

# Salinas River State Beach Dune Restoration and Management Plan

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Central Coast Wetlands Group and Coastal Conservation and Research  
in partnership with California State Parks

Funding provided by the California State Coastal Conservancy

January 2016



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# EXISTING CONDITIONS AND BACKGROUND

## INTRODUCTION

The following Restoration and Management Plan has been prepared by the Central Coast Wetlands Group (CCWG) and Coastal Conservation and Research (CCR) in partnership with the California State Parks (DPR) as part of the Salinas River State Beach Dune Restoration project being funded by the Coastal Conservancy through the Climate Ready Grant Program. This document will help guide the restoration and monitoring of sand dune habitat at selected sites at Salinas River State Beach in Moss Landing, California. No development or construction is planned as part of this project, only the fencing of walking paths and installation of educational signage.

## SITE DESCRIPTION

Salinas River State Beach (SRSB) comprises approximately 280 acres of beach and coastal dunes located in Northern Monterey County, California (Figure 1). SRSB is bordered by the Pacific Ocean to the west and the old Salinas River channel and agricultural fields to the east. SRSB extends northward to Sandholdt Road in Moss Landing and southward to the Salinas River mouth, wrapping around the Monterey Dunes colony in the lower half of the state beach. The most prominent feature of the state beach is the extensive sand dune system, which extends inland in some places for over 1000 feet and is 50–60 feet above sea level at the highest point.

The SRSB was classified as a state beach by the California State Park and Recreation Commission in November 1962, to “protect and perpetuate the area’s natural resource values and to provide beach-oriented recreation opportunities for the enlightenment, inspiration, and enjoyment of present and future generations (DPR 1987). The State Park and Recreation Commission resolution establishing the state beach specifically distinguishes the foredune and coastal scrub plant communities, the solitary sandy beach, the visual texture of the dunes and the expanse of Monterey Bay as the important elements. SRSB is also zoned as “scenic and natural resource recreation” in the North County Land Use Plan and “recreational” within the Monterey Bay National Marine Sanctuary.

The entirety of the SRSB lies within the California Coastal Zone, consequently potential human-caused alteration (e.g., development) or impacts to “environmentally sensitive habitats (ESHAs)” are subject to review under the California Coastal Act, Article 5, Section 30240(a). The provisions of the Coastal Act are administered locally by the California Coastal Commission in cooperation with Monterey County. Chapter 3 of the Coastal Element describes the specific development activities that are permitted within ESHAs, including coastal dunes and wetlands (CCC 1976).

SRSB contains rare coastal dune and coastal marsh habitat which provide habitat for many species of wildlife and migratory birds, and which host numerous special status animal and plant communities. SRSB also

contains two subunits classified as Natural Preserves: the Salinas River Dunes Natural Preserve and the Salinas River Mouth Natural Preserve. The qualities that make this area a haven for wildlife and a hotspot for rare plant communities also attract visitors who seek open space, solitude and a natural landscape relatively untouched by development. Beach combing, bird watching, photography, jogging, horseback riding and surfing are popular recreational uses of the state beach, but it is not uncommon for visitors to have the beach or the dunes to themselves, especially in winter.

There are three public parking and access locations associated with the SRSB. One is located at the Sandholdt Road access at the north boundary of SRSB. It is paved and has space for approximately 40 vehicles. The Potrero Road parking lot is located on county property, is unpaved, and has space for approximately 60 vehicles. Similarly, the Molera Road parking lot is paved and has space for approximately 50 vehicles. There are no facilities associated with the state beach. The Potrero Road parking lot provides pedestrian and equestrian access to the beach and is owned by the county. The Molera Rd parking lot offers pedestrian and equestrian access to the beach and is owned by DPR. Parking at Sandholdt Road is pedestrian access only and is also owned by DPR. SRSB is owned and operated by DPR.

With only these three entry points for this 3.6 mi (5.6 km) long area of the state beach, much of the use occurs near these locations. Whether visitors enter at Sandholdt or Potrero or Molera Road, the beach is the destination area for most visitors in the state beach. Between Sandholdt and Potrero Roads, visitors can follow a trail that runs behind the dunes along the Old Salinas River channel. In the dunes around and between the two northern access points, many volunteer trails run from the ridge trail through the dunes to the beach. The ridge trail spans the northern half of the state park and terminates at the Molera Road access point. Equestrians are directed to ride on the horse trail or on the beach on the wet sand to protect sensitive plant and animal species. Due to the dynamic nature of the shore environment, conditions along the beach and dunes are constantly changing.

## PLANTS AND ANIMALS AT THE DUNES

Plant and animal species that inhabit the dunes are specially adapted to the dynamic system of moving sand and wind. Plants that grow within the permeable, blowing substrate are either short-lived or persist through the development of deep, extensive root systems. Vegetation patterns within the dunes are strongly correlated with dune morphology (Pickart 1998). Seedling establishment is variable depending upon the species and micro-environments to which the seeds are carried. Animals that inhabit coastal dune habitats are subject to physical stresses that include sand movement, salt spray, temperature variability, wind, and disturbances such as storms. Their adaptations are mostly behavioral. Species such as western snowy plover shelter in depressions in the sand in the coastal strand where they also forage and breed. Invertebrate species such as globose dune beetle complete their entire life cycle in the dune habitat. Open areas or low vegetation in dune areas can support ground-nesting species such as California quail. SRSB supports populations of federally and state listed and special status animal species (8), plant species (4) and plant communities (2) and several species endemic to California.

