana</i>	Torrey Pine								X							X		
<b>Magnoliids</b>																			
<b>Saururaceae (Lizard's-tail family)</b>																			
	<i>Anemopsis californica</i>	Yerba mansa								X				X			X		
<b>Eudicots</b>																			
<b>Adoxaceae (Muskroot family)</b>																			
	<i>Sambucus nigra</i> subsp. <i>caerulea</i>	Mexican elderberry								X									
<b>Aizoaceae (Fig-marigold family)</b>																			
	<i>Aptenia cordifolia</i> *	Red apple iceplant				X									X				
	<i>Carpobrotus</i> sp.*	Hottentot fig						X	X	X	X	X	X	X	X	X	X	X	X
	<i>Carpobrotus chilensis</i> *	Sea fig	X																
	<i>Carpobrotus edulis</i> *	Hottentot fig	X	X	X	X	X			X									X
	<i>Malephora crocea</i> *	Crocea iceplant	X		X	X	X		X			X	X			X	X	X	X
	<i>Mesembryanthemum crystallinum</i> *	Crystalline iceplant	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	<i>Mesembryanthemum nodiflorum</i> *	Slenderleaf iceplant		X	X	X	X	X	X	X				X	X	X	X	X	X
	<i>Tetragonia tetragonioides</i> *	New Zealand spinach		X	X	X	X			X						X	X	X	
<b>Anacardiaceae (Sumac family)</b>																			
	<i>Malosma laurina</i>	Laurel sumac			X								X				X		
	<i>Rhus integrifolia</i>	Lemonade sumac	X	X	X	X		X	X		X		X	X	X	X	X	X	X
<b>Apiaceae (Carrot family)</b>																			
	<i>Apium graveolens</i> *	Wild celery											X						
	<i>Daucus</i> sp.	Wild carrot								X									
	<i>Foeniculum vulgare</i> *	Fennel			X		X		X				X					X	X
<b>Asteraceae (Aster family)</b>																			
	<i>Amblyopappus pusillus</i>	Dwarf coastweed	X		X	X	X	X		X						X	X	X	X
	<i>Ambrosia</i> sp.	Ragweed						X											

Family	Scientific name	Common name	Carlsbad State Beach, Pine to Tamarack	Carlsbad State Beach, North Terramar	Carlsbad State Beach, South Terramar	South Carlsbad 101 Median Strip	Carlsbad State Beach, Campground	Carlsbad State Beach, North Ponto	South Carlsbad, Batiquitos W1 and W2	South Carlsbad, Batiquitos 101 Median Strip	Carlsbad State Beach, South Ponto	Encinitas, Beacon's Beach	Encinitas, Swamis to Moonlight	San Elijo State Beach, 101 Median Strip	San Elijo State Beach, Campground	San Elijo Lagoon	Del Mar, North Torrey Pines	Torrey Pines State Reserve, Peñasquitos Lagoon	Torrey Pines State Reserve, Black's Beach
	<i>Ambrosia chamissonis</i>	Silver bur ragweed					X		X	X								X	X
	<i>Ambrosia psilostachya</i>	Cuman ragweed			X					X			X		X	X	X	X	
	<i>Artemisia californica</i>	Coastal sagebrush	X		X				X	X			X				X	X	X
	<i>Artemisia douglasiana</i>	Douglas' sagewort								X									
	<i>Baccharis pilularis</i>	Coyotebrush			X			X	X	X			X	X	X	X	X	X	
	<i>Baccharis salicifolia</i>	Mule fat	X	X	X				X	X				X	X	X	X		X
	<i>Centaurea melitensis*</i>	Tocalote			X		X		X	X			X				X		
	<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i>	Orcutt's pincushion									X					X	X		
	<i>Corethrogyne filaginifolia</i> var. <i>filaginifolia</i>	California aster			X														
	<i>Corethrogyne filaginifolia</i> var. <i>linifolia</i>	Del Mar Mesa sand aster															X		
	<i>Cotula australis*</i>	Australian waterbuttons								X						X		X	X
	<i>Cotula coronopifolia*</i>	Common brassbuttons														X			
	<i>Cynara cardunculus*</i>	Artichoke thistle																	X
	<i>Deinandra fasciculata</i>	Clustered tarweed											X				X	X	
	<i>Dimorphotheca fruticosa*</i>	Trailing african daisy														X			
	<i>Encelia californica</i>	California brittlebush	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	<i>Erigeron canadensis</i>	Canadian horseweed	X																
	<i>Eriophyllum confertiflorum</i>	Golden-yarrow								X							X		
	<i>Gaillardia*</i>	Blanketflower									X								
	<i>Gazania linearis*</i>	Treasureflower	X																
	<i>Glebionis coronaria*</i>	Crowndaisy			X						X		X		X	X			
	<i>Hazardia squarrosa</i>	Sawtooth goldenbush			X					X									
	<i>Hedypnois cretica*</i>	Cretanweed		X	X	X		X	X	X			X	X	X	X	X		
	<i>Heterotheca grandiflora</i>	Telegraphweed			X					X			X	X	X			X	
	<i>Hypochaeris glabra*</i>	Smooth cat's ear								X						X	X		
	<i>Isocoma menziesii</i>	Menzies' goldenbush						X					X						X
	<i>Isocoma menziesii</i> var. <i>menziesii</i>	Menzies' goldenbush	X	X	X	X	X				X								X
	<i>Isocoma menziesii</i> var. <i>vernonioides</i>	Menzies' goldenbush	X	X				X	X	X		X		X	X	X	X	X	
	<i>Jaumea carnosa</i>	Marsh jaumea						X	X					X	X	X	X	X	X
	<i>Lactuca serriola*</i>	Prickly lettuce															X		
	<i>Laennecia coulteri</i>	Coulter's horseweed														X			
	<i>Leptosyne maritima</i>	Sea dahlia	X	X						X		X				X	X	X	X
	<i>Logfia gallica*</i>	Narrowleaf cottonrose								X									

Family	Scientific name	Common name	Carlsbad State Beach, Pine to Tamarack	Carlsbad State Beach, North Terramar	Carlsbad State Beach, South Terramar	South Carlsbad 101 Median Strip	Carlsbad State Beach, Campground	Carlsbad State Beach, North Ponto	South Carlsbad, Batiqitos W1 and W2	South Carlsbad, Batiqitos 101 Median Strip	Carlsbad State Beach, South Ponto	Encinitas, Beacon's Beach	Encinitas, Swamis to Moonlight	San Elijo State Beach, 101 Median Strip	San Elijo State Beach, Campground	San Elijo Lagoon	Del Mar, North Torrey Pines	Torrey Pines State Reserve, Peñasquitos Lagoon	Torrey Pines State Reserve, Black's Beach
	<i>Osmadenia tenella</i>	False rosinweed															X		
	<i>Pluchea odorata</i> var. <i>odorata</i>	Sweetscent											X	X			X		
	<i>Pluchea sericea</i>	Arrowweed													X	X	X		
	<i>Pseudognaphalium</i> sp.	Cudweed						X										X	
	<i>Pseudognaphalium biolettii</i>	Two-color rabbit-tobacco								X			X		X				
	<i>Pseudognaphalium stramineum</i>	Cottonbatting plant			X	X	X		X	X					X	X			
	<i>Senecio vulgaris</i> *	Old-man-in-the-Spring						X											
	<i>Sonchus oleraceus</i> *	Common sowthistle	X	X	X		X	X	X	X	X	X	X	X	X	X		X	
	<i>Stephanomeria</i> sp.	Wirelettuce						X									X		
	<i>Stephanomeria diegensis</i>	San Diego wirelettuce																X	
	<i>Stylocline gnaphaloides</i>	Everlasting neststraw															X		
	<i>Xanthium strumarium</i>	Rough cocklebur							X	X				X					X
<b>Boraginaceae (Borage family)</b>																			
	<i>Amsinckia intermedia</i>	Common fiddleneck			X														
	<i>Cryptantha</i> sp.	Cryptantha				X													
	<i>Cryptantha intermedia</i>	Clearwater cryptantha						X	X								X	X	
	<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	Seaside heliotrope	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X
	<i>Phacelia cicutaria</i>	Caterpillar phacelia																X	
	<i>Phacelia distans</i>	Distant phacelia		X												X			
	<i>Phacelia ramosissima</i>	Branching phacelia														X			
	<i>Plagiobothrys collinus</i> var. <i>fulvescens</i>	Cooper's popcornflower														X			
<b>Brassicaceae (Mustard family)</b>																			
	<i>Brassica nigra</i> *	Black mustard			X														
	<i>Brassica tournefortii</i> *	Saharan mustard		X	X								X	X	X	X	X		
	<i>Cakile maritima</i> *	European searocket	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	<i>Descurainia pinnata</i>	Western tansymustard						X											
	<i>Descurainia sophia</i> *	Flix weed						X											
	<i>Hirschfeldia incana</i> *	Shortpod mustard						X								X			
	<i>Lepidium</i> sp.	Pepperweed																X	
	<i>Lepidium didymum</i> *	Lesser swinecress			X					X					X				
	<i>Lepidium lasiocarpum</i> subsp. <i>lasiocarpum</i>	Shaggyfruit pepperweed	X	X	X			X	X					X	X	X	X	X	
	<i>Lepidium nitidum</i>	Shining pepperweed											X						
	<i>Lobularia maritima</i> *	Sweet alyssum													X				

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	<i>Matthiola incana</i> *	Stock	X	X	X	X	X	X		X		X	X				X		X
	<i>Nasturtium officinale</i>	Watercress			X									X					
	<i>Raphanus sativus</i> *	Wild radish	X	X		X					X			X		X			X
	<i>Sisymbrium irio</i> *	London rocket	X					X						X		X			
<b>Cactaceae (Cactus family)</b>																			
	<i>Cylindropuntia prolifera</i>	Coast cholla	X		X	X	X											X	X
	<i>Ferocactus viridescens</i>	San Diego barrel cactus																X	X
	<i>Mammillaria dioica</i>	Strawberry cactus																	X
	<i>Opuntia ficus-indica</i> *	Nopales													X			X	
	<i>Opuntia littoralis</i>	Coastal pricklypear			X	X		X	X	X	X						X		X
	<i>Opuntia oricola</i>	Chaparral pricklypear						X						X					
<b>Caryophyllaceae (Pink family)</b>																			
	<i>Cardionema ramosissimum</i>	Sandcarpet									X						X		
	<i>Polycarpon tetraphyllum</i> var. <i>tetraphyllum</i> *	Four-leaved allseed									X					X	X		
	<i>Silene gallica</i> *	Common catchfly									X								
	<i>Spergularia marina</i>	Saltmarsh sand-spurrey									X					X			
	<i>Spergularia rubra</i> *	Red sandspurry			X														
<b>Chenopodiaceae (Goosefoot family)</b>																			
	<i>Arthrocnemum subterminale</i>	Parish's glasswort						X											X
	<i>Atriplex californica</i>	California saltbush														X			
	<i>Atriplex canescens</i>	Fourwing saltbush	X	X				X					X	X	X		X	X	X
	<i>Atriplex confertifolia</i>	Shadscale saltbush																	X
	<i>Atriplex glauca</i> *	Waxy saltbush		X		X													
	<i>Atriplex lentiformis</i>	Big saltbush			X		X	X				X				X			X
	<i>Atriplex leucophylla</i>	Beach saltbush	X															X	X
	<i>Atriplex pacifica</i>	South Coast saltscale				X													
	<i>Atriplex prostrata</i> *	Fat-hen															X		
	<i>Atriplex semibaccata</i> *	Australian saltbush	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X
	<i>Bassia hyssopifolia</i> *	Fivehook bassia			X			X						X	X	X	X	X	X
	<i>Chenopodium album</i> *	Lambsquarters		X		X												X	
	<i>Chenopodium californicum</i>	California goosefoot						X											
	<i>Chenopodium murale</i> *	Nettleleaf goosefoot	X	X	X	X		X				X	X	X	X	X	X	X	X
	<i>Salicornia pacifica</i>	Pickelweed			X				X							X	X	X	X
	<i>Salsola</i> sp.*	Russian thistle	X	X	X	X	X	X		X	X		X	X	X			X	X
	<i>Suaeda nigra</i>	Mojave seablite							X										
	<i>Suaeda taxifolia</i>	Woolly seablite			X	X	X										X	X	X

Family	Scientific name	Common name	Carlsbad State Beach, Pine to Tamarack	Carlsbad State Beach, North Terramar	Carlsbad State Beach, South Terramar	South Carlsbad 101 Median Strip	Carlsbad State Beach, Campground	Carlsbad State Beach, North Ponto	South Carlsbad, Batiqitos W1 and W2	South Carlsbad, Batiqitos 101 Median Strip	Carlsbad State Beach, South Ponto	Encinitas, Beacon's Beach	Encinitas, Swamis to Moonlight	San Elijo State Beach, 101 Median Strip	San Elijo State Beach, Campground	San Elijo Lagoon	Del Mar, North Torrey Pines	Torrey Pines State Reserve, Peñasquitos Lagoon	Torrey Pines State Reserve, Black's Beach
<b>Cleomaceae (Spiderflower family)</b>																			
	<i>Peritoma arborea</i>	Bladderpod	X	X	X		X	X	X	X	X	X	X			X	X	X	X
<b>Convolvulaceae (Morning-glory family)</b>																			
	<i>Calystegia macrostegia</i>	Island false bindweed				X				X	X						X	X	
	<i>Cressa truxillensis</i>	Spreading alkaliweed								X				X		X		X	X
	<i>Cuscuta californica</i>	Chaparral dodder								X							X	X	X
	<i>Cuscuta pacifica</i> var. <i>pacifica</i>	Goldenthread								X	X					X	X		
<b>Crassulaceae (Stonecrop family)</b>																			
	<i>Crassula connata</i>	Sand pygmyweed				X		X	X	X	X			X		X		X	
	<i>Dudleya edulis</i>	Fingertips	X	X							X		X	X			X	X	X
	<i>Dudleya lanceolata</i>	Lanceleaf liveforever	X			X					X					X	X	X	X
	<i>Dudleya pulverulenta</i>	Chalk dudleya																	X
<b>Cucurbitaceae (Cucumber family)</b>																			
	<i>Cucurbita foetidissima</i>	Missouri gourd											X						
	<i>Marah macrocarpa</i>	Cucamonga manroot							X		X			X	X		X	X	X
<b>Euphorbiaceae (Spurge family)</b>																			
	<i>Chamaesyce</i> sp.	Sandmat				X			X										
	<i>Chamaesyce maculata</i> *	Spotted sandmat												X					
	<i>Croton californicus</i>	California croton				X					X					X	X		
	<i>Euphorbia misera</i>	Cliff spurge	X		X											X			X
	<i>Euphorbia peplus</i> *	Petty spurge				X					X								
	<i>Ricinus communis</i> *	Castor bean	X		X	X	X		X		X			X				X	X
<b>Fabaceae (Pea family)</b>																			
	<i>Acacia</i> sp.*	Acacia	X			X	X	X			X	X	X	X	X	X	X	X	X
	<i>Acmispon americanus</i> var. <i>americanus</i>	Spanish clover												X					
	<i>Acmispon glaber</i> var. <i>glaber</i>	Common deerweed	X	X	X	X	X	X	X	X	X		X	X		X	X	X	
	<i>Acmispon micranthus</i>	Bird's-foot trefoil				X					X								
	<i>Acmispon prostratus</i>	Nuttall's acmispon					X		X		X					X		X	
	<i>Acmispon strigosus</i>	Strigose bird's-foot trefoil									X					X			
	<i>Astragalus trichopodus</i>	Santa Barbara milkvetch																	X
	<i>Lupinus concinnus</i>	Bajada lupine														X			
	<i>Lupinus truncatus</i>	Collared annual lupine									X								
	<i>Medicago polymorpha</i> *	Burclover								X									X
	<i>Melilotus indicus</i> *	Small melilot	X		X	X			X	X	X				X	X	X	X	X
<b>Frankeniaceae (Frankenia family)</b>																			

Family	Scientific name	Common name	Carlsbad State Beach, Pine to Tamarack	Carlsbad State Beach, North Terramar	Carlsbad State Beach, South Terramar	South Carlsbad 101 Median Strip	Carlsbad State Beach, Campground	Carlsbad State Beach, North Ponto	South Carlsbad, Batiquitos W1 and W2	South Carlsbad, Batiquitos 101 Median Strip	Carlsbad State Beach, South Ponto	Encinitas, Beacon's Beach	Encinitas, Swamis to Moonlight	San Elijo State Beach, 101 Median Strip	San Elijo State Beach, Campground	San Elijo Lagoon	Del Mar, North Torrey Pines	Torrey Pines State Reserve, Peñasquitos Lagoon	Torrey Pines State Reserve, Black's Beach
	<i>Frankenia salina</i>	Alkali seaheath				X			X	X				X		X	X	X	
<b>Geraniaceae (Geranium family)</b>																			
	<i>Erodium botrys</i> *	Longbeak stork's bill								X	X			X					
	<i>Erodium brachycarpum</i> *	Shortfruit stork's bill															X		
	<i>Erodium cicutarium</i> *	Redstem stork's bill	X		X			X	X	X				X	X	X	X		
<b>Grossulariaceae (Currant family)</b>																			
	<i>Ribes speciosum</i>	Fuchsiaflower gooseberry																	X
<b>Lamiaceae (Mint family)</b>																			
	<i>Salvia apiana</i>	White sage															X	X	
	<i>Salvia columbariae</i>	Chia			X														
	<i>Salvia mellifera</i>	Black sage	X																X
<b>Malvaceae (Mallow family)</b>																			
	<i>Malva parviflora</i> *	Cheeseweed	X	X				X					X	X		X		X	
	<i>Malvella leprosa</i>	Alkali mallow																	X
<b>Montiaceae (Miner's lettuce family)</b>																			
	<i>Calandrinia ciliata</i>	Fringed redmaids									X								
<b>Myrsinaceae (Myrsine family)</b>																			
	<i>Anagallis arvensis</i> *	Scarlet pimpernel			X	X			X	X				X	X	X	X	X	
<b>Myrtaceae (Myrtle family)</b>																			
	<i>Melaleuca sp.</i> *	Bottlebrush				X		X		X									
	<i>Myrtus communis</i> *	Myrtle								X									
<b>Nyctaginaceae (Four o'clock family)</b>																			
	<i>Abronia maritima</i>	Red sand-verbena	X					X		X							X	X	X
	<i>Abronia umbellata</i> var. <i>umbellata</i>					X				X		X		X	X	X	X	X	
	<i>Mirabilis laevis</i> var. <i>crassifolia</i>	California four o'clock	X	X	X	X													X
<b>Onagraceae (Evening Primrose family)</b>																			
	<i>Camissoniopsis bistorta</i>	Southern suncup			X			X		X					X	X			
	<i>Camissoniopsis cheiranthifolia</i> subsp. <i>suffruticosa</i>					X		X	X	X	X	X		X	X			X	X
	<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose			X		X		X	X					X			X	
	<i>Camissoniopsis robusta</i>	Robust suncup													X				
	<i>Epilobium canum</i>	Hummingbird trumpet	X																
	<i>Oenothera elata</i>	Hooker's evening								X									

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		primrose																	
	<i>Oenothera laciniata*</i>	Cutleaf evening primrose								X									
<b>Oxalidaceae (Wood-Sorrel family)</b>																			
	<i>Oxalis pes-caprae*</i>	Bermuda-buttercup	X	X	X	X	X		X	X	X		X	X	X	X		X	X
	<i>Oxalis purpurea*</i>	Purple woodsorrel								X									
<b>Papaveraceae (Poppy family)</b>																			
	<i>Eschscholzia californica</i>	California poppy									X					X			
<b>Plantaginaceae (Plantain family)</b>																			
	<i>Antirrhinum nuttallianum</i>	Nuttall's snapdragon				X	X				X								
	<i>Plantago coronopus*</i>	Buckhorn plantain	X		X					X						X		X	
	<i>Plantago erecta</i>	Dotseed plantain				X	X			X	X			X			X		
<b>Plumbaginaceae (Leadwort family)</b>																			
	<i>Limonium californicum</i>	Marsh rosemary																	X
	<i>Limonium perezii*</i>	Canary Island sea lavender	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X
	<i>Limonium ramosissimum*</i>	Algerian sea lavender	X						X				X	X					
	<i>Limonium sinuatum*</i>	Statice					X	X			X	X	X		X	X			
<b>Polemoniaceae (Phlox family)</b>																			
	<i>Gilia sp.</i>	Gilia									X								
<b>Polygonaceae (Buckwheat family)</b>																			
	<i>Emex spinosa*</i>	Spiny emex	X	X	X	X	X	X	X	X							X	X	X
	<i>Eriogonum fasciculatum</i>	California buckwheat	X		X	X		X	X	X	X		X			X	X	X	X
	<i>Eriogonum parvifolium</i>	Seacliff buckwheat	X	X	X		X									X			X
	<i>Lastarriaea coriacea</i>	Leather spineflower				X													
	<i>Nemacaulis denudata var. denudata</i>	Coast woolly-heads						X		X						X		X	
	<i>Polygonum sp.</i>	Knotweed														X			
	<i>Pterostegia drymarioides</i>	Woodland pterostegia				X					X					X		X	X
	<i>Rumex sp.</i>	Dock			X											X			
	<i>Rumex crispus*</i>	Curly dock							X										
	<i>Rumex salicifolius</i>	Willow dock				X													
<b>Portulacaceae (Purslane family)</b>																			
	<i>Portulaca oleracea*</i>	Little hogweed														X			
<b>Ranunculaceae (Buttercup family)</b>																			
	<i>Clematis pauciflora</i>	Ropevine clematis															X	X	
<b>Rhamnaceae (Buckthorn family)</b>																			
	<i>Adolphia californica</i>	California adolphia												X					



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<b>Asparagaceae (Asparagus family)</b>																			
	<i>Asparagus asparagoides</i> *	African asparagus fern												X		X			
	<i>Asparagus setaceus</i> *	Common asparagus fern												X					
<b>Asphodelaceae (Asphodel family)</b>																			
	<i>Asphodelus fistulosus</i> *	Onion weed				X													
<b>Cyperaceae (Sedge family)</b>																			
	<i>Cyperus</i> sp.	Flatsedge				X	X				X								
	<i>Cyperus involucratus</i> *	Umbrella plant	X														X		
	<i>Schoenoplectus</i> sp.	Bulrush																	X
	<i>Schoenoplectus acutus</i> var. <i>occidentalis</i>	Common tule																	X
	<i>Schoenoplectus californicus</i>	Southern bulrush	X																
<b>Iridaceae (Iris family)</b>																			
	<i>Iris</i> sp.*	Iris																	X
	<i>Sisyrinchium bellum</i>	Western blue-eyed grass															X		
<b>Juncaceae (Rush Family)</b>																			
	<i>Juncus</i> sp.	Rush																	X
	<i>Juncus acutus</i> subsp. <i>leopoldii</i>	Southwestern spiny rush							X	X	X		X	X	X	X	X	X	X
	<i>Juncus mexicanus</i>	Mexican rush									X								X
<b>Poaceae (Grass family)</b>																			
	<i>Arundo donax</i> *	Giant reed	X	X	X		X				X	X	X	X	X	X	X	X	X
	<i>Avena barbata</i> *	Lopsided oat			X	X					X			X				X	
	<i>Avena fatua</i> *	Wild oat								X				X				X	
	<i>Avena sterilis</i> *	Animated oat																X	
	<i>Bothriochloa barbinodis</i>	Cane bluestem												X				X	
	<i>Brachypodium distachyon</i> *	False brome				X												X	X
	<i>Bromus carinatus</i>	California brome				X													
	<i>Bromus catharticus</i> *	Rescuegrass	X		X						X								X
	<i>Bromus diandrus</i> *	Ripgut brome	X	X	X	X	X	X	X	X	X			X		X	X	X	X
	<i>Bromus hordeaceus</i> *	Soft brome				X		X											X
	<i>Bromus madritensis</i> *	Compact brome	X	X	X	X	X							X				X	X
	<i>Cortaderia selloana</i> *	Pampas grass	X		X	X				X	X		X	X	X	X	X	X	X
	<i>Cynodon dactylon</i> *	Bermuda grass	X			X	X	X	X		X			X	X	X	X	X	X
	<i>Distichlis spicata</i>	Saltgrass	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
	<i>Ehrharta erecta</i> *	Panic veldtgrass																	X
	<i>Ehrharta longiflora</i> *	Longflowered veldtgrass																	X

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	<i>Elymus condensatus</i>	Giant wildrye											X						
	<i>Festuca bromoides</i> *	Brome fescue																X	
	<i>Festuca myuros</i> *	Small fescue				X				X									
	<i>Festuca perennis</i> *	Perennial ryegrass											X						X
	<i>Hordeum marinum</i> subsp. <i>gussoneanum</i> *	Mediterranean barley	X	X	X					X			X	X			X	X	
	<i>Hordeum murinum</i> *	Mouse barley				X					X						X	X	
	<i>Lamarckia aurea</i> *	Goldentop grass											X				X		
	<i>Melica imperfecta</i>	Smallflower melicgrass															X		
	<i>Muhlenbergia microsperma</i>	Littleseed muhly				X													
	<i>Paspalum vaginatum</i> *	Seashore paspalum				X													
	<i>Pennisetum setaceum</i> *	Fountain Grass						X	X				X	X			X		
	<i>Polypogon monspeliensis</i> *	Annual rabbitsfoot grass			X	X							X	X			X	X	X
	<i>Schismus</i> sp.*	Mediterranean grass			X	X		X					X				X	X	
	<i>Stipa cernua</i>	Nodding needlegrass											X						
	<i>Stipa lepida</i>	Foothill needlegrass																	X
	<i>Stipa pulchra</i>	Purple needlegrass											X				X	X	
<b>Themidaceae (Brodiaea family)</b>																			
	<i>Dichelostemma capitatum</i>	Bluedicks								X									
<b>Typhaceae (Cat-tail family)</b>																			
	<i>Typha</i> sp.	Cattail			X	X		X											X
	<i>Typha domingensis</i>	Southern cattail	X			X			X	X		X	X	X	X	X	X		

# Appendix B

## Survey Site Maps

### Map Index

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## Key to Invasive Weed Labels

<u>Code</u>	<u>Weed Taxon</u>
ACACIA .....	<i>Acacia</i> sp. (Acacia)
APTCOR.....	<i>Aptenia cordifolia</i> (Red apple iceplant)
ARUDON .....	<i>Arundo donax</i> (Giant reed)
ASPASP .....	<i>Asparagus asparagoides</i> (African asparagus fern)
ASPFIS .....	<i>Asphodelus fistulosus</i> (Onion weed)
BASHYS .....	<i>Bassia hyssopifolia</i> (Fivehook bassia)
BRADIS .....	<i>Arundo donax</i> (Giant reed)
BRATOU .....	<i>Brassica tournefortii</i> (Saharan mustard)
BRDI .....	<i>Bromus diandrus</i> (Rippgut brome)
BRODIA .....	<i>Bromus diandrus</i> (Rippgut brome)
CAKMAR.....	<i>Cakile maritima</i> (European searocket)
CARPOBR .....	<i>Carpobrotus</i> sp. (Hottentot fig)
CENMEL .....	<i>Centaurea melitensis</i> (Tocalote)
CORSEL.....	<i>Cortaderia selloana</i> (Pampas grass)
CYNCAR.....	<i>Cynara cardunculus</i> (Artichoke thistle)
CYNDAC.....	<i>Cynodon dactylon</i> (Bermuda grass)
CYPINV .....	<i>Cyperus involucratus</i> (Umbrella plant)
DESSOP .....	<i>Descurainia sophia</i> (Flix weed)
EHRLOD.....	<i>Ehrharta longiflora</i> (Longflowered veldtgrass)
EMESPI.....	<i>Emex spinosa</i> (Spiny emex)
EUPPEP .....	<i>Euphorbia peplus</i> (Petty spurge)
FOEVUL .....	<i>Foeniculum vulgare</i> (Fennel)
GLECOR.....	<i>Glebionis coronaria</i> (Crowndaisy)
HIRINC.....	<i>Hirschfeldia incana</i> (Shortpod mustard)
Iris .....	<i>Iris</i> sp. (Iris)
LIMPER.....	<i>Limonium perezii</i> (Canary Island sea lavender)
LIMRAM .....	<i>Limonium ramosissimum</i> (Algerian sea lavender)
LIMSIN.....	<i>Limonium sinuatum</i> (Statice)
LOBMAR.....	<i>Lobularia maritima</i> (Sweet alyssum)
MALCRO.....	<i>Malephora crocea</i> (Crocea iceplant)
MALPAR .....	<i>Malva parviflora</i> (Cheeseweed)
MATINC.....	<i>Matthiola incana</i> (Stock)
Melaleuca .....	<i>Melaleuca</i> sp. (Bottlebrush)
MELIND .....	<i>Melilotus indicus</i> (Small melilot)
MESCRY.....	<i>Mesembryanthemum crystallinum</i> (Crystalline iceplant)
MESNOD .....	<i>Mesembryanthemum nodiflorum</i> (Slenderleaf iceplant)
MYOLAE .....	<i>Myoporum laetum</i> (Ngaio tree)
MYOP .....	<i>Myoporum</i> sp. (Myoporum)
MYOPAR.....	<i>Myoporum parvifolium</i> (Prostrate Myoporum)
NICGLA .....	<i>Nicotiana glauca</i> (Tree tobacco)
OPUFIC.....	<i>Opuntia ficus-indica</i> (Nopales)
OXAPES .....	<i>Oxalis pes-caprae</i> (Bermuda-buttercup)
PASVAG.....	<i>Paspalum vaginatum</i> (Seashore paspalum)
PENSET .....	<i>Pennisetum setaceum</i> (Fountain Grass)
PHOCAR .....	<i>Phoenix canariensis</i> (Canary Island date palm)
RAPSAT .....	<i>Raphanus sativus</i> (Wild radish)
RICCOM.....	<i>Ricinus communis</i> (Castor bean)
Salsola .....	<i>Salsola</i> sp. (Russian thistle)
SISIRO.....	<i>Sisymbrium irio</i> (London rocket)
SONASP.....	<i>Sonchus asper</i> (Sow thistle)
Tamarix .....	<i>Tamarix</i> sp. (Saltcedar)
WASROB .....	<i>Washingtonia robusta</i> (Mexican fan palm)

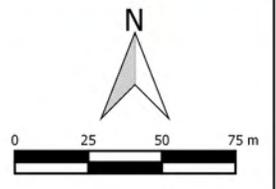


Oceanside, San Luis Rey

**Legend**

- |  |  |   |  |
|--|--|---|--|
| <ul style="list-style-type: none"> <li> Survey Sites</li> <li> Invasive Weeds</li> <li> MSP Plots</li> </ul> | <ul style="list-style-type: none"> <li> California box-thorn</li> <li> Cliff spurge</li> <li> Coast woolly-heads</li> <li> Del Mar Mesa sand aster</li> <li> Lewis' evening-primrose</li> <li> California adolphia</li> <li> Nuttall's acmispon</li> </ul> | <ul style="list-style-type: none"> <li> Orcutt's pincushion</li> <li> Red sand-verbena</li> <li> San Diego barrel cactus</li> <li> San Diego marsh-elder</li> <li> Sea dahlia</li> <li> Shaw's agave</li> </ul> | <ul style="list-style-type: none"> <li> South Coast saltscale</li> <li> Southwestern spiny rush</li> <li> Torrey Pine</li> <li> Woolly seablite</li> </ul> |
|--|--|---|--|

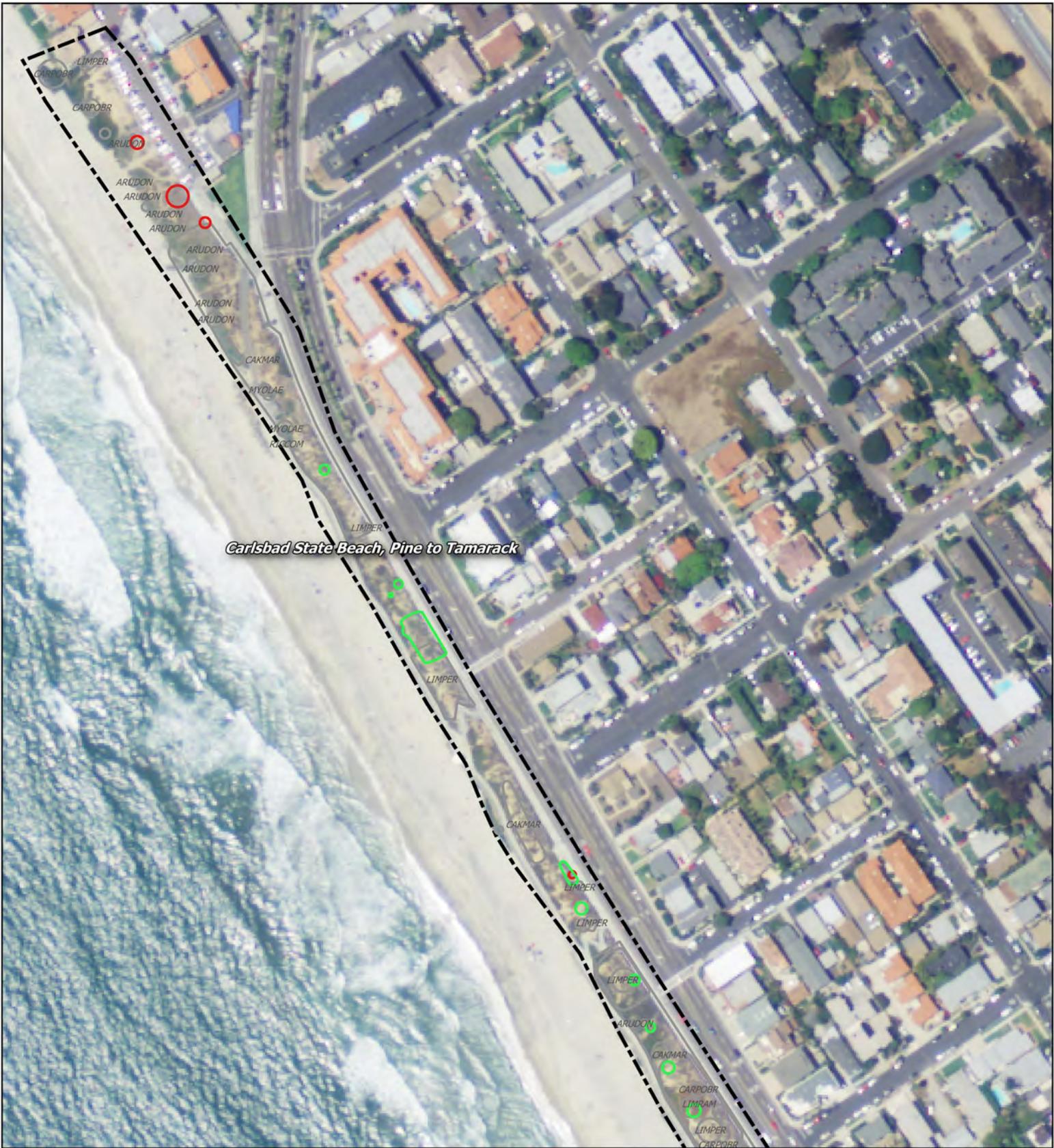
**Rare Plants**



**NCDHRP Botanical Survey Report**

**Map 1**

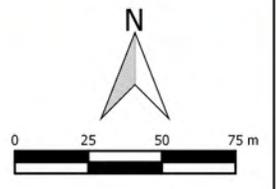




*Carlsbad State Beach, Pine to Tamarack*

**Legend**

- |  |  |   |  |
|--|--|---|--|
| <ul style="list-style-type: none"> <li> Survey Sites</li> <li> Invasive Weeds</li> <li> MSP Plots</li> </ul> | <ul style="list-style-type: none"> <li> California box-thorn</li> <li> Cliff spurge</li> <li> Coast woolly-heads</li> <li> Del Mar Mesa sand aster</li> <li> Lewis' evening-primrose</li> <li> California adolphia</li> <li> Nuttall's acmispon</li> </ul> | <ul style="list-style-type: none"> <li> Orcutt's pincushion</li> <li> Red sand-verbena</li> <li> San Diego barrel cactus</li> <li> San Diego marsh-elder</li> <li> Sea dahlia</li> <li> Shaw's agave</li> </ul> | <ul style="list-style-type: none"> <li> South Coast saltscale</li> <li> Southwestern spiny rush</li> <li> Torrey Pine</li> <li> Woolly seablite</li> </ul> |
|--|--|---|--|



**NCDHRP Botanical Survey Report**

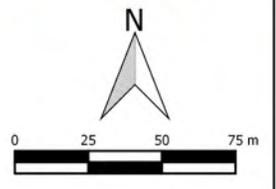
**Map 2**





**Legend**

Survey Sites	California box-thorn	Orcutt's pincushion	South Coast saltscale
Invasive Weeds	Cliff spurge	Red sand-verbena	Southwestern spiny rush
MSP Plots	Coast woolly-heads	San Diego barrel cactus	Torrey Pine
<b>Rare Plants</b>	Del Mar Mesa sand aster	San Diego marsh-elder	Woolly seablite
California adolphia	Lewis' evening-primrose	Sea dahlia	
Nuttall's acmispon	Shaw's agave		



**NCDHRP Botanical Survey Report**

**Map 3**





**Legend**

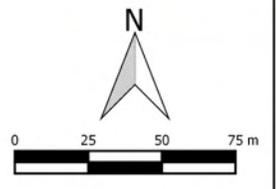
- Survey Sites
- Invasive Weeds
- MSP Plots

**Rare Plants**

- California adolphia
- Nuttall's acmispon
- California box-thorn
- Cliff spurge
- Coast woolly-heads
- Del Mar Mesa sand aster
- Lewis' evening-primrose

- Orcutt's pincushion
- Red sand-verbena
- San Diego barrel cactus
- San Diego marsh-elder
- Sea dahlia
- Shaw's agave

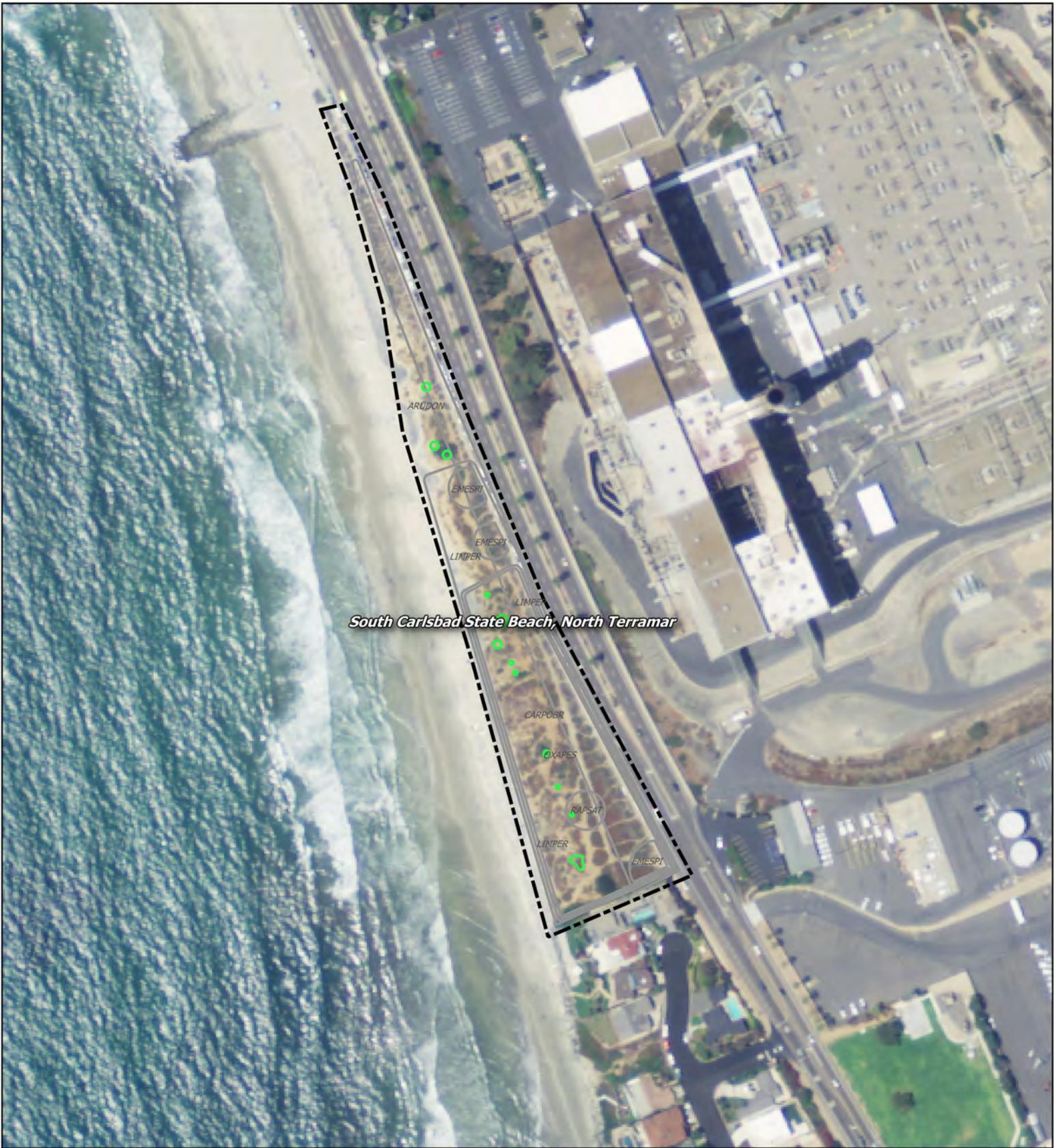
- South Coast saltscale
- Southwestern spiny rush
- Torrey Pine
- Woolly seablite