## Plants

There are three plant communities at SRSB: foredune, coastal scrub and dune pond. The most common plant species of the foredune are sand verbena (*Abronia umbellata* and *A. latifolia*), beach bur (*Ambrosia chamissonis*), beach sagewort (*Artemisia pycnocephala*), beach saltbush (*Atriplex leucophylla*), and beach pea (*Lathyrus littoralis*), all native species, and sea rocket (*Cakile maritima*), sea and Hottentot fig (*Carpobrotus chilensis* and *C. edulis*) and European dune grass (*Ammophila arenaria*), all non-native invasive species. The coastal scrub community occupies a narrow strip between the foredune and the old Salinas River channel. The most common species are mock heather (*Ericameria ericoides*), coast buckwheat (*Eriogonum latifolium*), Lizard Tail (*Eriophyllum staechadifolium*), bluff lettuce (*Dudleya farinosa*) and sea fig (*Carpobrotus edulis*). The dune pond in the southern end of SRSB was created by the shifting mouth of the Salinas River. The pond is seasonal and is surrounded by a sparse cover of sedges, rushes and grasses.

Several special status plants and plant communities occur within SRSB (Table 3, Figure 3), including Menzies' wallflower (*Erysimum menziessii* ssp. *menziessii*), Monterey gilia (*Gilia tenuiflora* ssp. *arenaria*), Monterey spineflower (*Chorizanthe pungens* var. *pungens*), and sand-loving wallflower (*Erysimum ammphilum*), as well as central dune scrub and northern coastal salt marsh communities.

Although there is a wide diversity of native species present in the SRSB, recent analysis of aerial imagery revealed that iceplant cover ranges from 35 to 65% with an average of 48% across the foredune community. Non-native invasive iceplant spreads through seed production and vegetative propagation, tolerates a range of soil moisture and nutrient conditions and can establish and grow in the presence of herbivores and competitors. These qualities enable iceplant to out-compete many native species and dominate resources, including space. In areas where iceplant has died and regrown, the build-up of organic matter can enable invasion by other non-native plants that would not ordinarily establish in the normally sandy soils.

## Animals

There are many invertebrate and vertebrate species found at SRSB. The beach and littoral zone are used by resting, feeding and nesting gulls and shorebirds. Observations include Caspian and elegant terns (*Hydroprogne caspia*, *Thalasseus elegans*, and *T. maximus*, respectively), many species of shorebirds, gulls, and waterfowl, such as sanderlings (*Calidris alba*) and willets (*Tringa semipalmata*), Heermann's, California and Western gulls (*Larus heermanni*, *L. californicus*, and *L. occidentalis*, respectively), many of which may feed on small crustaceans, molluscs and worms in the sandy intertidal. Vegetation in the foredune and coastal dune scrub communities provide food, cover, and nesting sites for many species of insects, birds, amphibians, reptiles and mammals. Velvet ants, ground-nesting wasps and bees, scarab and dune beetles and many other insects live in the dunes. Harriers and songbirds may forage on the plants and animals found in the dune scrub plant community. Amphibians and reptiles include the Pacific tree frog (*Pseudacris regilla*), Coast garter snake (*Thamnophis elegans terrestris*), and the northern alligator lizard (*Elgaria coerulea*). Mammals such as coyotes (*Canis latrans*), raccoons (*Procyon lotor*), feral cats (*Felis catus*) and non-native red foxes (*Vulpes vulpes*) may hunt birds and smaller mammals in the dune habitat.

Several special status animals occur within SRSB (Table 3, Figure 4 & Figure 5) and include globose dune beetle (*Coelus globosus*), California legless lizard (*Anniella pulchra*), tidewater goby (*Eucyclogobius newberryi*), longfin smelt (*Spirinchus thaleichthys*), bank swallow (*Riparia riparia*), western snowy plover (*Charadrius nivosus nivosus*), and short-eared owl (*Asio flammeus*).

## DUNES AND ICEPLANT

The five kilometer sand dune complex spanning the central Monterey Bay from the Moss Landing harbor mouth southward to the Salinas River Mouth is part of an ancient dune system that formed and stabilized during the Wisconsin glaciation (Dorrell-Canepa 2005). Dunes within the central Monterey Bay accrete sand through a complex interaction of littoral transport south from the Santa Cruz littoral cell to the mouth of the Monterey Bay Submarine Canyon at Moss Landing and local deposition of fresh sands from the Salinas River immediately south of the canyon. Strong seasonal winds and changing wave patterns drive beach sands inland forming an extensive dune complex.

Historically, the Salinas River flowed west to the coast where its flow was directed north along the eastern side of the dunes northward. The river bisected the dunes at numerous locations between its current location and a location north of Elkhorn slough where the Salinas met the mouth of the Pajaro River. In 1910 the Salinas River mouth was relocated at its current condition directly west of the point where the river once transitioned north behind the dunes. Between the 1850s and 1910 the mouth was located north of the current Moss Landing Harbor mouth in what is now Bennett Slough (Figure 6). In 1946 the Moss Landing Harbor Mouth was constructed, permanently bisecting the Salinas dunes complex.

### Invasive Iceplant Impacts on Central Coast Dunes

As development pressure expanded in the early 20<sup>th</sup> century, within and adjacent to the central Monterey dune system, there was a perceived need to stabilize the dunes and limit natural dune migration and sand movement. Initially, iceplant was populated along the coastal railroad corridor and later the species was actively planted by the military and state agencies (Cal Trans) to stabilize dune systems and protect adjacent properties from drifting sand (Au 2000).

The California Invasive Plant Council (Cal-IPC) classifies the impact of iceplant (*Carpobrotus edulis*) on native ecosystems as *high*. Species with a *high* rating have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure and their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment (Cal-IPC 2006). *C. edulis* effectively eliminates other species within areas it colonizes through several competitive advantages, leading to monotypic stands of this single species. *C. edulis* can reproduce through seeds dispersed by animals and through fragmentation and regrowth. Iceplant establishes a dense cover of plant material that eliminates open dune space and impedes recruitment of native species, especially species that require periodic disturbance for recruitment (D'Antonio and Mahall 1991).

## Loss of Native Species Diversity

The central Monterey Bay dunes system once reported supporting more than 50 species of plants. Today, at least 30 species can still be found within the Salinas State Beach dune system but the abundance of many of these species has been reduced significantly.

As noted above, numerous special status species occur in the central Monterey Bay sand dune system. Species of particular interest for this restoration project at Salinas State Beach include the Monterey spineflower (*Chorizanthe pungens*) and Sand gilia (*Gilia tenuiflora*). Both species benefit from natural dune systems devoid of iceplant that exhibit periodic disturbance and open sand areas. The removal of dense iceplant will allow for greater open area for the recruitment of native species including spineflower and gilia.

## Iceplant Cover and Distribution

Iceplant has recruited and now dominates most of the SRSB dune complex. Initial aerial estimates of iceplant percent cover in project locations were completed to develop work plan costs (Table 1). The remainder of the dune plant community is comprised of a mix of native species including those within Table 2.

## PREVIOUS RESTORATION EFFORTS IN MONTEREY BAY

This project creates a necessary connection between two ongoing related projects, the Moss Landing State Beach Coastal Dune Revegetation Plan to the north and the Monterey Dunes Colony restoration closer to the southern boundary of SRSB, and a historical project, the restoration of sand dunes at Moss Landing Marine Laboratories.

### Moss Landing State Beach (MLSB) Restoration Activity

MLSB consists of 66 acres of coastal sand dune, beach and salt marsh habitat and is located immediately north of the Moss Landing harbor inlet. Haphazard beach access has caused a loss of dune vegetation, resulting in blowout areas and sand moving into the state beach access roadway. DPR and the Elkhorn Slough Foundation have partnered to conduct dune restoration at MLSB, including eradication of non-native species, replanting of native dune plants, and maintaining beach access points to clearly delineate walking paths and prevent trampling of sensitive dune habitat. This work began in late 2013.

### Monterey Dunes Colony Restoration Activity

Monterey Dunes Colony is a 120 vacation home community on 125 acres of sand dunes that is bordered on the north, south, and west by the SRSB. The Monterey Dunes Colony recently initiated a small demonstration project in which they brought in sand and recontoured foredunes to 3–4 ft. above grade and then planted the new dunes with local native seeds and seedlings. The total project area was approximately 1000 square feet. The project was conducted to demonstrate to DPR and the California Coastal

Commission that importing sand could be done without negatively impacting DPR land or western snowy plovers. This work began in January 2015.

## **Moss Landing Marine Laboratories (MLML) Restoration Activities**

The beachside Moss Landing Marine Laboratories campus was destroyed in the 1989 Loma Prieta earthquake. Part of the rebuilding effort of MLML included sand dune reconstruction and restoration on a 2-acre parcel where most of the buildings and structures of the labs had been prior to their destruction. The site was heavily disturbed due to trampling from people crossing the dunes to get to the beach from the parking lot. Reconstruction and restoration included recontouring the sand dunes, removal of iceplant, propagation and planting of native dune plants, and placement of signage and fencing to protect the vulnerable site. Work began in 1992 and was largely finished by 1999.

## **DUNES AS COASTAL PROTECTION FROM STORMS**

### **Threats to Salinas Valley from Sea Level Rise**

Several recent studies regarding coastal vulnerabilities to Sea Level Rise (SLR) have documented the adaptive capacity natural ecosystems can provide to protect coastal areas from those vulnerabilities. Langridge et al. 2013 documents the future vulnerability of the Salinas Valley to rising seas and models the protective capacity that natural sand dunes can play to protect the valley from storm induced flooding. This project will document the importance dune restoration can have to improve the resiliency of dunes to storm damage.