**NCDHRP Botanical Survey Report**

**Map 4**





*South Carlsbad State Beach, North Terramar*

**Legend**

- Survey Sites
- Invasive Weeds
- MSP Plots

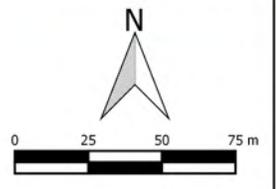
**Rare Plants**

- California adolphia
- Cliff spurge
- Coast woolly-heads
- Del Mar Mesa sand aster
- Lewis' evening-primrose
- Nuttall's acmispon

- California box-thorn
- Cliff spurge
- Coast woolly-heads
- Del Mar Mesa sand aster
- Lewis' evening-primrose
- Nuttall's acmispon

- Orcutt's pincushion
- Red sand-verbena
- San Diego barrel cactus
- San Diego marsh-elder
- Sea dahlia
- Shaw's agave

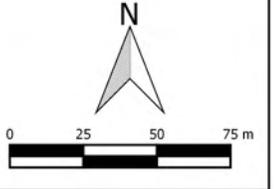
- South Coast saltscale
- Southwestern spiny rush
- Torrey Pine
- Woolly seablite





**Legend**

- |  |   |   |  |
|--|---|---|--|
| <ul style="list-style-type: none"> <li> Survey Sites</li> <li> Invasive Weeds</li> <li> MSP Plots</li> </ul> <p><b>Rare Plants</b></p> <ul style="list-style-type: none"> <li> California adolphia</li> <li> Nuttall's acmispon</li> </ul> | <ul style="list-style-type: none"> <li> California box-thorn</li> <li> Cliff spurge</li> <li> Coast woolly-heads</li> <li> Del Mar Mesa sand aster</li> <li> Lewis' evening-primrose</li> </ul> | <ul style="list-style-type: none"> <li> Orcutt's pincushion</li> <li> Red sand-verbena</li> <li> San Diego barrel cactus</li> <li> San Diego marsh-elder</li> <li> Sea dahlia</li> <li> Shaw's agave</li> </ul> | <ul style="list-style-type: none"> <li> South Coast saltscale</li> <li> Southwestern spiny rush</li> <li> Torrey Pine</li> <li> Woolly seablite</li> </ul> |
|--|---|---|--|



**NCDHRP Botanical Survey Report**

**Map 6**

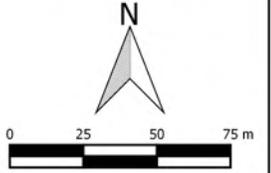




South Carlsbad State Beach, South Terramar

**Legend**

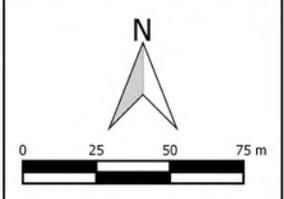
- |                     |                         |                         |                         |
|---------------------|-------------------------|-------------------------|-------------------------|
| Survey Sites        | California box-thorn    | Orcutt's pincushion     | South Coast saltscale   |
| Invasive Weeds      | Cliff spurge            | Red sand-verbena        | Southwestern spiny rush |
| MSP Plots           | Coast woolly-heads      | San Diego barrel cactus | Torrey Pine             |
| <b>Rare Plants</b>  | Del Mar Mesa sand aster | San Diego marsh-elder   | Woolly seablite         |
| California adolphia | Lewis' evening-primrose | Sea dahlia              |                         |
| Nuttall's acmispon  | Shaw's agave            |                         |                         |





**Legend**

Survey Sites	California box-thorn	Orcutt's pincushion	South Coast saltscale
Invasive Weeds	Cliff spurge	Red sand-verbena	Southwestern spiny rush
MSP Plots	Coast woolly-heads	San Diego barrel cactus	Torrey Pine
<b>Rare Plants</b>	Del Mar Mesa sand aster	San Diego marsh-elder	Woolly seablite
California adolphia	Lewis' evening-primrose	Sea dahlia	
	Nuttall's acmispon	Shaw's agave	



**NCDHRP Botanical Survey Report**

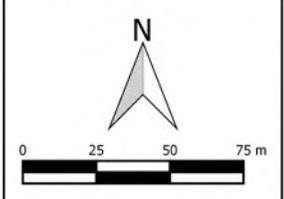
**Map 8**





**Legend**

Survey Sites	California box-thorn	Orcutt's pincushion	South Coast saltscale
Invasive Weeds	Cliff spurge	Red sand-verbena	Southwestern spiny rush
MSP Plots	Coast woolly-heads	San Diego barrel cactus	Torrey Pine
<b>Rare Plants</b>	Del Mar Mesa sand aster	San Diego marsh-elder	Woolly seablite
California adolphia	Lewis' evening-primrose	Sea dahlia	
Nuttall's acmispon	Shaw's agave		



**NCDHRP Botanical Survey Report**





**Legend**

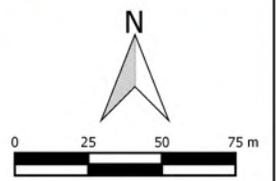
- ☐ Survey Sites
- ☐ Invasive Weeds
- ★ MSP Plots

**Rare Plants**

- ☐ California box-thorn
- ☐ Cliff spurge
- ☐ Coast woolly-heads
- ☐ Del Mar Mesa sand aster
- ☐ Lewis' evening-primrose
- ☐ California adolphia
- ☐ Nuttall's acmispon

- ☐ Orcutt's pincushion
- ☐ Red sand-verbena
- ☐ San Diego barrel cactus
- ☐ San Diego marsh-elder
- ☐ Sea dahlia
- ☐ Shaw's agave

- ☐ South Coast saltscale
- ☐ Southwestern spiny rush
- ☐ Torrey Pine
- ☐ Woolly seablite



**NCDHRP Botanical Survey Report**

**Map 10**





*South Carlsbad State Beach, Campground*

*South Carlsbad State Beach, Campground*

**Legend**

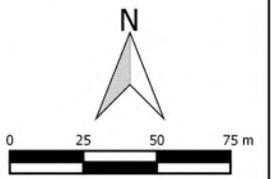
- ☐ Survey Sites
- ☐ Invasive Weeds
- ★ MSP Plots

**Rare Plants**

- ☐ California adolphia
- ☐ California box-thorn
- ☐ Cliff spurge
- ☐ Coast woolly-heads
- ☐ Del Mar Mesa sand aster
- ☐ Lewis' evening-primrose
- ☐ Nuttall's acmispon

- ☐ Orcutt's pincushion
- ☐ Red sand-verbena
- ☐ San Diego barrel cactus
- ☐ San Diego marsh-elder
- ☐ Sea dahlia
- ☐ Shaw's agave

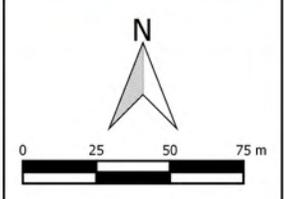
- ☐ South Coast saltscale
- ☐ Southwestern spiny rush
- ☐ Torrey Pine
- ☐ Woolly seablite





**Legend**

<ul style="list-style-type: none"> <li><span style="border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Survey Sites</li> <li><span style="background-color: lightgrey; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Invasive Weeds</li> <li><span style="color: red; font-weight: bold; font-size: 1.2em;">★</span> MSP Plots</li> </ul>	<ul style="list-style-type: none"> <li><span style="border: 1px solid green; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> California box-thorn</li> <li><span style="border: 1px solid red; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Cliff spurge</li> <li><span style="border: 1px solid cyan; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Coast woolly-heads</li> <li><span style="border: 1px solid magenta; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Del Mar Mesa sand aster</li> <li><span style="border: 1px solid yellow; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Lewis' evening-primrose</li> <li><span style="border: 1px solid orange; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Nuttall's acmispon</li> </ul>	<ul style="list-style-type: none"> <li><span style="background-color: orange; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Orcutt's pincushion</li> <li><span style="background-color: brown; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Red sand-verbena</li> <li><span style="background-color: blue; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> San Diego barrel cactus</li> <li><span style="background-color: grey; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> San Diego marsh-elder</li> <li><span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Sea dahlia</li> <li><span style="background-color: pink; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Shaw's agave</li> </ul>	<ul style="list-style-type: none"> <li><span style="background-color: purple; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> South Coast saltscale</li> <li><span style="background-color: lightblue; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Southwestern spiny rush</li> <li><span style="border-bottom: 1px dashed green; display: inline-block; width: 15px; margin-right: 5px;"></span> Torrey Pine</li> <li><span style="background-color: purple; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Woolly seablite</li> </ul>
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**NCDHRP Botanical Survey Report**

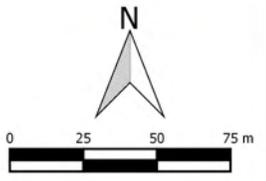
**Map 12**





**Legend**

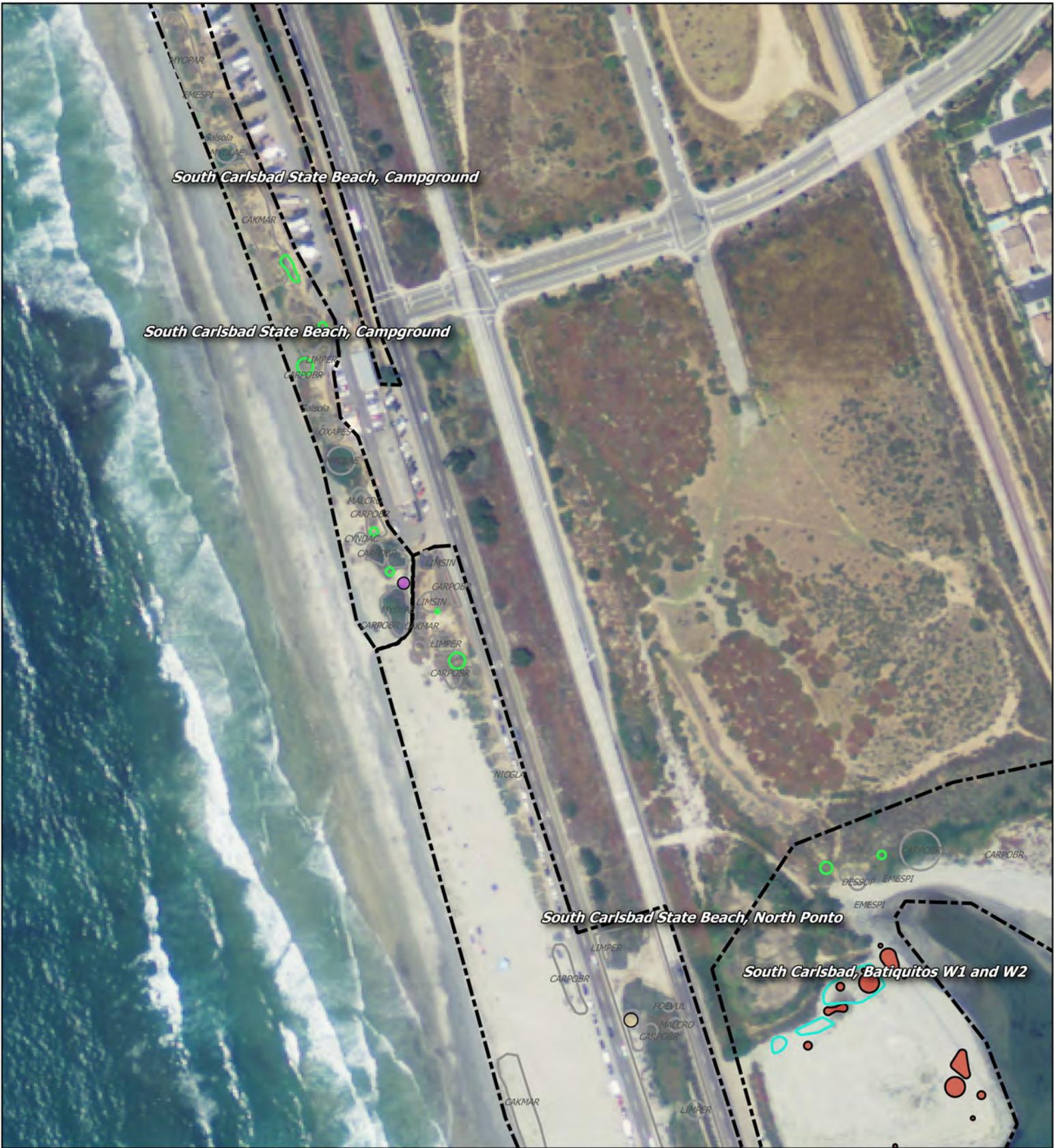
- |                     |                         |                         |                         |
|---------------------|-------------------------|-------------------------|-------------------------|
| Survey Sites        | California box-thorn    | Orcutt's pincushion     | South Coast saltscale   |
| Invasive Weeds      | Cliff spurge            | Red sand-verbena        | Southwestern spiny rush |
| MSP Plots           | Coast woolly-heads      | San Diego barrel cactus | Torrey Pine             |
| <b>Rare Plants</b>  | Del Mar Mesa sand aster | San Diego marsh-elder   | Woolly seablite         |
| California adolphia | Lewis' evening-primrose | Sea dahlia              |                         |
|                     | Nuttall's acmispon      | Shaw's agave            |                         |



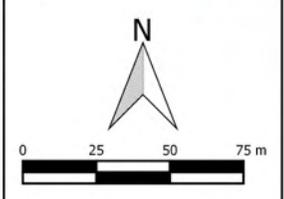
**NCDHRP Botanical Survey Report**

**Map 13**



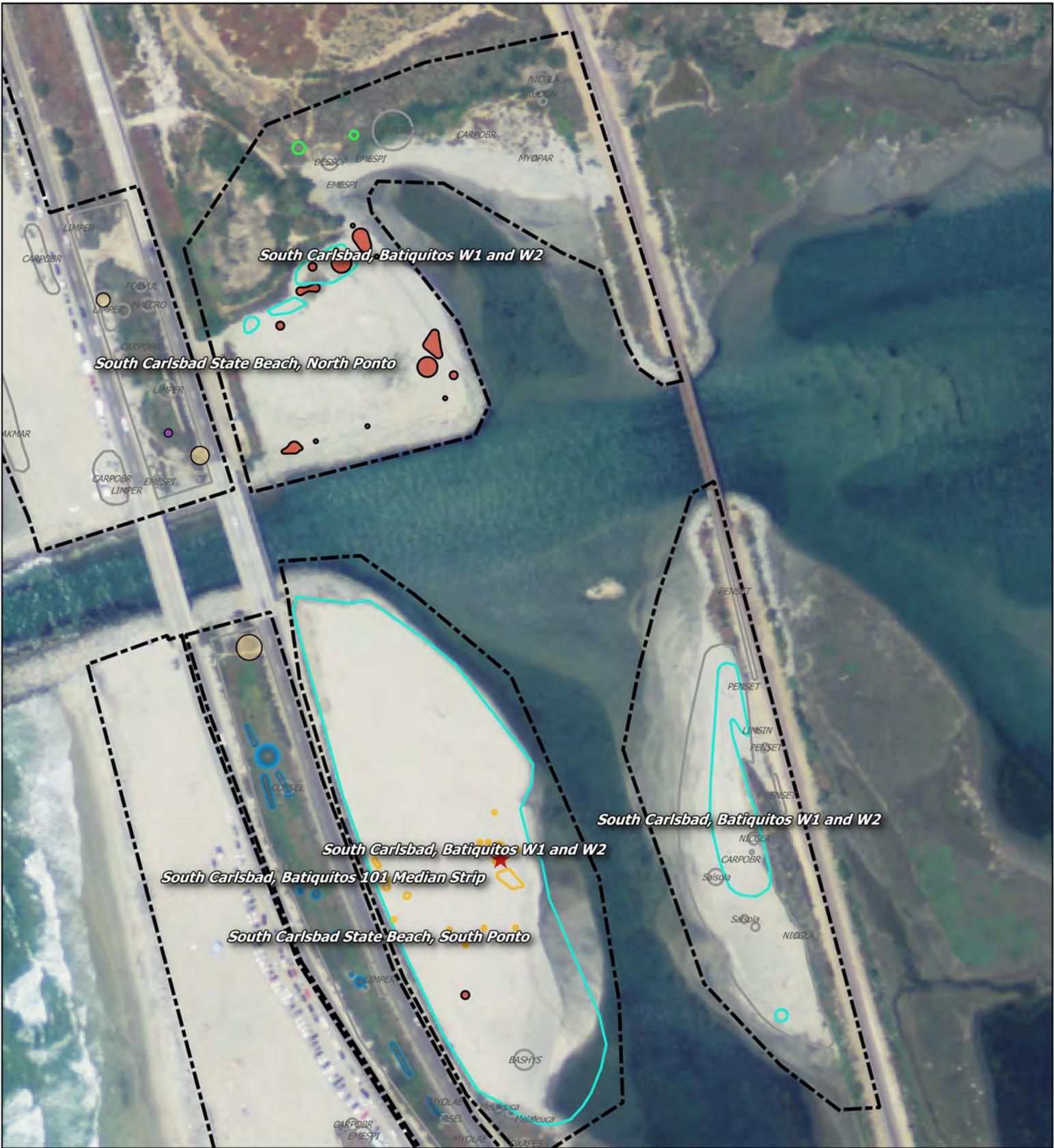


<b>Legend</b>			
<ul style="list-style-type: none"> <li><span style="border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Survey Sites</li> <li><span style="background-color: #cccccc; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Invasive Weeds</li> <li><span style="color: red; font-weight: bold; font-size: 1.2em;">★</span> MSP Plots</li> </ul>	<ul style="list-style-type: none"> <li><span style="border: 1px solid green; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> California box-thorn</li> <li><span style="border: 1px solid red; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Cliff spurge</li> <li><span style="border: 1px solid cyan; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Coast woolly-heads</li> <li><span style="border: 1px solid magenta; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Del Mar Mesa sand aster</li> <li><span style="border: 1px solid yellow; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Lewis' evening-primrose</li> <li><span style="border: 1px solid orange; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Nuttall's acmispon</li> </ul>	<ul style="list-style-type: none"> <li><span style="background-color: #e69a00; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Orcutt's pincushion</li> <li><span style="background-color: #c0504d; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Red sand-verbena</li> <li><span style="background-color: #4a7ebb; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> San Diego barrel cactus</li> <li><span style="background-color: #cccccc; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> San Diego marsh-elder</li> <li><span style="background-color: #ffff00; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Sea dahlia</li> <li><span style="background-color: #e91e63; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Shaw's agave</li> </ul>	<ul style="list-style-type: none"> <li><span style="background-color: #4a7ebb; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> South Coast saltscale</li> <li><span style="border: 1px dashed blue; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Southwestern spiny rush</li> <li><span style="border: 1px dashed green; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Torrey Pine</li> <li><span style="background-color: #9966cc; border: 1px solid black; display: inline-block; width: 15px; height: 15px; margin-right: 5px;"></span> Woolly seablite</li> </ul>



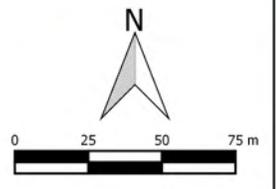
**NCDHRP Botanical Survey Report**





**Legend**

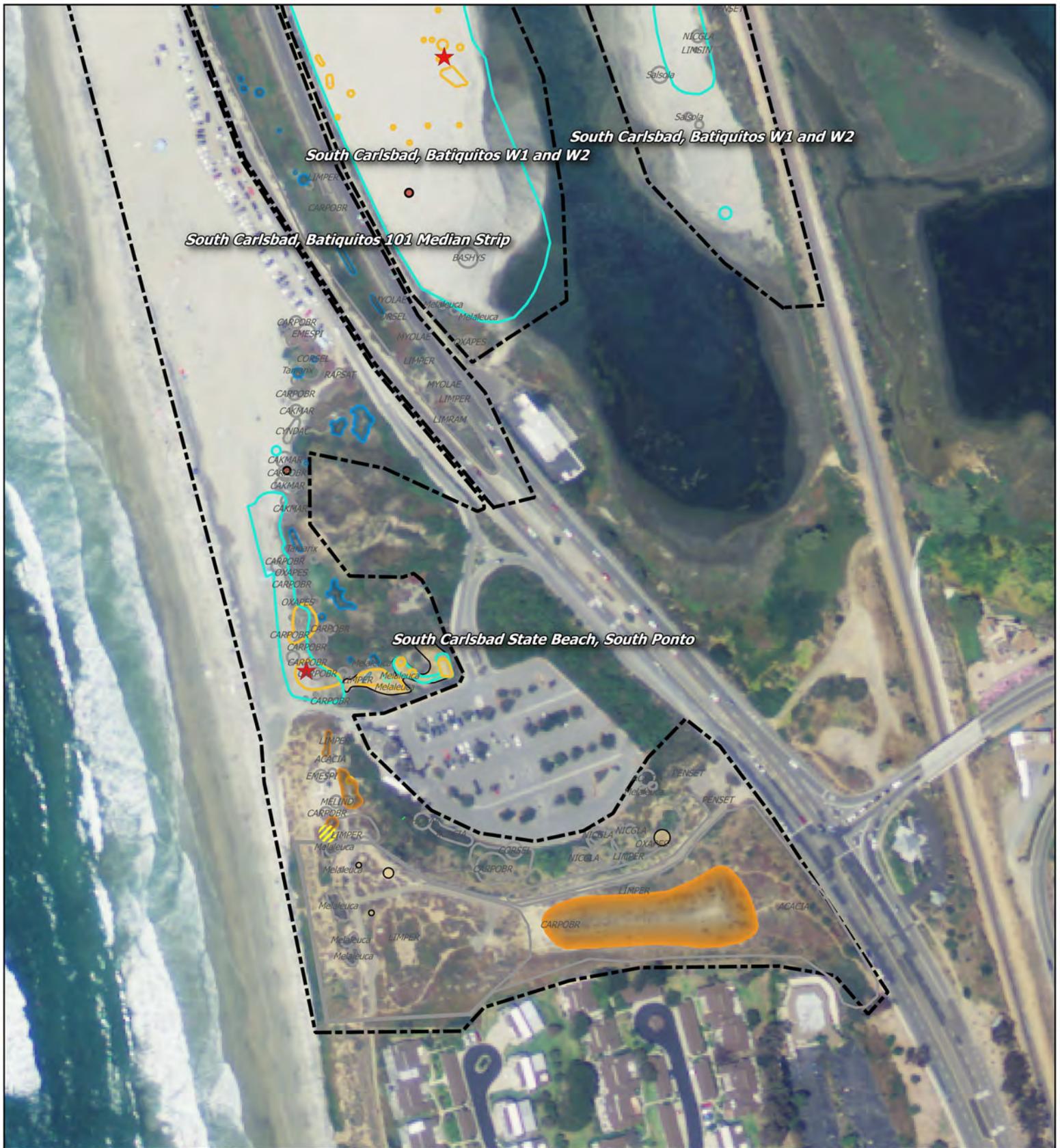
- |  |  |   |  |
|--|--|---|--|
| <ul style="list-style-type: none"> <li>■ Survey Sites</li> <li>■ Invasive Weeds</li> <li>★ MSP Plots</li> <li><b>Rare Plants</b></li> <li>■ California adolphia</li> </ul> | <ul style="list-style-type: none"> <li>■ California box-thorn</li> <li>■ Cliff spurge</li> <li>■ Coast woolly-heads</li> <li>■ Del Mar Mesa sand aster</li> <li>■ Lewis' evening-primrose</li> <li>■ Nuttall's acmispon</li> </ul> | <ul style="list-style-type: none"> <li>■ Orcutt's pincushion</li> <li>■ Red sand-verbena</li> <li>■ San Diego barrel cactus</li> <li>■ San Diego marsh-elder</li> <li>■ Sea dahlia</li> <li>■ Shaw's agave</li> </ul> | <ul style="list-style-type: none"> <li>■ South Coast saltscale</li> <li>■ Southwestern spiny rush</li> <li>■ Torrey Pine</li> <li>■ Woolly seablite</li> </ul> |
|--|--|---|--|



**NCDHRP Botanical Survey Report**

**Map 15**





**Legend**

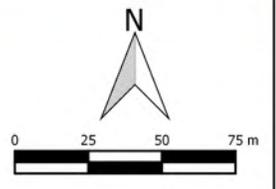
- ☐ Survey Sites
- ☐ Invasive Weeds
- ★ MSP Plots

**Rare Plants**

- ☐ California adolphia
- ☐ California box-thorn
- ☐ Cliff spurge
- ☐ Coast woolly-heads
- ☐ Del Mar Mesa sand aster
- ☐ Lewis' evening-primrose
- ☐ Nuttall's acmispon

- ☐ Orcutt's pincushion
- ☐ Red sand-verbena
- ☐ San Diego barrel cactus
- ☐ San Diego marsh-elder
- ☐ Sea dahlia
- ☐ Shaw's agave

- ☐ South Coast saltscale
- ☐ Southwestern spiny rush
- ☐ Torrey Pine
- ☐ Woolly seablite



**NCDHRP Botanical Survey Report**





**Legend**

Survey Sites	California box-thorn	Orcutt's pincushion	South Coast saltscale
Invasive Weeds	Cliff spurge	Red sand-verbena	Southwestern spiny rush
MSP Plots	Coast woolly-heads	San Diego barrel cactus	Torrey Pine
<b>Rare Plants</b>	Del Mar Mesa sand aster	San Diego marsh-elder	Woolly seablite
California adolphia	Lewis' evening-primrose	Sea dahlia	
	Nuttall's acmispon	Shaw's agave	

N

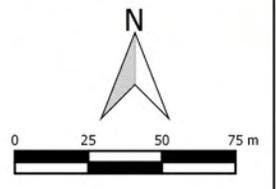
**NCDHRP Botanical Survey Report**





**Legend**

- |                     |                         |                         |                         |
|---------------------|-------------------------|-------------------------|-------------------------|
| Survey Sites        | California box-thorn    | Orcutt's pincushion     | South Coast saltscale   |
| Invasive Weeds      | Cliff spurge            | Red sand-verbena        | Southwestern spiny rush |
| MSP Plots           | Coast woolly-heads      | San Diego barrel cactus | Torrey Pine             |
| <b>Rare Plants</b>  | Del Mar Mesa sand aster | San Diego marsh-elder   | Woolly seablite         |
| California adolphia | Nuttall's acmispon      | Sea dahlia              |                         |
|                     |                         | Shaw's agave            |                         |



**NCDHRP Botanical Survey Report**

**Map 18**





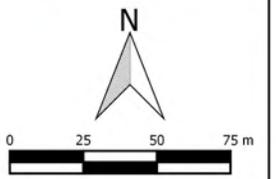
*Encinitas, Swamis to Moonlight*

ALICIA

**Legend**

- |  |  |   |  |
|--|--|---|--|
| <ul style="list-style-type: none"> <li> Survey Sites</li> <li> Invasive Weeds</li> <li> MSP Plots</li> </ul> | <ul style="list-style-type: none"> <li> California box-thorn</li> <li> Cliff spurge</li> <li> Coast woolly-heads</li> <li> Del Mar Mesa sand aster</li> <li> Lewis' evening-primrose</li> <li> Nuttall's acmispon</li> </ul> | <ul style="list-style-type: none"> <li> Orcutt's pincushion</li> <li> Red sand-verbena</li> <li> San Diego barrel cactus</li> <li> San Diego marsh-elder</li> <li> Sea dahlia</li> <li> Shaw's agave</li> </ul> | <ul style="list-style-type: none"> <li> South Coast saltscale</li> <li> Southwestern spiny rush</li> <li> Torrey Pine</li> <li> Woolly seablite</li> </ul> |
|--|--|---|--|

**Rare Plants**



**NCDHRP Botanical Survey Report**

**Map 19**





**Legend**

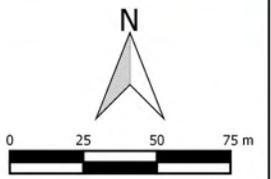
- Survey Sites
- Invasive Weeds
- MSP Plots

**Rare Plants**

- California adolphia
- Nuttall's acmispon
- California box-thorn
- Cliff spurge
- Coast woolly-heads
- Del Mar Mesa sand aster
- Lewis' evening-primrose

- Orcutt's pincushion
- Red sand-verbena
- San Diego barrel cactus
- San Diego marsh-elder
- Sea dahlia
- Shaw's agave

- South Coast saltscale
- Southwestern spiny rush
- Torrey Pine
- Woolly seablite



**NCDHRP Botanical Survey Report**

**Map 20**





*Encinitas, Swamis to Moonlight*

**Legend**

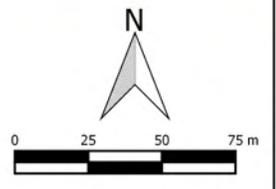
-  Survey Sites
-  Invasive Weeds
-  MSP Plots

**Rare Plants**

-  California adolphia
-  Nuttall's acmispon
-  California box-thorn
-  Cliff spurge
-  Coast woolly-heads
-  Del Mar Mesa sand aster
-  Lewis' evening-primrose

-  Orcutt's pincushion
-  Red sand-verbena
-  San Diego barrel cactus
-  San Diego marsh-elder
-  Sea dahlia
-  Shaw's agave

-  South Coast saltscale
-  Southwestern spiny rush
-  Torrey Pine
-  Woolly seablite

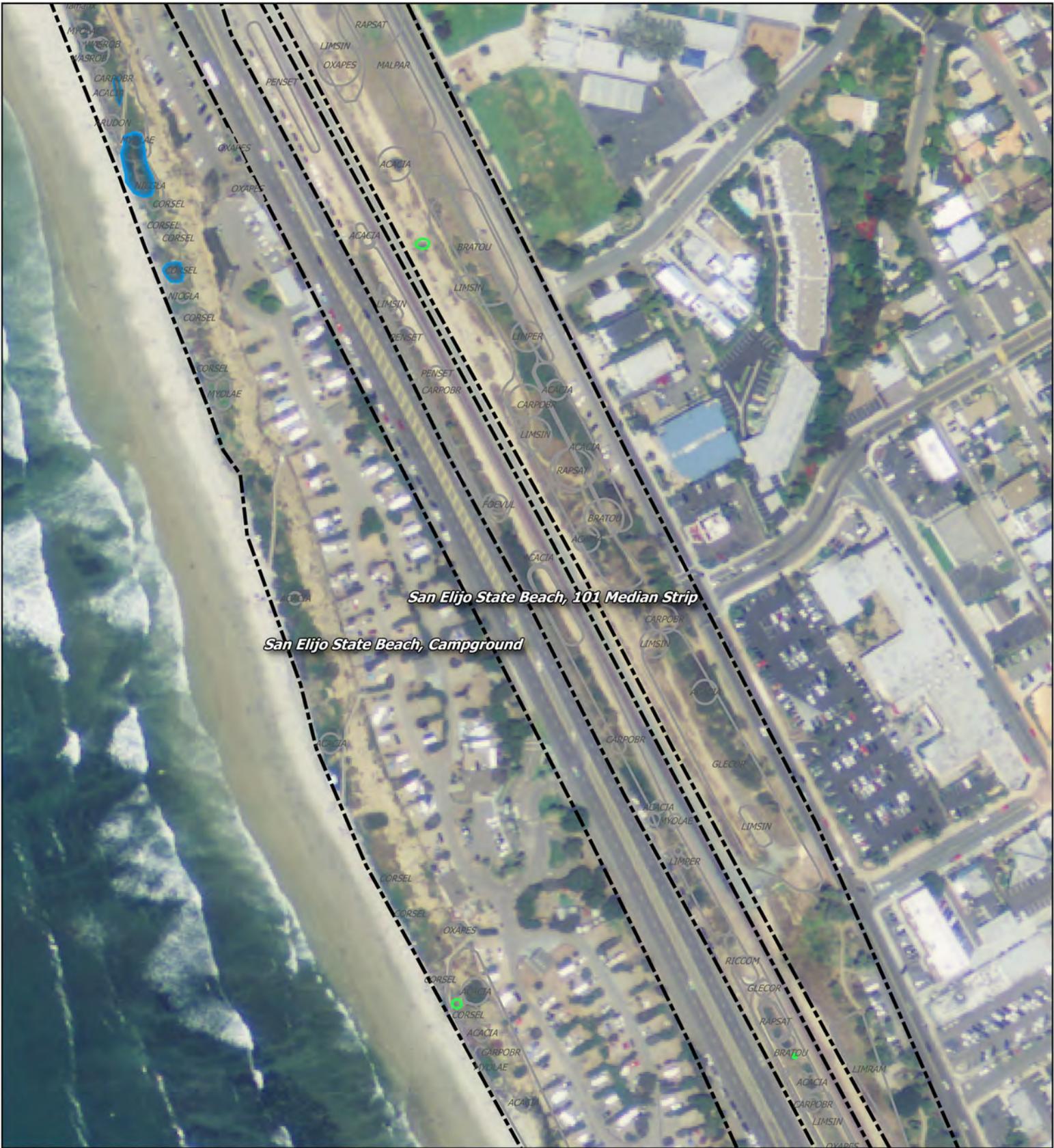


**NCDHRP Botanical Survey Report**

**Map 21**

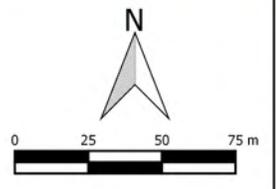






**Legend**

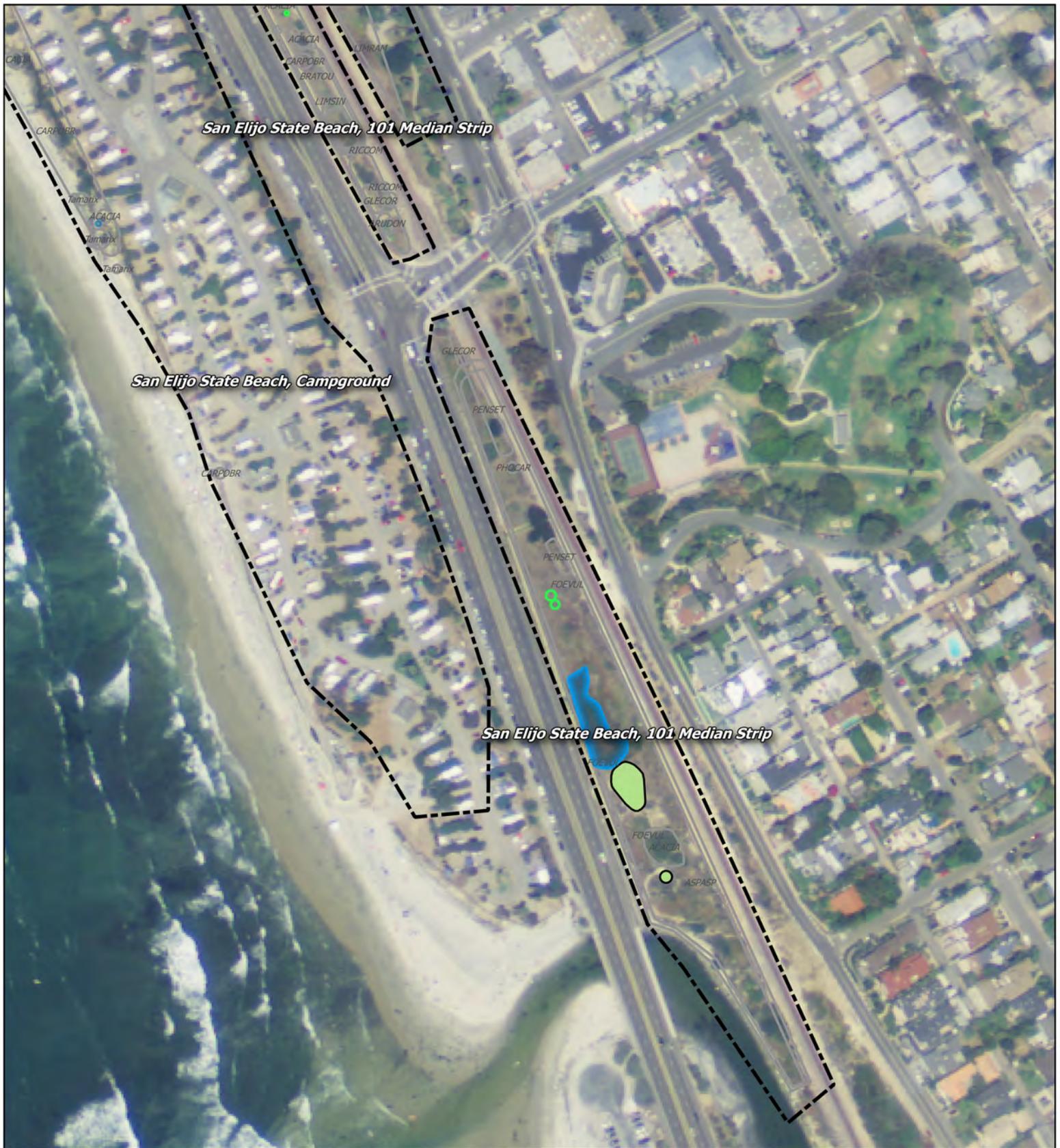
- |  |  |   |  |
|--|--|---|--|
| <ul style="list-style-type: none"> <li> Survey Sites</li> <li> Invasive Weeds</li> <li> MSP Plots</li> </ul> <p><b>Rare Plants</b></p> <ul style="list-style-type: none"> <li> California adolphia</li> <li> Cliff spurge</li> <li> Coast woolly-heads</li> <li> Del Mar Mesa sand aster</li> <li> Lewis' evening-primrose</li> <li> Nuttall's acmispon</li> </ul> | <ul style="list-style-type: none"> <li> California box-thorn</li> <li> Cliff spurge</li> <li> Coast woolly-heads</li> <li> Del Mar Mesa sand aster</li> <li> Lewis' evening-primrose</li> <li> Nuttall's acmispon</li> </ul> | <ul style="list-style-type: none"> <li> Orcutt's pincushion</li> <li> Red sand-verbena</li> <li> San Diego barrel cactus</li> <li> San Diego marsh-elder</li> <li> Sea dahlia</li> <li> Shaw's agave</li> </ul> | <ul style="list-style-type: none"> <li> South Coast saltscale</li> <li> Southwestern spiny rush</li> <li> Torrey Pine</li> <li> Woolly seablite</li> </ul> |
|--|--|---|--|



**NCDHRP Botanical Survey Report**

**Map 23**





**Legend**

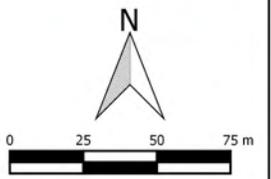
- ☐ Survey Sites
- ☐ Invasive Weeds
- ★ MSP Plots

**Rare Plants**

- ☐ California adolphia
- ☐ Nuttall's acmispon
- ☐ California box-thorn
- ☐ Cliff spurge
- ☐ Coast woolly-heads
- ☐ Del Mar Mesa sand aster
- ☐ Lewis' evening-primrose

- ☐ Orcutt's pincushion
- ☐ Red sand-verbena
- ☐ San Diego barrel cactus
- ☐ San Diego marsh-elder
- ☐ Sea dahlia
- ☐ Shaw's agave

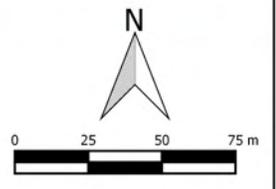
- ☐ South Coast saltscale
- ☐ Southwestern spiny rush
- ☐ Torrey Pine
- ☐ Woolly seablite