Specifically, native dunes plants develop deep root systems that provide erosive resilience and support natural sand migration and accumulation patterns that are expected to dissipate wave energy without leading to significant dune face failure. The foredune plants form low sloping dune faces that encourage wave run-up energy to dissipate rather than undercut foredunes dominated by Iceplant. Studies suggest that the removal of iceplant and reestablishment of native species will enable dune complexes to better respond to wave impacts, which will enable them to be more resilient to more frequent and more damaging storms (De Lillis et al. 2004).

### **Dune Protection**

The sand dune complex that parallels the central Monterey Bay between the current location of the Salinas River mouth and Moss Landing Harbor has been in place since the opening of the Harbor and the breaching of the River at its current location. The dunes provide a natural buffer from ocean derived processes (waves, sand deposition, salt spray) and the productive agriculture fields of the Salinas Valley. The historical Salinas River (now Old Salinas River channel) flows behind the dunes between the river and Moss Landing Harbor. Water elevation within the channel is regulated by the Old Salinas River slide gates at the river lagoon and the Potrero tide gates which limits tidal exchange with the harbor.

The Salinas Valley is most vulnerable to coastal flooding from storm induced wave run-up and dune overtopping at three locations between the Salinas River (with its levee protections) and the Potrero tide gates to the north. These locations all are dominated by invasive iceplant and are the most narrow sections of the dune system. These dunes are backed by agriculture fields, which limits future dune migration. Sand supply along this portion of the coast, adjacent to the Salinas River mouth is assumed plentiful and can support dune building processes.

Recent SLR hazard maps, created by the State Coastal Conservancy and ESA PWA (2014) for the Monterey Bay Coast, identify two sections of the SRSB as being highly vulnerable to storm induced dune and beach erosion and flooding, which will be exacerbated by SLR. A study conducted by the Center for Ocean Solutions in 2012 shows this area to be at the greatest risk of future dune erosion due to SLR. SRSB provides a natural ocean barrier to thousands of acres of low lying agricultural and wetlands resources that are protected from winter storms by these dunes (Langridge 2014). Sand dunes, in their natural state, dissipate wave run-up erosive energy and minimizing ocean induced dune undercutting and inland flooding, while providing critical habitat to many special status species.

The natural dune vegetation at SRSB, however, has been disrupted by the introduction of iceplant (*Carpobrotus edulis*) and other invasive plants. Iceplant is an invasive species that has choked local dune systems and impacted important physical and ecological dune functions. The documented degradation of foredune habitat by invasive species undermines the dune's capacity to act as a protective barrier to SLR. Restoring impacted dune areas identified as being most vulnerable to SLR restore a unique and sensitive habitat of the Salinas Beach Natural Preserve and river mouth lagoon, but will also enhance the resiliency of the dune system from the multiple impacts of SLR.

Small breaches in the two most vulnerable sections of the SRSB could allow ocean flooding of vast areas of the Salinas Valley. **This project seeks to reduce climate related vulnerabilities of two potential breach points in the Salinas River State Beach dunes complex by improving the natural adaptive capacity of these coastal dunes.**

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# RESTORATION PLAN

## SUMMARY

CCWG and CCR will work in partnership with DPR to restore (eradicate invasive iceplant and reestablish native plants) invasive iceplant from approximately 20 acres of sensitive dune habitat in areas that have been identified as being vulnerable to sea level rise impacts. Iceplant will be eradicated primarily through the use of hand spraying herbicide (2% dilution of Roundup). Hand pulling of iceplant will be used in areas where special status plant species are present. Sprayed iceplant will be left in place to act as mulch for native plants. Iceplant will be left to decompose for approximately 4–9 months before native plants are planted within it. Seeds from native plants for propagation and hand broadcasting will be collected from the SRSB dunes complex to ensure local genetic diversity is supported. Approximately 20,000 native plants will be propagated throughout the project period and planted during the 2016/2017 and 2017/2018 planting season. Additionally, seeds will be hand broadcast and lightly raked in to dune areas with bare sand. Efforts to increase the structural integrity of the dunes will include strategic planting placement and the use of drift wood or jute fencing to help build dunes. Several trail upgrades will be made that include updating or replacing fencing to help better delineate access ways and reduce wayward foot traffic through sensitive dune habitat. Interpretive signs will be installed at two main access locations and along main dune trails to provide education about sea level rise, dune erosion, habitat restoration, and endangered species.

## RESTORATION GOALS AND OBJECTIVES

- Goal 1: Eradicate iceplant from fore and mid dunes
- Goal 2: Establish diverse native plant species composition in treated dune areas
- Goal 3: Enhance storm resilience of dune system and report results
- Goal 4: Support DPR efforts to enhance long-term management of Monterey dune ecosystems

## GOAL 1. ERADICATE ICEPLANT FROM FORE AND MID DUNES

### Iceplant Eradication

A field crew of 2–4 members will be responsible for spraying iceplant within the 20-acre target fore and mid dune area (Figure 2) in the early spring and fall and early winter of 2016. Spraying will occur approximately 4–9 months prior to revegetation efforts to allow enough time for the iceplant to decompose and allow for easier planting. Areas with thick iceplant may need to wait until after the second year of spraying before planting. In areas with a substantial cover of native species, iceplant should be sprayed in late fall 2016 when the natives are essentially dormant and germinating native seedlings are limited. In weedy, disturbed areas, iceplant can be sprayed in early to late spring 2016 and 2017 so that the annual weeds are also eliminated before their seed is dispersed.

Crew members will be trained to properly identify iceplant and native dune species (including *Dudleya*) and will have proper certifications to use the spray application equipment. A 2% dilution of Roundup (2% glyphosate/1.5% imazapyr mix + surfactant solution) with added tracer dye will be used. Iceplant will be sprayed in linear swaths parallel to the shore by the field crew in a manner that limits dune trampling. Spraying will be limited to still and dry days to prevent chemical drift from rain and wind. A second spot application will be completed approximately 3–9 months after the initial application to address areas where iceplant remains robust. The foredune areas will be sprayed outside of the Snowy Plover nesting season (March–September) to ensure breeding plovers are not impacted. Mid and backdune areas may be sprayed or hand weeded year round if approved by DPR and Point Blue partners. Sprayed iceplant will be left in place to act as mulch for new native plants.

In many places, native species are intermixed with the iceplant and therefore care will be taken to minimize drift or overspray of herbicides on native plants. No spraying will occur in areas where sand gilia and Monterey spineflower are present. Iceplant in those areas will be hand pulled to protect the special status plants. After planting and seeding occur, herbicide spraying will be limited to areas where overspray will not jeopardize native plants.

Small patches of iceplant may be hand pulled whenever staff familiar with the eradication procedures is on site. Iceplant will be disposed of offsite in approved composting areas.

### **Additional Invasive Species Control (as funding permits)**

1. **Iceplant outside of the project focus area:** Successful eradication and/or control of iceplant populations require management of recruitment of new plants from adjacent areas. Iceplant fragmentation and seed dispersal from adjacent dunes can lead to re-establishment of populations within the restored areas. Annual spot check surveys and removal of recruits is necessary. Fragmentation and encroachment by existing iceplant populations within adjacent areas of the dunes represents a significant challenge to maintenance of restored areas. As funding allows, the restoration team will work with DPR to spray and manually remove iceplant inland of the restoration focus area to ensure that recruitment pressure to the foredune after restoration is managed. Project staff will identify priority areas within the back dune community where iceplant can be eliminated, establishing isolation areas to protect the restoration program and support long term elimination of iceplant from the dune system between the Salinas River and the harbor mouth, to provide maximum adaptive capacity to SLR.
2. **Spraying of European beach grass (*Ammophila arenaria*):** *Ammophila* sp. Is present on the adjacent Monterey Dunes Colony property and has recruited to one area south of the Colony. Herbicide application staff will treat the area with 2% glyphosate/1.5% imazapyr mix + surfactant solution during at least two application periods. Additional spot checks will determine the effectiveness and additional treatment requirements. Native dune grasses will be planted in place of the European populations after spraying ends.
3. ***Arundo donax* management:** *Arundo donax* is present near the southern end of the focus area and efforts will be made to eliminate the species from the north River mouth area. The *Arundo* will be cut

by mechanical means and the cut stump will be treated with a 50–100% solution of Roundup. Additional spot check applications will be made during the second year.

## **Long-term Weed Eradication and Control**

Spot check surveys of the restored dune areas by will occur each year to document native plant growth and succession patterns and to identify areas where iceplant recolonizes. Recolonized areas will be noted using a GPS unit and reported to the Project Manager and DPR staff. As resources are available, qualified field crews will revisit areas where iceplant reestablishes and spray or pull the plant as needed. Work will be scheduled to avoid impacts to western snowy plovers

## **GOAL 2. ESTABLISH DIVERSE NATIVE PLANT COMPOSITION IN SRSB DUNES**

### **Species Composition of Dune Complex**

The most dominant plant species of the Salinas River State Beach dunes include those listed in Table 2 and will be planted in densities sufficient to achieve a percent of plant cover similar to reference areas.

### **Seed Collection**

Trained botanists and restoration crew members will collect seeds of native species listed in Table 2 at the Salinas River State Beach dunes complex to ensure local genetic diversity is supported. Seed will be collected under the supervision of a restoration biologist by permission from DPR. Maximum genetic diversity shall be assured by collecting seed from un-restored sections of the nearby dunes, and by gathering from as many different plants of the same species as possible. No more than 10% of the produced seed from any one plant shall be collected. Seeds will be collected in the fall and stored until early spring when the seeds will be broadcast within the dune focus areas or planted in the greenhouse for propagation and future out planting. Seed will be collected each year for propagation and out planting during the fall/winter planting season.

### **Dune Grass Rhizome Collection**

Native dune grass planting is most successful using small plugs generated from segmenting adult plants. Local dune grasses will be collected in small numbers and planted in a greenhouse to generate an adult population from which to establish rhizome plugs for out planting.