**Legend**

- |                     |                         |                         |                         |
|---------------------|-------------------------|-------------------------|-------------------------|
| Survey Sites        | California box-thorn    | Orcutt's pincushion     | South Coast saltscale   |
| Invasive Weeds      | Cliff spurge            | Red sand-verbena        | Southwestern spiny rush |
| MSP Plots           | Coast woolly-heads      | San Diego barrel cactus | Torrey Pine             |
| <b>Rare Plants</b>  | Del Mar Mesa sand aster | San Diego marsh-elder   | Woolly seablite         |
| California adolphia | Nuttall's acmispon      | Sea dahlia              | Shaw's agave            |



**NCDHRP Botanical Survey Report**

**Map 25**

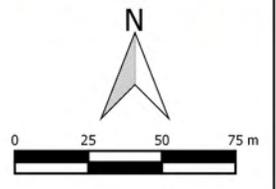






**Legend**

- |   |  |   |  |
|---|--|---|--|
| <ul style="list-style-type: none"> <li>☐ Survey Sites</li> <li>☐ Invasive Weeds</li> <li>★ MSP Plots</li> </ul> <p><b>Rare Plants</b></p> <ul style="list-style-type: none"> <li>☐ California adolphia</li> </ul> | <ul style="list-style-type: none"> <li>☐ California box-thorn</li> <li>☐ Cliff spurge</li> <li>☐ Coast woolly-heads</li> <li>☐ Del Mar Mesa sand aster</li> <li>☐ Lewis' evening-primrose</li> <li>☐ Nuttall's acmispon</li> </ul> | <ul style="list-style-type: none"> <li>☐ Orcutt's pincushion</li> <li>☐ Red sand-verbena</li> <li>☐ San Diego barrel cactus</li> <li>☐ San Diego marsh-elder</li> <li>☐ Sea dahlia</li> <li>☐ Shaw's agave</li> </ul> | <ul style="list-style-type: none"> <li>☐ South Coast saltscale</li> <li>☐ Southwestern spiny rush</li> <li>☐ Torrey Pine</li> <li>☐ Woolly seablite</li> </ul> |
|---|--|---|--|



**NCDHRP Botanical Survey Report**

**Map 27**





**Legend**

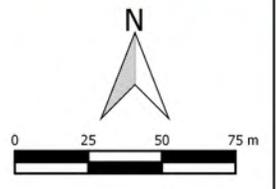
- Survey Sites
- Invasive Weeds
- MSP Plots

**Rare Plants**

- California adolphia
- Nuttall's acmispon
- California box-thorn
- Cliff spurge
- Coast woolly-heads
- Del Mar Mesa sand aster
- Lewis' evening-primrose

- Orcutt's pincushion
- Red sand-verbena
- San Diego barrel cactus
- San Diego marsh-elder
- Sea dahlia
- Shaw's agave

- South Coast saltscale
- Southwestern spiny rush
- Torrey Pine
- Woolly seablite



**NCDHRP Botanical Survey Report**

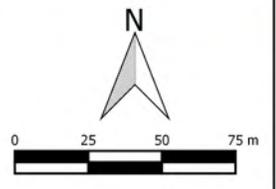
**Map 28**





**Legend**

- |  |   |   |  |
|--|---|---|--|
| <ul style="list-style-type: none"> <li> Survey Sites</li> <li> Invasive Weeds</li> <li> MSP Plots</li> </ul> | <ul style="list-style-type: none"> <li> California box-thorn</li> <li> Cliff spurge</li> <li> Coast woolly-heads</li> <li> Del Mar Mesa sand aster</li> <li> Lewis' evening-primrose</li> <li> California adolphia</li> </ul> | <ul style="list-style-type: none"> <li> Orcutt's pincushion</li> <li> Red sand-verbena</li> <li> San Diego barrel cactus</li> <li> San Diego marsh-elder</li> <li> Sea dahlia</li> <li> Shaw's agave</li> </ul> | <ul style="list-style-type: none"> <li> South Coast saltscale</li> <li> Southwestern spiny rush</li> <li> Torrey Pine</li> <li> Woolly seablite</li> </ul> |
|--|---|---|--|



**NCDHRP Botanical Survey Report**

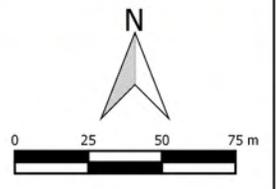
**Map 29**





**Legend**

- |                     |                         |                         |                         |
|---------------------|-------------------------|-------------------------|-------------------------|
| Survey Sites        | California box-thorn    | Orcutt's pincushion     | South Coast saltscale   |
| Invasive Weeds      | Cliff spurge            | Red sand-verbena        | Southwestern spiny rush |
| MSP Plots           | Coast woolly-heads      | San Diego barrel cactus | Torrey Pine             |
| <b>Rare Plants</b>  | Del Mar Mesa sand aster | San Diego marsh-elder   | Woolly seablite         |
| California adolphia | Lewis' evening-primrose | Sea dahlia              |                         |
| Nuttall's acmispon  | Shaw's agave            |                         |                         |



**NCDHRP Botanical Survey Report**

**Map 30**





**Legend**

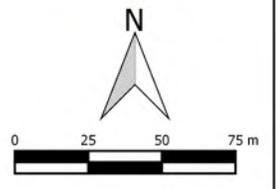
- ☐ Survey Sites
- ☐ Invasive Weeds
- ★ MSP Plots

**Rare Plants**

- ☐ California box-thorn
- ☐ Cliff spurge
- ☐ Coast woolly-heads
- ☐ Del Mar Mesa sand aster
- ☐ Lewis' evening-primrose
- ☐ California adolphia
- ☐ Nuttall's acmispon

- ☐ Orcutt's pincushion
- ☐ Red sand-verbena
- ☐ San Diego barrel cactus
- ☐ San Diego marsh-elder
- ☐ Sea dahlia
- ☐ Shaw's agave

- ☐ South Coast saltscale
- ☐ Southwestern spiny rush
- ☐ Torrey Pine
- ☐ Woolly seablite



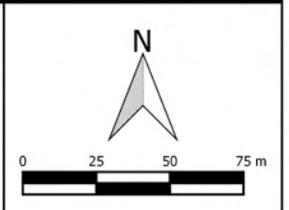
**NCDHRP Botanical Survey Report**

**Map 31**





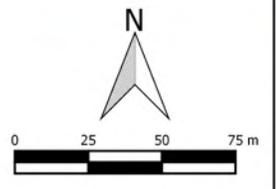
<b>Legend</b>			
<ul style="list-style-type: none"> <li><span style="border: 1px dashed black; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Survey Sites</li> <li><span style="border: 1px solid black; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Invasive Weeds</li> <li><span style="color: red; font-weight: bold; font-size: 1.2em;">★</span> MSP Plots</li> </ul>	<ul style="list-style-type: none"> <li><span style="border: 1px solid green; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> California box-thorn</li> <li><span style="border: 1px solid red; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Cliff spurge</li> <li><span style="border: 1px solid cyan; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Coast woolly-heads</li> <li><span style="border: 1px solid magenta; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Del Mar Mesa sand aster</li> <li><span style="border: 1px solid yellow; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Lewis' evening-primrose</li> <li><span style="border: 1px solid orange; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Nuttall's acmispon</li> </ul>	<ul style="list-style-type: none"> <li><span style="border: 1px solid brown; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Orcutt's pincushion</li> <li><span style="border: 1px solid darkred; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Red sand-verbena</li> <li><span style="border: 1px solid blue; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> San Diego barrel cactus</li> <li><span style="border: 1px solid grey; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> San Diego marsh-elder</li> <li><span style="border: 1px solid yellow; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Sea dahlia</li> <li><span style="border: 1px solid pink; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Shaw's agave</li> </ul>	<ul style="list-style-type: none"> <li><span style="background-color: blue; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> South Coast saltscale</li> <li><span style="background-color: cyan; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Southwestern spiny rush</li> <li><span style="background-color: green; border: 1px dashed green; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Torrey Pine</li> <li><span style="background-color: purple; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Woolly seablite</li> </ul>





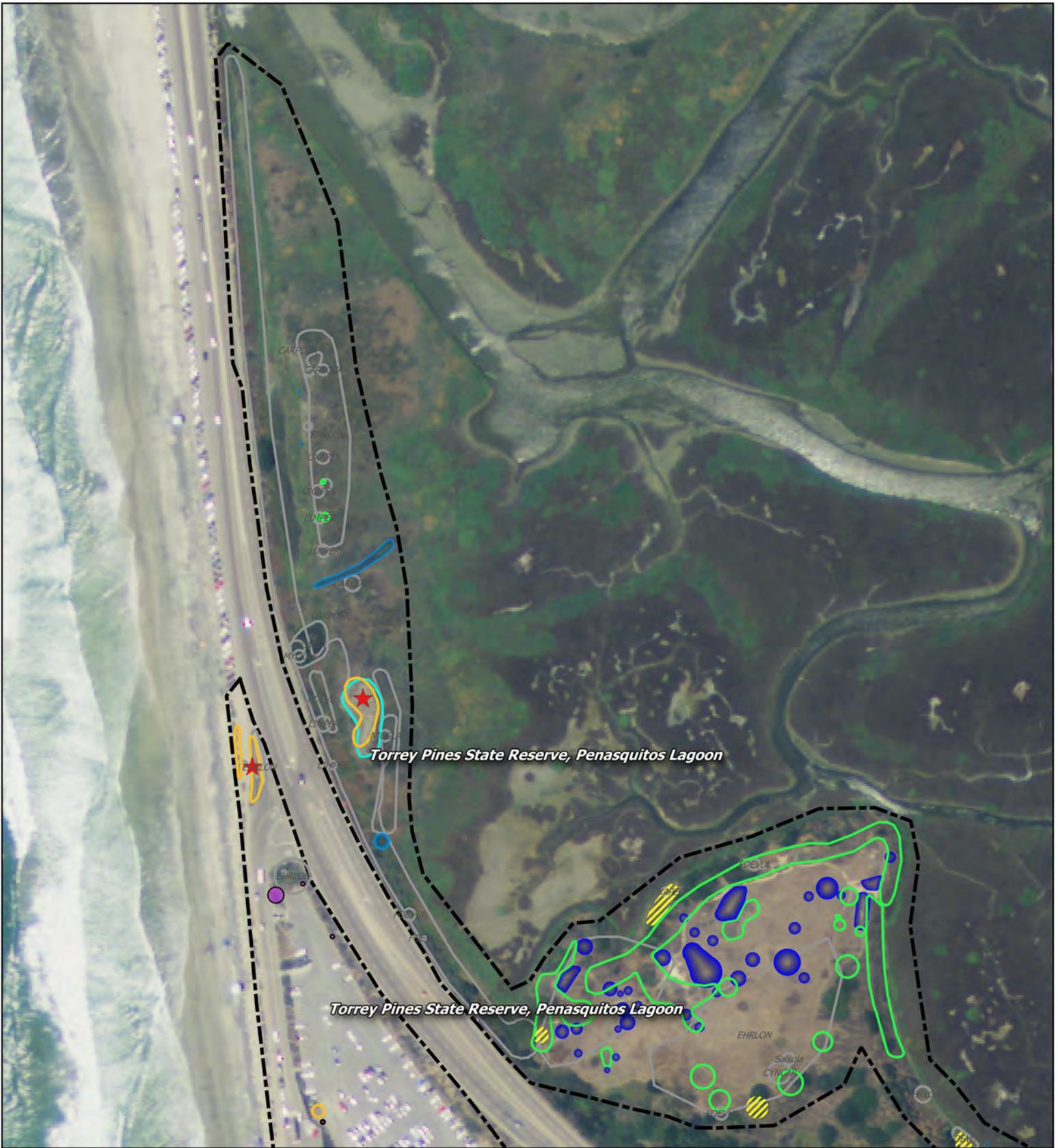
*Torrey Pines State Reserve, Penasquitos Lagoon*

<b>Legend</b>			
Survey Sites	California box-thorn	Orcutt's pincushion	South Coast saltscale
Invasive Weeds	Cliff spurge	Red sand-verbena	Southwestern spiny rush
MSP Plots	Coast woolly-heads	San Diego barrel cactus	Torrey Pine
<b>Rare Plants</b>	Del Mar Mesa sand aster	San Diego marsh-elder	Woolly seablite
California adolphia	Lewis' evening-primrose	Sea dahlia	
	Nuttall's acmispon	Shaw's agave	



**NCDHRP Botanical Survey Report**





**Legend**

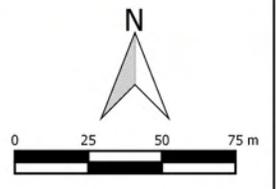
- ☐ Survey Sites
- ☐ Invasive Weeds
- ★ MSP Plots

**Rare Plants**

- ☐ California adolphia
- ☐ California box-thorn
- ☐ Cliff spurge
- ☐ Coast woolly-heads
- ☐ Del Mar Mesa sand aster
- ☐ Lewis' evening-primrose
- ☐ Nuttall's acmispon

- ☐ Orcutt's pincushion
- ☐ Red sand-verbena
- ☐ San Diego barrel cactus
- ☐ San Diego marsh-elder
- ☐ Sea dahlia
- ☐ Shaw's agave

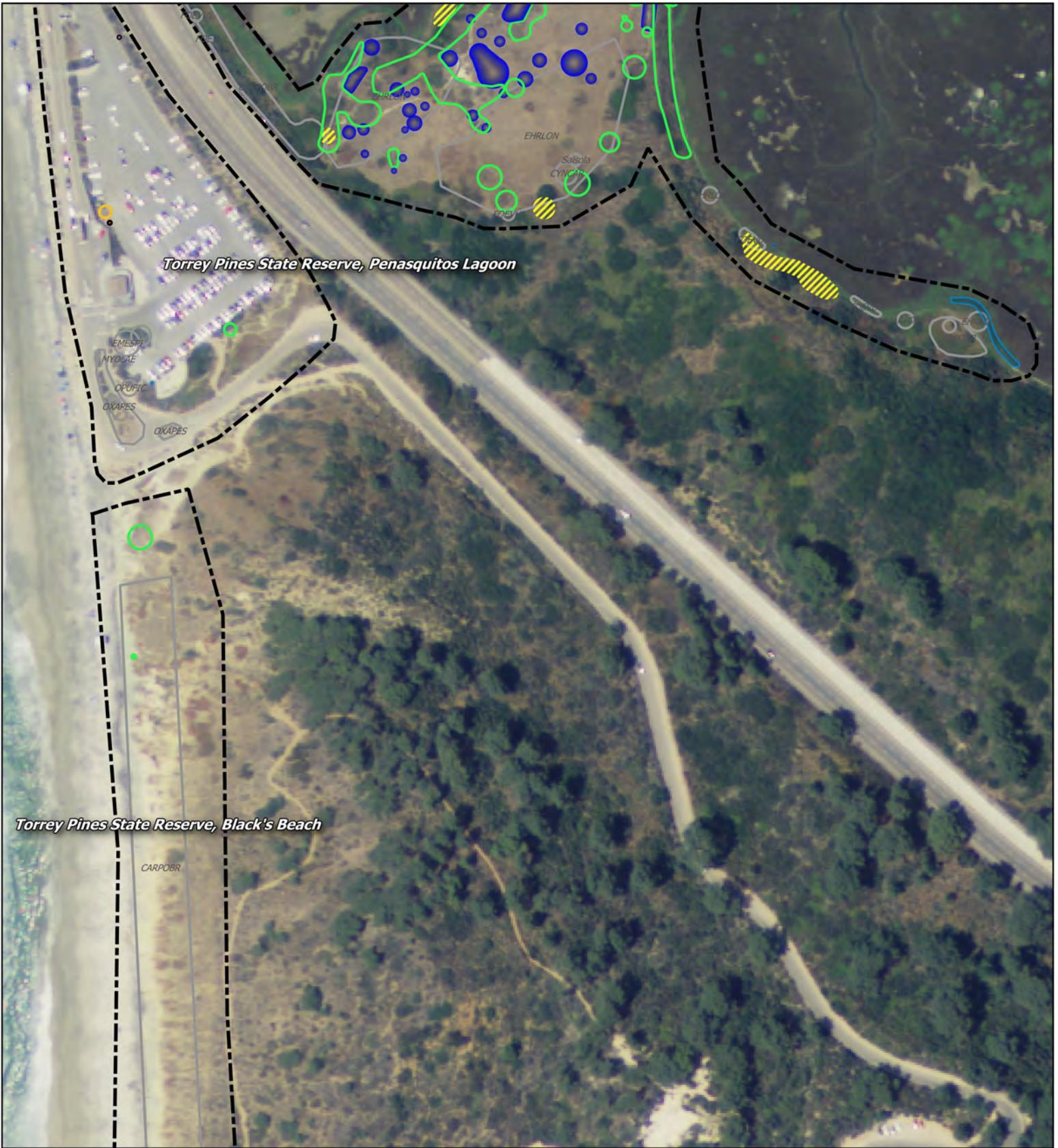
- ☐ South Coast saltscale
- ☐ Southwestern spiny rush
- ☐ Torrey Pine
- ☐ Woolly seablite



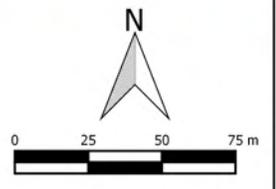
**NCDHRP Botanical Survey Report**

**Map 34**



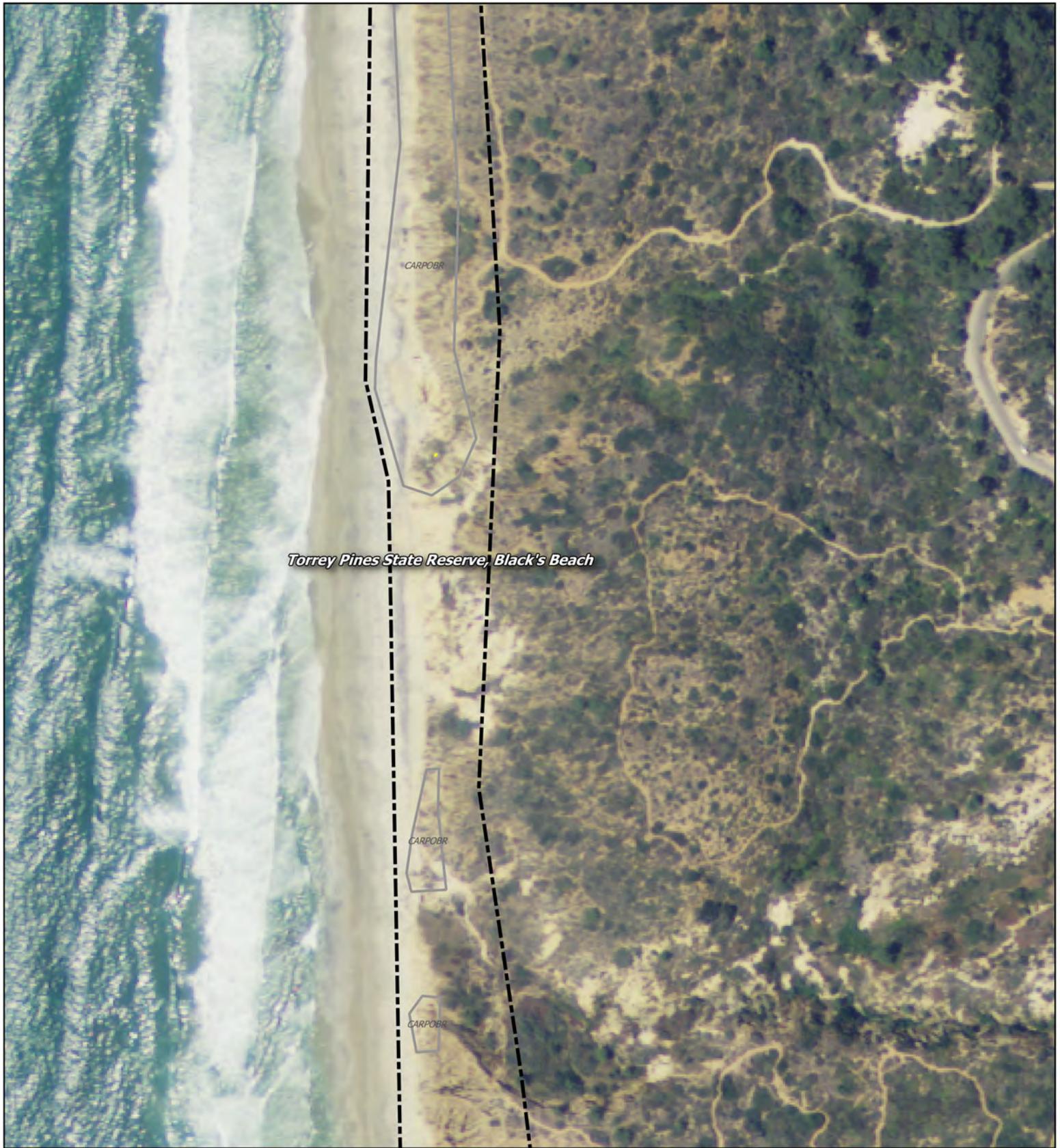


Legend			
Survey Sites	California box-thorn	Orcutt's pincushion	South Coast saltscale
Invasive Weeds	Cliff spurge	Red sand-verbena	Southwestern spiny rush
MSP Plots	Coast woolly-heads	San Diego barrel cactus	Torrey Pine
Rare Plants		San Diego marsh-elder	Woolly seablite
California adolphia	Nuttall's acmispon	Sea dahlia	
		Shaw's agave	



**NCDHRP Botanical Survey Report**

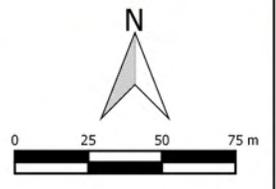




*Torrey Pines State Reserve, Black's Beach*

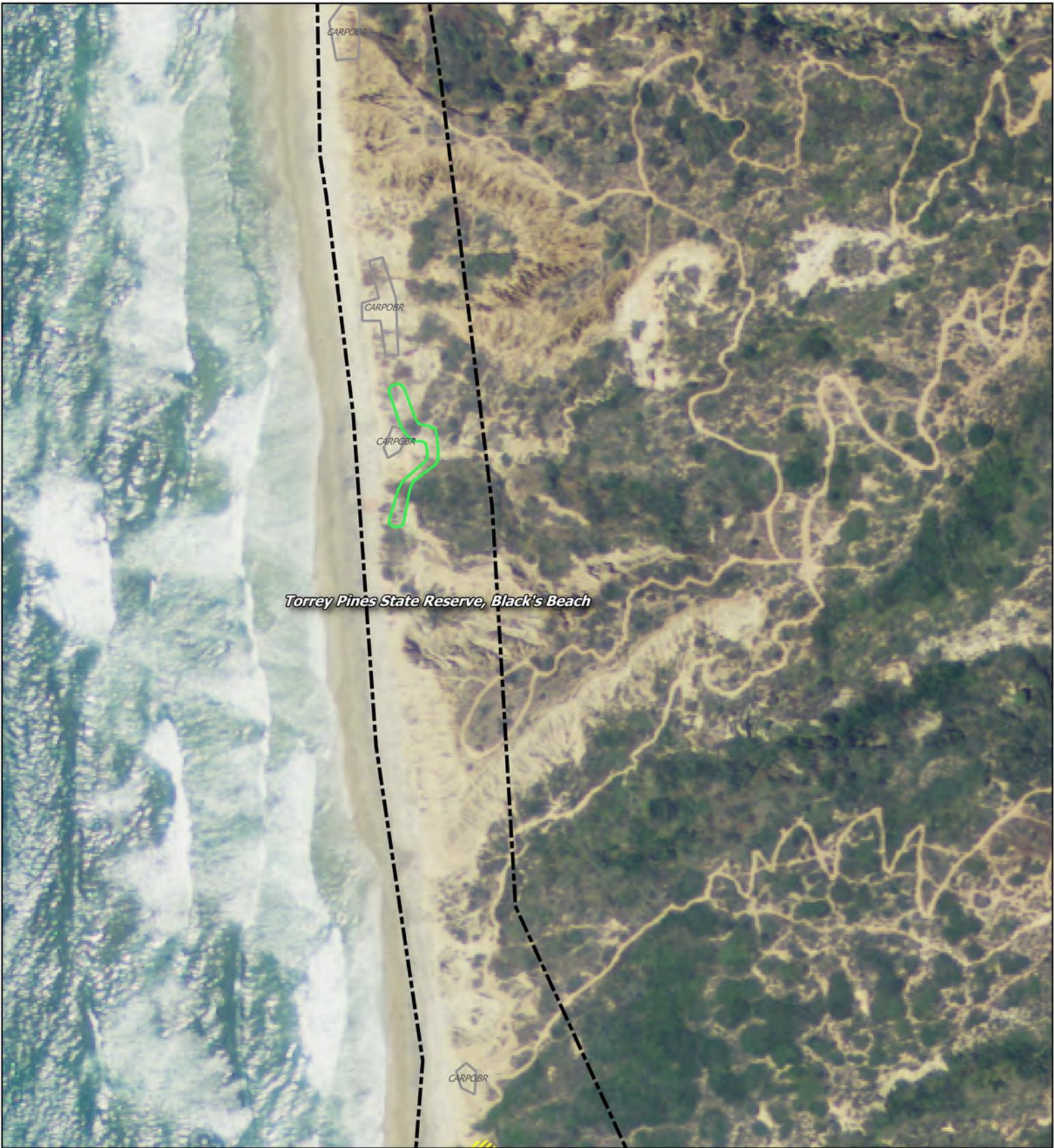
**Legend**

- |                     |                         |                         |                         |
|---------------------|-------------------------|-------------------------|-------------------------|
| Survey Sites        | California box-thorn    | Orcutt's pincushion     | South Coast saltscale   |
| Invasive Weeds      | Cliff spurge            | Red sand-verbena        | Southwestern spiny rush |
| MSP Plots           | Coast woolly-heads      | San Diego barrel cactus | Torrey Pine             |
| <b>Rare Plants</b>  | Del Mar Mesa sand aster | San Diego marsh-elder   | Woolly seablite         |
| California adolphia | Lewis' evening-primrose | Sea dahlia              |                         |
| Nuttall's acmispon  | Shaw's agave            |                         |                         |



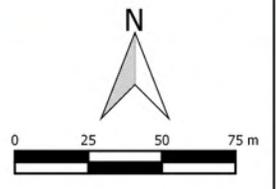
**NCDHRP Botanical Survey Report**





*Torrey Pines State Reserve, Black's Beach*

<b>Legend</b>			
Survey Sites	California box-thorn	Orcutt's pincushion	South Coast saltscale
Invasive Weeds	Cliff spurge	Red sand-verbena	Southwestern spiny rush
MSP Plots	Coast woolly-heads	San Diego barrel cactus	Torrey Pine
<b>Rare Plants</b>		San Diego marsh-elder	Woolly seablite
California adolphia	Nuttall's acmispon	Sea dahlia	
		Shaw's agave	



**NCDHRP Botanical Survey Report**





*Torrey Pines State Reserve, Black's Beach*

**Legend**

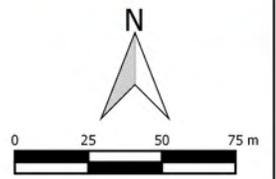
- ☐ Survey Sites
- ☐ Invasive Weeds
- ★ MSP Plots

**Rare Plants**

- ☐ California adolphia
- ☐ Cliff spurge
- ☐ Coast woolly-heads
- ☐ Del Mar Mesa sand aster
- ☐ Lewis' evening-primrose
- ☐ Nuttall's acmispon

- ☐ California box-thorn
- ☐ Red sand-verbena
- ☐ San Diego barrel cactus
- ☐ San Diego marsh-elder
- ☐ Sea dahlia
- ☐ Shaw's agave

- ☐ Orcutt's pincushion
- ☐ South Coast saltscale
- ☐ Southwestern spiny rush
- ☐ Torrey Pine
- ☐ Woolly seablite



**NCDHRP Botanical Survey Report**

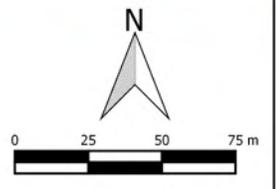
**Map 38**





**Legend**

- |   |  |   |  |
|---|--|---|--|
| <ul style="list-style-type: none"> <li>■ Survey Sites</li> <li>□ Invasive Weeds</li> <li>★ MSP Plots</li> </ul> <p><b>Rare Plants</b></p> <ul style="list-style-type: none"> <li>○ California adolphia</li> </ul> | <ul style="list-style-type: none"> <li>○ California box-thorn</li> <li>○ Cliff spurge</li> <li>○ Coast woolly-heads</li> <li>○ Del Mar Mesa sand aster</li> <li>○ Lewis' evening-primrose</li> <li>○ Nuttall's acmispon</li> </ul> | <ul style="list-style-type: none"> <li>○ Orcutt's pincushion</li> <li>○ Red sand-verbena</li> <li>○ San Diego barrel cactus</li> <li>○ San Diego marsh-elder</li> <li>○ Sea dahlia</li> <li>○ Shaw's agave</li> </ul> | <ul style="list-style-type: none"> <li>○ South Coast saltscale</li> <li>○ Southwestern spiny rush</li> <li>○ Torrey Pine</li> <li>○ Woolly seablite</li> </ul> |
|---|--|---|--|



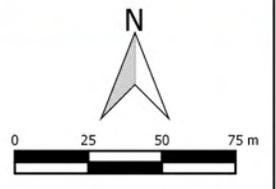
**NCDHRP Botanical Survey Report**





*Torrey Pines State Reserve, Black's Beach*

<b>Legend</b>			
□ Survey Sites	□ California box-thorn	□ Orcutt's pincushion	□ South Coast saltscale
□ Invasive Weeds	□ Cliff spurge	□ Red sand-verbena	□ Southwestern spiny rush
★ MSP Plots	□ Coast woolly-heads	□ San Diego barrel cactus	□ Torrey Pine
<b>Rare Plants</b>	□ Del Mar Mesa sand aster	□ San Diego marsh-elder	□ Woolly seablite
□ California adolphia	□ Lewis' evening-primrose	□ Sea dahlia	
□ Nuttall's acmispon	□ Shaw's agave		



**NCDHRP Botanical Survey Report**





*Torrey Pines State Reserve, Black's Beach*

**Legend**

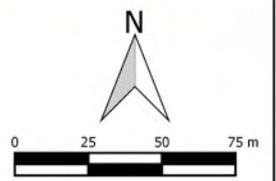
- ☐ Survey Sites
- ☐ Invasive Weeds
- ★ MSP Plots

**Rare Plants**

- ☐ California adolphia
- ☐ California box-thorn
- ☐ Cliff spurge
- ☐ Coast woolly-heads
- ☐ Del Mar Mesa sand aster
- ☐ Lewis' evening-primrose
- ☐ Nuttall's acmispon

- ☐ Orcutt's pincushion
- ☐ Red sand-verbena
- ☐ San Diego barrel cactus
- ☐ San Diego marsh-elder
- ☐ Sea dahlia
- ☐ Shaw's agave

- ☐ South Coast saltscale
- ☐ Southwestern spiny rush
- ☐ Torrey Pine
- ☐ Woolly seablite





## **Attachment B: Rancho Santa Ana Botanic Garden Documents**

# RANCHO SANTA ANA BOTANIC GARDEN

1500 North College Avenue, Claremont, CA 91711-3157 • Phone (909) 625-8767 • Fax (909) 626-7670  
[www.rsabg.org](http://www.rsabg.org)

12/4/15

David Varner  
San Elijo Conservancy  
777 Hwy 101  
Solana Beach, CA 92075

## **Re: Temporary five year seed collections of five coastal strand plant taxa on the San Elijo Lagoon Ecological Reserve**

Dear David,

The cleaning, testing and storage of five collections of coastal strand species from San Elijo Lagoon has been completed. These seeds are held as propagules for restoration and enhancement of dune vegetation at the San Elijo Lagoon. These seeds will be stored at Rancho Santa Ana Botanic Garden (RSABG) for up to five years from the date of receipt of this final report. Should seeds be required to be stored longer than 5 years, and additional charge of \$150 per year will be billed prior to distribution of seeds.

As we discussed, the collection of Nuttall's Acmispon (*Acmispon prostratus*) is being stored in maternal lines, with a backup sample sent to the USDA National Center for Genetic Resource Preservation. Maternal line collections are stored with seeds of each individual plant kept in separate packets. This storage technique is utilized for very rare taxa as it allows for the highest level of potential use of the collection. The remaining collections are stored in bulk, with the entirety of each collection stored at RSABG. These collections are collected from a large number of individuals, and provide excellent, genetically diverse source material for seed regeneration. RSABG is experienced in this process and would be excited to discuss future work to produce locally sourced seed for enhancement of the San Elijo Dunes.

A draft invoice in the amount of \$3,723.00 is included with this report. An official invoice will be sent by our accounting department within one week. A payment of \$1,934.72 has already been made for work conducted on this project in the previous fiscal year.

If you have any questions regarding the information in this report, please don't hesitate to contact me.

Sincerely,

Evan Meyer

## Taxon Information

*Abronia umbellata* var. *umbellata* (Nyctaginaceae)

Beach sand verbena

California Rare Plant Rank (CRPR): 1B.1 rare, threatened or endangered

*Acmispon prostratus* (Fabaceae)

Nuttall's Acmispon

CRPR: 1B.1 rare, threatened or endangered

*Chaenactis glabriuscula* var. *orcuttiana* (Asteraceae)

Orcutt's yellow pincushion

CRPR: 1B.1 rare, threatened or endangered

*Nemacaulis denudata* var. *denudata* (Polygonaceae)

Coast woolly heads

CRPR: 1B.2 rare, threatened or endangered

*Camissoniopsis cheiranthifolia* subsp. *suffruticosa* (Onagraceae)

Shrubby beach primrose

## Collecting

Seed collection occurred over four days: May 28<sup>th</sup>, 2015, June 9<sup>th</sup>, 2015, June 23<sup>rd</sup> and July 16<sup>th</sup>, 2015. All species, except *Acmispon prostratus*, were collected as bulk seed collections over the course of the four days. *Acmispon prostratus* was collected as a maternal line collection, meaning that seeds from each mother plant were collected and kept separate.

## Processing

The cleaning of each species included, but was not limited to the use of threshing over soil sieves, sorting based on density using a seed aspirator, and hand sorting. Non-viable seeds, along with chaff were removed from each seed lot during this process. An initial assessment of seed viability was conducted for all seed lots during the cleaning process and was based on seed dissection and presence of an embryo. The dissection of each species resulted in 60% -95% viability rating for the respective seed collections (Tables 1, 2, 3, 4, & 5).

## Packaging and Storage

To prepare the seeds for long term storage, the seed moisture content was reduced by allowing the seed to equilibrate at 12-15% relative humidity in an airtight drying chamber for a minimum of two weeks. Seed quantities of each accession were calculated based on the proportion of total weight to the weight of two hundred seeds which were counted by hand. *Abronia umbellata* var. *umbellata*, *Camissoniopsis cheiranthifolia* subsp. *suffruticosa*, *Chaenactis glabriuscula* var. *orcuttiana*, and *Nemacaulis denudata* var. *denudata* were stored as a five year Temporary Research and Recovery Collection. *Acmispon prostratus* was split into three seed lots; an active research collection housed at RSABG, a base long term collection housed at RSABG, and a backup collection sent to the National Center for Genetic Resource Preservation in Fort Collins, CO. Each collection was separated based on

accession, seed lot, and the categories described above and packaged into heavy duty foil plastic laminate heat sealed storage pouches, labeled, and placed into RSABG freezers at -23°C.

## Seed Collection Information

### *Abronia umbellata* var. *umbellata* Accession # 24162

United States: California: San Diego County: San Elijo Lagoon Ecological Reserve. Landowner: California Department of Fish and Game. GPS: N 33°0'23.076", W 117°16'39.936". Elevation: 10 feet. Collectors: Evan Meyer, Billy Sale, Andrew Chambers, Nick Regoli and David Varner. **May 28, 2015 & June 9, 2015** (Table 1).

Table 1. *Abronia umbellata* var. *umbellata* seeds stored in the RSABG seed house.

Collection Type	Lot #	Storage Type	Seed Quantity	Seed Viability	# Plants Sampled
Temporary	5445	Bulk	3,374	60%	100

### *Acmispon prostratus* Accession # 24216

United States: California: San Diego County: San Elijo Lagoon Ecological Reserve. Landowner: California Department of Fish and Game. GPS: N 33°0'15.732", W 117°16'40.043". Elevation: 4 feet. Collectors: Evan Meyer, Billy Sale, Andrew Chambers, and Nick Regoli. **June 9, 2015** (Table 2).

Table 2. *Acmispon prostratus* seeds stored in the RSABG seed house.

Collection Type	Lot #	Storage Type	Seed Quantity	Seed Viability	# Plants Sampled
Active	5446	Maternal Line	979	95%	50
Base	5446	Maternal Line	1976	95%	50
Backup	5446	Maternal Line	1947	95%	50

### *Camissoniopsis cheiranthifolia* subsp. *suffruticosa* Accession # 24159

United States: California: San Diego County: San Elijo Lagoon Ecological Reserve. Landowner: California Department of Fish and Game. GPS: N 33°0'23.076", W 117°16'39.936". Elevation: 10 feet. Collectors: Evan Meyer, Billy Sale, Andrew Chambers, Nick Regoli and David Varner. **May 28, 2015 & June 9, 2015** (Table 3).

Table 3. *Camissoniopsis cheiranthifolia* subsp. *suffruticosa* seeds stored in the RSABG seed house.

Collection Type	Lot #	Storage Type	Seed Quantity	Seed Viability	# Plants Sampled
Temporary	5444	Bulk	93,242	95%	140

### *Chaenactis glabriuscula* var. *orcuttiana* Accession # 24161

United States: California: San Diego County: San Elijo Lagoon Ecological Reserve. Landowner: California Department of Fish and Game. GPS: N 33°0'15.732", W 117°16'40.043". Elevation: 4 feet. Collectors: Evan Meyer, Billy Sale, Andrew Chambers, Nick Regoli and David Varner. **May 28, 2015 & June 9, 2015** (Table 4).

Table 4. *Chaenactis glabriuscula* var. *orcuttiana* seeds stored in the RSABG seed house.

Collection Type	Lot #	Storage Type	Seed Quantity	Seed Viability	# Plants Sampled
Temporary	5443	Bulk	4,385	95%	160

*Nemacaulis denudata* var. *denudata*  
Accession # 24217

United States: California: San Diego County: San Elijo Lagoon Ecological Reserve. Landowner: California Department of Fish and Game. GPS: N 33°0'23.076", W 117°16'39.936". Elevation: 10 feet. Collectors: Evan Meyer, Billy Sale, Andrew Chambers, and Nick Regoli. **June 9, 2015** (Table 5).

Table 5. *Nemacaulis denudata* var. *denudata* seeds stored in the RSABG seed house.

Collection Type	Lot #	Storage Type	Seed Quantity	Seed Viability	# Plants Sampled
Temporary	5442	Bulk	15,336	95%	50

## Germination Tests

Seeds were randomly selected from each accession and sown on a 0.5% agar solution on clear plastic examination plates. Prior to sowing, the *Abronia umbellata* var. *umbellata* and *Acmispon prostratus* seeds were administered a pretreatment whereby the *Abronia umbellata* var. *umbellata* seeds were excised from their fruit and the *Acmispon prostratus* seeds were soaked in boiling water (Table 9). Seeds from all species were soaked in a sterilizing bleach-tween solution for one minute to prevent mold contamination prior to being sown on agar. Following sowing, a pretreatment of cold-moist stratification and alternating warm-cold-warm stratification are currently being administered to *Nemacaulis denudata* var. *denudata* and *Abronia umbellata* var. *umbellata*, respectively. All species will eventually be placed in a germination chamber, maintained at 11 hours of light at 20°C and 13 hours of dark at 12°C. Seeds are being monitored once per week, with each new germination being scored during monitoring. Protrusion of the radicle to at least one half the length of the seed is considered positive germination. Information on germination testing of each species can be found in Table 9.

## Germination Test Data

Table 6. Germination tests of five species conducted at RSABG growth chamber facilities.

Species	Acc #	Lot #	Pretreatment	# tested	# germ.	% germ.
<i>Abronia umbellata</i> var. <i>umbellata</i>	24162	5445	Excised from fruit; Alternating warm-cold- warm stratification	16	3	19%
<i>Acmispon prostratus</i>	24216	5446	Soaked in boiling water	30	21	70%
<i>Camissoniopsis cheiranthifolia</i> subsp. <i>suffruticosa</i>	24159	5444	No treatment	50	28	56%
<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i>	24161	5443	No treatment	50	45	90%
<i>Nemacaulis denudata</i> var. <i>denudata</i>	24217	5442	Cold-moist stratification	50	35	70%

Germination rates ranged from 18% to 90%. These results do not necessarily reflect viability of each collection, as several of these species are known to be highly dormant. It is likely that the overall viability of the collections with low germination rates is significantly higher.