### **Broadcast Seeding**

A seed mix of native species will be created (based on Table 2) and field crew will hand broadcast the seeds in areas where the sand is relatively stable and some native vegetation is present. Broadcast seeding is an effective way to help reclaim pathways and bare areas on the foredune. Further broadcast seeding may be feasible where spayed iceplant has been decomposing for over one year. Broadcast seeding will be done prior to the first rains (Nov–Jan). Seed may also be broadcast and raked into barren back dune areas if seed supply is available and if seeding the area is not expected to negatively impact snowy plover breeding habitat per DPR and Point Blue guidance. Seed will be spread by hand onto the sand or fully decomposed iceplant litter and raked in lightly. Two seed mixes shall be created, corresponding to the species diversity of the

fore or mid-to-rear dunes. An estimate of 10 pounds per acre of seed is needed where broadcast seeding will occur.

## Dune Plant Propagation

Species from the DPR approved list will be collected within (1km) of the project site. Quantities of individual plants of each species will be grown and out planted in numbers to reestablish the expected diversity and density. The use of perlite soil amendment for seed propagation will help reduce soil compaction, low water retention and high permeability found within the soil type of coastal dunes. Depending on the species, propagation will begin between winter and spring to allow for seedlings to grow large enough to be out planted in late fall (Nov/Dec) prior to first rains. Consistent watering, thinning to one seedling per cell, and the prevention of herbivory are all essential for the survival and health of the dune seedlings.

### 1. From seed

Seeds will be propagated in 3” deep trays with a mixture of perlite and top soil or potting soil.

Once seedlings have germinated they will be transplanted into 2” pots within a soil/sand mix and grown out.

### 2. From plant material (rhizomes)

*Leymus mollis* will be propagated/divided from parent material/cuttings taken from approved locations within the project site. Cuttings will be planted in 2” pots. Recommended spacing between plants is 18” and 36” between strip rows.

## Native Species Out-planting Techniques:

### 1. Iceplant mulch and native planting

Desiccated iceplant material will be present throughout the dunes after the herbicide spraying (approximately 6 months after initial application). This mulch material provides enhanced conditions for survival of planted juvenile native species. The mulch layer provides insulation from extreme soil temperature fluctuations, retains dune moisture, inhibits weed colonization and can enhance fog condensation (D’Antonio 1990, Magnoli 2013). A four-inch spade will be used to cut through the iceplant mulch and juvenile native plants will be planted. Sand and mulch will be laid around the plant and water will be applied. Plants will be placed at distances of 6 to 18 inches apart, dependent on the expected width of a one-year-old plant. Several studies have found that iceplant removal areas (with and without the presence of iceplant mulch) can enhance invasive, non-native annual grass recruitment (Magnoli 2013). Invasive annual grasses are not a problem within the Salinas River State Beach and therefore not a significant concern. Surveys will be completed to ensure that invasive grasses do not become a problem.

### 2. Planting on bare sand

Some native plants will be planted in foredune areas where no plants currently exist. In these areas, plants will be planted within small mounds (3” high) above the base elevation to reduce

burial. Plants will be watered after planting. Plant spacing in this area will be determined in close consultation with DPR and Point Blue to ensure that snowy plover breeding habitat is not negatively impacted.

### **3. Planting in straw bales**

Straw bales may be placed in low density in areas where excessive human trampling has led to a degradation of dune contours. Straw bales will be placed at low density to encourage rebuilding of foredune habitat that replicates natural topographic variability. Native foredune plants (i.e. *Leymus*) will be planted within and adjacent to the bales to stabilize the structures and increase foredune roughness and stability.

### **4. Watering**

All greenhouse reared plants will be out-planted in the late fall, scheduled to coincide with first rains. Additional watering during the project period may occur if necessary.

## **GOAL 3. ENHANCE STORM RESILIENCE OF DUNE SYSTEM**

### **Increasing Erosive Resistance of Dunes**

Several studies have documented the increased vulnerabilities to wave impacts posed by iceplant invasion on native dune systems. Sand dune vegetation plays a primary role in dune stabilization (De Lillis, 2004), and the loss of plant species that trap sand make the beach more vulnerable to wind and wave derived erosion. In areas open to direct winter wave action, waves can impact the steep edges of iceplant hardened fore-dunes causing undercutting beneath the plant biomass, washing away underlying sands below the shallow root zone, leading to catastrophic failure. In contrast, native dune species of the central Monterey Bay establish deep root matrixes that provide a three dimensional lattice of roots and mycorrhizae that resists wave and wind erosion and support vertical plant growth in step with dune formation (Dorrell-Canepa 2005).