# Germination Test Images

Figure 1: *Acmispon prostratus* germination test



Figure 2: *Abronia umbellata* var. *umbellata* germination test



Figure 3: *Camissoniopsis cheiranthifolia* germination test

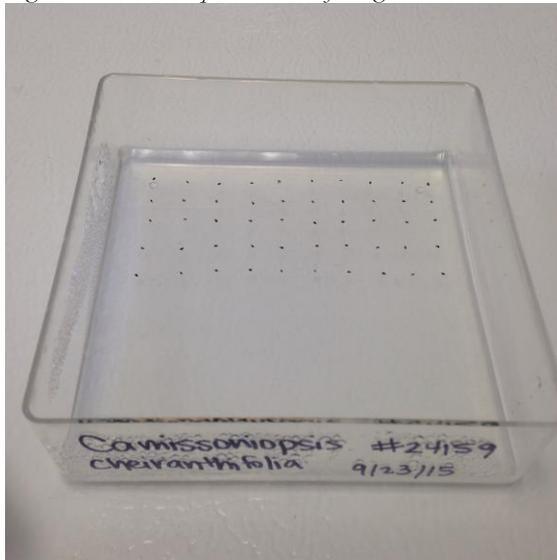


Figure 4: *Nemacaulis denudata* var. *denudata* germination test

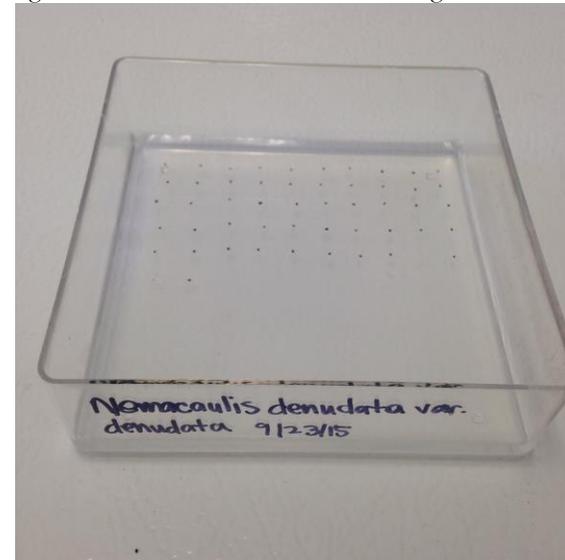
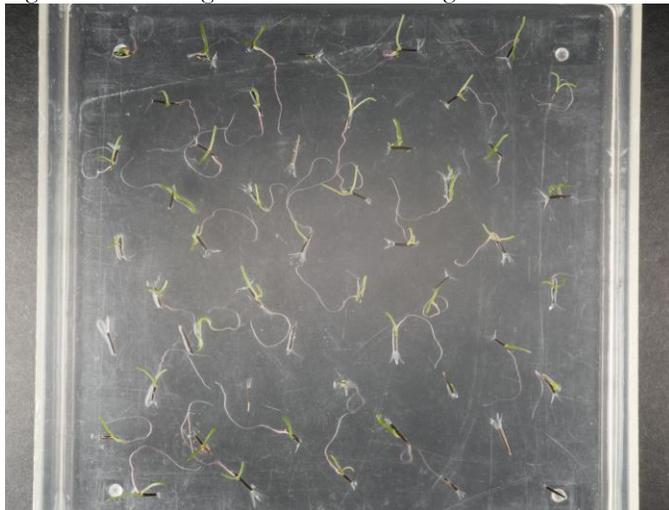


Figure 5: *Chaenactis glabriscula* var. *orcuttiana* germination test



## Seed Images

Figure 6: *Abronia umbellata* var. *umbellata* seeds



Figure 7: *Acmispon prostratus* seeds

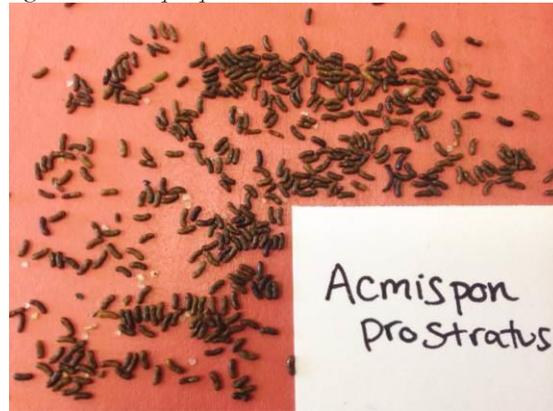


Figure 8: *Camissoniopsis cheiranthifolia* ssp. *suffruticosa* seeds



Figure 9: *Chaenactis glabriuscula* var. *orcuttiana* seeds

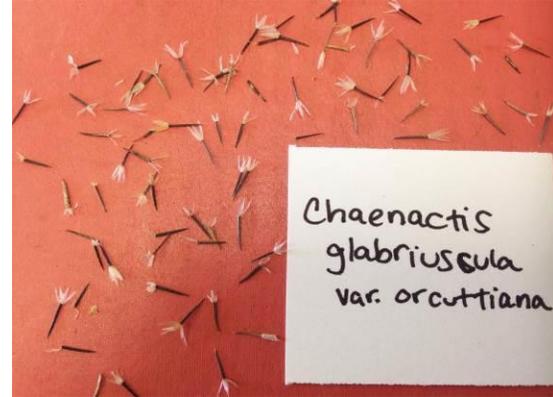
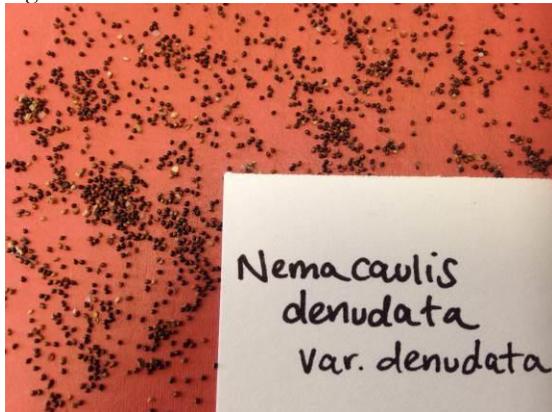


Figure 10: *Nema caulis* *denudata* var. *denudata* seeds



## Seed Images

Figure 11: *Abronia umbellata* var. *umbellata* packaged in a heat-sealed foil package

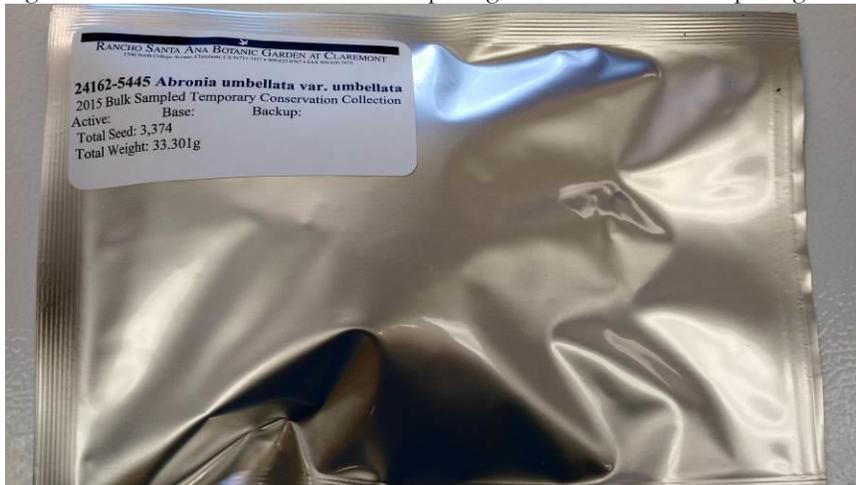


Figure 12: *Acmispon prostratus* packaged in a heat-sealed foil package



Figure 13: *Camissoniopsis cheiranthifolia* subsp. *suffruticosa* packaged in a heat-sealed foil package



Figure 14: *Chaenactis glabriuscula* var. *orcuttiana* packaged in a heat-sealed foil package

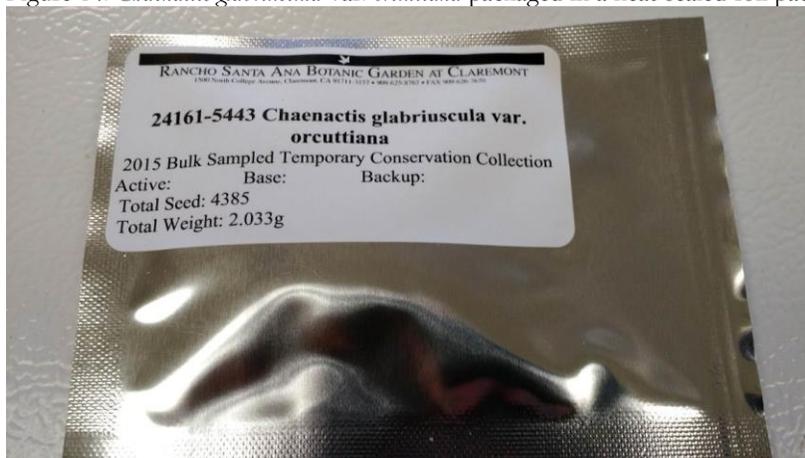


Figure 15: *Nemacaulis denudata* var. *denudata* packaged in a heat-sealed foil package



## Appendix A. Contract/Agreement

### Memorandum of Agreement Between Rancho Santa Ana Botanic Garden And San Elijo Lagoon Conservancy

This Memorandum of Agreement is hereby entered into by and between the Rancho Santa Ana Botanic Garden, hereinafter referred to as "RSABG", and San Elijo Lagoon Conservancy hereinafter referred to as the "SELC" (referred to collectively as the "Parties").

A. Purpose: The purpose of this agreement is to work cooperatively on projects outlined in the scope of work, following provisions and the hereby incorporated Financial Plan, attached as Exhibit A.

B. Effective Period: This contract shall be effective from February 24, 2016 and shall terminate on February 2, 2018.

C. Total Amount Authorized: Total cumulative charges to be billed against this contract shall not exceed \$5,879.60. The funds necessary for this project are described in the financial plan in Tables 1 & 2 (Exhibit A).

D. Agreements:

RSABG Shall:

- i. Withdraw seeds of *Abronia umbellata* var. *umbellata*, *Camissoniopsis cheiranthifolia* subsp. *suffruticosa*, *Chaenactis glabriuscula* var. *orcuttiana*, and *Nemacaulis denudata* var. *denudata* from temporary storage in RSABG freezers for propagation and seed bulking. 30
- ii. Propagate ~~25~~ *Abronia umbellata* var. *umbellata* into 3" x 9" treebands.
- iii. Propagate 8 *Acmispon prostratus* into 6" pots.
- iv. Propagate ~~20~~ *Camissoniopsis cheiranthifolia* subsp. *suffruticosa* into 3" x 9" treebands. 31
- v. Propagate, seed bulk, harvest and clean 50 *Abronia umbellata* var. *umbellata*.
- vi. Propagate, seed bulk, harvest and clean 7 *Acmispon prostratus* from previous RSABG germination test.
- vii. Propagate, seed bulk, harvest and clean 75 *Camissoniopsis cheiranthifolia* subsp. *suffruticosa*.
- viii. Propagate, seed bulk, harvest and clean 75 *Chaenactis glabriuscula* var. *orcuttiana*.
- ix. Propagate, seed bulk, harvest and clean 75 *Nemacaulis denudata* var. *denudata*.
- x. Notify cooperator following completion of each seed bulking for each species

Cooperator shall:

- i. Pay 25% of the total contract (\$1,368.50\*) 30 days following receipt of invoice. 31
- ii. Pick up all plants (~~25~~ *Abronia umbellata* var. *umbellata*, 8 *Acmispon prostrates*, and ~~20~~ *Camissoniopsis cheiranthifolia* subsp. *suffruticosa*) between November 1, 2016 – February 1, 2017\*\*.

Project Number  
Account Code  
Date

- iii. Pick up or have mailed at cooperators expense all seeds of *Abronia umbellata* var. *umbellate*, *Acmispon prostrates*, *Camissoniopsis cheiranthifolia* subsp. *suffruticosa*, *Chaenactis glabriuscula* var. *orcuttiana*, and *Nemacaulis denudata* var. *denudata* produced from seed bulking within three months of being notified.

\* Deposit calculated from ID 1-8 in Table 1 (check payable to Rancho Santa Ana Botanic Garden)

\*\* Pick-up after February 1, 2017 will incur late fees as described in Delivery and Maintenance fees

E. Payments and Reimbursement: Payment of a non-refundable deposit of 25% of the propagation charges (\$1,368.50) is required to initiate all terms of the contract. Following pick-up and/or delivery, an invoice will be provided to SELC for the balance owed. Delivery and maintenance fees will incur additional invoices, to be provided quarterly.

Each invoice should include cost incurred to date, not to exceed the amount authorized as shown in the financial plan. The contractor is approved to submit quarterly billings.

Each invoice will include, at a minimum:

1. Name, address, and telephone number
2. Agreement number
3. Invoice date
4. Performance dates of the work completed (start & end date)
5. Total invoice amount of the billing period
6. Invoice number, if applicable.

Invoices will be sent to: San Elijo Lagoon Conservancy  
P.O. Box 230634  
Encinitas, CA 92023-0634  
Attn: Chris Lewis [chris@sanelijo.org](mailto:chris@sanelijo.org)

Send a copy of the invoice to: Shirley Innecken [shirley@sanelijo.org](mailto:shirley@sanelijo.org)

F. Delivery and Maintenance Fees: Plant delivery is available for an additional \$240.00 fee per delivery, with at least two weeks advance notice.

Storage and maintenance fees will be incurred for all plants not picked up during the designated time period. Fees will begin February 2, 2017 for all plants that remain at RSABG following this date. Fees are assessed monthly at the rate of \$.20 per plant, per month. After one year of incurring storage fees, San Elijo Lagoon Conservancy relinquishes the right to the above plants and they will be incorporated into RSABG plant nursery stock. All 69 plants will be declared relinquished starting February 2, 2018.

Individuals listed below are authorized to act in their respective areas for matters related to this agreement.

G. Administration:

*California's Native Garden*

Project Number  
Account Code  
Date

**Principal RSABG Contacts:**

<b>RSABG Project Contact</b>	<b>RSABG Financial Contact</b>
Name: Billy Sale Address: Rancho Santa Ana Botanic Garden, 1500 N. College Ave. City, State, Zip: Claremont, CA 91711-3157 Telephone: 909-625-8767 FAX: 909-626-7670 Email: bsale@rsabg.org	Name: Kristine Crosby Address: Rancho Santa Ana Botanic Garden, 1500 N. College Ave. City, State, Zip: Claremont, CA 91711-3157 Telephone: : 909-625-8767 FAX: 909-626-7670 Email: kcrosby@rsabg.org

**Principal Cooperator Contacts:**

<b>San Elijo Lagoon Conservancy Project Contact</b>	<b>San Elijo Lagoon Conservancy Financial Contact</b>
Name: Joe DeWolf Address: P.O. Box 230634 City, State, Zip: Encinitas, CA 92023 Telephone: (760) 436-3944 x 709 FAX: (760) 944-9606 Email: joe@sanelijo.org	Name: Chris Lewis Address: P.O. Box 230634 City, State, Zip: Encinitas, CA 92023 Telephone: (760) 436-3944 x 710 FAX: (760) 944-9606 Email:

**H. Miscellaneous:**

**Amendment:** This Agreement may not be amended except by an instrument in writing signed by an authorized representative of each of the Parties.

**Authorization:** Each person executing this Agreement on behalf of a Party warrants and represents that he or she is authorized to execute the Agreement on behalf of such Party and that the Agreement shall be binding upon such Party.

**Termination of the agreement:** Either organization may terminate this MOA with 30 days written notification.

**Modifications:** Modifications within the scope of this agreement must be made by mutual consent of the parties, by the issuance of a written modification signed and dated by all properly authorized, signatory officials, prior to any changes being performed. Requests for the modification should be made in writing, at least 30 days prior to implementation of the requested change.

**Signature Warranty**

The undersigned represent and warrant that they are authorized to bind their principals to the terms of this agreement.

SELC and RSABG have executed this contract in duplicate originals, with one original being retained by each party.

Project Number  
Account Code  
Date

The acceptance of this contract (all pages) shall be returned to Rancho Santa Ana Botanic Garden at the following address:

Rancho Santa Ana Botanic Garden  
Attn: Naomi Fraga (Conservation Botanist)  
1500 North College Avenue  
Claremont, California 91711

**San Elijo Lagoon Conservancy**



Signature

2/23/2016

Date

W. Barry Lindgren

Printed Name

Associate Director

Title

for Doug Gibson Executive Director

**Rancho Santa Ana Botanic Garden**



Signature

7 Mar 2016

Date

Dr. Lucinda McDade

Printed Name

Executive Director

Title

Project Number  
 Account Code  
 Date

**Exhibit A.**

**Financial Plan:**

**Table 1. Base Charges for Contract**

ID	DESCRIPTION	Amt	Unit Price	Amount
1	Abronia umbellata var. umbellata	30	\$15.00	\$450.00
2	Acmispon prostratus	8	\$10.00	\$80.00
3	Camissoniopsis cheiranthifolia subsp. suffruticosa	31	\$10.00	\$310.00
4	Abronia umbellata var. umbellata	50	\$17.00	\$850.00
5	Camissoniopsis cheiranthifolia subsp. suffruticosa	75	\$12.00	\$900.00
6	Chaenactis glabriuscula var. orcuttiana	75	\$12.00	\$900.00
7	Nemacaulis denudata var. denudata	75	\$12.00	\$900.00
8	Acmispon prostratus	7	\$12.00	\$84.00
9	Harvest and processing of seed (for species in ID 4-7)	20	\$50.00	\$1000.00
			<b>Amount Owed</b>	<b>\$5474.00</b>

**Table 2. Possible Additional Charges**

DESCRIPTION	Amt	Unit Price	Amount
Delivery Fees	1	\$240.00	\$240.00
Late Fees (69 plants @ \$0.20/plant/month)	12	\$13.80	\$165.60
		<b>Amount Owed</b>	<b>\$405.60</b>

**Cumulative charges (Table 1 + Table 2): \$5879.60**

**Attachment C: Torrey Pines State Beach – “Black’s Beach”**  
**Draft Habitat Restoration Plan**

# Torrey Pines State Beach – “Black’s Beach” Draft Habitat Restoration Plan

**April 2016**

**Prepared for:**



**Prepared by:**





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## 1.0 Project Overview

### 1.1 Introduction

The San Elijo Lagoon Conservancy (SELC) has prepared this report as part of its North County Dunes Habitat Restoration Project, funded by the San Diego Association of Governments (SANDAG) Transnet Environmental Mitigation Program (EMP). The Torrey Pines State Beach – Black’s Beach Draft Habitat Restoration Plan (Project) was developed with the intent of restoring and enhancing coastal sand dune habitat along 1.2 miles of coastal strand at Torrey Pines State Beach. The following sections of this report present an overview of existing coastal dune resources in the Project site and provide a preliminary framework for coastal sand dune conservation, enhancement, and restoration.

### 1.2 Project Background and Development

SELC entered into Grant Agreement #5001768 with SANDAG under the Transnet EMP on July, 19 2013. Per the agreement, SELC was contracted to survey and conduct restoration activities at coastal sand dune habitat between northern Carlsbad and northern La Jolla. In addition, SELC agreed to develop three site-specific restoration plans for sites selected following a comprehensive ecological inventory.

In 2015, SELC contracted Kentner Botanical to conduct botanical surveys and a site inventory for the Project. Based on the results of Kentner Botanical’s surveys and site inventory, and in collaboration with California State Parks (CSP), the southern portion of Torrey Pines State Beach was selected as a preferred restoration project location. SELC staff met with Darren Smith, District Services Manager at CSP San Diego Coast District, to design a restoration plan that will restore and enhance local dune habitat at Torrey Pines State Beach while maintaining public access for recreational use.

### 1.3 Project Location

The Project is located on 1.2 miles of coastal strand within Torrey Pines State Beach (property of CSP). The Project begins on the coastal strand immediately south the “Flat Rock” area and extends to the northwest of the Torrey Pines Glider Port. The Project also encompasses an unofficial nude beach known colloquially as Black’s Beach (**Figure 1**).

### 1.4 Responsible Parties

SELC is the Project co-manager. CSP is the landowner and Project co-manager. Contact information is provided:

San Elijo Lagoon Conservancy  
Shirley Innecken, Lead Ecologist  
777 Hwy 101  
Solana Beach, CA 92011  
760-436-3944  
shirley@sanelijo.org

California State Parks  
Darren Smith, District Services Manager San Diego Coast District  
4477 Pacific Highway  
San Diego, CA 92110  
619-952-3895  
Darren.Smith@parks.ca.gov



**Figure 1. Vicinity Map**  
**Torrey Pines State Beach - Black's Beach Draft**  
**Habitat Restoration Plan**



Imagery Date: 2012  
 Map Date: APR 2016  
 Data Source: SELC & SANGIS

## 2.0 Project Description and Objectives

### 2.1 Existing Conditions

The Project site consists of 35 acres of Torrey Pines State Beach, a highly-visited public beach. It offers many forms of recreation including swimming, sunbathing, beachcombing, fishing, walking, jogging, and photography. Public access to the site includes the beach to the north, the Beach Trail from Torrey Pines State Natural Reserve to the east, and the unofficial trail from the Torrey Pines Glider Port to the south. There are unofficial foot trails throughout the site, particularly in the Black's Beach area. Several soil units have been recorded at Torrey Pines State Beach, most falling into the textural class range of loamy sand to sandy loam. The Project site provides habitat for sand-dwelling invertebrates, shorebirds, and gulls. No rare or endangered wildlife species are known to nest on this site (State of California 1984).

Vegetation on the Project site is limited to back-beach coastal sand dune vegetation as well as some coastal bluff vegetation (State of California 1984). The beach is above the high tide level and supports native coastal sand dune habitat with a large dispersed population of red sand-verbena (*Abronia maritima*) and patches of woolly seablite (*Suaeda taxifolia*). California box-thorn (*Lycium californicum*) is scattered on the bluffs along the entire length of the Project site. The most significant area for special-status plant species is an elevated terrace near the base of the bluff on the northern part of the Project site. This area supports large populations of California box-thorn and cliff spurge (*Euphorbia misera*), as well as a patch of San Diego barrel cactus (*Ferocactus viridescens*). Another special-status plant found on the Project site is sea dahlia (*Leptosyne maritima*) (Kentner 2015).

**Table 1. Special-status Species in Project Site**

Scientific Name	Common Name	USFWS Status	CDFW Status	CNPS Rank <sup>1</sup>
<i>Abronia maritima</i>	red sand-verbena	None	None	4.2
<i>Euphorbia misera</i>	cliff spurge	None	None	2B.2
<i>Ferocactus viridescens</i>	San Diego barrel cactus	None	None	2B.1
<i>Leptosyne maritima</i>	sea dahlia	None	None	2B.2
<i>Lycium californicum</i>	California box-thorn	None	None	4.2
<i>Suaeda taxifolia</i>	woolly seablite	None	None	4.2

In addition to native coastal sand dune plant species, there are also many exotic species on the Project site. The dominant non-native plant species scattered throughout the Project site is Hottentot fig

<sup>1</sup> CNPS Rare Plant Ranks:

- 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
- 2A: Plants Presumed Extirpated in California, But Common Elsewhere
- 2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
- 3: Plants About Which More Information is Needed – A Review List
- 4: Plants of Limited Distribution – A Watch List

CNPS Threat Ranks:

- 0.1-Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
- 0.2-Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
- 0.3-Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known) (CNPS 2016)

(*Carpobrotus edulis*) (**Figure 2**). Other invasive species include Acacia (*Acacia* sp.), giant reed (*Arundo donax*), pampas grass (*Cortaderia selloana*), Bermuda grass (*Cynodon dactylon*), spiny emex (*Emex spinosa*), fennel (*Foeniculum vulgare*), Canary Island sea lavender (*Limonium perezii*), Ngaio tree (*Myoporum laetum*), tree tobacco (*Nicotiana glauca*), Bermuda-buttercup (*Oxalis pes-caprae*), castor bean (*Ricinus communis*), Russian thistle (*Salsola* sp.), and saltcedar (*Tamarix* sp.) (Kentner 2015).

## 2.2 Historical Conditions

Very little documented history exists for the Project site. Torrey Pines State Natural Reserve, which is located to the east of Torrey Pines State Beach, was home to the Kumeyaay Indians prior to the European discovery of the Americas. In the mid-1820s, the Mexican government confirmed the area—now referred to as Torrey Pines State Beach—as the northwest boundary of the “Pueblo Lands of San Diego”. This area was renamed the “Public Lands of San Diego” during the early American period. In 1924, the construction of Coast Highway 101 to the east of Torrey Pines State Beach likely had the most significant impact on use of the area because the highway made access to the beach readily available to urban dwellers. It was not until 1952 that the City of San Diego (City) turned over Torrey Pines Beach to the California State Park System, giving the beach the unique historical reputation among southern California coastal areas of having always been in public ownership (State of California 1984).

## 2.3 Regional and Local Considerations for Restoration Planning

The Project site is located within California State Parks as well as the San Diego Multiple Species Conservation Program (MSCP), City of San Diego Subarea Plan. The MSCP Subarea Plan incorporated CSP general plans for Torrey Pines State Beach and Reserve as general management directives for the area (City of San Diego 1997). Accordingly, SELC staff collaborated with CSP staff in the design of this draft habitat restoration plan in order to maintain consistency with the general plan objectives for Torrey Pines State Beach.

## 2.4 Ecological Benefits of Restoration

Coastal sand dunes provide valuable and unique habitat that supports special-status plant and bird species. Despite their intrinsic value, coastal sand dunes have been heavily impacted by coastal development and very little remain in Southern California. The Project would reintroduce native dune habitat, which would fill a much needed ecological void for the northern County of San Diego as much of San Diego’s coastal sand dune habitat was lost in the late 1800’s/early 1900’s due to transportation construction (SCC. 2016).

The Project aims to ecologically enhance coastal sand dune habitat at Torrey Pines State Beach by planting and seeding local native dune plant species, removing dominant invasive species, and reducing human disturbance in the site through fencing and signage. The restoration of native coastal sand dune habitat will likely benefit special-status plant species as well as enhance habitat that will attract more roosting birds, including the western snowy plover (*Charadrius alexandrinus nivosus*) and other migratory birds.

## 2.5 Project Goals and Objectives

The goal of the Project is to enhance vegetation conditions such that native coastal sand dune habitat is enhanced and restored at the Project site, without undue disturbance of existing resources. The following objectives are designed to accomplish the aforementioned goal:

- Eradicate dominant, non-native Hottentot fig from the Project site;
- Apply locally-sourced native plant propagules and seed to the Project site; and
- Install minimal fencing and signage that discourages human access to high-quality habitat zones.




**Figure 2. Site Map**  
 Torrey Pines State Beach - Black's Beach Draft  
 Habitat Restoration Plan

Imagery Date: 2012  
 Map Date: APR 2016  
 Data Source: SELC,  
 SANGIS, CSP, Kentner

### **3.0 Constraints to Restoration**

The two constraints to restoration work in the Project site are human disturbance and limited vehicular access. The Project site is located in a highly-visited public beach with open access to all parts of the shoreline, dunes, bluffs and canyons. It will be challenging to keep the public out of fenced off areas. Crew access to the Project site is an issue because of its location on the shoreline. This site is subject to high-tides that may prevent vehicular access along the beach from north to south at the “Flat Rock” area, located on the northern end of the Project site. Alternatively, the Project site may be accessed through a City access road. However, access permission will have to be pursued through the City.

### **4.0 Project Implementation**

The Project will be implemented over the course of two yearlong phases, with an additional 1-3 years of maintenance and monitoring. Once funding has been obtained for this Project, a final restoration plan will be written.

#### **4.1 Site Preparation and Seed Propagation (Year 1)**

The first step of the Project will be to install minimal fencing around areas of the Project site that are dominated by Hottentot fig. Fencing will consist of fiberglass poles installed six feet apart and connected by biodegradable string. Signage reading “Habitat Restoration in Progress” will be installed at various points along the fencing. The fencing is designed to discourage the public from entering areas to which they formally had unrestricted access. After the fencing has been in place for two weeks, invasive plant species treatment will begin by spot-treating with and U.S. Environmental Protection Agency-approved, species-appropriate herbicide. The primary focus of treatment will be to eliminate all of the Hottentot fig in the Project site. Treated Hottentot fig will be left in place to desiccate the first year; the necessity of re-treatments will be determined during periodic monitoring visits.

In addition to site preparation, native coastal sand dune plant species seed will be collected from the Project site and the dune area within the nearby Los Peñasquitos Lagoon. Some of the collected seed will be bulked at a local nursery, with limited grow-out. The remainder of the seed will be broadcast directly onto the Project site during the spring of Year 2. Native plant seed to be collected includes beach sand verbena (*Abronia umbellata*), beach evening-primrose (*Camissoniopsis cheiranthifolia*), and coast wooly-heads (*Nemacaulus denudata*).

#### **4.2 Biomass Removal, Plant Installation and Seeding (Year 2)**

The second phase of the Project will include Hottentot fig biomass removal. The residual biomass from the originally treated Hottentot fig on the bluffs will remain in place in order to avoid bluff destabilization. The native coastal sand dune plants that were propagated and bulked during Year 1 will be installed and broadcast, respectively. Container plant installation will include only perennial species that will be used to stabilize the local substrate and shelter seeds. Plant installation and seeding will coincide with the late winter/early spring rainy season. If there is a lack of seasonal rain, water trucks will be used to irrigate the site pending resolution of vehicular site access.

### **5.0 Maintenance, Monitoring, and Reporting**

#### **5.1 Maintenance (Years 2-5)**

Continual treatment of non-native invasive plant species and re-seeding of native species will occur on an as-needed basis determined during periodic monitoring visits. The site may require manual irrigation if there is a lack of adequate seasonal rain to support seed germination and container plant survival. In the case

of manual irrigation, seeds and container plants will be water during a plant establish period of no more than 120 days. In addition, fencing and signage will be repaired as needed.

## 5.2 Monitoring (Years 2-5)

### 5.2.1 Reference Site Evaluation

A reference site will be selected in close proximity (if possible) with similar slope, aspect, topography, soils, and which contain the desired vegetation type of the restoration site. A reference site evaluation is performed over a 10 meter radius and the complete floral composition of the site is recorded as well as total vascular percent cover, percent cover native vegetation, percent cover non-native vegetation, native tree cover, native shrub cover, native herb cover, etc. This includes species-specific percent cover estimates for all species.

Methods for collecting the vegetation data will follow the industry standard developed by the California Native Plant Society (CNPS) and will be based on the CNPS Relevé Protocol (CNPS 2007). Species lists generated from the reference site evaluations will inform the planting palette for the restoration sites. When feasible, reference site data should be collected when the vegetation type is in peak bloom.

### 5.2.2 Restoration Site Evaluation – Percent Composition

The Project site will be evaluated using the same site evaluation protocol described above for the reference sites. This includes recording the complete floral composition for the site as well as cover categories including total vascular percent cover, total native percent cover, total non-native percent cover, total native tree percent cover, total native shrub percent cover (for bluff areas), etc. Quality control is achieved by calibrating the staff frequently. A polygon of the active revegetation area is recorded using Global Positioning System (GPS) technologies. For most sites <1/3 acre, the entire site is included in the evaluation. For sites greater than 1/3 acre, a representative area is selected and a 10 meter radius is sampled. This restoration site evaluation is performed prior to the restoration activities, and annually thereafter for a period of 3 to 5 years after planting has concluded. Data collected during this evaluation also quantify native species richness pre- and post-restoration. When feasible, the restoration site evaluation should be performed during peak bloom in order to capture the site at its most productive season. An effort should be made to perform the restoration site evaluation during or close to the same month each year for consistency.

### 5.2.3 Seeding Success

Active restoration sites that will be seeded are also monitored annually for seeding success (**Attachment A: Seeding Success Protocol**). Seeds are sown early winter to take full advantage of winter rains. Monitoring is quadrat-based and performed in the early spring to record the site in full bloom.

### 5.2.4 Survivorship and Stand Density

Survivorship counts are performed on an annual basis approximately 1 year after the plants are installed. Survivorship counts will continue for 3 to 5 years after the initial planting and will include the previous years' plantings. For example, survivorship counts performed during year 3 will include the plants installed during years one and two combined. In this way, survival of installed plants is tracked for longer than just the first year of installation. The total number of live plants per species documented alive over the total number of that species installed since the start of plant installation, equals the percent survivorship of that species. Stand density can then be calculated by summing the total stem count for the entire site and then dividing it by the unit of land area of your choosing (i.e. plants per acre).

### 5.2.5 Photo Monitoring

Strategic photo monitoring points are chosen and recorded. Photos are taken at the same bearing and camera angle. Baseline photos are taken prior to restoration activities and annually thereafter until the goals of the site have been met. When feasible, photo monitoring should coincide with the annual restoration site evaluation, and be conducted during peak bloom of the floristic community.

## 5.3 Analysis and Adaptive Management

### 5.3.1 Restoration Site Evaluation —Percent Composition

Percent composition data collected during the restoration site evaluation are used to track which species are most successful in a specific restoration site. Percent cover values show the progress of the site and allow the evaluator to determine a trajectory and hypothesize how long the site will take to achieve the cover estimates of the reference site. If the percent cover of native species is lower than the expected for the time since the initial planting, then succession plants are added to increase the cover of the site.

### 5.3.2 Seeding Success

Results from seeding success analysis help determine if various seeding techniques have been successful. Several methods, i.e. direct seeding and use of seed balls, are performed and evaluated in the same season using a randomized design. Then results are analyzed to infer if one method is more successful than the other.

### 5.3.3 Survivorship and Stand Density

Survivorship results are recorded in order to inform site-specific adaptive management techniques. Adaptive management decisions could include, for example, altering the species planting palette for succession plantings based on poor survivorship of one species compared to another. Recording survivorship data and applying adaptive management techniques on a site-specific basis increases enhancement efficiency and probability of success. Low stand density values indicate the site would benefit from succession plantings or additional seeding.

## 5.4 Reporting

Monitoring results will be reported in annual progress reports and a final report. Monitoring results will include % cover reduction of the target invasive species. The total native and total non-native cover, stand density per acre, current percent cover native vegetation relative to the reference site, and species richness relative to the reference site will be reported. Photo monitoring results will also be included. Progress toward meeting goals will and any adaptive management implemented as a result of the monitoring efforts will be discussed. Success criteria will be analyzed on an annual basis to determine a trajectory for the site, and to evaluate whether the site is on track to meet the performance standards.

## **6.0 Measures to Minimize Impacts to Sensitive Biological Resources**

Several special-status coastal sand dune plant species are known to occur within the Project site and surrounding area. Prior to project initiation, a compliance training will be held to discuss project avoidance and minimization measures; all project participants will attend the compliance training. Restoration activities oversight will be conducted by SELC or CSP staff familiar with dune restoration and the associated special-status species. Avoidance and minimization measures will be presented in the final restoration plan, and will include all required permit conditions and best management practices.

## 7.0 Measures to Minimize Impacts to Cultural Resources

Cultural resource review per CEQA is required (from the earliest planning stages to construction completion) to avoid impacting cultural resources (both historic and prehistoric) adversely. Dependent upon the results of CEQA analysis, Native American monitors may be required.

## 8.0 Permitting

Since no potential for significant impact to the environment is anticipated, CSP expects the Project to be categorically exempt from CEQA. Fence installation may require Coastal Commission permitting and SELC and CSP will work to obtain a Coastal Development Permit. In order to access the Project site for restoration activities, a Right-of-Entry permit will need to be obtained from CSP for work trucks to drive on the beach. Additionally, an access permit from the City of San Diego will be pursued so that trucks may use the City's access road near Black's Beach.

## 9.0 Itemized Costs

Table 2. Itemized Costs\*

Item No.	Work Item	Cost	Percent
1	Biomass Removal	\$10,000	11.8%
2	Project Mgmt.	\$8,980	10.6%
3	Planting/Seeding	\$8,590	10.1%
4	Arch Monitoring	\$7,500	8.9%
5	Irrigation	\$6,900	8.2%
6	Fencing	\$6,310	7.5%
7	Vegetation Monitoring	\$6,050	7.1%
8	In-kind Permitting (CSP)	\$6,000	7.1%
9	Reporting	\$5,380	6.4%
10	Invasive Species Control	\$5,000	5.9%
11	Re-treatment	\$5,000	5.9%
12	Signage	\$3,680	4.3%
13	Site Maintenance	\$2,650	3.1%
14	Right of Entry Permits	\$2,250	2.7%
15	Travel	\$350	0.4%
<b>TOTAL:</b>		<b>\$84,640</b>	<b>100.0%</b>

**Notes:**

ROE requirements placed by the City of San Diego could increase costs of access to site.

\*Itemized costs for 2 years. 5 years of funding for maintenance and monitoring is preferred.

## 10.0 Project Schedule

Table 3. Project Schedule

Task	Date
Site Preparation and Seed Propagation	Year 1
Biomass Removal, Plant Installation and Seeding	Year 2
Maintenance	Years 2-5
Monitoring	Years 2-5

## References Cited

- California Native Plant Society. *California Native Plant Society Relevé Protocol (online edition, Revised 8/23/2007)*. Sacramento, CA: California Native Plant Society, 2007. Website <http://www.cnps.org/cnps/vegetation/protocol.php> [accessed 14 April 2016].
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- City of San Diego. *Multiple Species Conservation Program: City of San Diego MSCP Subarea Plan*. San Diego, CA: City of San Diego, Community and Economic Development Dept., 1997. Print.
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## **Attachment A: Seeding Success Protocol**



## **Seeding Success Evaluation Protocol**

**Seedling Survivorship Monitoring:** Set up and perform monitoring at restoration sites to assess success of seeding activities

1. Randomly place quadrat within planted area (avoid placing quadrat over out planting)
2. Stake opposite corners
3. Secure pre labeled metal tag tightly on one of the stakes
4. Take Picture (call leader)
  - a. Orient picture so metal tag is in lower left corner
  - b. Place piece of paper with site name in lower right corner
5. Map Quadrats (call leader)
6. Survey
  - a. Count number of individual seedlings present (only concerned with species in seed mix)
  - b. Non-native cover estimate

Tools needed:

- Quadrats
- Data sheets
- Percent cover diagrams
- Clipboards
- Pens
- Wood stakes
- Metal tags
- Mallet

**Attachment D: Cardiff State Beach Living Shoreline  
Draft Habitat Restoration Plan**

# Cardiff State Beach Living Shoreline Draft Habitat Restoration Plan

April 2016

Prepared for:



Prepared by:





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## Executive Summary

The City of Encinitas (City), in partnership with the San Elijo Lagoon Conservancy (SELC), the California State Coastal Conservancy (SCC), and California State Parks (CSP), proposes to create a dune system on the seaward side of Highway 101 (HWY 101) on Cardiff State Beach. The highway has been damaged and flooded on numerous occasions in the past as a result of extreme wave events and high tides. Increased static water levels associated with projected sea-level rise (SLR) will result in increased frequency and severity of flooding and damage to the highway. Creating a dune system will serve as a natural sea level rise (SLR) adaptation approach to protecting a vulnerable segment of the roadway while providing habitat for sand dune-dependent plant and wildlife species.

Coastal dune systems have been found to provide multiple benefits by providing coastal habitat and storm damage reduction during extreme events. The Cardiff State Beach Living Shoreline Project (Project) proposes to beneficially re-use export materials generated from the adjacent San Elijo Lagoon Restoration Project (SELRP), or another opportunistic source for the dune construction. The SELRP is proposed to begin in fall 2016 and continue through 2019. Construction of the SELRP is estimated to yield approximately one million cubic yards (CY) of export material.

The Project site spans 2,900 linear feet (approximately 0.5 mile) of shoreline, from the Chart House Restaurant to the north, to just before the South Cardiff State Beach Parking Lot to the south (**Figure 1 and Figure 2**). Moffatt & Nichol (M&N) and SELC prepared a feasibility study to evaluate viable dune restoration alternatives for the site. Concurrently, SELC is under a grant agreement with the San Diego Association of Governments (SANDAG) to prepare three restoration plans for select dune sites located between northern Carlsbad and northern La Jolla. SANDAG awarded Transnet Environmental Mitigation Program funds to extend the range and increase the population size of dune-dependent species including California least tern (*Sternula antillarum browni*), western snowy plover (*Charadrius alexandrinus nivosus*), and Nuttall's acmispom (*Acmispon prostratus*).