The restoration of coastal dune systems can retard coastal erosion. Removal of the exotic ice plant (*C. edulis*) can lead to an increase in native dune species and to the re-establishment of a more dynamic foredune community. Such restoration has been recommended as an initial response to projected dune erosion from sea level rise and helps to maintain natural coastlines and dune systems at far less expense than coastal armoring (De Lillis et al. 2004, Langridge et al. 2014)

Several studies suggest that restoring the complexity of dune species (De Lillis et al. 2004) and the reestablishment of native foredunes can aid the long term resiliency of dunes to wave derived erosion. This structural complexity is anticipated to play a key role in maintaining resilience as ocean levels rise and dunes are required to adapt and migrate. This project anticipates and will study how the removal of *C. edulis* and the replanting of native foredunes species enhance foredune stability and resilience due to storm induced wave impacts; that will intensify as ocean levels rise.

## Key Processes of Foredune Failure

Three key processes that lead to foredune failure will be ameliorated through removal of iceplant and reintroduction of native species.

### 1. **Catastrophic dune edge collapse**

Foredunes dominated by ice plant capture and retain sand while forming a dense canopy and a steep dune face. While these dune edges (usually located above high water line) may be resistant to average wave patterns, wave impacts during large storm events can hit the dune edge with significant force, washing sand from below the ice plant canopy, resulting in mass wasting events and the loss of all plant material on the face of the fore dune.

### 2. **Increase in wave run up energy**

Foredunes edges dominated by ice plant often are devoid of plant material between the foredune edge and the water. The steeper ice plant dominated foredune fails to reduce wave runup energy as is common from gradually sloped foredune with sparse native plants that provide foredune roughness and protection provided by the deep root systems of the native plants. Restoration of sparse and diverse foredune species will reduce wave runup energy through increased roughness and a more gradual foredune slope.

### 3. **Reduced vigor of native species**

Several studies have documented the impacts on native dune plants in the vicinity of iceplant due to subsurface competitive interactions that lead to stunted growth of native plants (D'Antonio et al. 1991). Both above and below ground biomass of native species is reduced leading to less efficient accumulation of sand and reduced subsurface root biomass and dune structure (D'Antonio et al. 1991, Jucker 2013).

## Key Actions to Reduce Erosion

Key actions that will be taken to reduce these three coastal erosion processes include:

### 1. **Increase complexity of foredune**

Native species will be planted within areas where ice plant was removed. Species including the native dune grass (*Leymus mollis*) and beach bur (*Ambrosia chamissonias*) will be planted directly in front of dunes with steep faces.

### 2. **Enhance structural integrity (using driftwood) of foredune**

Locally derived large driftwood will be placed in areas along the foredune where dunes are steep and where previous wave erosion scars are evident. The wood will be placed in low density to increase roughness and provide three-dimensional stability as native species reestablish. \*

### 3. **Enhance contours to reduce erosive impacts of waves**

There are several areas of the Salinas River State Beach where dune erosion is evident and may lead to further wave impacts and possible dune overtopping during extreme storm events.

- a. **Eliminate perpendicular access ways:** There are several coastal access ways from inland trails and parking lots that lead out to the beach perpendicular to the shore. These visitor derived dune scars provide optimal wave ramps and funnels to encourage wave run-up and potential dune overtopping. By realigning these access ways (through restoration and fencing of a portion of the broad beach entrance) to angle away from the dominant wave angle, these enhanced access ways will limit wave funneling.
- b. **Encourage dune aggradation and enhanced dune roughness in low relief foredune areas:** Several strategies will be used to aid sand accumulation in areas where sand migration and foredune topography have been compromised by ice plant.
  - i. Native plantings of beach bur and dune grass will be placed forward of the dune faces to encourage low density reestablishment of native species and foredune topographic complexity\*.
  - ii. Straw bale planting mounds will be placed in low density in areas where erosion scars have cut into the foredune to eliminate wave run-up ramps\*.
  - iii. Decomposing drift fence (jute and bamboo) may be used in short segments (as not become a barrier to plover movement) to encourage sand deposition, reestablishing foredune complexity\*.
  - iv. Opportunistic sand placement will continue to be discussed with Monterey County to investigate future use of sand removed to breach the Salinas River lagoon. No sand placement is planned for this project.
  - v. Locally derived driftwood may be placed sparsely along the dune front to increase foredune roughness and complexity\*. Driftwood will not be used as an alternative to coastal hardening.

\*Note: All area-specific planting and the use and placement of drift wood or straw bales will be reviewed and approved by DPR and Point Blue in advance of plantings.

## GOAL 4. SUPPORT CALIFORNIA STATE PARKS DUNE MANAGEMENT EFFORTS

### Trail System Upgrades

SRSB has approximately 7,000 feet of existing trails in the dune system. With direction from DPR, the project will install or upgrade post and cable, no-climb fencing, or a similar type of fencing at access points and priority trails in order to protect sensitive habitat, reduce erosion caused by wayward foot and vehicle traffic, and to delineate public access corridors to the beach. DPR has prioritized fencing needs at the Molera Road and Sandholdt Road access points where wayward trails are most abundant (Figure 7). Specific locations to install new or upgrade existing fencing include the western edge of the Sandholt Road

parking lot/entrance (530 feet) and along both sides of the trail from the Molera parking lot to the beach (1600 feet). If the budget allows, additional locations for fence installation or upgrades will be determined by DPR.