The Project site was selected as suitable for habitat restoration based on an inventory of potential sites conducted by SELC as a component of the SANDAG program. The Cardiff Beach Living Shoreline Project Final Feasibility Study (M&N and SELC 2016) identified three Project alternatives. This plan provides a preliminary framework for beach dune restoration based on the preferred alternative—Alternative 3— as discussed in the final feasibility study.




**Figure 1. Vicinity Map**  
 Cardiff State Beach Living Shoreline Draft Habitat Restoration Plan

0 400 800 1,600 Feet

Imagery Date: 2012  
 Map Date: APR 2016  
 Data Source: SELC & SANGIS



Figure 2. Site Map  
 Cardiff State Beach Living Shoreline Draft Habitat  
 Restoration Plan



Imagery Date: 2012  
 Map Date: APR 2016  
 Data Source: SELC & SANGIS

## 1.0 Overview/Introduction

### 1.1 Project Background

Highway 101 (HWY 101) was the original California highway system established in 1926. HWY 101 is an essential coastal north-south route that links Camp Pendleton to San Diego and is considered a critical highway for the Department of Defense. HWY 101 handles approximately 20,000 vehicle trips per day, allowing public access to the City's many beaches and coastal resources (SCC 2016).

The section of HWY 101 that runs parallel to Cardiff State Beach has been damaged and ocean-flooded on numerous occasions as a result of extreme wave events, coastal erosion and high tides. Since the 1990's, HWY 101 closed at least 40 times during extreme storms and caused major damage to this area resulting in limited access and emergency repairs. The current El Niño has also caused wave overtopping along HWY 101 which required emergency actions by the City and the Coastal Commission to prevent flooding.

HWY 101 is currently "protected" from flooding by a non-engineered revetment, beach nourishment projects, and a natural cobble berm. For beach nourishment, two projects have taken place, one in 2001 and another in 2012, which placed a total of 190,000 CY at this beach. To date, the beach nourishment projects have resulted in a general trend of increasing beach widths. While the current El Niño has caused minor flooding to date, the beach widths have stayed relatively consistent due to the bathymetry of the shoreline and sand movement from the beaches to the north. Although beach nourishment has provided a short-term solution, protective infrastructure is needed now. If the proposed Project is not funded, the City will likely build up the current un-engineered rock revetment to protect Hwy 101 from flooding—a strategy that only provides that single benefit.

The SCC-funded Phase I of the Project included a 30% conceptual design, dune plant seed collection and bulking, and a feasibility study to analyze the efficacy of using dune habitats as natural flood protection infrastructure. It also included an extensive numerical modeling effort to analyze the benefits and longevity of the proposed dune system against various, site-specific, extreme wave and water-level conditions.

Overall, modeling results suggested that HWY 101 is vulnerable, in its existing condition, to undermining and flooding for wave events greater than a 43-year return period. The proposed Project was found to protect HWY 101 from undermining and flooding during a 100-year event under existing, extreme water levels. The Project was also found to offer a similar level of protection to Hwy 101 under a lesser, but still extreme wave event (43-year wave), under a 2050 high sea-level rise condition. The dune would not be eroded in this scenario. The proposed dune system would be, however, overwhelmed by year 2100, and frequent flooding and undermining of HWY 101 would be expected should no other actions be taken. Thus, the dune system alone is not considered an effective adaptation measure beyond the year 2050, although every effort was made to ensure that this Project lifetime is conservative.

This Project has already been successful in that it has shifted the coastal planning and management climate in northern San Diego to consider ecologically-based approaches for flood protection. The SCC views this Project as an important step in supporting cities like Encinitas who are willing to test "green" infrastructure and explore other long-term solutions. For instance, the modeling results from the feasibility study demonstrated that by 2010 this segment of HWY 101 will be in danger, even with implementation of the Project. This data has forced the City to begin exploring even longer nature-based solutions such as managed retreat, which allows an area that was not previously exposed to flooding by the sea to become flooded by removing coastal protection. The Project is a necessary first step to move

in this direction. According to the SCC, Cardiff State Beach is the ideal location to test dune restoration as a natural, flood-protection infrastructure because it is vulnerable now, has local jurisdictional support, has access to a sustainable sand source in perpetuity, and access to a regional science advisory committee (SCC 2016).

## 1.2 Project Location

The Project site is located in the City of Encinitas, California and spans 2,900 linear feet (about 0.5 mile) of shoreline, from the Chart House Restaurant to the north to just before the South Cardiff State Beach Parking Lot to the south (**Figure 1 and Figure 2**). The Project site straddles the Swami's State Marine Conservation Area (SMCA) and the San Elijo Lagoon SMCA, both managed by the California Department of Fish and Wildlife (CDFW). It is comprised of Southern Fordunes and Beach vegetation communities (Oberbauer 2008).

## 1.3 Project Development

In Phase 1 of the Project, the City contracted with a consultant team to analyze the feasibility of dune restoration concepts along the Project site. A total of four Stakeholder Workgroup meetings were conducted during concept development in order to collaborate on constraints and opportunities and to build consensus around an alternative. Workgroup meetings were attended by members of the SCC, California Coastal Commission (CCC), CSP, SELC, Scripps Institute of Oceanography (SIO), CDFW, SANDAG, U.S. Army Corps of Engineers (USACE), and the Surfrider Foundation. Three alternatives were considered during design. Based on the results of a site-specific numerical modeling effort and in coordination the Stakeholder Workgroup, the Project Team selected Alternative 3. This alternative would:

- Reconfigure/repair the existing rip rap into an engineered revetment form;
- Reconfigure existing cobble into a dune core;
- Create a sand dune feature to be planted/seeded with native habitat; and
- Create pedestrian improvements along HWY 101. The Preferred Alternative would meet established Project goals and objectives in the short-term by reducing the vulnerability of HWY 101 to undermining and flooding, create dune habitat, and beneficially reuse export sand from the SELRP (M&N and SELC 2016).

•  
Meanwhile, SELC has been under a grant agreement with the SANDAG to prepare three restoration plans for select dune sites located between northern Carlsbad and northern La Jolla. The Project site was selected as suitable for habitat restoration based on an inventory of potential sites conducted by SELC as a component of the SANDAG program. The feasibility study, prepared by M&N and SELC, has provided preliminary framework for beach dune restoration at the Project site.

## 1.4 Responsible Parties

CSP is the landowner and Project co-manager. The City is also Project co-manager. San Elijo Lagoon Conservancy is an adjacent landowner and a constituent of the Project team. Contact information is provided:

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California State Parks  
4477 Pacific Highway  
San Diego, CA 92110

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## 2.0 Project Description and Objectives

### 2.1 Existing Conditions

The Project site consists of a low-lying, cobble and sand barrier spit northwest of the San Elijo Lagoon. The beach is backed by a natural cobble berm and rip rap. The beach has been nourished twice recently (2001 and 2012) as part of the Regional Beach Sand Project, as administered by SANDAG. These nourishment projects, in combination with a relatively benign wave climate, have resulted in a wide, sandy beach at this location. As a result of continual nourishment, the cobble berm and a portion of the rock riprap are currently buried by sand. Beach conditions during the 1998 El Niño as compared to present day is shown in **Photographs 1-2**.



**Photographs 1-2. Project Site Conditions (Left - Eroded Conditions during the 1998 El Niño. Right – Existing Conditions (9/2015).**

The current average beach width is approximately 100 feet from the back beach to the mean high water line. The back beach (at the toe of the existing riprap) is at an average elevation of +12 feet (NAVD88).

The crown elevation for HWY 101 along the Project site varies from +15.5 to +18 feet NAVD88 from north to south.

Development in the vicinity of the Project includes the Chart House restaurant to the north and South and the Cardiff State Beach parking lot to the south. Public vehicle parking extends parallel to HWY 101 beginning at the Chart House and extending south parallel to approximately 1,000-feet of the Project site.

The beach is owned and managed by CSP. CSP patrols the beach with vehicles and utilizes one vehicular beach access point located within the north end of the Project site (**Figure 2**). This access point will be accommodated in the Project design (CDPR 2016).

## 2.2 Historical Conditions

HWY 101 was originally constructed by Caltrans in 1912 and was later realigned in 1926 to its present day location. HWY 101 and Interstate 5 (I-5) are the only two north to south arterials in this area of San Diego County. Thus, HWY 101 is critical to regional transportation, emergency evacuation, and homeland security. HWY 101 is currently owned and maintained by the City and supports approximately 20,000 average daily trips (ADT) (M&N and SELC 2016).

The highway has been damaged and flooded in the past when large wave events coincide with high tides. Such events occurred in late January and February of the 1983 El Niño. These events resulted in extensive beach erosion, flooding and undermining of the highway, and projectile cobble that damaged windows along restaurant row. The rip rap in place along the beach was found to be ineffective in protecting the buildings and ½ ton of boulders were thrown onto the highway by the waves (Kuhn and Shephard 1985). Larger rip rap was placed in front these buildings following this event.

The January and February 1998 El Niño storms also resulted in major damage to this section of shoreline. HWY 101 was temporarily closed or resulted in limited access more than 20 times during this season due to flooding or undermining. A March 2010 storm also resulted in limited access along HWY 101 due to flooding and undermining in one section that prompted emergency repairs.

Two beach nourishment projects have taken place at the Project site recently, which resulted in importation of a total of 190,000 CY. Additionally, the site has been identified as a receiving beach for two programs that aim to offset sediment losses in the region. These programs are the Coastal Regional Sediment Management Plan for the San Diego region and the City's Opportunistic Beach Fill Program. The beach nourishment events and programs were taken into account during Project design (M&N and SELC 2016).

## 2.3 Regional and Local Considerations for Restoration Planning

The proposed Project is consistent with or supported by the following plans:

- City plans including the:
  - Local Coastal Plan,
  - Climate Action Plan (2010),
  - Natural Resource Management Plan (1986), and the
  - Hazard Mitigation Plan (2012).
- SANDAG Regional Plans including:
  - Shoreline Preservation Strategy (1993),

- Climate Action Strategy (2010),
- North Coast Corridor Transportation and Resource Enhancement Program and Highway Public Works Plan (2010), and the
- Coastal Regional Sediment Management Plan (2009).
- Statewide SLR Adaptation plans including the Climate Adaptation Strategy (2009).

Agencies and public institutions that support the Project include:

- SELC: The Project will protect the San Elijo Lagoon from coastal overwash in the existing and future condition and will provide a low-cost disposal option for materials generated during the construction of the restoration project. SELC also encourages the use of sustainable, ecologically-based adaptation approaches.
- California Department of Parks and Recreation (CDPR): The Project will benefit park users, residents, and natural resources by improving the sustainability of recreational activities at Cardiff and San Elijo State Beaches, providing coastal dune restoration opportunities, and improving the sustainability of coastal infrastructure (Highway 101, utility infrastructure, coastal businesses, and the San Elijo State Park Campground). The placed sand will serve to increase beach area, and improve function and aesthetics by raising the back beach elevation and covering existing rip rap revetment along HWY 101.
- SANDAG: The Project is consistent with SANDAG's regional initiative to restore dune habitats (Weldon 2015).

## 2.4 Ecological Benefits of Restoration

The Project will ecologically enhance the Project site by amending the existing substrate with sand, adding seeds of locally collected native dune plant species, and reducing human disturbance through trail designation, fencing, signage, and education. Special-status plant and avian species associated with coastal dune habitat will benefit from the Project. Special-status plants that could benefit include coast woolly heads (*Nemacaulis denudata* var. *denudata*) and Nuttall's acmispon, which are both identified as California Rare Plant Rank (CRPR) 1B by the California Native Plant Society (CNPS).

Plants with a CRPR of 1B are rare throughout their range with the majority of them endemic to California. Most of the plants that are ranked 1B have declined significantly over the last century. Out-planting seeds of these species and removing invasive exotic plant species and human disturbance will potentially increase the distribution and abundance of these rare plant species. The establishment of a native dune plant community could make the habitat more attractive for roosting birds, including the California least tern, western snowy plover, and other migratory birds.

The establishment of a robust native vegetation community will help prevent future invasion by aggressive, non-native plants that exploit disturbed and transitional conditions. On-going invasive vegetation control will be exercised, but the effort to do so will decrease with time once cover and diversity values of native vegetation are attained.

The ultimate ecological benefit of any restoration project is to strengthen the relationship of living things to their environments. Success for this Project will include strengthened relationships between native species and the coastal strand environment that exists at the site, as well as the relationship of the human visitors to the site. The Project will have impacts to the human community beyond the immediate site as it will build public appreciation for coastal strand resources by educating visitors about native plants and animals and the techniques used to restore their habitat.

## 2.5 Project Goals and Objectives

The Project's goal is to reintroduce coastal sand dune habitat by enhancing substrate and vegetation conditions such that native dune habitat is established at the site, with minimal disturbance to existing resources. The objectives of the Project are to:

- Create approximately 1.5 acres of sand dune that are heterogeneous in structure (i.e. incorporate cobble & sand) with 10% or less absolute cover of woody perennial species, less than 5% absolute cover of non-native plant species, and native herbaceous species richness of four and achieving 10-30% native herbaceous cover, in proportion to reference site (to be selected) conditions for a given year; and
- Create sand dune that will persist dynamically for approximately 50 years. Future maintenance may be required in the way of additional beach nourishment and active planting; and
- Provide an environmentally sensitive and beneficial reuse option for compatible dredge materials generated from the SELRP (CDPR 2016).

## 3.0 Constraints to Restoration

Unauthorized human disturbances such as driving, biking, and walking across sensitive areas within the Project site would prevent realization of restoration goals. Lack of weed, fence, and trail management beyond the scope of this proposal may threaten to undermine restoration efforts; therefore, ongoing funding will be required to ensure future success.

## 4.0 Project Implementation

### 4.1 Site Preparation

Site preparation will consist of sand dune creation using approximately 30,000 CY of imported sand. The sand dune will cover reconfigured riprap and will occupy a width of 15-20 feet (starting from the edge of pavement at HWY 101). The crest of the sand dune will range from 4 feet above the crown elevation of HWY 101 along the northern end to 2 feet above the crown elevation in the middle and southern areas.

### 4.2 Public Outreach & Education

The Project team took a collaborative approach to project development, involving public and regulatory agencies in quarterly concept development meetings at the City in 2015, including one public stakeholder meeting. Participating entities included the SCC, SANDAG, Surfrider Foundation, USFWS, SIO, and USACE. After construction, SELC will be utilizing its established volunteer base and existing educational programs working with elementary schools in Encinitas and Escondido to educate and engage the public in the invasive control and monitoring efforts. As part of SELC's 5th grade curriculum, students learn about watershed resources, from inland to coastal communities. The program includes a beach clean up to demonstrate how everyone can make a difference in protecting our coastal communities. This education program will be funded by the Ocean Protection Council (OPC) (grant submitted).

With support from the OPC, SELC will expand its school program to include an introduction to sensitive dune habitats to 150 students annually. SELC will also provide opportunities for these same students to return with their families on a quarterly basis to directly engage in dune restoration activities on the weekend. Over a three year period, nearly 1,000 community members will learn about and engage directly in dune restoration. This program complements the SELC's education program that not only teaches about our natural environment, but provides direct experiences to take actions to protect it (SCC 2016).

### 4.3 Trail Designation

Six to eight beach access points will be constructed across the dune system to provide public access to the beach while protecting created habitat areas. Access points will be concentrated along the northern portion of the Project site where street-side parking currently exists. The vehicular beach access point in the vicinity of the Las Olas signaled intersection will be retained for State Parks usage (Ocean 2016).

### 4.4 Fencing & Signage

The dune will be protected from recreationist incursion with fencing and 8-10 signs indicating the restoration boundary. Fencing will consist of fiberglass poles installed six feet apart and connected by twine. For educational purposes, beyond the proposed outreach program (see Section 3.2 Public Outreach and Education), two interpretative signs will be placed at the northern and southern ends of the Project site (SCC 2016).

### 4.5 Plant Selection, Acquisition and Installation

The sand dune will be seeded with a native plant palette, as provided in Table 1. The dune will not be seeded until the soils have been adequately leached of salt. Irrigation is not proposed; instead natural rainfall will leach the sand that will eventually establish plantings. Seed will be broadcasted at a rate of approximately 20 lbs/acre in the late fall or early winter of 2017 and manually tilled using hand rakes or comparable equipment to gently move seeds into the topsoil. To provide sand stabilization, techniques such as mechanical straw crimping, straw-wattles, temporary overhead irrigation, hydro-seeding, silt-fencing, and/or vegetative windbreaks composed of grown-out native perennial “nurse” species will be considered.

From 2013 to 2015, SELC and Ranch Santa Ana Botanic Garden (RSABG) collected a subset of the native dune species palette from the west basin dune strand in San Elijo Lagoon Ecological Reserve (SELER) including: Nuttall’s acmispon, beach sand verbena (*Abronia umbellata* var. *umbellata*), and Orcutt’s yellow pincushion (*Chaenactis glabriuscula* var. *orcuttiana*). The seeds were sent to RSABG for cleaning, testing, and storage. The remaining plant seed will be collected in summer of 2016 including: coast woolly heads, beach sun cup (*Camissoniopsis cheiranthifolia* subsp. *suffruticosa*), beach bur-sage (*Ambrosia chamissonis*), beach morning-glory (*Calystegia soldanella*), and red sand verbena (*Abronia maritima*) (SCC 2016).

**Table 1: Proposed Planting Palette**

Common Name	Scientific Name	Form
beach sun cup	<i>Camissoniopsis cheiranthifolia</i> subsp. <i>suffruticosa</i>	subshrub
Nuttall's acmispon	<i>Acmispon prostratus</i>	annual herb
beach sand verbena	<i>Abronia umbellata</i>	annual herb
Orcutt’s pincushion	<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i>	annual herb
coast woolly heads	<i>Nemacaulis denudata</i> var. <i>denudata</i>	annual herb
beach bur-sage	<i>Ambrosia chamissonis</i>	perennial herb
beach morning-glory	<i>Calystegia soldanella</i>	perennial herb
red sand verbena	<i>Abronia maritima</i>	perennial herb

## 5.0 Measures to Minimize Impacts to Sensitive Biological Resources

Special-status species with the potential to occur within the Project site include the federally and state endangered California least tern and the federally threatened western snowy plover (CDFW 2016). Nesting by these special-status species has not been documented within the Project site. Designated

critical habitat for these species is not located within the Project site. However, the site could potentially support future nesting of special status species. Therefore, areas within and adjacent to the Project site shall be surveyed for special status species by a qualified biologist prior to Project initiation.

No proposed or designated critical habitat for federally-listed species exists within the Project site. No special-status plant species were observed at the site during a rare plant survey conducted in 2015 (Kentner 2015). Two special-status plants, Nuttall's acmispson and coast wooly heads, occur in small numbers just south of the Project at Seaside Terrace. These plants are both identified as CRPR 1B by CNPS.

The following mitigation measures will reduce potential impacts to below a level of significance:

- Prior to substrate deposition or manipulation, areas within and adjacent to the Project site shall be surveyed for special status species by a biologist. Any such species found on-site shall be avoided to the maximum extent practical through project redesign, timing/seasonal restrictions, delineated buffers, or other measures deemed necessary by the SELC or CSP staff.
- To avoid adverse impacts to any sensitive species (i.e., least tern, western snowy plover or grunion), construction activities will occur between September 15th and February 28th of any given year.
- The Project site shall be kept clear of trash to avoid attracting scavengers/predators of the western snowy plover. All food and garbage shall be placed in sealed containers and regularly transported from the site. Following construction, any trash, debris, or rubbish remaining within the work limits shall be collected and hauled off to an appropriate location/facility (CDPR 2016).

Additional avoidance and minimization measures will be included in the final restoration plan based on permit requirements from all applicable entities.

## **6.0 Measures to Minimize Impacts to Cultural Resources**

Cultural resource review, as per the California Environmental Quality Act (CEQA), is required (from the earliest planning stages to construction completion) to avoid impacting cultural resources (both historic and prehistoric) adversely. Dependent upon the nature of the Project, Native American monitors approved by the appropriate local tribes may be required during Project implementation.

## **7.0 Maintenance, Monitoring and Reporting**

Physical and biological monitoring will be conducted before and after Project construction to understand how and why dune topography changes over time (i.e. elevation, erosion, and progradation) and which native plants are the best suited for dune restoration in the region.

For physical monitoring, the City will monitor the seaward toe of the dune to evaluate progradation and erosion while SIO will monitor elevations and specific morphological changes using photogrammetry. The City purchased a Real-Time Kinetic (RTK) unit and initiated its own beach monitoring program in 2014 in coordination with two other on-going programs conducted by Coastal Frontiers Corporation (CFC) under the Regional Beach Monitoring Program and by SIO. The City's monitoring efforts follow SIO's Mobile Berm Erosion Monitoring methodologies. The City will supplement the on-going programs by conducting quarterly RTK surveys along with intensified sampling periods during the winter season to coordinate with storms. The City will conduct the surveys along established transects covering the beach nourishment Project area. The number of transects included in the two on-going monitoring programs has varied over time due to budgetary constraints, so the City & SIO will establish transects at the beginning of the Project.

Additionally, Dr. Timu Gallien of SIO will conduct quarterly drone photogrammetry surveys using a SenseFly eBee unmanned aerial vehicle (UAV).

Annual revegetation monitoring will occur in the spring. Invasive control efforts will occur as needed based on the results of the revegetation monitoring. Revegetation monitoring will follow the industry standard developed by CNPS and will be based on the CNPS Relevé Protocol (CNPS 2007). SELC will record total vascular percent cover, percent cover/native vegetation, percent cover/non-native vegetation, and percent survivorship. The data will include species-specific percent cover estimates for all species. Monitoring locations and sizes will be established prior to Project implementation. Strategic photo monitoring points will be recorded with a Yuma GPS. Photos will be taken at the same bearing and camera angle during every photo-monitoring effort. In addition, SELC will conduct or facilitate Rare Plant Monitoring per the San Diego Management & Monitoring Program protocols.

Percent composition data will be used to evaluate which species and which seeding techniques are most successful. Cover values show the progress of the site and will allow SELC to determine a trajectory for the site to achieve the cover estimates of the reference site. Based on that trajectory, if the percent cover of native species is lower than expected for the time since the initial planting/seeding, supplemental planting and/or seeding will occur to increase the cover of the site. Survivorship will inform site-specific adaptive management techniques. Adaptive management decisions may include but will not be limited to varying the species planting palette for succession plantings/seeding (SCC 2016).

## **9.0 Environmental Review**

Per CEQA, a Mitigated Negative Declaration has been acquired for the Project and is included as **Attachment A: Mitigated Negative Declaration.**

## **10.0 Permitting**

The Project will require the following permits:

- Coastal Development Permit (CCC),
- Right of Entry Permit (CDPR),
- Section 10 & 404 Permit (USACE),
- 401 Certification (Regional Water Quality Control Board), and the
- Lease of State Lands (California State Lands Commission).

## 11.0 Itemized Costs

**Table 2: Itemized Costs\***

Item No.	Work Item	Cost	Percent
1	Fencing and Access pts.	\$19,950	24.7%
2	Sand Stabilization	\$11,700	14.5%
3	Project Mgmt.	\$9,450	11.7%
4	Invasive Spp. Control	\$8,500	10.5%
5	Irrigation/Watering	\$6,900	8.6%
6	Signage	\$6,830	8.5%
7	Seeding	\$6,250	7.8%
8	Vegetation Monitoring	\$5,400	6.7%
9	Reporting	\$5,380	6.7%
10	Travel	\$250	0.3%
<b>TOTAL:</b>		<b>\$80,610</b>	<b>100%</b>
<b>Notes:</b>			
Fencing and Sand Stabilization materials and methods are highly dependent on permit restrictions.			

\*Itemized costs for 2 years. 5 years of funding for maintenance and monitoring is preferred.

## 12.0 Project Schedule

**Table 3: Project Schedule**

Task	Date
Sand placement	February 2017 – June 2017
Sand stabilization	February 2017 – June 2017
Fencing & Signage	February 2017 – June 2017
Seeding	October 2018
Irrigation (as needed)	October 2018 – February 2019
Maintenance re-seeding (as needed in spring)	March 2019 – March 2022
Monitoring	February 2017 – March 2022

## References Cited

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- California Department of Parks and Recreation. *Initial Study Mitigated Negative Declaration Cardiff State Beach Living Shoreline Project*. Rep. San Diego: State of California Department of Parks and Recreation, 2016. Print.
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- Weldon, Katherine. *Agenda Report City Council - Award of a California Coastal Conservancy Grant for a Cardiff State Beach Living Shoreline Conceptual Plan*. Rep. Encinitas: City of Encinitas, 2015. Print.

## **Attachment A: Mitigated Negative Declaration**

**DRAFT**

**INITIAL STUDY  
MITIGATED NEGATIVE DECLARATION**

**CARDIFF STATE BEACH LIVING SHORELINE  
PROJECT**

**February 2016**



State of California  
**DEPARTMENT OF PARKS AND RECREATION**

## MITIGATED NEGATIVE DECLARATION

**PROJECT:**           **CARDIFF STATE BEACH LIVING SHORELINE PROJECT**

**LEAD AGENCY:**   California Department of Parks and Recreation

**AVAILABILITY OF DOCUMENTS:** The Initial Study for this Mitigated Negative Declaration is available for review at:

- San Diego Coast District Headquarters  
California Department of Parks & Recreation  
*4477 Pacific Highway, San Diego, CA 92110*
- North Sector Office San Diego Coast District  
*2680 Carlsbad Blvd., Carlsbad, CA 92008*
- San Diego County Library Encinitas Branch  
*540 Cornish Drive Encinitas, CA 92024*

### **PROJECT DESCRIPTION:**

In partnership with the San Elijo Lagoon Conservancy, the City of Encinitas, and the California State Coastal Conservancy, California State Parks proposes to construct a dune system along back beach portions of Cardiff State Beach. The project is located in San Diego County, along the western edge of Highway (HWY) 101 spanning approximately 2,900 linear feet (~0.5 mile) of shoreline at South Cardiff State Beach. Primary project elements include:

- Sand Dune Restoration - A sand dune would be constructed with approximately 25,000 cubic yards (cy) of imported sand. The sand dune would cover reconfigured riprap with a cobble core starting from the edge of pavement at HWY 101. The dune would be seeded with native plants after construction. The crest of the sand dune would range from 4 feet above the crown elevation of HWY 101 along the northern end to 18 inches above the crown elevation in the middle and southern reaches. The dune is anticipated to be constructed after implementation of a significant beach nourishment project as part of the San Elijo Lagoon Restoration Project described in more detail below.
- Buried Riprap - The existing un-engineered rock riprap along the project site will be reconfigured into a more robust form, using no more than 10,000 cy of new 2-ton rock. The rock would provide a last line of defense for HWY 101 against extreme waves and high tides. The crest elevation of the riprap would vary, but would be no higher than 17.5 feet (NAVD88). The riprap would be buried by a minimum of 18 inches of imported sand to allow for plant establishment.

- Pedestrian Footpath – A 4-foot wide, decomposed granite footpath is proposed adjacent to and along the western side of HWY 101. The footpath will run parallel to the dune system and will improve public access along Cardiff State Beach. Six lateral public access points will also be constructed across the proposed dunes, allowing pedestrians to access the beach from HWY 101.

Though the proposed project is not a component of the San Elijo Lagoon Restoration Project (SELRP), the two projects are being closely coordinated due to its utility in providing a source of sand to the project. The SELRP is a large-scale wetland restoration project proposed to be restored starting in the winter of 2017 and spanning through 2019. Construction is estimated to yield just under one million cy of sand from the proposed dredging. The export material from the lagoon is proposed to be used for the construction of the proposed dune system, as well as beach nourishment at Cardiff State Beach with 300,000 cy of sand. Beach nourishment would directly benefit the proposed project by providing a wider beach, which would protect the proposed coastal dune system and provide more sand to the system. Impacts associated with the lagoon restoration project and the beach nourishment component are analyzed in the Final EIR/EIS prepared for the SELRP (AECOM 2016).

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

Darren Smith, District Service Manager  
 California Department of Parks & Recreation  
 San Diego Coast District  
 4477 Pacific Highway  
 San Diego, CA 92110

Pursuant to Section 21082.1 of the California Environmental Quality Act, the California Department of Parks and Recreation (DPR) has independently reviewed and analyzed the Initial Study and Negative Declaration for the proposed project and finds that these documents reflect the independent judgment of DPR. DPR, as lead agency, also confirms that the project mitigation measures detailed in these documents are feasible and will be implemented as stated in the Negative Declaration.

  
 \_\_\_\_\_

2/3/16  
 Date

District Superintendent

  
 \_\_\_\_\_

2/3/16  
 Date

Environmental Coordinator

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# CHAPTER 1 INTRODUCTION

## 1.1 INTRODUCTION AND REGULATORY GUIDANCE

The Initial Study/Mitigated Negative Declaration (IS/MND) has been prepared by Moffatt and Nichol (M&N) on the behalf of the California Department of Parks and Recreation (DPR) to evaluate the potential environmental effects of the proposed Cardiff State Beach Living Shoreline Project (Project) at Cardiff State Beach, San Diego County, California. This document has been prepared in accordance with the California Environmental Quality Act (CEQA), Public Resources Code §21000 *et seq.*, and the State CEQA Guidelines, California Code of Regulations (CCR) §15000 *et seq.*

An Initial Study is conducted by a lead agency to determine if a project may have a significant effect on the environment [CEQA Guidelines §15063(a)]. If there is substantial evidence that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) must be prepared, in accordance with CEQA Guidelines §15064(a). However, if the lead agency determines that revisions in the project plans or proposals made by or agreed to by the applicant mitigate the potentially significant effects to a less-than-significant level, a Mitigated Negative Declaration may be prepared instead of an EIR [CEQA Guidelines §15070(b)]. This IS/MND conforms to the content requirements under CEQA Guidelines §15071.

## 1.2 LEAD AGENCY

The lead agency is the public agency with primary approval authority over the proposed project. In accordance with CEQA Guidelines §15051(b)(1), "the lead agency will normally be an agency with general governmental powers, such as a city or county, rather than an agency with a single or limited purpose." The lead agency for the proposed project is DPR. The contact person for the lead agency is:

Darren Smith, District Service Manager  
California Department of Parks & Recreation  
San Diego Coast District  
4477 Pacific Highway  
San Diego, CA 92110  
Darren.Smith@parks.ca.gov

All inquiries regarding environmental compliance for this project, including comments on this environmental document should be addressed to:

Cardiff State Beach Living Shoreline Project  
California Department of Parks & Recreation  
Attn: Cindy Krimmel  
San Diego Coast District  
4477 Pacific Highway  
San Diego, CA 92110  
Cindy.Krimmel@parks.ca.gov

### 1.3 PURPOSE AND DOCUMENT ORGANIZATION

The purpose of this document is to evaluate the potential environmental effects of the proposed project at Cardiff State Beach. Mitigation measures have also been incorporated into the project to eliminate any potentially significant impacts or reduce them to a less-than-significant level.

This document is organized as follows:

- Chapter 1 - Introduction.  
This chapter provides an introduction to the project and describes the purpose and organization of this document.
- Chapter 2 - Project Description.  
This chapter describes the reasons for the project, scope of the project, and project objectives.
- Chapter 3 - Environmental Checklist.  
This chapter identifies the significance of potential environmental impacts, explains the environmental setting for each environmental issue, and evaluates the potential impacts identified in the CEQA Environmental (Initial Study) Checklist. Mitigation measures are incorporated, where appropriate, to reduce potentially significant impacts to a less-than-significant level.
- Chapter 4 - Mandatory Findings of Significance  
This chapter identifies and summarizes the overall significance of any potential impacts to natural and cultural resources, cumulative impacts, and impact to humans, as identified in the Initial Study.
- Chapter 5 - Summary of Mitigation Measures.  
This chapter summarizes the mitigation measures incorporated into the project as a result of the Initial Study.
- Chapter 6 - References.  
This chapter identifies the references and sources used in the preparation of this IS/MND. It also provides a list of those involved in the preparation of this document.
- Chapter 7 - Report Preparation  
This chapter provides a list of those involved in the preparation of this document.

## 1.4 SUMMARY OF FINDINGS

Chapter 3 of this document contains the Environmental (Initial Study) Checklist that identifies the potential environmental impacts (by environmental issue) and a brief discussion of each impact resulting from implementation of the proposed project. Based on the IS and supporting environmental analysis provided in this document, the proposed project would result in less-than-significant impacts for the following issues: aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, mineral resources, noise, population and housing, public services, recreation, transportation/traffic, and utilities and service systems.

In accordance with §15064(f) of the CEQA Guidelines, a MND shall be prepared if the proposed project will not have a significant effect on the environment after the inclusion of mitigation measures in the project. Based on the available project information and the environmental analysis presented in this document, there is no substantial evidence that, after the incorporation of mitigation measures, the proposed project would have a significant effect on the environment. It is proposed that a Mitigated Negative Declaration be adopted in accordance with the CEQA Guidelines.

## **CHAPTER 2 PROJECT DESCRIPTION**

### **2.1 INTRODUCTION**

This Initial Study/Mitigated Negative Declaration (IS/MND) has been prepared by M&N on behalf of California Department of Parks and Recreation (DPR) in partnership with the San Elijo Lagoon Conservancy, City of Encinitas, and California State Coastal Conservancy to evaluate the potential environmental effects of the proposed project at Cardiff State Beach, located in the City of Encinitas, San Diego County, California. The proposed project would construct a dune system on the seaward side of HWY 101 on Cardiff State Beach to protect a vulnerable segment of the roadway while providing native dune habitat. The project would serve as a natural sea-level rise (SLR) adaptation approach.

### **2.2 PROJECT LOCATION**

The project is located in San Diego County, along the western edge of HWY 101 in the City of Encinitas, California. The project area spans approximately 2,900 linear feet (~0.5 mile) of shoreline, from the Chart House to the north to South Cardiff State Beach parking lot to the south (Appendix A).

### **2.3 BACKGROUND AND NEED FOR THE PROJECT**

HWY 101 has been damaged and flooded on numerous occasions as a result of extreme wave events and high tides. Increased still water levels associated with projected SLR could result in an increased frequency and severity of flooding and damage to the highway. Coastal dune systems have been found to provide multiple benefits by providing coastal habitat and storm damage reduction during extreme events (USACE 2013).

The project proposes to utilize sand from the San Elijo Lagoon Restoration Project (SELRP) for dune and beach restoration. The SELRP is a large-scale wetland restoration project proposed to be restored starting in the winter of 2017 and spanning through 2019. Construction is estimated to yield just under one million cubic yards (cy) of sand from the dredging of an overdredge pit in the Central Basin. Dredging would be conducted through a barge-mounted, cutterhead pipeline system. Transport to the project site would be via pipeline that would traverse through the existing lagoon inlet and along the back beach to the project site. The dredge export has been determined to be beach compatible and vary from silty sand to sand.

The project is anticipated to require maintenance periodically as a result of wave-driven erosion. Maintenance of the project is proposed to be accomplished through use of sand from the San Elijo Lagoon mouth opening. The lagoon mouth opening occurs annually in the spring and removes approximately 25,000 cy via conventional earthwork equipment (i.e., excavator and trucks) from the sand deposit in the vicinity of the HWY

101 bridge overcrossing. Excavated materials from the mouth would be loaded into trucks and driven down the beach to the project area for deposition. The sand would be placed in areas in need of rebuilding and the remainder would be placed at the permitted placement site along inter-tidal portions of the beach fronting the Pacific Coast Grill restaurant.

## 2.4 PROJECT OBJECTIVES

1. Create approximately three acres of sand dunes that are heterogeneous in structure (i.e. incorporate cobble and sand) with 10% or less absolute cover from woody perennial species, less than 5% absolute cover from non-native plant species, and native herbaceous species richness of four and achieving 10 to 30% native herbaceous cover, in proportion to reference site conditions for a given year.
2. Create sand dunes that will persist dynamically for approximately 50 years. Future maintenance may be required in the way of additional beach nourishment and active planting. Future maintenance work will be reviewed and permitted separately prior to commencement of the repair work.
3. Beneficially re-use native beach quality sand from the San Elijo Lagoon to construct and maintain the beach and dune system.
4. Protect HWY 101 from its current vulnerability to episodic flooding and undermining.
5. Protect HWY 101 from more frequent and severe flooding and undermining from storms and sea-level rise over the next 50 years.

## 2.5 PROJECT DESCRIPTION

In partnership with the San Elijo Lagoon Conservancy, the City of Encinitas, and the California State Coastal Conservancy, California State Parks proposes to construct a dune system along back beach portions of Cardiff State Beach. The project consists of 1) sand dune restoration, 2) riprap maintenance and reconfiguration and a 3) pedestrian footpath. These features are described in detail in this section.

### 1. Sand Dune Restoration

A sand dune would be constructed with a maximum of 25,000 cy of imported sand from the SELRP restoration project or from another compatible source. Imported sand would be formed in a hummock profile along the project reach to mimic a natural dune system. It is envisioned that the contractor would rework placed sand into dune features with a small backhoe. Minimum and maximum hummock elevations would be given to the contractor to represent the crest and troughs of the dune features. The seaward slope of the dune would have a slope of approximately 2:1 (H:V). The dune is anticipated to be created after implementation of a significant beach nourishment project as part of the SELRP, which proposes to place 300,000 cy of sand on Cardiff Beach.

The sand dune would occupy a maximum width of 60 feet (starting from the edge of pavement at HWY 101 to the seaward toe). The dune feature would have a crest elevation no greater than 4 feet above the HWY 101 crown elevation of the highway at any given location. The majority of the project area would maintain a dune crest elevation no greater than 2 feet above the HWY 101 crown elevation to minimize visual impacts from the roadway. The crown elevation for HWY 101 along the project reach varies from +15.5 to +18 feet NAVD88 from north to south. Thus, the dune crest would be no greater than +20 feet, NAVD88.

The dune is proposed to be seeded with a native plant pallet (an assortment of native plants selected for the area and site conditions) collected from the San Elijo Lagoon and bulked (grown to appropriate size and density) at a local nursery. Dune seeding may incorporate a rice straw feature to promote plant establishment by reducing seed blowing and providing nutrients. Once the imported sand is formed into a hummock profile, the sand would be leached of salt to promote plant establishment. Leaching would be performed by physically irrigating the dune or by allowing for natural precipitation events.

Created dune habitat areas will use sand fencing to capture blowing sand and promote plant establishment. Symbolic fencing (e.g. post and cable) will also be used to reduce public disturbance of created habitat areas. Fencing will also be used to focus beach access points within the project area. Six beach access points are proposed along this reach. Four of the access points will be in the northern reach, where street-side parking currently exists.

## 2. Riprap Maintenance and Reconfiguration

The existing un-engineered rock riprap along the project site will be reconfigured to protect HWY 101 from undermining. The reconfiguration work would vary along the project reach contingent on the condition of the riprap relative to the proposed riprap template. In general, the riprap along the southern reach is in better condition (i.e. more stone in a tighter configuration) than the northern reach. Many areas, the northern reach in particular, will require the addition of 2-ton rock to form the proposed rock template.

The crest of the riprap will vary along the project reach but will be no higher than 2 feet above the crown of HWY 101 at any location. The reconfigured riprap will occupy a footprint no wider than 30 feet at any location. The seaward riprap slope will have a slope of about 1.5:1 (H:V) . No more than 10,000 cy of 2-ton rock is proposed to be imported to match existing rock riprap. The contractor would use special placement methods to ensure that placed rocks have at least three points of contact with other rocks. Bedding stone and geotextile fabric would be used to form an underlayer base for the reconfigured 2-ton stone.

Excavation of the existing rock, cobble and sand within the riprap footprint will be necessary to construct the design template. This is especially needed in the northern

reach, where the difference between the edge of pavement and the back beach elevation is small (approximately 2 feet). A trench will be dug in these locations in order to construct the buried riprap section. The trench size will vary depending on the beach conditions at the time of construction. Cuts will be no greater than 10 feet below existing grade at any location. The deepest cuts will be on the seaward edge of the riprap footprint. The cut adjacent to the road would be no closer than 2 feet from the edge of pavement at any location to protect the roadway sub-grade.

The excavation needed for the buried riprap is anticipated to generate a sand and cobble mix, with the majority being cobble. The cobble and sand mix is to be placed seaward and adjacent to the reconfigured riprap template and will form a dune core.

Once the riprap and cobble core template are constructed, these features would be buried by imported sand to form the dune. A minimum of 18 inches of sand cover would be achieved at any location in order to allow for plant establishment.

### 3. Pedestrian Footpath

A four-foot wide, decomposed granite footpath will be constructed along the western edge of HWY 101, parallel to the dune system, to improve public access along Cardiff State Beach. The footpath would be placed between the bike lane and the dune in the middle and southern sections of the project and between the street-side parking and the dune along the northern reach.

Lateral public beach access points will also be constructed across the dune system to allow pedestrians to enter the beach from the footpath along HWY 101. In total, six lateral beach access points are proposed along the Project area. More access points will be provided along the northern reach, where the street-side parking currently exists.

## 2.6 PROJECT IMPLEMENTATION

Construction of the project is estimated to take four months. Construction would occur between September 15<sup>th</sup> and March 1<sup>st</sup> of any given year to avoid breeding seasons of sensitive species and higher public visitation. Construction may require temporary closures of a southbound lane of HWY 101 during construction hours (i.e., 9am to 3pm). If a lane is closed, a 750-foot taper would be provided to transition traffic safely around the construction area. The construction area is anticipated to be no greater than 500 linear feet at any one time. The existing bike lane would be temporarily shifted to the west but, remain usable during construction.

Construction equipment would be staged within a small portion of South Cardiff State Beach parking lot. The staging area would occupy an approximate 6,000 square feet (sq.ft.) area (120 feet wide by 50 feet long) within the parking lot, as shown in Appendix A. The staging area would not occupy more than 10 parking spaces. Staging activities would include equipment fueling, maintenance and overnight storage. Construction best

management practices (BMPs) would be implemented onsite to minimize potential water quality impacts.

Imported clean rock would be temporarily stockpiled on the beach on the northern portion of South Cardiff State Beach. The stockpile would allow efficient and continuous construction by the contractor and would be no greater than 10 feet in height. The stockpile area would occupy no greater than 2,500 sq.ft. (50 feet wide x 50 feet long) of beach, as shown in Appendix A.

The street-side, HWY 101 parking along the northern reach of the beach will be temporarily impacted during construction. It is anticipated that a maximum of 28 street-side parking spaces will be impacted by the 500 foot long construction closure. This assumes parking in parallel along the roadway. The existing north-south pedestrian beach access will be retained along Cardiff State Beach during construction. Beach access along the beach will be on the seaward side of the construction site. Safety personnel will be present on the beach during all construction activities to safely direct the public around the construction area.

A Coastal Permit would be required and BMPs shall be implemented during construction and revegetation of the site. The project would be maintained by the San Elijo Lagoon Conservancy, City of Encinitas, and San Diego State Parks personnel. Habitat maintenance would be provided by the San Elijo Lagoon Conservancy.

## **2.7 VISITATION TO CARDIFF STATE BEACH**

Attendance in fiscal year 2013/2014 was estimated at two million. Attendance consists of paid day use and free day use.

## **2.8 CONSISTENCY WITH LOCAL PLANS AND POLICIES**

The Cardiff State Beach General Plan was approved by the State Parks in November 1983. Cardiff State Beach was classified as a state beach by the State Park and Recreation Commission in May 1969. Primary uses of the beach include sunbathing, swimming and surfing. The project is located within Area 2 of the unit, which is described as generally unimproved with a small, informal boat launch and scattered lifeguard stands. The boat launch is said to lack adequate trailer parking and space to safely maneuver a boat trailer from the highway. The project would not prohibit primary uses and would not preclude future uses of the small boat launch.

## **2.9 DISCRETIONARY APPROVALS**

The project will be required to obtain a Coastal Permit from the California Coastal Commission, a Major Use Permit from the City of Encinitas, and a right-of-entry permit from the DPR. Permits may be required from the U.S. Army Corps of Engineers (USACE), State Lands Commission and Regional Water Quality Control Board contingent on beach conditions at the project site at the time of permit processing.

Further coordination with these agencies will be conducted to determine specific permit needs. Any other resource agency permits required for the construction of the project shall be coordinated with the jurisdictional agencies before a project enters its construction phase.

## 2.10 RELATED PROJECTS

The Project is related to the following projects:

- Seaside Terrace Restoration Project – The Seaside Terrace Restoration project is located immediately south of the project and proposes to restore one-acre of habitat for coastal dune plants and coastal sage scrub. Thus, the project has similar goals to the proposed project. Implementation of the Seaside Terrace project is planned in 2016.
- San Elijo Lagoon Restoration Project (SELRP) – The SELRP proposes to restore tidal flow and habitats in the San Elijo Lagoon. Approximately one million cy of sediment is proposed to be dredged from the lagoon to achieve these project goals. Export sand from the lagoon project is proposed to construct and maintain the proposed project. The SELRP is planned for construction in the winter of 2017.

## CHAPTER 3 ENVIRONMENTAL CHECKLIST

### PROJECT INFORMATION

- |  |  |
|--|--|
| 1. Project Title:                                | Cardiff State Beach Living Shoreline Project                                   |
| 2. Lead Agency Name & Address:                   | California Department of Parks and Recreation                                  |
| 3. Contact Person & Phone Number:                | Darren Smith, (619) 952-3895   |
| 4. Project Location:                             | Cardiff State Beach  |
| 5. Project Sponsor Name & Address:               | City of Encinitas<br>505 South Vulcan Avenue<br>Encinitas, California<br>92024 |
| 6. General Plan Designation:                     | Cardiff State Beach  |
| 7. Zoning:                                       | State Park   |
| 8. Description of Project:                       | Refer to Chapter 2   |
| 9. Surrounding Land Uses & Setting:              | Refer to Chapter 3 of this document (Section IX, Land Use and Planning)        |
| 10. Approval Required from Other Public Agencies | Refer to Chapter 2, Section 2.9  |

**1. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:**

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

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Aesthetics                    | <input type="checkbox"/> Agricultural Resources             | <input type="checkbox"/> Air Quality            |
| <input type="checkbox"/> Biological Resources          | <input type="checkbox"/> Cultural Resources                 | <input type="checkbox"/> Geology/Soils          |
| <input type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Hydrology/Water Quality            | <input type="checkbox"/> Land Use/Planning      |
| <input type="checkbox"/> Mineral Resources             | <input type="checkbox"/> Noise                              | <input type="checkbox"/> Population/Housing     |
| <input type="checkbox"/> Public Services               | <input type="checkbox"/> Recreation                         | <input type="checkbox"/> Transportation/Traffic |
| <input type="checkbox"/> Utilities/Service Systems     | <input type="checkbox"/> Mandatory Findings of Significance | <input type="checkbox"/> None                   |

**DETERMINATION**

On the basis of this initial evaluation:

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

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

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

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

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

  
Darren Smith

2/3/16

\_\_\_\_\_  
District Service Manager

\_\_\_\_\_  
Date

## EVALUATION OF ENVIRONMENTAL IMPACTS

1. A brief explanation is required for all answers, except "No Impact", that are adequately supported by the information sources cited. A "No Impact" answer is adequately supported if the referenced information sources show that the impact does not apply to the project being evaluated (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on general or project-specific factors (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).
2. All answers must consider the whole of the project-related effects, both direct and indirect, including off-site, cumulative, construction, and operational impacts.
3. Once the lead agency has determined that a particular physical impact may occur, the checklist answers must indicate whether that impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate when there is sufficient evidence that a substantial or potentially substantial adverse change may occur in any of the physical conditions within the area affected by the project that cannot be mitigated below a level of significance. If there are one or more "Potentially Significant Impact" entries, an Environmental Impact Report (EIR) is required.
4. A "Mitigated Negative Declaration" (Negative Declaration: Less Than Significant with Mitigation Incorporated) applies where the incorporation of mitigation measures, prior to declaration of project approval, has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact with Mitigation." The lead agency must describe the mitigation measures and briefly explain how they reduce the effect to a less than significant level.
5. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR (including a General Plan) or Negative Declaration [CCR, Guidelines for the Implementation of CEQA, § 15063(c)(3)(D)]. References to an earlier analysis should:
  - a) Identify the earlier analysis and state where it is available for review.
  - b) Indicate which effects from the environmental checklist were adequately analyzed in the earlier document, pursuant to applicable legal standards, and whether these effects were adequately addressed by mitigation measures included in that analysis.
  - c) Describe the mitigation measures in this document that were incorporated or refined from the earlier document and indicate to what extent they address site-specific conditions for this project.
6. Lead agencies are encouraged to incorporate references to information sources for potential impacts into the checklist or appendix (e.g., general plans, zoning ordinances, biological assessments). Reference to a previously prepared or outside document should include an indication of the page or pages where the statement is substantiated.
7. A source list should be appended to this document. Sources used or individuals contacted should be listed in the source list and cited in the discussion.
8. Explanation(s) of each issue should identify:
  - a) the criteria or threshold, if any, used to evaluate the significance of the impact addressed by each question
  - and**
  - b) the mitigation measures, if any, prescribed to reduce the impact below the level of significance.

## ENVIRONMENTAL ISSUES

### I. AESTHETICS.

#### ENVIRONMENTAL SETTING

Aesthetic resources at Cardiff State Beach include views of the beach and Pacific Ocean. Existing riprap along the back beach detracts from the visual character of the reach.

<b>WOULD THE PROJECT:</b>	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
a) Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

#### DISCUSSION

- a) Scenic vistas at Cardiff State Beach shall not be adversely affected, but returned to a more natural state by burying the existing riprap and restoring native coastal dune habitat.
- b) HWY 101 is recognized as a highway of scenic significance within the City. The dune crest height was optimized to be no greater than 2 feet above the crown elevation of the highway in most areas to avoid visual impacts from motorists on the highway. In the northern portion of the project site (in the area where street-side parking exists), the dune crest would be no greater than 4 feet above the elevation of the crown of the highway. Scenic resources along this reach are not considered significant as views in this area are typically obstructed by parked cars. Thus, scenic resources will not be impacted by the proposed dune system.
- c) The visual character of Cardiff State Beach shall not be degraded, but rather improved by restoring the native coastal dune habitat that once existed along this reach. The existing riprap and cobble that exists along the back beach would be buried by imported sand and planted with a native plant palette.
- d) The project would not create a new source of light or glare.

## II. AGRICULTURAL RESOURCES.

### ENVIRONMENTAL SETTING

The project would not convert farmland to nonagricultural use, nor would this project conflict with the existing agricultural zoning, as there is no farmland in the project area.

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
<b>WOULD THE PROJECT*:</b>				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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

### DISCUSSION

- a) No farmlands exists within Cardiff State Beach and, therefore, no farmland will be converted to a non-agricultural use.
- b) Cardiff State Beach is not zoned for agricultural use
- c) Farmland is not located at Cardiff State Beach or adjacent to it. There is no portion of the proposed project that will impact any farmland.

### III. AIR QUALITY.

#### ENVIRONMENTAL SETTING

The project is within the San Diego Air Basin, which encompasses all of San Diego County. The air basin is currently designated as nonattainment for both the 24-hour and the annual State particulate matter (PM)10 standards. The air basin is also designated as nonattainment for the State annual PM2.5 standard. PM10 is primarily due to activities that re-suspend dust, such as emissions from paved and unpaved roads and construction. PM2.5 is primarily a byproduct of combustion; therefore, is from sources such as vehicles, residential wood combustion, agricultural and prescribed burning, and stationary combustion sources.

Standard construction protocols for dust control during grading shall be implemented. These protocols shall be included within a Stormwater Pollution Prevention Plan (SWPPP) for the project prior to construction. The State’s Representative and/or State Environmental Scientist Construction Manager will periodically inspect the work area to ensure that construction-related activities do not generate excessive amounts of dust or cause other in-air disturbances (e.g. noise).

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

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

#### DISCUSSION

- a) Construction of the project would not obstruct the implementation of the San Diego Regional Air Quality Strategy (RAQS) or the San Diego portion of the California State Implementation Plan (SIP).

- b) The project would not violate any air quality standards maintained by the San Diego County Air Pollution Control District. Construction will result in the short-term increase in PM2.5 emissions. Standard construction protocols for will be implemented during construction.
- c) There shall be no cumulatively considerable net increase of any criteria pollutant for which the San Diego Air Basin is in non-attainment.
- d) Construction of the project will not expose visitors to substantial pollutant concentrations.
- e) The project will not create objectionable odors.

## IV. BIOLOGICAL RESOURCES.

### ENVIRONMENTAL SETTING

#### Habitat

The project site is primarily beach that is part of the coastal strand on the west side of San Elijo Lagoon. The substrate in the project area consists of sand, cobble, rip-rap, compacted soil, and remnant pavement. Due to public activity, high salinity, and periodic storm surges, vegetation is absent or composed of sparse non-native sea rocket (*Cakile maritima*) and ocean derived organic material. South of the project site (Seaside Terrace) there is about one acre of higher ground that doesn't receive wave action and supports poorly developed coastal dune and southern foredune habitat.

Southern foredunes are coastal -ependent ecosystems that occur within a short distance from the shoreline and often integrate with upper beaches. Southern foredune habitat is used by the western snowy plover and the California least tern as foraging, loafing, and nesting habitat. It is also important for certain plant species, some of which are considered to be rare and endangered. Currently, minimal southern foredune habitat still remains in an undisturbed state in California.

Active coastal dunes are dynamic systems affected by wind and waves: waves deposit sand on the beach and wind transports it inland. Sand collects behind various objects on the beach, forming incipient dunes. Left undisturbed, sand continues to collect, eventually forming foredunes. Over time and with adequate space and sand supply, winds further develop foredunes into a larger, more complex system of dune ridges, swales, and deflation plains. Active dunes along the immediate coastline are not necessarily stabilized and only sparsely vegetated (Pickart and Sawyer 1998).

#### Listed/Sensitive Species

The California Natural Diversity Database and California Native Plant Society's Inventory contained records on 57 special status species that could potentially occur near the project site (Appendix C, Table 1). Based on initial review, 53 of the plants/wildlife were unlikely to be found as appropriate habitat types or conditions were not present in the project boundaries. With respect to other resources, no proposed or designated critical habitat for federally listed species exists on the Cardiff coastal strand.

No sensitive plant species were observed at the site during a rare plant survey conducted in 2015 (Kentner 2015). Immediately south of the site (at Seaside Terrace site), two rare annual plants, *Nemacaulis denudata* var. *denudata* and *Acmispon prostratus*, occur in small numbers. These plants are both identified as California Rare Plant Rank 1B by the California Native Plant Society.

No special-status wildlife species have been documented within the project site, although the endangered California least tern (*Sternula (Sterna) antillarum browni*) and threatened western snowy plover (*Charadrius alexandrinus nivosus*) have been observed in the vicinity of the project and could use the project area for loafing. The Project site is unsuitable for western

snowy plover nesting habitat. One western snowy plover nest was observed on higher ground immediately south of the site (at Seaside Terrace site) in 2015, the first in at least 15 years.

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

**DISCUSSION**

a) Federally listed species that could be present within the project area (foraging or loafing) include the endangered California least tern (*Sternula (Sterna) antillarum browni*) and the threatened western snowy plover (*Charadrius alexandrinus nivosus*). Nesting by these federally listed species has not been documented within the project area. Designated critical habitat for these species is not located within the project area. However, the site could potentially support future nesting of special status species. Therefore, areas within and adjacent to the project footprint shall be surveyed for special status species prior to construction. Implementation of mitigation measure BIO-1 would reduce potential impacts to below a level of significance.

The project will ecologically enhance the project area by removing non-native invasive plants, and by amending the existing substrate with sand, adding seeds and plants of locally collected native dune and coastal sage scrub plant species. Pre- and post-construction monitoring will be conducted to evaluate the effectiveness of restoration techniques. These actions may increase the distribution and abundance of rare plant species, potentially making the area more attractive for roosting birds, including the California least tern, western snowy plover, and other migratory birds.

- b) With respect to other resources, no proposed or designated critical habitat for federally listed species exists on the Cardiff coastal strand. No sensitive plant species were observed at the site during a rare plant survey conducted in 2015 (Kentner 2015). Immediately south of the site (at Seaside Terrace site), two rare annual plants, *Nemacaulis denudata* var. *denudata* and *Acmispon prostratus*, occur in small numbers. These plants are both identified as California Rare Plant Rank 1B by the California Native Plant Society.
- c) The project is proposed above the high tide line<sup>1</sup> on the beach. Therefore, the project is likely outside the jurisdiction of the USACE and will not require a USACE Permit prior to construction. No federally protected wetlands exist on the project site.
- d) The project will not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or nurseries. The breeding restrictions for the western snowy plover, least tern and grunion will be avoided for construction. This would avoid any adverse impacts to these species.
- e) The project complies with all known local policies and ordinances. The project site is located within the coastal zone as designated in the City of Encinitas General Plan (1995). Public beaches are designated as Ecological Resource/Open Space/Parks in the City's General Plan (1995). The Encinitas General Plan identifies issues and opportunities relative to planning decisions within the City. In compliance with the California Coastal Act of 1976, the City of Encinitas includes a Local Coastal Plan (LCP) and Land Use Plan (LUP) in its General Plan. The LUP identifies policies and provisions that serve to apply the Coastal Act. The project is also subject to guidelines set forth in the San Diego Coastal State Park System General Plan.
- f) The project is not in conflict with any adopted Habitat or Conservation Plan.

<b>MITIGATION MEASURE BIO-1</b>
---------------------------------

- |   |
|---|
| <ul style="list-style-type: none"><li>▪ Prior to substrate deposition or manipulation, areas within and adjacent to the project footprint shall be surveyed for special status species by a biologist. Any such species found on-site shall be avoided to the maximum extent practical through project redesign, timing/seasonal restrictions, delineated buffers, or other measures deemed necessary by the SELC or CSP staff.</li></ul> |
|---|

<sup>1</sup> The high tide line is the line of intersection of the land with the water's surface at the maximum height reached by a rising tide.

- To avoid adverse impacts to any sensitive species (i.e., least tern, western snowy plover or grunion), construction activities will occur between September 15<sup>th</sup> and February 28<sup>th</sup> of any given year.
- The project footprint shall be kept clear of trash to avoid attracting scavengers/ predators of the western snowy plover. All food and garbage shall be placed in sealed containers and regularly transported from the site. Following construction, any trash, debris, or rubbish remaining within the work limits shall be collected and hauled off to an appropriate location/facility.

## V. CULTURAL RESOURCES.

### ENVIRONMENTAL SETTING

A previous beach nourishment project at Cardiff State Beach (i.e., Regional Beach Sand Project II) identified 11 cultural resources within about a 0.5-mile radius (AECOM et al. 2011). None of these resources are located within or immediately adjacent to the proposed project footprint. Seven of these sites are prehistoric, three are historic, and one has both prehistoric and historic elements. The prehistoric sites include a shell midden with associated artifacts, two campsites, a shell midden, a habitation site, an artifact and shell scatter, and cobble hearths.

The historic sites include a small trash dump, a kelp factory dating to 1915, and a railroad alignment. One site contains both a small historic trash dump and remnant prehistoric shell midden and associated La Jollan flexed human burial.

The project will not impact any known historic or archaeological resources. Construction activities that could adversely impact unknown historical and archaeological resources, or disturb human remains, include any ground disturbance into native material (deeper than about 3 feet in depth). These activities include riprap rework and trenching. Sand placement is unlikely to adversely affect these resources.

Dredged lagoon sand to be reused on the site as part of the SELRP will be cleared of cultural deposits prior to redeposition on Cardiff State Beach.

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
<b>WOULD THE PROJECT:</b>				
a) Cause a substantial adverse change in the significance of a historical resource, as defined in §15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Cause a substantial adverse change in the significance of an archaeological resource, pursuant to §15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Disturb any human remains, including those interred outside of formal cemeteries?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### DISCUSSION

- a) No known historical resources are located within the project area; however, archaeological sites have been identified near the site (AECOM et al. 2011). Therefore, avoidance and mitigation measures are proposed to avoid adverse impacts on historic resources that could be found during trenching. Implementation of these measures will reduce potential impacts to historical resources to below a level of significance.

- b) No known archaeological resources are located within the project area (CDPR 1983). However, cultural resources have been identified near the site (AECOM et al. 2011). Therefore, archeological monitoring will be implemented in proposed areas of trenching with the potential for unknown cultural resources. This effort will help minimize adverse impacts on archaeological resources that could be found during trenching work. In the event that cultural resources are discovered, work would be temporally halted and protective measures would be put in place until the resource can be evaluated. The cultural resources principal investigator will coordinate with DPR archaeologist to initiate a plan for evaluation or avoidance through redesign. Resource evaluation may require archaeological testing, including artifact analysis, curation of artifact collection and preparation of a final technical report documenting the resource and addressing regional research issues. Implementation of these avoidance/mitigation measures will reduce potential impacts to archeological resources to below a level of significance.
- c) The proposed project will not disturb any human remains, including those interred outside of formal cemeteries. In the event that human remains are observed, the project will be halted until the discovery can be evaluated and the appropriate course of action is determined.

**AVOIDANCE AND MITIGATION MEASURES CULT-1**

- In areas where existing ground disturbance (trenching associated with the riprap reconfiguration) is proposed, the DPR Archaeologist will be consulted such that archaeological and Native American monitors can be scheduled as necessary.
- The discovery of any archaeological or historical objects or features (including bone) will be reported to the Cultural Resources specialist immediately and work will cease in that location until the potential resource can be evaluated. Whenever possible resources will be protected and avoided through redesign in consultation with District Archaeologist. If archaeological deposits and features are encountered during the project, resources shall be protected from construction impacts until a data recovery program can be implemented.
- Contractor educational efforts will be completed prior to construction to alert workers to potential sensitive cultural resources and impact minimization measures to be implemented during construction.
- In the event that human remains are observed, there shall be no further excavation or disturbance of the site or any nearby area suspected to overlie adjacent human remains until the San Diego County Medical Examiner has evaluated the remains. If the Medical Examiner determines the remains to be Native American, the Medical Examiner will contact the Native American Heritage Commission within 24 hours. The Native American Heritage Commission shall identify the person or persons to be the Most Likely Descendent (MLD). The landowner (DPR) or DPR representative and the MLD will determine the appropriate course of action.

## VI. GEOLOGY AND SOILS.

### ENVIRONMENTAL SETTING

The project area consists of a low-lying, cobble and sand barrier spit fronting the San Elijo Lagoon. The beach is backed by a natural cobble berm and riprap. The beach has been nourished twice recently (2001 and 2012). These nourishment projects, in combination with a relatively benign wave climate, have resulted in a generally wide, sandy beach at this location. The average beach width at the time of this report is approximately 100 feet, from the back beach to the mean high water line. The back beach (at the toe of the existing riprap) is at an average elevation of 12 feet North American Vertical Datum of 1988 (NAVD88).

Cardiff State Beach displays relatively low seismic activity compared to the regionally high seismic levels in Southern California. The highest seismic risks originate from nearby zones such as the Elsinore Fault zone, the Rose Canyon Fault zone and other offshore faults. Each zone has the potential to cause moderate to large earthquakes that would cause ground shaking. No major earthquakes are known to have originated at Cardiff State Beach and the beach is not located in an Alquist-Priolo special study zone.

WOULD THE PROJECT:	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area, or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Be located on a geologic unit or soil that is unstable, or that would become unstable, as a result of the project and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1997), creating substantial risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste disposal systems,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

where sewers are not available for the disposal of waste water?

- f) Directly or indirectly destroy a unique paleontological resource or site, or unique geologic feature?

## DISCUSSION

- a) The project does not include any structures and no such substantial adverse effects are anticipated. The City of Encinitas is not listed as a city affected by Alquist-Priolo Earthquake Fault Zones. The project would not expose people or buildings to substantial adverse effects relative to strong seismic ground shaking, ground failure including liquefaction, or landslides beyond that which presently exists.
- b) The project will not result in erosion and topsoil loss beyond that which presently occurs. The project site is a sand and cobble beach with no soil cover. Beaches are dynamic environments and erosion is a naturally occurring process.
- c) The project site is not located on a geologic unit or soil that is unstable and the project would not create an unstable soil condition.
- d) The project site is a sand and cobble beach with no soil cover. Expansive soils are not documented to exist at the beach site, nor would they be created by the project. Therefore, the project would not create risk to human life or property due to expansive soils.
- e) Not applicable; septic systems are not proposed by the project.
- f) There are no known paleontological resources, sites, or unique geologic features that would be damaged or destroyed by the project. Construction activities involve rock and beach fill placement and minor grading, it is unlikely that any unknown resources, sites, or features exist and construction activities would not damage or destroy such areas.

## VII. HAZARDS AND HAZARDOUS MATERIALS.

### ENVIRONMENTAL SETTING

No known hazards or hazardous materials are located on Cardiff State Beach (AECOM 2011). Construction of the proposed project would not result in the creation of a significant hazard or result in hazardous emissions.

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
<b>WOULD THE PROJECT:</b>				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials, substances, or waste into the environment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on a site which is included on a list of hazardous materials sites, compiled pursuant to Government Code §65962.5, and, as a result, create a significant hazard to the public or environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport? If so, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Be located in the vicinity of a private airstrip? If so, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Expose people or structures to a significant risk of loss, injury, or death from wildland fires, including areas where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

### DISCUSSION

- a) No hazardous substances would be transported to or from the project site. Source sand and rock material that is found to be contaminated, through standard testing practices compliant with applicable federal, state and local regulations, would not be used for riprap

reconfiguration or dune and beach nourishment. Therefore, the proposed project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

- b) The only type of hazardous materials associated with the project would be the use of conventional types of fuels to power construction equipment and trucks. The potential for leaks during construction exists and will be mitigated through preparation of a Spill Prevention, Containment and Countermeasures Plan (SPCCP).
- c) Cardiff Elementary School is located about one mile away from the northern end of the project site at 1888 Montgomery Avenue. While there are no schools located within one-quarter of a mile of the project site, haul routes for equipment and material could use roads that pass closer to the school. The proposed project, including transport trucks, would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste, except for conventional types of fuels. Therefore, the project would have no potential effect on any nearby school related to hazardous material exposure.
- d) The proposed project is not located on a hazardous materials site; therefore, would not create a significant hazard to the public or the environment.
- e) The project is not located near an airport.
- f) The project is not located near a private airstrip.
- g) Material transport as part of the proposed project would follow designated haul routes capable of conveying the traffic, while maintaining access for emergency response and evacuation. Construction may result in a temporary lane closure (southbound HWY 101) though adequate access would be provided for emergency response. Therefore, the proposed project would not interfere with an emergency response plan or emergency evacuation plan.
- h) The proposed receiving beach sites are not located in wildland fire areas.

**MITIGATION MEASURE HAZMAT 1**

- A Spill Prevention, Containment and Countermeasures Plan (SPCCP) will be prepared by the construction contractor. That plan specifies fueling procedures, equipment maintenance procedures, and containment and cleaning measures to be followed in the event of a spill. If not deemed necessary (due to not requiring fuel storage on-site, similar procedures are specified in the required Stormwater Management Plan (SWMP) or SWPPP.

## VIII. HYDROLOGY AND WATER QUALITY.

### ENVIRONMENTAL SETTING

Cardiff State Beach has two distinct hydrologic areas with the Pacific Ocean on the west side of the beach and San Elijo Lagoon to the east. The beach consists of a low-lying, cobble and sand barrier spit which separates the San Elijo Lagoon from the Pacific Ocean. The San Elijo Lagoon is connected to the Pacific Ocean by an inlet north of Cardiff State Beach, this inlet is dredged annually to facilitate tidal exchange within the lagoon.

The project area is under the jurisdiction of the San Diego Regional Water Quality Control Board. The board establishes a Total Maximum Daily Load (TMDL) for impaired water bodies in which pollutant sources exceed established concentration levels and are included on a 303(d) list of impaired surface waters. The Pacific Ocean shoreline at Cardiff State Beach is 303(d) listed for total coliform, fecal coliform and enterococcus (SDRWCB 2010).

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

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
h) Place structures that would impede or redirect flood flows within a 100-year flood hazard area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i) Expose people or structures to a significant risk of loss, injury, or death from flooding, including flooding resulting from the failure of a levee or dam?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
j) Result in inundation by seiche, tsunami, or mudflow?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**DISCUSSION**

- a) The proposed project is outside of the range of extreme tides on the beach and should have no impact on water quality, thus will not violate water quality standards. The project will not discharge waste. Sand to be placed to form dune hummocks will be beach compatible, as determined by the U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. During construction, best management practices BMPs outlined in the stormwater pollution prevention plan (SWPPP) will be followed to minimize any water quality impacts that could result during construction. Thus, impacts to water quality would be less than significant.
- b) The project does not propose the use of groundwater nor does it introduce new impervious areas or features that would interfere with groundwater recharge.
- c) The project does not alter existing drainage patterns of the site or area that would result in erosion or siltation. Drainage along HWY 101 would remain the same as pre-project conditions and additional erosion protection may be provided by the project. The project would not alter the course of a stream or river.
- d) The project does not alter the existing drainage pattern of the site or area and does not alter the course of a stream or river. Thus, will not increase the amount of surface runoff and will not result in increased on site or off site flooding. The project raises the back beach profile and may provide additional flood protection for HWY 101 and the San Elijo Lagoon.
- e) The project does not create any new impervious areas and would not result in increased volumes of storm water runoff or introduce additional polluted runoff from the site. The project uses compatible beach fill materials and any runoff from the project would be similar to existing and naturally occurring conditions. Runoff from construction activities would be managed through the use of BMPs outlined in the SWPPP.
- f) The project is outside of the tidal zone and should have no impact on water quality. During construction BMPs, as outlined in the SWPPP, will be followed to minimize any water quality impacts that could result from runoff to less than significant levels.

- g) The project does not entail the construction of housing.
- h) The project entails the construction of a sand dune and reconfiguring riprap to protect HWY 101 from undermining and flooding during 100-year coastal storms. These features will protect the highway by impeding water from being conveyed onto the highway. Proposed project impacts to 100-year coastal floods are considered beneficial in that they would not result in roadway closures as a result of undermining or flooding.
- i) The proposed project would offer added protection to people and the highway from flooding. Therefore, the project would not expose people or structures to a significant risk of loss, injury, or death from flooding.
- j) Implementation of the project would not result in the increased exposure of people or property to seiche, tsunami, or mudflow. The project area is currently vulnerable to tsunamis and the project would not significantly improve this existing condition. The project area is not subject to seiches or mudflows.

**IX. LAND USE AND PLANNING.**

**ENVIRONMENTAL SETTING**

The project site is located in Cardiff State Beach. The area is classified as a State Beach which allows for balance between recreational activity and natural resource conservation.

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
<b>WOULD THE PROJECT:</b>				
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with the applicable land use plan, policy, or regulation of any agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**DISCUSSION**

- a) The proposed project is located along the Pacific Ocean shoreline, thus, would not divide established communities.
- b) Cardiff State Beach is designated as a public beach and the project is consistent with this designation. No change of land use on the subject property or on adjoining properties is anticipated as a result of the proposed project.
- c) Under the California Marine Life Protection Act (MLPA) passed in 1999, California began to establish a statewide network of MPAs through a collaborative effort that includes the California Department of Fish and Wildlife and California State Parks. In the waters adjacent to Cardiff State Beach, there are two MPAs, San Elijo Lagoon State Marine Conservation Area (SMCA) No-Take and Swami’s State Marine Conservation Area (SMCA). Swami’s SMCA is immediately adjacent to Cardiff State Beach. This conservation area does allow some take, including fishing/harvest of some marine species. The proposed project does not conflict with the regulations of the MPA.

**X. MINERAL RESOURCES.**

**ENVIRONMENTAL SETTING**

Cardiff State Beach is not located within an area with existing or historic energy or mineral extraction land uses, and it is not designated as an important mineral resource by the California Department of Conservation. Mineral resource extraction is not permitted under the Resource Management Direction of State Parks.

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
<b>WOULD THE PROJECT:</b>				
a) Result in the loss of availability of a known mineral resource that is or would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**DISCUSSION**

a - b) The project area has no known mineral resources that would be lost due to the construction and operation of the project. The site is not classified or nominated as a locally important mineral resource recovery site. Therefore, no impacts to mineral resources are anticipated from the proposed project.

## XI. NOISE.

### ENVIRONMENTAL SETTING

Cardiff State Beach is located between HWY 101 and the Pacific Ocean. Existing sources of noise include ocean wave noise, vehicular traffic on HWY 101, restaurant and human activity, and NCTD railroad noise. Ambient noise levels near at the rear of one of the restaurants is 64 dBA<sup>2</sup> (AECOM 2016). Human activity levels are generally higher during peak summer months and middle of the day. Traffic noise is higher during peak traffic hours and the summer season. Surf and wind noise is higher as storm-generated swells reach the shoreline. Typical noise levels during restaurant use hours for surf and highway noise have been recorded between 64 and around 68 dBA Leq<sup>3</sup> (AECOM 2015).

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
<b>WOULD THE PROJECT:</b>				
a) Generate or expose people to noise levels in excess of standards established in a local general plan or noise ordinance, or in other applicable local, state, or federal standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Generate or expose people to excessive groundborne vibrations or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Create a substantial permanent increase in ambient noise levels in the vicinity of the project (above levels without the project)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Create a substantial temporary or periodic increase in ambient noise levels in the vicinity of the project, in excess of noise levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e) Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport? If so, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Be in the vicinity of a private airstrip? If so, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

### DISCUSSION

<sup>2</sup> Noise levels are measured and expressed in decibels (dB). Noise levels weighted to the A noise scale to filter out frequencies not audible to the human ear are written dBA.

<sup>3</sup> The Leq is the average sound level over the period of the measurement.

a - b) The EPA office of Noise Abatement and Control issued the federal Noise Control Act in 1972, to establish programs and guidelines that protect public health and safety and prevent disruption of various human activities. Oversight has since been transferred to state and local governments and local jurisdictions now have noise plans and regulations in place. Applicable standards for construction noise and construction hours within City of Encinitas limits are 7:00 a.m. to 7:00 p.m. Mondays through Saturdays (Noise Abatement and Control Ordinance No. 9.32.410). Additionally, a construction noise level limit of 75 dB shall not to be exceeded for more than 8 hours between 7:00 a.m. and 7:00 p.m. per 24-hour period. The City may permit operations outside of these limits if not detrimental to health, safety or welfare.

The main sources of noise during construction would be rock and sand transport and placement. Construction noise may temporarily and intermittently exceed 75 dBA, but, maximum hourly noise levels would be expected to be around 65 dBA.

While ambient noise levels range from 60 to 70 dBA, the difference in character compared to ambient surf and traffic noises would be noticeable, but intermittent and temporary. Therefore, the impact would be less than significant.

- c) The proposed project would not result in construction of a permanent noise generating facility. By definition, the activity would only occur during the construction period and involve trucks hauling material and conventional construction equipment (e.g., bulldozers, loaders) spreading and placing material. Therefore, the project would not cause a permanent increase in ambient noise levels in the project vicinity above existing levels.
- d) The project could result in temporary, periodic increases in noise levels during construction. However, noise levels would be in compliance with the City's Noise Ordinance and construction would take place during normal construction hours. Compliance with these measures would minimize noise impacts to below a level of significance.
- e) The project is not located within an airport land use plan or within two miles of an airport.
- f) The project is not located within the vicinity of a private airstrip.

## XII. POPULATION AND HOUSING

### ENVIRONMENTAL SETTING

The project site is located at Cardiff State Beach along a narrow spit in between HWY 101 and the Pacific Ocean. Several restaurants front the beach at the north end of the site. The nearest residential homes are east of HWY 101 to the north and south of the project area.

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
<b>WOULD THE PROJECT:</b>				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

### DISCUSSION

- a) The proposed project would not induce population growth.
- b) The proposed project would not displace housing.
- c) The proposed project would not displace people necessitating the construction of replacement housing elsewhere.

### XIII. PUBLIC SERVICES.

#### ENVIRONMENTAL SETTING

State Park Lifeguards and Rangers are the primary provider of visitor safety and law enforcement at Cardiff State Beach. Fire services are handled by the City of Encinitas and County Fire departments. Medical emergencies are handled by the local emergency responders as well as the local fire departments. Search and rescue operations are conducted by a combined effort with State Park Rangers and County Fire and Sheriff's departments.

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
<b>WOULD THE PROJECT:</b>				
a) Result in significant environmental impacts from construction associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fire protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Police protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other public facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

#### DISCUSSION

a) The project would not result in a significant increase in visitation to the State Park. There is no impact to fire or police protection, in that levels of required fire or police services would not change as a result of the project. The project would not result in any impacts to schools. The project would also not impact parks by affecting park services or require additional park services or park personnel. The project would have no impact on other public facilities.

## XIV. RECREATION.

### ENVIRONMENTAL SETTING

Cardiff State Beach is located adjacent to HWY 101. In its entirety, Cardiff State Beach stretches from Cardiff Reef south to Seaside Reef, encompassing approximately 25 acres, along 6,550 feet of ocean frontage. The facility includes two parking lots (one at the north end and one at the south end of the beach), restrooms, and an emergency vehicle access ramp.

Beaches within the project area are used for recreation and surfing; however, are not as heavily used as adjacent beaches due to access, parking and surf quality. More popular recreational and surfing beaches located to the north and the south of the project and include Cardiff Reef to the north and Seaside Reef/Tabletops to the south. A surf spot called George's is located along the project area, which is a beach break of variable quality. Quality is contingent on sandbar form and incident wave conditions. Generally, waves approaching from multiple directions or shorter periods are better at this location due to the typically straight sandbars and beach.

The beaches within the project area are variable in width contingent on seasonal shifts and sand management actions (i.e. beach nourishment projects and annual lagoon bypassing actions). The average beach width at the time of this report is 100 feet from the roadway to the mean high tide line. The portion of the beach width within the project area consists of riprap, cobble and sandy beach (from east to west). The project would designate a portion of this beach area (60 feet in width) as a habitat area with restricted access to the public. The total portion of sandy beach impacted by the project varies along the reach, but is about 30 feet on average. These restricted access points would be bisected by six proposed beach access points.

The San Elijo Lagoon Ecological Reserve is adjacent to the site, just east of HWY101. The San Elijo Lagoon Nature Center opened to the public in January 2009. Recreation at the reserve is primarily limited to passive uses such as hiking, jogging, nature photographing, and bird watching.

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

## DISCUSSION

- a) Due to the presence of riprap, cobbles and proximity to HWY 101, the majority of the project area does not support a significant amount of sand-oriented recreational activity (towel space, beach sports, etc.). The project footprint is estimated to convert approximately two acres of sandy beach to a dune habitat area that would be restricted to the public. This assumes a maximum of 30 feet of sandy beach would be impacted. Given the existing beach condition a total of 40 feet, or 2.7 acres of dry beach would still exist for recreation along this reach. Additionally, the proposed project is to be constructed at a similar time to the proposed placement of 300,000 cy of beach sand at Cardiff State Beach as a component of the SELRP. This project would benefit the project by providing wider beach widths. Thus, impacts to recreation are considered less than significant.

During construction, areas in the southern parking lot will be used for staging and could occupy an area of up to 6,000 sq.ft. This would impact no more than 10 parking spaces during construction. Adequate parking exists in this lot during normal, non-special event periods. A portion of the street-side parking that runs parallel to a portion of the project area along HWY 101 may also be restricted during construction activities in these areas. No more than 28 street-side parking spots would be impacted during construction. Use of these parking areas during construction will be temporary and will not result in inadequate parking capacity.

Vehicular and pedestrian access to Cardiff State Beach may be disturbed during construction, but will still be available to all areas of the park. Although some visitors may be detracted from the project area due to construction activities, this impact is not anticipated to be significant.

The proposed project would not increase the use of neighborhood or regional parks

- b) The proposed project does not require the construction or expansion of recreational facilities. All work elements are proposed to repair and maintain the existing beach along with access to the area.

## XV. TRANSPORTATION/TRAFFIC.

### ENVIRONMENTAL SETTING

Access to Cardiff State Beach is provided by HWY 101. Caltrans originally constructed HWY 101 in 1912 and later realigned the highway in 1926 to its present day location. HWY 101 and Interstate 5 (I-5) are the only two north to south arterials in this area of San Diego County. HWY 101 is currently owned and maintained by the City and supports approximately 20,000 average daily trips (ADT). The reach of HWY 101 that runs parallel to the project area is a four lane highway with two traffic lanes and a class II bikeway in each direction. No pedestrian improvements exist along the project site, though pedestrians are not precluded from using the roadway shoulder to traverse the site.

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

### DISCUSSION

- a) The project would result in a temporary increase in vehicular traffic as a result of rock being hauled to the site by truck. Trucks hauling the rock material would be limited to the designated truck route roadways. Construction may require temporary closures of a southbound lane of HWY 101 during construction hours. Closures are anticipated to be no greater than 500 feet at any one time; however, additional closure lengths will result from lane closure tapers. Lane closure procedures would be addressed in the traffic

control plan. These segments are identified as currently operating at acceptable levels of service and the proposed project would not result in a change to those levels of service. With the implementation of traffic control procedures outlined in Mitigation Measure Transportation/Traffic-1 any disruptions to traffic will be less than significant.

- b) SANDAG prepared the Congestion Management Program (CMP) for the San Diego Region. No roadways identified for this project are designated as a CMP arterial. The CMP requires an Enhanced CEQA review for all large projects that are expected to generate more than 2,400 ADT or more than 200 peak hour trips. The anticipated truck trip generations are well below the threshold identified in the CMP. Therefore, a CMP review would not be required.
- c) The project would not include changes to air traffic and is not located in an area that would affect or be affected by air traffic. Therefore, it would not result in a change of air-traffic patterns or levels, or a change in location that results in substantial safety risks.
- d) Vehicle transport of rock to the project location may increase hazards along haul routes and at the beach site itself during construction due to conflict between pedestrians, cyclists, and trucks. The contractor would implement a traffic control plan to reduce these potential hazards. The potential for wind to blow sand from the created dune features could result in additional maintenance on HWY 101, the implementation of a roadway buffer, sand fencing and rice straw seeding to help establish herbaceous cover will reduce the likelihood of windblown sand to below a level of significance.
- e) The project would not block emergency access to the beach or access to nearby uses at the proposed project site. Adequate emergency access and access to surrounding areas would continue to be provided on public streets with the implementation of the project. A traffic control plan would be required for access to and from construction sites.
- f) The project would not result in a significant increase in visitation to the beach and additionally does not propose the removal of any parking spaces; therefore, additional parking capacity will not be needed. During construction, areas in the south parking lot will be used for staging areas; the staging area would occupy an approximate 6,000 sq.ft portion of the parking lot. A portion of the street-side parking that runs parallel to the northern portion of the project area may be closed during construction activities in these areas. Use of these parking areas during construction will be temporary and will not result in inadequate parking capacity.
- g) Implementation of the project would not conflict with adopted policies supporting alternative transportation. Existing bicycle routes, bus access, and other similar features would remain accessible during the project. Due to construction activities along HWY 101, temporary lane and shoulder closures would require the existing bike lane to be shifted to the west but, remain usable during construction. During construction any detours to pedestrians or bicycle routes would be temporary and in accordance with the traffic control plan. The project would improve pedestrian access along the project site by

constructing a 4-foot wide footpath adjacent to the western edge of HWY 101. The foot path provide a vital north-south linkage.

**MITIGATION MEASURES TRANSPORTATION /TRAFFIC-1**

- State Parks would require the contractor to implement a traffic control plan with a system of signs and flagmen to prevent accidents while construction vehicles access and egress from the project site. The traffic control plan would include plans for traffic lane closure, shoulder closure, bike lane detour and pedestrian detour. The traffic control plan would also consider the additional safety measures at the schools located within the vicinity of the haul routes (e.g., extra control at school crossings) to reduce potential hazards. The traffic control features would reduce impacts to transportation and circulation to below a level of significance.

**XVI. UTILITIES AND SERVICE SYSTEMS.**

**ENVIRONMENTAL SETTING**

The project area is not served by electrical, water, wastewater, or solid waste utilities or services. Two existing utilities were located within the project area, a 36-inch concrete sewer outfall line oriented perpendicular to the shoreline that is operated by the San Elijo Joint Powers Authority (JPA) and a 4-inch gas supply line along the west edge of HWY 101 right of way operated by San Diego Gas & Electric.

	<u>POTENTIALLY SIGNIFICANT IMPACT</u>	<u>LESS THAN SIGNIFICANT WITH MITIGATION</u>	<u>LESS THAN SIGNIFICANT IMPACT</u>	<u>NO IMPACT</u>
<b>WOULD THE PROJECT:</b>				
a) Exceed wastewater treatment restrictions or standards of the applicable Regional Water Quality Control Board?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Would the construction of these facilities cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Would the construction of these facilities cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Have sufficient water supplies available to serve the project from existing entitlements and resources or are new or expanded entitlements needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Result in a determination, by the wastewater treatment provider that serves or may serve the project, that it has adequate capacity to service the project's anticipated demand, in addition to the provider's existing commitments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Comply with federal, state, and local statutes and regulations as they relate to solid waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**DISCUSSION**

- a) No development is proposed; therefore, the project would not result in an increase of wastewater.

- b) The project does not entail the construction of new or expanded water or wastewater treatment facilities.
- c) The project does not entail the construction of new or expanded storm water drainage facilities.
- d) The project does not require a water supply.
- e) The project would not be serviced by a wastewater treatment provider.
- f) The project would not produce solid waste and would not be served by a landfill.
- g) No development is proposed; therefore, the project would not involve the need for solid waste disposal and, therefore, does not alter the compliance with federal, state, and local statutes and regulations related to solid waste.

## CHAPTER 4

### MANDATORY FINDINGS OF SIGNIFICANCE

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

#### DISCUSSION

- a) The project proposes to improve the quality of the environment for wildlife species by restoring native plant habitat along the coastal strand. The project site currently consists of scattered riprap, cobble and some sandy beach that is devoid of native habitat. The project would provide a hummock dune profile with native plantings that would provide habitat for sensitive avian species, such as the western snowy plover.
  
- b) The project proposes up to 10-foot cuts along portions of Cardiff State Beach. Though cultural resources are not known to exist in this area, resources have been identified in nearby areas. Qualified cultural resources monitors are proposed to be present during all trenching activities to identify significant examples of California history or prehistory.
  
- c) Sand placement has occurred on Cardiff State Beach in 2001 and 2012 as part of regional beach nourishment projects. The site received approximately 200,000 cy of sand from these projects. Sand was placed on subaerial and inter-tidal portions of the beach during these projects with the goal to widen the existing beach. Up to 300,000 cy of beach nourishment is proposed at Cardiff State Beach as part of the SELRP. Sand is proposed to be placed along inter-tidal portions of the beach and will ultimately widen the beach in this location. Potential impacts associated with this beach nourishment were evaluated in the

EIR/EIS for that project and were found to be less than significant with incorporation of mitigation measures. The proposed project consists of placement of up to 25,000 cy of sand on only the subaerial (i.e. dry) portion of the beach such that potential impacts to nearshore resources from turbidity or burial are not anticipated. Thus, cumulative impacts from the proposed project are less than significant.

d) The project would not result in any direct or indirect environmental impacts to humans.

## **CHAPTER 5**

### **SUMMARY OF MITIGATION MEASURES**

The following mitigation measures would be implemented by DPR as part of the proposed project.

#### **BIOLOGICAL RESOURCES**

##### **MITIGATION MEASURES BIO-1**

- Prior to substrate deposition or manipulation, areas within and adjacent to the project footprint shall be surveyed for special status species. Any such species found on-site shall be avoided to the maximum extent practical through project redesign, timing/seasonal restrictions, delineated buffers, or other measures deemed necessary by the SELC or CSP staff.
- To avoid adverse impacts to any sensitive species (i.e. least tern, western snowy plover or grunion), construction activities will occur between September 15<sup>th</sup> and February 28<sup>th</sup> of any given year.
- The project footprint shall be kept clear of trash to avoid attracting scavengers/predators of the western snowy plover. All food and garbage shall be placed in sealed containers and regularly transported from the site. Following construction, any trash, debris, or rubbish remaining within the work limits shall be collected and hauled off to an appropriate location/facility.

#### **CULTURAL RESOURCES**

##### **AVOIDANCE AND MITIGATION MEASURES CULT-1**

- In areas where existing ground disturbance (trenching associated with the riprap reconfiguration) is proposed, DPR Archaeologist will be consulted such that archaeological and Native American monitors can be scheduled as necessary.
- The discovery of any archaeological or historical objects or features (including bone) will be reported to the Cultural Resources specialist immediately and work will cease in that location until the potential resource can be evaluated. Whenever possible resources will be protected and avoided through redesign in consultation with District Archaeologist. If archaeological deposits and features are encountered during the project, resources shall be protected from construction impacts until a data recovery program can be implemented.
- Contractor educational efforts will be completed prior to construction to alert workers to potential sensitive cultural resources and impact minimization measures to be implemented during construction.
- In the event that human remains are observed, there shall be no further excavation or disturbance of the site or any nearby area suspected to overlie adjacent human remains until the San Diego County Medical Examiner has evaluated the remains. If the Medical

Examiner determines the remains to be Native American, the Medical Examiner will contact the Native American Heritage Commission within 24 hours. The Native American Heritage Commission shall identify the person or persons to be the Most Likely Descendent (MLD). The landowner (DPR) or DPR representative and the MLD will determine the appropriate course of action.

## **HAZARDS AND HAZARDOUS MATERIALS**

### **MITIGATION MEASURES HAZMAT-1**

- The contractor will implement an applicable plan to avoid contamination from fuel or other potential hazards. A Spill Prevention, Containment and Countermeasures Plan (SPCCP) may be necessary. That plan specifies fueling procedures, equipment maintenance procedures, and containment and cleaning measures to be followed in the event of a spill). If not deemed necessary (due to not requiring fuel storage on-site, similar procedures are specified in the required Stormwater Management Plan (SWMP) or SWPPP, mentioned previously in Section III.

## **TRANSPORTATION/TRAFFIC**

### **MITIGATION MEASURES TRANS-1**

- The City would require the contractor to implement a traffic control plan with a system of signs and flagmen to prevent accidents while construction vehicles access and egress from the project site. The traffic control plan would include plans for traffic lane closure, shoulder closure, bike lane detour and pedestrian detour. The traffic control plan would also consider the additional safety measures at the schools located within the vicinity of the haul routes (e.g., extra control at school crossings) to reduce potential hazards. The traffic control features would reduce impacts to transportation and circulation to below a level of significance.

## CHAPTER 6 REFERENCES

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### Cultural Resources

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### Geology and Soils

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### Hazards and Hazardous Materials

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### Land Use and Planning

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### Mineral Resources

California Department of Conservation Division of Mines and Geology Special Report 153. 1983. Mineral Land Classification: Aggregate Materials in the Western San Diego County Production – Consumption Region. Encinitas Quadrangle. Plate 11.

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Transportation Studies, Inc. 2010. City of Encinitas Vehicle Data Collection Effort.

## Report Preparation

MOFFAT & NICHOL ON BEHALF OF CALIFORNIA DEPARTMENT OF PARKS AND RECREATION, SAN ELIJO LAGOON CONSERVANCY AND CALIFORNIA COASTAL CONSERVANCY.

APPENDIX A  
**MAPS, TABLES, AND CHARTS**

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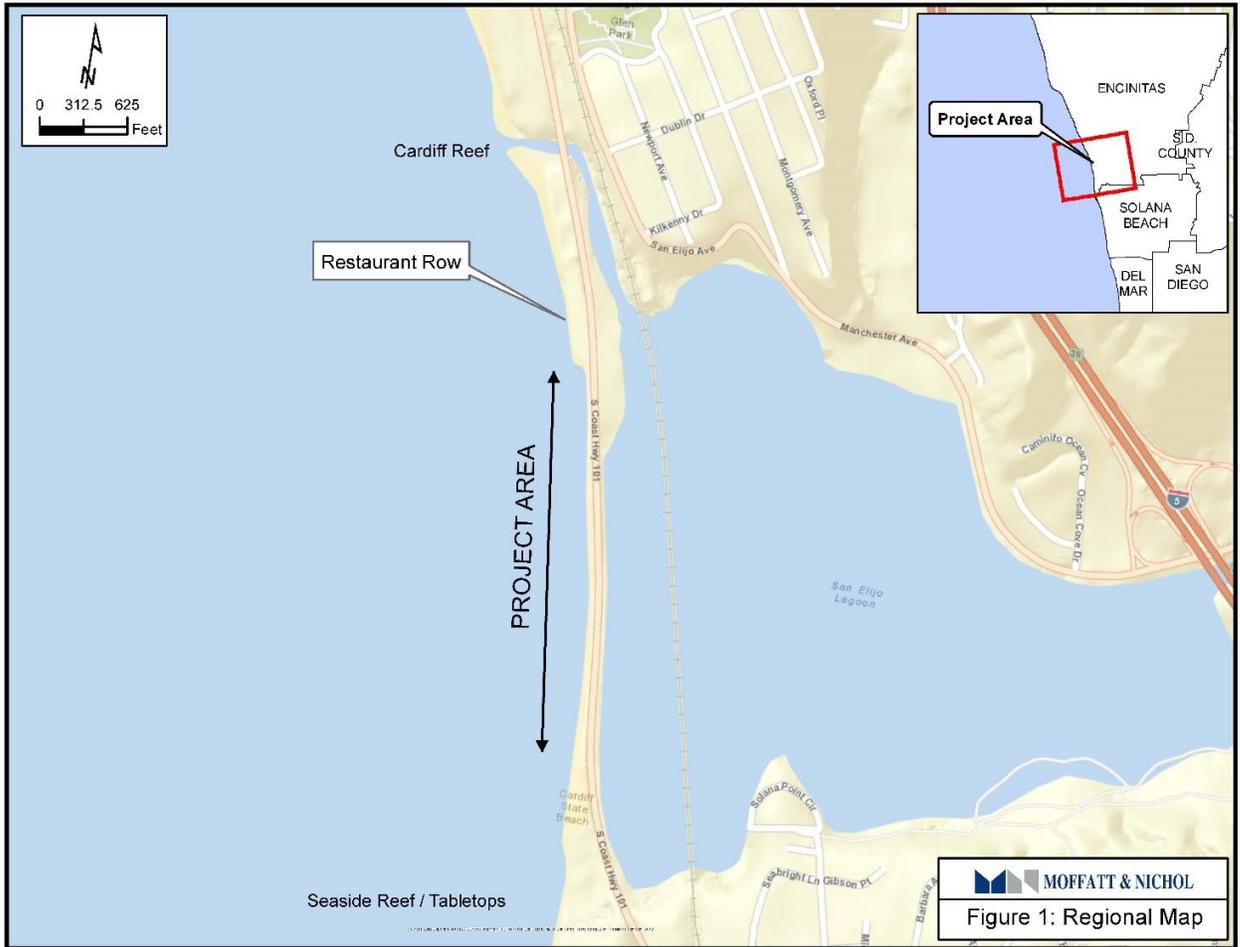


FIGURE 1. PROJECT LOCATION MAP



FIGURE 2. PROPOSED CONSTRUCTION STAGING AND STOCKPILE LOCATION

APPENDIX B

# PROJECT DESIGN GRAPHICS

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Figure 1. Plan View

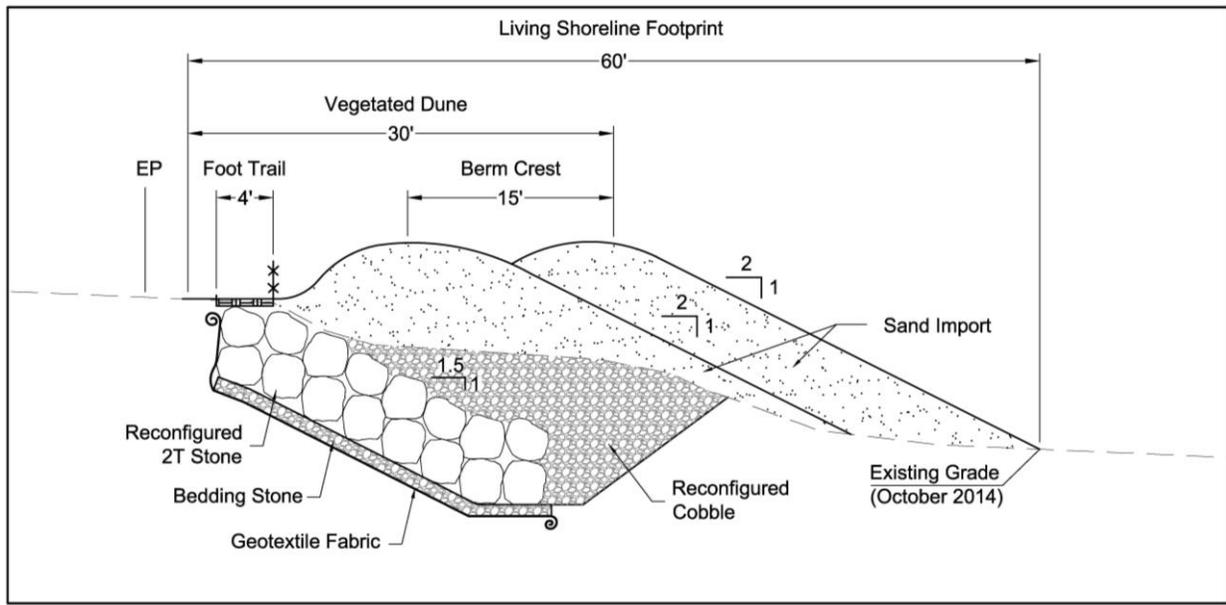


FIGURE 2. TYPICAL SECTION

APPENDIX C  
**SENSITIVE SPECIES LIST  
CNDDDB RECORD SEARCH**

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Table 1. List\* of Possible Species Present at Project Site

Scientific Name	Common Name	Listing	Presence
<b>Birds</b>			
<i>Aimophila ruficeps canescens</i>	southern California rufous-crowned sparrow	WL	Unlikely
<i>Campylorhynchus brunneicapillus sandiegensis</i>	coastal cactus wren	SSC	Unlikely
<i>Charadrius alexandrinus nivosus</i>	western snowy plover	FT, SSC	Possible
<i>Laterallus jamaicensis coturniculus</i>	California black rail	CT, FP	Unlikely
<i>Passerculus sandwichensis beldingi</i>	Belding's savannah sparrow	CE	Unlikely
<i>Polioptila californica californica</i>	coastal California gnatcatcher	FT, SSC	Unlikely
<i>Rallus longirostris levipes</i>	light-footed clapper rail	FE, CE, FP	Unlikely
<i>Sternula antillarum browni</i>	California least tern	FE, CE,	Possible
<i>Vireo bellii pusillus</i>	least Bell's vireo	FE, CE,	Unlikely
<b>Crustaceans and Mollusks</b>			
<i>Branchinecta sandiegonensis</i>	San Diego fairy shrimp	FE	Unlikely
<i>Streptocephalus woottoni</i>	Riverside fairy shrimp	FE	Unlikely
<i>Tryonia imitator</i>	mimic tryonia (=California brackishwater snail)	None	Unlikely
<b>Insects</b>			
<i>Cicindela senilis frosti</i>	senile tiger beetle	None	Unlikely
<i>Danaus plexippus pop. 1</i>	monarch - California overwintering population	None	Unlikely
<b>Mammals</b>			
<i>Chaetodipus californicus femoralis</i>	Dulzura pocket mouse	SSC	Unlikely
<i>Chaetodipus fallax fallax</i>	northwestern San Diego pocket mouse	SSC	Unlikely
<i>Choeronycteris mexicana</i>	Mexican long-tongued bat	SSC	Unlikely
<i>Neotoma lepida intermedia</i>	San Diego desert woodrat	SSC	Unlikely
<i>Nyctinomops femorosaccus</i>	pocketed free-tailed bat	SSC	Unlikely
<i>Perognathus longimembris pacificus</i>	Pacific pocket mouse	FE, SSC	Unlikely
<b>Reptiles</b>			
<i>Aspidoscelis hyperythra</i>	orangethroat whiptail	SSC	Unlikely
<i>Phrynosoma blainvillii</i>	coast horned lizard	SSC	Unlikely
<b>Plants</b>			
<i>Acanthomintha ilicifolia</i>	San Diego thorn-mint	FT, CE, CRPR 1B.1	Unlikely
<i>Acmispon prostratus</i>	Nuttall's acmispon	CRPR 1B.1	Possible
<i>Adolphia californica</i>	California adolphia	CRPR 2B.1	Unlikely
<i>Arctostaphylos glandulosa ssp. crassifolia</i>	Del Mar manzanita	FE	Unlikely
<i>Artemisia palmeri</i>	San Diego sagewort	None	Unlikely
<i>Atriplex coulteri</i>	Coulter's saltbush	CRPR 1B.2	Unlikely
<i>Baccharis vanessae</i>	Encinitas baccharis	FT, CE, CRPR 1B.1	Unlikely
<i>Brodiaea filifolia</i>	thread-leaved brodiaea	FT, CE, CRPR 1B.1	Unlikely

Scientific Name	Common Name	Listing	Presence
<i>Brodiaea orcuttii</i>	Orcutt's brodiaea	CRPR 1B.1	Unlikely
<i>Ceanothus verrucosus</i>	wart-stemmed ceanothus	CRPR 2B.2	Unlikely
<i>Chaenactis glabriuscula var. orcuttiana</i>	Orcutt's pincushion	CRPR 1B.1	Unlikely
<i>Chorizanthe orcuttiana</i>	Orcutt's spineflower	FE, CE, CRPR 1B.1	Unlikely
<i>Chorizanthe polygonoides var. longispina</i>	long-spined spineflower	CRPR 1B.2	Unlikely
<i>Comarostaphylis diversifolia ssp. diversifolia</i>	summer holly	CRPR 1B.2	Unlikely
<i>Corethrogyne filaginifolia var. linifolia</i>	Del Mar Mesa sand aster	CRPR 1B.1	Unlikely
<i>Cryptantha wigginsii</i>	Wiggins' cryptantha	CRPR 1B.1	Unlikely
<i>Ericameria palmeri var. palmeri</i>	Palmer's goldenbush	CRPR 1B.1	Unlikely
<i>Eryngium aristulatum var. parishii</i>	San Diego button-celery	FE, CE, CRPR 1B.1	Unlikely
<i>Euphorbia misera</i>	cliff spurge	CRPR 2B.2	Unlikely
<i>Ferocactus viridescens</i>	San Diego barrel cactus	CRPR 2B.1	Unlikely
<i>Harpagonella palmeri</i>	Palmer's grapplinghook	CRPR 4.2	Unlikely
<i>Hazardia orcuttii</i>	Orcutt's hazardia	CT, CRPR 1B.1	Unlikely
<i>Heterotheca sessiliflora ssp. sessiliflora</i>	beach goldenaster	CRPR 1B.1	Unlikely
<i>Isocoma menziesii var. decumbens</i>	decumbent goldenbush	CRPR 1B.2	Unlikely
<i>Iva hayesiana</i>	San Diego marsh-elder	CRPR 2B.2	Unlikely
<i>Lasthenia glabrata ssp. coulteri</i>	Coulter's goldfields	CRPR 1B.1	Unlikely
<i>Lepidium virginicum var. robinsonii</i>	Robinson's pepper-grass	CRPR 4.3	Unlikely
<i>Leptosyne maritima</i>	sea dahlia	CRPR 2B.2	Unlikely
<i>Myosurus minimus ssp. apus</i>	little mousetail	CRPR 3.1	Unlikely
<i>Navarretia fossalis</i>	spreading navarretia	FT, CRPR 1B.1	Unlikely
<i>Nemacaulis denudata var. denudata</i>	coast woolly-heads	CRPR 1B.2	Possible
<i>Orcuttia californica</i>	California Orcutt grass	FE, CE, CRPR 1B.1	Unlikely
<i>Orobanche parishii ssp. brachyloba</i>	short-lobed broomrape	CRPR 4.2	Unlikely
<i>Quercus dumosa</i>	Nuttall's scrub oak	CRPR 1B.1	Unlikely
<i>Suaeda esteroa</i>	estuary seablite	CRPR 1B.2	Unlikely

\* Inventory from California Natural Diversity Database and California Native Plant Society's Inventory

**FE** denotes a species that is a Federal Endangered Species.

**FT** denotes a species that is a Federal Threatened Species.

**FC** denotes a species that is a Federal Species of Concern.

**CE** denotes a species that is California State Endangered.

**CT** denotes a species that is California State Endangered.

**SSC** denotes a species that is a California Department of Fish and Game Species of Special Concern.

**WL** denotes a species that is a California Department of Fish and Game Watch List Species.

**CDFS** denotes a species that is a California Department of Forestry and Fire Protection Sensitive Species.

**CRPR** denotes the California Rare Plant Rank of the species.

**FP** denotes the California State Fully Protected status of the species.

APPENDIX D  
**ACRONYMS**

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BMPs	Best Management Practices
CCR	California Code of Regulations
CDPR	California Department of Parks and Recreation
CEQA	California Environmental Quality Act
cy	cubic yards
DPR	[California] Department of Parks and Recreation
EIR	Environmental Impact Report
HWY 101	Highway 101
IS/MND	Initial Study/Mitigated Negative Declaration
LCP	Local Coastal Plan
LUP	Land Use Plan
mcy	million cubic yards
MLD	Most Likely Descendent
MLLW	mean lower low water
NAVD88	North American Vertical Datum of 1988
PM	Particulate Matter
the “project”	Cardiff State Beach Living Shoreline Project
SELRP	San Elijo Lagoon Restoration Project
sq. ft.	square feet
SLR	sea-level rise
USACE	U.S. Army Corps of Engineers
RAQS	[San Diego] Regional Air Quality Strategy
SIP	[California] State Implementation Plan

**Attachment E: Seaside Terrace Dunes**  
**Draft Habitat Restoration Plan**

# Seaside Terrace Dunes Draft Habitat Restoration Plan

April 2016

Prepared for:



Prepared by:



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## 1.0 Overview/Introduction

### 1.1 Project Background

The project concept was originally developed by the San Elijo Lagoon Conservancy (SELC) and California State Parks (CSP) resource managers to mitigate for development of a special events space at the southern portion of the site. Initially, managers planned a low-cost project that focused on minimizing impacts related to the proposed special event space and existing recreational activities, as well as building appreciation for sensitive coastal resources that exist on site. Managers solicited input from the United States Fish and Wildlife Service (USFWS) Coastal Program (CP) for development of the project. The USFWS encouraged a more elaborate approach that would achieve several objectives related to special-status plant and native habitat protection, and would substantially increasing public appreciation for coastal strand habitat protection. SELC, CSP, and USFWS have been collaboratively developing the project over the past several years, and intend to implement it by 2019.

### 1.2 Project Location

The project is located on the southern part of the coastal strand that extends between Solana Beach and Cardiff-by-the-Sea, California (see **Figure 1: Vicinity Map**). The coastal strand is traversed by Hwy 101 and its bike lanes, a corridor armored by large boulder rip-rap for most of its length. The strand includes remnant dunes, immediately east of Hwy 101, where USFWS and SELC have had some success restoring native dune ecological processes and species since 2008.

The project is located on CSP property known locally as “Seaside.” The official name for the parking and recreation area directly adjacent to the southern boundary of the project site is South Cardiff State Beach. The project is located at South Cardiff State Beach immediately north of the State Beach parking lot and is owned by the State of California Department of Parks and Recreation (see **Figure 2: Site Map**). It is approximately one acre and currently available for recreation associated with beach activities (e.g., sun bathing, walking). The site is classified as a State Beach which allows for balance between recreational activity and natural resource conservation. State Park Natural Resource Policy provides for long-term protection of sensitive species and habitats within all State Parks. Biologists surveying sites throughout San Diego County in 2014 and 2015 noted that the project site is one of the very few sites in coastal North County where coastal dune rare plant species persist on the beach (Kentner 2015). This project will provide a foundation for management strategies to provide long term conservation for this habitat, with implications for management of similar habitats in other areas.

Figure 1: Vicinity Map



 Figure 1. Vicinity Map  
Seaside Terrace Dunes Draft Habitat Restoration Plan

0 300 600 1,200 Feet

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Imagery Date: 2012  
Map Date: APR 2016  
Data Source: SELC & SANGIS

Figure 2: Site Map




**Figure 2. Site Map**  
 Seaside Terrace Dunes Draft Habitat Restoration Plan
 
 Imagery Date: 2012  
 Map Date: APR 2016  
 Data Source: SELC & SANGIS

### 1.3 Project Development

The project was originally conceived by CSP and SELC biologists to enhance habitat and aesthetic conditions at the site to protect it and adjacent areas from invasive plant infestation and unauthorized (human) disturbances. It is believed that a stinkwort (*Dittrichia graveolens*) infestation occurred in 2009-2010, following the introduction of fill soil to the South Cardiff State Beach parking lot for landscaping purposes. The stinkwort flourished on the site, and eventually spread across Hwy 101 and into the San Elijo Lagoon Ecological Reserve (SELER). Project co-managers believed that enhancing native habitat conditions would bolster ecological conditions and result in more invasion-resistant vegetation conditions. Unauthorized access to and through the site includes bikes and motor vehicles including San Diego County law enforcement vehicles and local lifeguard equipment. Project co-managers believe that habitat enhancement coupled with symbolic fencing, signage, and interpretive exhibits will deter unauthorized vehicle access and other disturbances, as well as build appreciation for native coastal strand habitat conditions. The project received a significant increase in fiscal support and guidance when USFWS CP personnel joined the project development team in 2014<sup>1</sup>.

#### 1.3.1 Responsible Parties

California State Parks is the landowner and project co-manager. San Elijo Lagoon Conservancy is an adjacent landowner and project co-manager. USFWS is the major funder and project co-manager. Contact information is provided:

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<sup>1</sup> USFWS funding is documented in the Award Letter dated September 12, 2014 from Alice Garrett, USFWS, to David Varner, SELC. Funds expire on September 15, 2019.

## 2.0 Project Description and Objectives

### 2.1 Existing Conditions

The site is classified as a State Beach which allows for balance between recreational activity and natural resource conservation. State Park Natural Resource Policy provides for long-term protection of sensitive species and habitats within all State Parks. The substrate in the project area consists of sand, compacted soil, and remnant pavement from an old road. Vegetation is generally sparse and consists of patches of plants associated with dune scrub as well as scattered invasive plant infestations. Human uses in the area consists of walking, biking, beach going, bird-watching, and occasional off-road driving.

Currently, an informal trail that dissects the site is used by pedestrians and state park users. It receives north- and south-bound pedestrians from Hwy 101, delivering them to the northern and southern boundaries of the site, as well as to the beach on the western boundary. The path is a wide, double-track at the southern boundary, where the occasional vehicle accesses and traverses the site, proceeding east- and westward to/from the beach (lifeguard vehicles), or only partially traverses the site to park for short periods (sheriff vehicles) and then retreating the same way to exit. The informal trail is occasionally used by bicyclists, although most remain on Hwy 101 in the bike lane.

A sidewalk ramp exists at the southeastern corner of the site, enabling wheeled vehicles access through the sidewalk to the informal double-track trail. A set of stairs at the southern boundary of the site provides access from the lifeguard stand and shower area that are connected to South Cardiff State Beach parking lot. Both the sidewalk ramp and stairs are used by pedestrians to access the beach.

The beach area just north of the Seaside parking lot is above the high tide level and, currently supports a large population of Nuttall's acmispon (*Acmispon prostratus*) and a few small patches of coast woolly-heads (*Nemacaulis denudata* var. *denudata*). The substrate in the project area consists of sand, compacted soil, and remnant pavement from an old driveway. Vegetation is generally sparse and consists of patches of plants associated with dune scrub. In 2012, overall vegetative cover was around 75 to 100% along Highway 101, falling to 25% on the sand flat west of the Highway 101 (Landis 2012). In 2014, there was less vegetative cover as a result of more severe disturbance associated with foot traffic and camping (Landis 2014). Biologists visiting the site during spring botanical surveys in 2014 and 2015 reported that recreational use was heavy in this area and lifeguard vehicles were observed driving through the rare plant populations during the survey (Kentner 2015). Patches of Hottentot fig and Canary Island sea lavender occur throughout the area, and threaten to displace the rare plant habitat without management (Kentner 2015). Native plant species include the native beach evening-primrose (*Camissoniopsis cheiranthifolia* subsp. *suffruticosa*), salt heliotrope (*Heliotropium curassavicum*), Nuttall's acmispon, coast woolly heads, Menzies' goldenbush (*Isocoma menziesii* var. *menziesii*), and mulefat (*Baccharis salicifolia*). Non-native plant species on-site include iceplant (*Carpobrotus edulis* and *chilensis*), yellow sweetclover (*Melilotus indica*), non-native sea lavenders (*Limonium sinuatum* and *L. perezii*), sea rocket, wattle (*Acacia* sp.), radish (*Raphanus sativus*), mustards (*Brassica* and *Hirschfeldia* spp.), stinkwort, tree tobacco (*Nicotiana glauca*), Russian thistle (*Salsola australis*), prickly sow thistle (*Sonchus asper* subsp. *asper*), Australian saltbush (*Atriplex semibicatta*), and non-native grasses (*Bromus* spp., etc.).

### 2.1.1 Historical Conditions

As previously mentioned, the project site is located within the South Cardiff State Beach. The site has been through several transitions over the past few decades. The CSP compiled a photographic history of the site based on images acquired from the California Coastal Records Project, and this was used by project co-managers to aid in site planning. Prior to 2008, much of the site was under pavement that was the former entrance to South Cardiff State Beach parking lot. A roadway previously ran through the project area that connected Highway 101 to a trailer park south of the Project area. The trailer park was replaced by a parking lot. The roadway was removed between 2006 and 2008, though remnant pavement still exists. Prior to development, the area likely consisted of beach, sand dunes, and tidal inlets to San Elijo Lagoon. The area was utilized by Native Americans and then settled by the Spanish in the 1700s. The area changed hands from Spain to Mexico, and in the 1800s the Mexican government issued land grants to ranchers. More recently, CSP took ownership of the land.

### 2.2 Regional and Local Considerations for Restoration Planning

The site is pertinent to the Encinitas Subarea Plan portion of SANDAG's North County Multiple Habitat Conservation Program (North County MHCP), itself a component of the region's Natural Communities Conservation Plan (NCCP). The MHCP identifies California least tern (*Sternula antillarum browni*); western snowy plover (*Charadrius alexandrinus nivosus*), and Nuttall's lotus (*Acmispon nuttallianus*) as conservation targets (CDFW 2016). The site falls within San Diego Management and Monitoring Program (SDMMP) Conserved Lands, which are lands conserved for the purpose of protecting the open space and natural habitats including lands inside and outside of NCCP areas (SDMMP 2014). The site falls within Management Unit 7 North Coast, which also includes the adjacent SELER (SDMMP 2013).

Locally, much has been accomplished in the past decade regarding ecological restoration. SELC has successfully conducted numerous native habitat restoration efforts in and around the SELER with the support and involvement of the local community. Specific to coastal strand habitat restoration, SELC and USFWS are responsible for successfully restoring native dune vegetation communities at the nearby San Elijo Lagoon dunes site directly east of Hwy 101. Techniques refined during the San Elijo dunes effort are incorporated into the methods prescribed for the Project. Biological surveys have revealed that there has been a recent increase in native avian species utilizing the SELER dunes.

In addition, local efforts to improve habitat conditions along the beach north of Seaside Terrace are underway. The City of Encinitas has conducted studies and is applying for implementation funds for the Cardiff Living Shorelines project. The projects are similar in that they both have goals to re-create native dune habitat using native propagule introduction, sand placement, pedestrian controls, and a multi-pronged approach to outreach and education.

#### 2.2.1 Ecological Benefits of Restoration

Sensitive plant and avian species associated with coastal dune habitat will benefit from the project. Sensitive plants that could benefit include coast woolly-heads and Nuttall's acmispon, which are both identified as California Rare Plant Rank (CRPR) 1B by the California Native Plant Society. Plants with a CRPR of 1B are rare throughout their range with the majority of them being endemic to California. Most of the plants that are ranked 1B have declined significantly over the last century. Out-planting seeds of

these species and removing invasive exotic plant species and human disturbance will potentially increase the distribution and abundance of these special-status plant species. The establishment of a native dune plant community could make the habitat more attractive for roosting birds, including the California least tern, western snowy plover, and other migratory birds.

Establishment of a robust native vegetation community will help prevent future invasion by aggressive, non-native plants that exploit disturbed and transitional conditions. On-going invasive vegetation control will be exercised, but the effort to do so will decrease with time once cover and diversity values of native vegetation are attained.

The ultimate ecological benefit of any restoration project is to strengthen the relationship of living things to their environments. This project will strengthen relationships between native species and coastal strand environment, as well as the relationship of the human visitors to the site. The Project will increase public appreciation for coastal strand resources through education and community involvement.

## 2.4 Project Goals and Objectives

The goal of Seaside Terrace Dunes Restoration Project is to enhance substrate and vegetation conditions such that native dune habitat is established at the site, without undue disturbance of existing resources. The following objectives will be implemented to accomplish the aforementioned goal:

- Eradicate non-native vegetation from the site;
- Import sand to the site to restore sand dune habitat;
- Seed with relevant native dune species;
- Install habitat-sensitive fencing and demarcated pathways that prevent unauthorized human access to high-quality habitat zones; and
- Install signage that informs and builds appreciation for the protection of the native coastal strand ecosystem.

## 3.0 Constraints to Restoration

The installation of a special events space adjacent the project will increase foot traffic in the area during events. The space must be planned and installed with attention to the appreciation and protection of the adjacent native dune ecosystems. Trespass into the site must be discouraged through signage and symbolic fencing. Continued unauthorized human disturbances such as driving, biking, and walking across sensitive areas within the site would prevent realization of restoration goals. The lack of weed, fence and trail management beyond the scope of this proposal may threaten to undermine restoration efforts. Therefore, ongoing funding will be required to ensure future success.

## 4.0 Project Implementation

### 4.1 Site Preparation

Site preparation will consist of the removal of non-native invasive plants and placement of imported sand into the project area. Non-native invasive vegetation control began in 2013 with hand removal-only. Herbicide applications were conducted in 2015 and will continue through the remainder of the project. Species targeted at the site include iceplant, yellow sweetclover, non-native sea lavenders, sea rocket (*Cakile maritima*), wattle, radish, mustards, stinkwort, tree tobacco, Russian thistle, prickly sow thistle, Australian saltbush, and non-native grasses. Non-native vegetation control should be conducted throughout the entire project site, and in any accessible adjacent buffer zones.

In late May or early June of every calendar year SELC excavates the inlet of the San Elijo Lagoon to maintain tidal influence. The material is excavated with land-based equipment such as front loaders, excavators, and dump trucks. The excavated material contains sand suitable for beach placement. To date, all the excavated material has been placed in the near shore surf zone. This project plans to take the beach-suitable sand from the excavated material and put it within the dune habitat zones using land-based equipment (**Figure 2**). Beach-suitable sand is determined based on the San Elijo Inlet Excavation Coastal Development Permit (CDP) and the United States Army Corp of Engineers 404 and 401 permits.

Imported sand will be graded to create dune topography with a slight grade towards the ocean. The SELC, CSP, and CP Biologist will work together to finalize specific locations for restoration actions (e.g., sand placement, seeding, container plants, fencing, signage) prior to implementation. The imported sand will mechanically shaped into a dune profile and subsequently leached of salt to promote appropriate soil conditions. Leaching will be occur organically, by waiting for several natural precipitation events to occur prior to propagule introduction. If time and resources do not allow for at least two natural precipitation events to occur prior to seeding/planting, physically irrigating the dune area may be warranted. The SELC staff have experience with salt leaching in excavated materials, and will perform investigations necessary to achieve appropriate salinity levels.

Initial plans are to import approximately 100 cubic yards of sand onto the site, leaving a mosaic substrate of sand, cobble and vegetated areas. Because of low site topography, the limited amount of sand being imported, and sufficient distance from Hwy 101, no structural (e.g., sand fence, erosion control blanket, etc.) measures will be utilized to stabilize the sand. The vegetation installed and fostered as part of the project will be sufficient to stabilize imported sand (see **Section 4.4 Plant Selection, Acquisition and Installation**).

In coordination with this project, CSP intends to plan and install a special events space adjacent the project. The area designated for this space is identified in **Figure 2**. The specifications for the special events space will be reviewed by project managers and technical staff for input prior to finalization and implementation. Appropriate construction boundaries will be established to minimize impacts to the site and project. CSP is currently developing a CDP application that will accurately define the special events space location and construction plan.

## 4.2 Public Outreach

The project will engage the public through signage and active interpretation by SELC and CSP staff. SELC and CSP staff currently cooperate to conduct education and interpretation presentations at nearby coastal strand sites. Site visitors will be educated regarding the project and coastal strand conservation issues in general.

Signage will include directional and educational information. Directional signage will clearly direct visitor behavior with respect to trash and debris, trail usage and no-use areas. Educational signage will describe the project and native coastal strand resources.

### 4.2.1 Education & Interpretation

It is important that education efforts be addressed actively, and not just passively via signage. As described, CSP and SELC currently conduct nature and restoration site interpretation presentations and events. Efforts will be expanded to include the Seaside Terrace Dunes Restoration project.

SELC Biologists will engage and educate volunteers from the community to help implement portions of the Project. Volunteers will understand the value of native species and the threats posed by invasive species and human disturbances prior to participating in Project activities. The volunteers will apply this knowledge by working with SELC Biologists and CSP staff to help restore sensitive habitat. Community awareness will be raised with regard to the issues facing watershed resources and how the public can help to reduce habitat and water quality impacts. The tasking and sharing of restoration site responsibilities among willing and capable community volunteers will increase the capacity of Project partners and build a sense of community pride in the Reserve. All participants will receive an educational handout/brochure that they can utilize in the future. The brochure will outline the topics discussed at each event. All participants will:

- understand the difference between native and non-native plants and will be able to identify common species;
- learn why SELC uses contractors to implement herbicide treatments at specific locations;
- understand the impact of invasive species and human disturbance on native habitats and species;
- learn invasive plant management techniques and how to plant native species;
- understand the impact of their own behaviors on sensitive areas;
- adopt a stewardship ethic to guide activities such as landscape plant selection in their own neighborhoods;
- increase their connection with nature and appreciation for local natural resources and their benefits to current and future generations.

#### 4.2.2 Signage

Informative signage will be used to describe the need for and actions taken to restore coastal dune habitat. Signage will be designed to build support for conservation and preservation projects while guiding simultaneous recreational use.

CSP intends to create a special events space directly adjacent to the Project area. The special events space will include interpretive exhibits that help visitors understand native dune ecology and Project activities.

#### 4.3 Trail Designation

An existing, unofficial 550-foot long footpath dissects the site from north to south. The direction and length of the trail will be maintained during the project. The SELC, CSP, and CP Biologist will work together to designate an official trail alignment and design as the project is implemented. The final trail will be approximately 3-4 feet wide and approximately 550 feet long, and will run north-south through the Project site.

CSP is going to construct an approximately 1,000-square foot special event area adjacent the Project site. A trail is designated to traverse the eastern edge of the event area, based on an existing established informal footpath. As previously mentioned, directional signage will be posted at either end of the trail. In order to adaptively manage user access and through-passage, temporary signs will be initially used and will ultimately be replaced with long-term signage.

Once Project co-managers identify the ultimate location of the special event area, a formal fencing plan will be designed. A spur trail will also be designated to connect the eastern trail through the special events facility to the beach, and to the stair access at the South Cardiff Beach parking lot.

#### 4.3 Fencing

Fencing will demarcate the outer boundary of native habitat to be protected and the boundaries of a 550 foot trail and 1000 square foot special event area, the latter which may be planned and implemented by CSP at a future phase not associated with this project. The preference is for 'symbolic' fencing that works in conjunction with outreach and education efforts to deter human disturbance of the site. Fence specifications will ultimately be decided by the landowner, CSP, but it is envisioned that 2.5" x 2.5" fiberglass fence posts will be installed by hand and connected by braided rope. This style has been used successfully to protect other sensitive resources on CSP land, and is called 'symbolic' because it is not prohibitive. Symbolic fencing will be installed on the west side of the trail and the east boundary of the restored dunes area and an installation option is depicted in Figure 2.

#### 4.4 Plant Selection, Acquisition and Installation

Native plants local to San Elijo Lagoon will be planted throughout the project area with the exception of the areas within the 550 foot trail (~2200 square feet) and special event area (~1000 square feet). The entire site will be planted and seeded with the dune plant species listed in Table 1. Plantings of coastal sage scrub species will be performed in the vegetation transition zone, located at the project's interface with Highway 101 and identified in Figure 2, in part to serve as a buffer between the restored habitat and the roadway.

**Table 1. San Elijo coastal strand planting palette as proposed by SELC.**

Common Name	Scientific Name	Form	Notes
beach sun cup	<i>Camissoniopsis cheiranthifolia</i> subsp. <i>suffruticosa</i>	subshrub	Currently abundant east of Hwy 101; scattered patches exist west of Hwy 101
Nuttall's acmispon	<i>Acmispon prostratus</i>	annual herb	Currently abundant east of Hwy 101; scattered plants exist west of Hwy 101 at southern end of Seaside Terrace site
beach sand verbena	<i>Abronia umbellata</i>	annual herb	Currently abundant east of Hwy 101; occasional individuals observed west of Hwy 101
Orcutt's pincushion	<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i>	annual herb	Currently abundant at very small site immediately east of Hwy 101; this is potentially the sole remaining population of the coastal variation of this species (Oberbauer...)
coast woolly-heads	<i>Nemacaulis denudata</i> var. <i>denudata</i>	annual herb	Currently abundant east of Hwy 101; scattered plants exist west of Hwy 101 at southern end of Seaside Terrace site
beach bur-sage	<i>Ambrosia chamissonis</i>	perennial herb	No recent observations of this species at San Elijo coastal strand
beach morning-glory	<i>Calystegia soldanella</i>	perennial herb	No recent observations of this species at San Elijo coastal strand
red sand verbena	<i>Abronia maritima</i>	perennial herb	No recent observations of this species at San Elijo coastal strand

SELC staff collected seeds of native coastal dune plants and coastal sage scrub from the SELER. The seeds are being stored and bulked at a native plant nursery for the purposes of restoration, resulting in

seeds and propagated plants local to the SELER available for restoration in and around San Elijo Lagoon. The species of plants for which seeds and plants are available for the project are listed in Table 2. Other species of plants may be utilized pending agreement between project co-managers. Quantities of seed and container plants to be outplanted are an estimate; final values will be determined after site designs are finalized and plant viability is assessed.

**Table 2. Estimated quantity of native species propagules to be outplanted at the project site.**

Species	Propagule Type	Quantity (pounds of seed per acre)
<i>Abronia umbellata</i>	Seed	5
<i>Abronia maritima</i>	Seed	5
<i>Acmispon prostratus</i>	Seed	3.5
<i>Camissoniopsis cheiranthifolia</i> subsp. <i>suffruticosa</i>	Seed	4
<i>Chaenactis glabriuscula</i> var. <i>orcuttiana</i>	Seed	1.5
<i>Nemacaulis denudata</i> var. <i>denudata</i>	Seed	4

Container plants (2-inch containers) will be added to the planting palette, as determined by the co-managers, to provide adequate seed shelter and physical stabilization of the dune sand.

## 5.0 Measures to Minimize Impacts to Sensitive Biological Resources

Federally listed species that potentially utilize the project area for foraging or loafing include the endangered California least tern (*Sternula (Sterna) antillarum browni*) and threatened western snowy plover (*Charadrius alexandrinus nivosus*). Except for a single (unsuccessful) nest made by a pair of western snowy plovers in 2015, nesting by these federally listed species has not been recently documented within the project area or at the SELER. No critical habitat for any federally listed species occurs within the project area. To avoid impacts to breeding birds, the following activities will not be conducted within the project area during the bird breeding season (between March 16 and Sept 14):

- a. A qualified biologist will conduct pre-activity surveys in the project site to determine the location of any active bird nests in the area, including raptors and ground nesting birds. Locations of nests will be identified on maps and cordoned off by stakes and warning tape to identify locations where work activities will be restricted. The survey should begin not more than three days prior to the beginning of project activities. No activities are allowed within 100 feet of active nesting territories unless measures are implemented to minimize the noise and disturbance to those adjacent birds. If these conditions cannot be met, no further work will be conducted without coordination with the USFWS.

- b. On the day of these project activities, participants will be instructed as to the purpose of the flagging or stakes used to delineate locations of sensitive species and advised of areas to be avoided. Participants will be shown pictures of the rare and sensitive birds and maps of any identified nesting locations. Activities will be overseen by SELC or CSP staff familiar with dune biology, ecology, associated native species, and the conservation measures identified for the project. The following additional measures will be implemented during the breeding season if breeding birds are present in the project area:
  - i. Work parties engaged in trash/refuse removal activities will be supervised by SELC or CSP staff.
  - ii. Vegetation monitoring crews will be limited to three trained people at one time.

Avifauna monitoring crews will be limited to two people at one time. Avifauna monitoring will be conducted by qualified personnel or experienced SELC or CSP staff.

The specifications for the special events space will be reviewed by project managers and technical staff for input prior to finalization and implementation. A hard and soft boundary for construction will be established so as to minimize impacts to the site and project.

USFWS determined that, while the project has the potential to disturb roosting and/or nesting birds, implementation of the conservation measures as described above will avoid the potential for substantive impacts. As well, the “project should benefit the California least tern and western snowy plover by expanding native habitat that could be utilized for roosting. Based on the project description, the beneficial effects of the project, and the implementation of measures to minimize potential adverse impacts, the project is not likely to adversely affect the California least tern or western snowy plover” (USFWS 2014).

## **6.0 Measures to Minimize Impacts to Cultural Resources**

The ground within the project area is disturbed. A roadway previously traversed the project area that was ‘removed’ between 2006 and 2008 (though remnant pavements still exists). If present below the remnant pavements, cultural resource would not be disturbed by the project. Project co-manager, CSP, conducted an evaluation of cultural and historical resources at the site and approved the project (CSP 2014) with the following measures incorporated:

1. If fencing and sign installation activities require ground disturbance beyond 3 feet in depth, an archaeological monitor and Native American monitor may be required. District Archaeologist (Nicole Turner, 619-933-9013 or [Nicole.Turner@parks.ca.gov](mailto:Nicole.Turner@parks.ca.gov)) should be consulted with the final planned depth of excavation prior to construction activities so monitors can be scheduled if necessary.
2. Discovery of archaeological or historical objects or features (including bone) should be reported to the on-site Cultural Resources specialist immediately, and work should cease in that location until the potential resource can be evaluated.

Project co-manager, USFWS, evaluated potential cultural resource impacts as a result of the project and determined “no field inventory for cultural resources is necessary” (USFWS 2015). USFWS approved the project with the same measures incorporated by CSP, as listed above.

## **7.0 Maintenance, Monitoring and Reporting**

The project will remove trash and non-native invasive plants by hand. Contractors and co-manager staff may treat non-native invasive plants with herbicide for later removal by hand, using volunteers or staff. The site will be irrigated, as required. Trail and fence maintenance and repair will be accomplished by staff and volunteers.

Vegetation surveys will be conducted before and after project implementation for the life of the agreement to evaluate whether the project met the goal of establishing habitat for coastal dune plants. Surveys will identify the percent cover of native vegetation and non-native vegetation, and will identify the species located within the project area (species composition). Methods to conduct these surveys include Relevé ([http://www.cnps.org/cnps/vegetation/pdf/cnps\\_releve\\_protocol\\_20070823.pdf](http://www.cnps.org/cnps/vegetation/pdf/cnps_releve_protocol_20070823.pdf)) and/or ten-meter point intercept transects with photos at each end.

Surveys for rare plant species also will be conducted in the spring (i.e., March through June). Methods for monitoring rare plant species will be consistent with methods previously utilized in the project area in 2012 and 2014 (Landis 2012, 2014). These methods include counting all individuals in the project area and estimating the population through frame-based sampling. Only frame-based sampling will be conducted when the abundance of plants is too high to count all individuals. Frame-based sampling consists of directly counting the number of target plant species within a 1-foot by 1-foot frame. At least 20 frame counts will be conducted within the project area. The frame is thrown to bounce and roll erratically. The surveyor will move between throws to sample within the project area, resulting in a semi-random plot location. If appropriate, the project also will sample per the Management Strategic Plan 2014 Monitoring Protocol for Rare Plant Occurrences on Conserved Lands in the Western San Diego County

([http://www.sdmmp.com/Libraries/Monitoring\\_Plans\\_and\\_Reports/MSP\\_2014\\_Rare\\_Plant\\_Habitat\\_Assessment\\_Field\\_Form\\_Instructions\\_Final.sflb.ashx](http://www.sdmmp.com/Libraries/Monitoring_Plans_and_Reports/MSP_2014_Rare_Plant_Habitat_Assessment_Field_Form_Instructions_Final.sflb.ashx)) so this occurrence can be compared with occurrences throughout San Diego County.

Retention of the sand will be measured by using marked posts installed prior to sand deposition or RTK GPS measurements. RTK GPS measurements will be conducted by the USFWS. Measurements will occur twice per year.

Monitoring reports will be presented annually to USFWS with the interim performance reports. At a minimum, the reports will present the methods utilized, resulting data for that performance period, previous cumulative data collected immediately before and during project implementation, discussion and conclusions, and any recommendations for future actions to benefit sensitive resources.

## **9.0 Environmental Review**

CEQA Compliance: The State Parks project manager conducted a review of the project under the California Environmental Quality Act (CEQA), which included a review of project activities in relation to protection of cultural, historical, and biological resources. The project was granted a categorical exemption on November 19, 2014, with certain conditions in regard to archaeological resource protection which are outlined in Section 6.0 Measures to Minimize Impacts to Cultural Resources.

NEPA Compliance was determined and documented in the “NEPA Compliance Checklist,” which was signed and dated February 17, 2015. The project is categorically excluded from further NEPA documentation. The specific subjects related to NEPA compliance, cultural and biological elements, are addressed above in Section 5.0 Measures to Minimize Impacts to Sensitive Biological Resources and Section 6.0 Measures to Minimize Impacts to Cultural Resources.

## **10.0 Permitting**

A Right of Entry permit was developed so that SELC staff, volunteers, and contractors are able to work at the site. This permit will be maintained throughout the life of the project per annual renewals.

CSP is currently developing a CDP application that will better define the special events space and its construction. The area that will be occupied by this space is displayed in Figure 2.

Regarding placement of sand at the site: SELC will include this action in its own inlet maintenance CDP, and tentative approval from CCC staff has already been obtained. The timing of each sand placement will be coordinated with USFWS and any current ESA requirements for avian species in effect.

## 11.0 Itemized Costs

**Table 3. Itemized Costs\***

Item No.	Project Task	Cost	Percent
1	Fencing 1580 ft.@6.70/ft.	\$ 10,586	15.8%
2	In-kind Services (CSP)	\$ 8,500	12.7%
3	Project Mgmt.	\$ 7,620	11.4%
4	Planting/Seeding	\$ 7,500	11.2%
5	Invasives Control	\$ 7,350	10.9%
6	Vegetation Monitoring	\$ 7,200	10.7%
7	Plant propagules	\$ 6,500	9.7%
8	Signage	\$ 3,895	5.8%
9	Reporting	\$ 3,480	5.2%
10	Irrigation	\$ 2,300	3.4%
11	Hand Tools	\$ 2,000	3.0%
12	Travel	\$ 200	0.3%
	<b>TOTAL:</b>	<b>\$ 67,131</b>	<b>100.0%</b>
<b>Notes:</b>			
Fencing materials are highly dependent on permit restrictions and the needs of State Parks			

\*Itemized costs for two years. Five years of funding for maintenance and monitoring preferred

## 12.0 Project Schedule

Initiation of on-the-ground activities began October 2015, when vegetation management activities commenced. It is expected that vegetation management will be maintained until project completion. Community restoration events will be held throughout the project as needed to perform debris removal, vegetation and infrastructure management, and monitoring. Fence and signage installation will commence spring 2016. Permit for placing sand is will be acquired as part of SELC's inlet maintenance project. Sand deposition may commence as early as June, 2016 and repeat annually until the target sand volume and area are reached. Avian, vegetation, and substrate monitoring will be performed for the duration of the project.

## References Cited

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- Kentner, E. 2015. North County Dunes Habitat Restoration Project Botanical Survey Report. Report to San Elijo Lagoon Conservancy.
- Landis, F. 2014. San Elijo Lagoon Rare Plant Surveys Draft Report, Spring 2014. Report to San Elijo Lagoon Conservancy.
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- San Diego Management and Monitoring Program (SDMMP). 2013. Management Strategic Plan for Conserved Lands in Western San Diego County, Vol. 1: Overview and Approach. 3 Volumes. Prepared for the San Diego Association of Governments. San Diego. Version 08.27.2013.
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<https://www.sciencebase.gov/catalog/item/53e8fd4be4b02d190f05eb4b?community=San+Diego+Management+%26+Monitoring+Program>.
- USFWS. 2014. Letter from Coastal Program Coordinator to Deputy Field Supervisor, Subject: Intra-Service Section 7 for the Seaside Terrace Dune Plant Restoration Project at South Cardiff State Beach, City of Encinitas, California. October 6, 2104.
- USFWS. 2015. Letter from Anan Raymond to Carolyn Lieberman, Subject: Notification of Conditional Compliance with Section 106 of the National Historic Preservation Act (NHPA). February 11, 2015.

## **Appendix A: Access Permissions**

SITE	APN	LANDOWNER	LANDOWNER'S ADDRESS	PERMISSION
OCEANSIDE, SAN LUIS REY	N/A	N/A	N/A	NO
CARLSBAD STATE BEACH, PINE TO TAMARACK	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
	2043100100	STATE OF CALIFORNIA	N/A	YES
	2032501500	STATE OF CALIFORNIA	N/A	YES
	2032511001	CRAIG BARBARA C TRUST 10-08-99	300 CARLSBAD VILLAGE DR. #108A363, CARLSBAD, CA 92008	NO
CARLSBAD, AGUA HEDIONA	2100104500	CABRILLO POWER I L L C	4600 CARLSBAD BLVD., CARLSBAD, CA 92008	NO
	2060701700	CABRILLO POWER I L L C	4600 CARLSBAD BLVD., CARLSBAD, CA 92008	NO
	2100101100	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
SOUTH CARLSBAD STATE BEACH, NORTH TERRAMAR	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
	2100104500	CABRILLO POWER I L L C	4600 CARLSBAD BLVD., CARLSBAD, CA 92008	NO
	2100202300	BYRNE HERBERT R & LORINE C	5001 TIERRA DEL ORO ST., CARLSBAD, CA 92008	NO
SOUTH CARLSBAD STATE BEACH, SOUTH TERRAMAR	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
	2110302900	STATE OF CALIFORNIA	N/A	YES
	2101000300	STATE OF CALIFORNIA	N/A	YES
	2101202900	STATE OF CALIFORNIA	N/A	YES
SOUTH CARLSBAD STATE BEACH, 101 MEDIAN STRIP	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
SOUTH CARLSBAD STATE BEACH, CAMPGROUND	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
	2141501900	STATE OF CALIFORNIA	N/A	YES
	2110302900	STATE OF CALIFORNIA	N/A	YES
SOUTH CARLSBAD STATE BEACH, NORTH PONTO	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
	2141501900	STATE OF CALIFORNIA	N/A	YES
	2161400800	STATE OF CALIFORNIA	N/A	YES
SOUTH CARLSBAD, BATIQUITOS W1 AND W2	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
	2161401900	STATE OF CALIFORNIA LANDS COMMISSION	N/A	YES

SITE	APN	LANDOWNER	LANDOWNER'S ADDRESS	PERMISSION
	2160420700	STATE OF CALIFORNIA	N/A	YES
	2161404400	L S F 5 CARLSBAD HOLDINGS L L C	2711 N. HASKELL AVE. #1800, DALLAS, TX 75204	NO
	2161400200	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
	2160420900	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
SOUTH CARLSBAD, BATIQUITOS 101 MEDIAN STRIP	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
SOUTH CARLSBAD STATE BEACH, SOUTH PONTO	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
	2160412000	W 2007 ENCINITAS I L L C	50905 AVENIDA BERMUDAS, LA QUINTA, CA 92553	NO
	2160412600	K S L ENCINITAS RESORT CORP	50905 AVENIDA BERMUDAS, LA QUINTA, CA 92253	NO
	2160412500	STATE OF CALIFORNIA	N/A	YES
	2160412300	STATE OF CALIFORNIA	N/A	YES
ENCINITAS, BEACON'S BEACH	2543010602	G G B ASSETS LTD PARTNERSHIP	C/O GARY G BITTER, 8100 E. CAMELBACK RD. #53, SCOTTSDALE, AZ, 85251	NO
	2543010603	NOEL FAMILY TRUST 12-17-86	P.O. BOX 232781, ENCINITAS, CA 92024	NO
	2543010604	ZETTEL FAMILY TRUST 05-23-03	1002 NEPTUNE AVE., ENCINITAS, CA 92024	NO
	2543010601	BERLIN PARTNERS L L C	P.O. BOX 547, RANCHO SANTA FE, CA 92067	NO
	2543110100	L R B TRUST 03-02-06	43725 MONTEREY AVE. #C, PALM DESERT, CA 92260	NO
	2543110200	EVERGREEN HEBRON L P	1821 S. COAST HWY, OCEANSIDE, CA 92054	NO
	2540403100	STATE OF CALIFORNIA	N/A	NO
ENCINITAS, SWAMI'S TO MOONLIGHT	2580742400	CANTER BEVERLY J IRREVOCABLE TRUST 12-28-92	15591 HARTE LN., MOORPARK, CA 93021	NO
	2580742300	CAMPBELL STEVEN D	444 MOONLIGHT LN., ENCINITAS, CA 92024	NO
	2580742200	CALANDRA JERRIE TRUST 10-28-04	462 MOONLIGHT LN., ENCINITAS, CA 92024	NO

SITE	APN	LANDOWNER	LANDOWNER'S ADDRESS	PERMISSION
	2580734501	AVEY VICTORIA C & SHIRLEY P	510 4TH ST. #1A, ENCINITAS, CA 92024	NO
	2580734502	DICKINSON DEVON E & CYNTHIA D	510 4TH ST. #1B, ENCINITAS, CA 92024	NO
	2580734503	WARK ROBERT C & KACY HELEN S	510 4TH ST. #1C, ENCINITAS, CA 92024	NO
	2580734504	PRITCHETT DAVID R & DONNA J FAMILY TRUST 05-23-00	9820 E. THOMPSON PEAK PKWY #648, SCOTTSDALE, AZ 85255	NO
	2580734505	FELLMAN ALLAN & GLADYS E	P.O. BOX 2043, GLENDALE, CA 91209	NO
	2580734506	BROYLES JOHN & CLELAND-BROYLES PAMELA L REVOCABLE TRUST 06-02-00	76142 VIA FIRENZE, INDIAN WELLS, CA 92210	NO
	2580734507	DUFFY ANTHONY B LIVING TRUST	510 4TH ST. #3A, ENCINITAS, CA 92024	NO
	2580734508	RAHILL JOHN IRREVOCABLE TRUST 03-30-06	C/O CRAIG EALY, 6840 E. INDIAN SCHOOL RD., SCOTTSDALE, AZ 85251	NO
	2580734509	KEOGH KARLENE A	510 4TH ST. #3C, ENCINITAS, CA 92024	NO
	2580540100	STATE OF CALIFORNIA	N/A	YES
	2580423000	STATE OF CALIFORNIA	N/A	YES
	2580742500	STATE OF CALIFORNIA	N/A	YES
	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
	2580734300	GEIERMAN WILLIAM C	520 4TH ST., ENCINITAS, CA 92024	NO
	2580732700	PERL FAMILY TRUST 11-10-80	C/O ENCINITAS INVESTMENTS, P.O. BOX 5054, BEVERLY HILLS, CA 90209	NO
	2580734401	TRIVISON FAMILY TRUST 05-22-91	538 4TH ST., ENCINITAS, CA 92024	NO
	2580734402	V N C FOURTH L L C	14825 VISTA DEL OCEANO, DEL MAR, CA 92014	NO
	2580732100	WAKABAYASHI ERNEST	3347 PETE DYE DRAW, PARK CITY, UT 84098	NO
	2580734602	BILLICK THOMAS O	1049 S. COAST HWY #101, ENCINITAS, CA 92024	NO
	2580734601	SANDT RONALD F & CHERGO KATHRYN S	3220 MARSHALL ST., WHEAT RIDGE, CO 80033	NO
	2580731900	CITY OF ENCINITAS	505 S. VULCAN AVE., ENCINITAS, CA 92024	YES
	2581512300	ALBANI SALVATORE & ERIKA	629 4TH ST., ENCINITAS, CA 92024	NO
	2581511200	DANILOV NICK TR	101 CLUB RD., PASADENA, CA 92024	NO
	2581511100	HOMAYOUNI FAMILY TRUST 05-26-06	1750 E. OCEAN BLVD. #D, LONG BEACH, CA 90802	NO

SITE	APN	LANDOWNER	LANDOWNER'S ADDRESS	PERMISSION
	2581511000	MCPHERSON ENTERPRISE A L L C	1014 1ST ST., MANHATTAN BEACH, CA 90266	NO
	2581510900	SCOLLARD FAMILY TRUST 10-22-94	13142 MOORPARK ST., SHERMAN OAKS, CA 91423	NO
	2581510800	SCOLLARD FAMILY TRUST 10-22-94	13142 MOORPARK ST., SHERMAN OAKS, CA 91423	NO
	2581510600	BULLARD WILSON P SEPARATE PROPERTY TRUST 06-15-02	645 4TH ST., ENCINTTAS, CA 92024	NO
	2581510700	ROSS FAMILY TRUST 03-24-94	412 W. F ST., ENCINITAS, CA 92024	NO
	2581531200	ALTA SEASHORE L L C	4445 EASTGATE MALL #400, SAN DIEGO, CA 92121	NO
	2581531300	ALTA SEASHORE L L C	4445 EASTGATE MALL #400, SAN DIEGO, CA 92121	NO
	2581531002	ZINMAN IRA B REVOCABLE TRUST	403 E. 3RD ST., BLOOMINGTON, IN, 47401	NO
	2581531001	BROWN FAMILY INTER VIVOS TRUST 06-21-05	4011 EUREKA AVE., YORBA LINDA, CA 92886	NO
	2581531003	BLANCHARD KENNETH H RESIDENCE TRUST 03-07-06 ET AL	125 STATE PL., ESCONDIDO, CA 92029	NO
	2581531101	TIPPETT FAMILY TRUST 02-02-89	2741 WOOLSEY ST., BERKELEY, CA 94705	NO
	2581531102	MANDELBAUM-BYRNES 2009 TRUST 07-15-09	1925 CENTURY PARK E, LOS ANGELES, CA 90067	NO
	2581531103	GALLOWAY JOHN D JR & DONNA M LIVING TRUST 04-16-98	371 HILLCREST DR., ENCINITAS, CA 92024	NO
	2581530500	4TH STREET RESIDENCE TRUST	3110 CAMINO DEL RIO S #310, SAN DIEGO, CA 92108	NO
	2581530600	CHENG JEAN	744 4TH ST., ENCINITAS, CA 92024	NO
	2581530700	WEISS ALLEN C	205 N. STEPHANIE ST #189, HENDERSON, NV 89074	NO
	2581530800	HASNAIN TRUST 02-19-10	760 4TH ST., ENCINITAS, CA 92024	NO
	2581730100	GANAN FAMILY TRUST 10-07-05	806 4TH ST., ENCINITAS, CA 92024	NO
	2581730300	V K P PROPERTIES L L C	85 ENCINITAS BLVD., ENCINITAS, CA 92024	NO
	2581730400	BEARD/SAFT 2001 TRUST 07-06-01	838 4TH ST., ENCINITAS, CA 92024	NO
	2581722404	PODAR MAHESH K TRUST 11-08-02 & PODAR DENISE S TRUST 11-08-02	315 S. COAST HIGHWAY 101 #534, ENCINITAS, CA 92024	NO
	2581722406	TURNER FAMILY TRUST 11-01-91	1998 PORT EDWARD CIR., NEWPORT BEACH, CA 92660	NO
	2581722409	BIENSTOCK-BEDDOW FAMILY REVOCABLE TRUST 11-17-11	8629 N. SKYLINE DR., PHOENIX, AZ 85028	NO
	2581722407	LA COSTA INVESTMENTS L L C	920 SEALANE DR. #A, ENCINITAS, CA 92024	NO

SITE	APN	LANDOWNER	LANDOWNER'S ADDRESS	PERMISSION
	2581722401	OTTO SUSAN M	916 SEALANE DR. #A, ENCINITAS, CA 92024	NO
	2581722405	FARSHCHI JAMIL D&ERIN M	918 SEALANE DR. #A, ENCINITAS, CA 92024	NO
	2581722402	DIAMAND BENJAMIN R	1630 STEWART ST. #A, SANTA MONICA, CA 90404	NO
	2581722410	PHILION KRISTINE	8838 94TH ST. NW, EDMONTON, ALBERTA, CANADA T6C3V-1000	NO
	2581722411	FORK DONALD J & NADINE L	80 W. ORO VALLEY DR., TUCSON, AZ 85737	NO
	2581722403	SANTHANAM HARISH K & VIDYA K	916 SEALANE DR. #C, ENCINITAS, CA 92024	NO
	2581722408	CHIRUVOLU PREM K & SARADA	167 HALE DR., PRINCETON, NJ 08540	NO
	2581722412	ZIMDARS TERRI P REVOCABLE TRUST 05-31-96	3657 COPPER CREST RD., ENCINITAS, CA 92024	NO
	2581722413	BARNETT GLORIA Q TRUST 08-20-07	14326 174TH AVE. NE, REDMOND, WA 98052	NO
	2581722311	KEMPER MICHAEL & FRANCES LIVING TRUST 12-31-87	10816 N. 68TH PL., SCOTTSDALE, AZ 85254	NO
	2581722314	RILEY MICHAEL H & MARY A	P.O. BOX 132043, THE WOODLANDS, TX 77393	NO
	2581722302	DUKANE CORP	2900 DUKANE DR., ST. CHARLES, IL 60174	NO
	2581722308	KOHUT MICHAEL J DECEDENT TRUST B (DOUBLE T TRUST) 11-13-91	47750 WIND SPIRIT DR., LA QUINTA, CA 92253	NO
	2581722316	16 PACIFIC PANORAMA L P	970 SINGING WOOD DR., ARCADIA, CA 91006	NO
	2581722319	KRAUSS JEFFREY A	774 KEELER AVE., BERKELEY, CA 94708	NO
	2581722304	GEHL TRUST 12-05-05	11611 LISBURN PL., LA MIRADA, CA 90638	NO
	2581722312	HATCH WENDELL & JULIE	3005 89TH ST. NW, GIG HARBOR, WA 98332	NO
	2581722303	SMALE ROSWITHA K TRUST 11-25-98	11001 MUIRFIELD DR., RANCHO MIRAGE, CA 92270	NO
	2581722307	BULLEN FAMILY TRUST 09-26-13	C/O CARL BULLEN, 1208 SAN DIEGUITO DR., ENCINITAS, CA 92024	NO
	2581722315	15 PACIFIC PANORAMA L P	970 SINGING WOOD DR., ARCADIA, CA 91006	NO
	2581722313	WHITFIELD GUY & FISCHER JOAN F	18 YORKVILLE AVE. #2505, TORONTO, CANADA M4W 3Y8	NO
	2581722309	KRIVINE RUTH G LIVING TRUST 11-15-96	2360 RISING GLEN WAY #211, CARLSBAD, CA 92008	NO
	2581722305	BOWEN J & M FAMILY TRUST 08-05-93	5152 STONE CANYON AVE., YORBA LINDA, CA 92886	NO
	2581722306	STEGMAN ROBERT W	4720 BIRCHWOOD CIR., CARLSBAD, CA 92008	NO

SITE	APN	LANDOWNER	LANDOWNER'S ADDRESS	PERMISSION
	2581722310	BESSUDO ALBERTO & BESSUDO RINA	940 SEALANE DR. #10, ENCINITAS, CA 92024	NO
	2581722301	VEZZOLI DIEGO S FAMILY TRUST 08-19-93 & AURELIA ROTTIGNI FAMILY TRUST 08-19-93	940 SEALANE DR. #1, ENCINITAS, CA 92024	NO
	2581722318	MILLER J SCOTT & RENEE M	P.O. BOX 14, BONDURANT, WY 82922	NO
	2581722317	WALKER DIANA L	940 SEALANE DR. #17, ENCINITAS, CA 92024	NO
	2581721900	PACIFIC CREST APARTMENTS L L C	330 W. I ST. #1V, ENCINITAS, CA 92024	NO
	2582921824	A Z F FINANCIAL	205 N. STEPHANIE ST. #189, HENDERSON, NV 89074	NO
	2582921814	WEISS ALLEN C	205 N. STEPHANIE ST. #189, HENDERSON, NV 89074	NO
	2582921815	KAIZER GERALDINE D LIVING TRUST 05-24-02 & GALLI TRUST 08-28-87	361 W. I ST., ENCINITAS, CA 92024	NO
	2582921801	WEISS ALLEN C	205 N. STEPHANIE ST. #189, HENDERSON, NV 89074	NO
	2582921831	LINCOLN-SMITH DOROTHY	3228 E. SAN MIGUEL PL., PARADISE VALLEY, AZ 85253	NO
	2582921833	FINGAL CHARLES V JR & DIANNE M	393 W. I ST., ENCINITAS, CA 92024	NO
	2582921808	SPRAGG JUSTIN M & AMY	2715 BRESSI RANCH WAY, CARLSBAD, CA 92009	NO
	2582921823	STALL ALAN M & EVE M	373 W. I ST., ENCINITAS, CA 92024	NO
	2582921803	CANTER ELLIOT B	374 N. COAST HWY 101 #F7, ENCINITAS, CA 92024	NO
	2582921818	RAUDASKOSKI FAMILY TRUST 06-25-09	6355 HUNTINGTON DR., CARLSBAD, CA 92009	NO
	2582921828	WEINBERGER TERRY M SURVIVORS TRUST 08-06-98	383 W. I ST., ENCINITAS, CA 92024	NO
	2582921829	EHRHART JAMES M & BRITTA	385 W. I ST., ENCINITAS, CA 92024	NO
	2582921807	MATTHEWS ROBERT C III REVOCABLE LIVING TRUST 09-16-09	1106 2ND ST. #302, ENCINITAS, CA 92024	NO
	2582921810	POPONYAK MICHAEL J & HIATT-POPONYAK MARY K	816 WOODSIDE LN., OLIVENHAIN, CA 92024	NO
	2582921816	SCHLACHTER REALTY LTD	6211 W. NORTHWEST HWY #256, DALLAS TX75225	NO
	2582921817	STRICK JUDY L TRUST 04-13-00	325 W. I ST., ENCINITAS, CA 92024	NO
	2582921821	ROSE MARC D	369 W. I ST., ENCINITAS, CA 92024	NO
	2582921822	DURRANT MICHAEL N&JOAN F	361 W. I ST., ENCINITAS, CA 92024	NO
	2582921830	SOMMERS PAUL & MARINA	387 W. I ST., ENCINITAS, CA 92024	NO

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	2582921812	RATOFF FAMILY TRUST 05-26-06	5291 N. CAMINO SUMO, TUCSON, AZ 85718	NO
	2582921802	WEISS ALLEN C	205 N. STEPHANIE ST. #189, HENDERSON, NV 89074	NO
	2582921804	GOETZ SURVIVORS FAMILY TRUST 02-01-03	PMB 640, 1106 2ND ST., ENCINITAS, CA 92024	NO
	2582921826	ROSSO FAMILY TRUST 04-09-97	P.O. BOX 9917, RANCHO SANTA FE, CA 92067	NO
	2582921827	CONTINENTAL AMERICAN PROPERTIES LTD & CONTINENTAL AMERICAN PROPERTIES LTD ET AL	3990 RUFFIN RD. #100, SAN DIEGO, CA 92123	NO
	2582921811	A Z F FINANCIAL INC	205 N. STEPHANIE ST. #189, HENDERSON, NV 89074	NO
	2582921820	SHAW DOUGLAS A & GAUNTLETT-SHAW WENDY REVOCABLE TRUST 07-20-04 & GRILLO DEANEY G ET AL	6729 CORINTIA ST., CARLSBAD, CA 92009	NO
	2582921825	BURGESS FAMILY DECEDENTS TRUST 01-15-87	377 W. I ST., ENCINITAS, CA 92024	NO
	2582921832	ANDREWS CATHY L FAMILY TRUST 07-10-00	1106 2ND ST. #178, ENCINITAS, CA 92024	NO
	2582921805	MEHDY MITCHELL J TRUST 04-02-04	339 W. I ST., ENCINITAS, CA 92024	NO
	2582921806	RAKOV FAMILY TRUST 01-21-95	341 W. I ST., ENCINITAS, CA 92024	NO
	2582921809	MEHDY MITCHELL J DEFINED BENEFIT PLAN	339 W. I ST., ENCINITAS, CA 92024	NO
	2582921813	THOMPSON R W & IRENE FAMILY TRUST 08-08-96	357 W. I ST., ENCINITAS, CA 92024	NO
	2582921819	MENDELL FAMILY TRUST 11-11-92	14828 DE LA VALLE PL., DEL MAR, CA 92014	NO
	2600220100	SELF-REALIZATION FELLOWSHIP CHURCH	3880 SAN RAFAEL AVE., LOS ANGELES, CA 90065	NO
	2600213200	SELF-REALIZATION FELLOWSHIP CHURCH	3880 SAN RAFAEL AVE., LOS ANGELES, CA 90065	NO
	2600213000	CITY OF ENCINITAS (MANAGEMENT: JOHN FRANKEN OR ERIC STEENBLOCK)	505 S. VULCAN AVE., ENCINITAS, CA 92024	YES
	2600212800	CITY OF ENCINITAS	505 S. VULCAN AVE., ENCINITAS, CA 92024	YES
	2600301300	STATE OF CALIFORNIA	N/A	YES
	2600300200	SALINGER STEVEN & LAJOIE ADRIANNE	1350 S. COAST HIGHWAY 101, ENCINITAS, CA 92024	NO
	2600300300	CARNELL BRIDGET REVOCABLE TRUST 05-09-01	C/O BRIDGET ASH, 1360, S. COAST HIGHWAY 101, ENCINITAS, CA 92024	NO
	2600302300	COLLINS NORMAN A QUALIFIED PERSONAL RESIDENCE TRUST ET AL	19705 LEMBCKE RD., HARVARD, IL 60033	NO
	2600301900	GEIWALD PAUL U	1376 S. COAST HIGHWAY 101, ENCINITAS, CA 92024	NO

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	2600300700	GEIWALD PAUL U	1376 S. COAST HIGHWAY 101, ENCINITAS, CA 92024	NO
	2600300800	HOFFMAN STEPHEN LIVING TRUST 01-12-05	1494 S. HIGHWAY 101, ENCINITAS, CA 92024	NO
	2600301300	STATE OF CALIFORNIA	N/A	YES
	2600302400	STATE OF CALIFORNIA	N/A	YES
	2600302500	CITY OF ENCINITAS (MANAGEMENT: JOHN FRANKEN OR ERIC STEENBLOCK)	505 S. VULCAN AVE., ENCINITAS, CA 92024	YES
	2600300900	PERKINS FAMILY LIVING 1997 TRUST 05-19-97	14030 JUDY ANN DR., RIVERSIDE, CA 92503	NO
	2600302600	CITY OF ENCINITAS (MANAGEMENT: JOHN FRANKEN OR ERIC STEENBLOCK)	505 S. VULCAN AVE., ENCINITAS, CA 92024	YES
SAN ELIJO STATE BEACH, 101 MEDIAN STRIP	2603300200	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
	2610201400	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
	2603300300	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
	N/A	CALTRANS	4050 TAYLOR ST., SAN DIEGO, CA 92110	NO
	2610201400	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
SAN ELIJO STATE BEACH, CAMPGROUND	2603300400	STATE OF CALIFORNIA	N/A	YES
	2603300100	STATE OF CALIFORNIA	N/A	YES
	N/A	CALTRANS	N/A	NO
	2610201100	STATE OF CALIFORNIA	N/A	YES
SAN ELIJO LAGOON	2611910700	STATE OF CALIFORNIA	N/A	YES
	2630112400	SAN ELIJO LAGOON CONSERVANCY	P.O. BOX 230634, ENCINITAS, CA 92023	YES
	2630112900	STATE OF CALIFORNIA	N/A	YES
	2630111400	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
	2630113400	STATE OF CALIFORNIA	N/A	YES
	2630110200	STATE OF CALIFORNIA	N/A	YES
	N/A	CALTRANS	N/A	NO
	2630110100	STATE OF CALIFORNIA	N/A	YES
	2630111800	STATE OF CALIFORNIA	N/A	YES
	2630113600	STATE OF CALIFORNIA	N/A	YES
	2630113300	STATE OF CALIFORNIA	N/A	YES
	2630113200	SAN ELIJO LAGOON CONSERVANCY	P.O. BOX 230634, ENCINITAS, CA 92023	YES
	2630111700	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
	2630111300	NORTH SAN DIEGO COUNTY TRANSIT DEVELOPMENT BOARD	N/A	NO
	DEL MAR, NORTH TORREY PINES	N/A	N/A	N/A

<b>SITE</b>	<b>APN</b>	<b>LANDOWNER</b>	<b>LANDOWNER'S ADDRESS</b>	<b>PERMISSION</b>
TORREY PINES STATE RESERVE, PENASQUITOS LAGOON AREA	N/A	STATE OF CALIFORNIA	N/A	NO
TORREY PINES STATE RESERVE, BLACK'S BEACH	N/A	STATE OF CALIFORNIA	N/A	NO