Additional trail upgrade work may include the removal of the dilapidated boardwalk at Molera Road beach access, as it presents a liability hazard for public use at SRSB. The debris would be removed to a certified recycling or landfill facility.

## **Interpretive Signage**

To enhance visitor appreciation, enjoyment, and knowledge of SRSB, interpretive signs will be constructed at coastal access points and along main dune trails to provide education about sea level rise, dune erosion, habitat restoration, and endangered species (Figure 7). One 3-paneled kiosk will be installed at the Molera Road beach access parking lot, two 2'x3' low profile interpretive signs will be installed at the Potrero Road beach access parking lot, and approximately ten "kindly keep off the dunes" regulatory/interpretive signs will be installed along beach access trails and along the dune/horse trail. Please see Figure 8 for design of low-profile and kiosk interpretive signs. If budget permits, additional signs may be placed at the neighboring Monterey Dunes Colony to help inform this community about the sensitive dune habitat and sea level rise. All interpretive sign design and language will be approved by DPR to ensure that signs meet DPR standards. Interpretive signs will be made of a material that resists damage by vandals and the weather. Low profile signs and kiosks will be secured into the ground by concrete footings. No signs will be installed on the beach. Additional temporary signs prohibiting entry into restoration may read "Restoration in progress- Please Do Not Enter" and will be placed at the edges of the restoration areas.

## **Expansion of Iceplant Eradication Efforts**

CCWG and CCR will work with DPR and grant funding programs to identify additional resources to expand and maintain the iceplant eradication and native species planting efforts. Long term management of the SRSB will require adequate funding and time to ensure all iceplant is removed and that DPR has the resources to quickly address recolonization of iceplant.

## **Dune Restoration Monitoring**

Periodic plant monitoring efforts will be completed to quantify native species abundance and diversity, track changes in dune topography and identify and address recolonization by iceplant. Surveys will be completed by trained researchers and scheduled in foredune areas and other breeding habitat outside of the snowy plover nesting season. Please see the Plant Surveys section of this document for more information.

# **AVOIDANCE AND MITIGATION MEASURES**

All sensitive species and their habitats were evaluated for potential impacts by this project (CCWG 2015, Appendix B). Any potential impacts to native animal species are likely to be minimal and temporary, while the benefits are expected to endure. Project guidelines have been developed and will be implemented to avoid, reduce, or mitigate impacts (to a less than significant level) to the native fauna including the sensitive and special status species.

The sparsely vegetated dunes, beach and river mouth area of SRSB provide important breeding habitat for the western snowy plover. The snowy plover breeding season occurs from March 1 to September 30 each year. No project activities will be scheduled within the breeding habitat during the breeding season. Some project activity may be conducted in the mid to rear dune coastal scrub during the plover breeding season, but only at the discretion of DPR biologists in consultation with Point Blue ecologists.

Because this project proposes to install native vegetation in sparsely vegetated areas, it will be important not to decrease the amount or quality of breeding habitat available for western snowy plovers at SRSB. Area-specific planting plans and the use of straw bales will be reviewed and approved by DPR and Point Blue biologists in advance of plantings. Plans will be modified if they appear to negatively alter plover habitat. Additionally, plants may be removed if important breeding areas are inadvertently planted too densely.

For a complete list of avoidance and mitigation measures and project requirements please see Appendix B.

## RESTORATION SCHEDULE

	2016				2017				2018
	winter	spring	summer	fall	winter	spring	summer	fall	winter
<b>Restoration</b>									
Iceplant Eradication: Spray and hand									
Plant Propagation									
Outplanting									
Seed Collection for Broadcast									
Broadcast Seeding									
<b>Trail Enhancement</b>									
Sign Design and Construction									
Trail Fencing									
<b>Monitoring</b>									
Vegetation Monitoring									
Dune Morphology Monitoring									
Dune Restoration Best Practices Study									

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# MONITORING PROGRAM

## SUMMARY

Periodic plant and dune monitoring efforts will be completed to quantify native species abundance and diversity, track changes in dune topography and identify and address recolonization by iceplant. Surveys will be completed by trained researchers and scheduled in foredune areas outside of Snowy Plover nesting season.

## PLANT SURVEYS

### Methods

Plant surveys will be conducted throughout the project period. Vegetation surveys will document successful reestablishment of native plant species, successful eradication of invasive plants and identify areas where greater species diversity is needed. Additional surveys will occur at Moss Landing State Beach where a restoration project is already in place to help compare restoration success. Presence of iceplant during monitoring will be noted and reported to maintenance crew for spraying or hand removal. Vegetation monitoring will occur once before project initiation, twice a year during implementation, and once post implementation. Ongoing vegetation surveys past the project period will be conducted by CSUMB restoration ecology students. Vegetation monitoring will consist of three separate approaches (Figure 9):

1. **Point-intercept transects perpendicular to the coastline (percent cover)**

Transects will be aligned with dune topography study benchmarks, and in between the benchmarks as needed. Each 50 m transect will be laid perpendicular to shore and plant species will be recorded every half meter. The datasheet will be set up so that spatial information will be recorded. The zero mark will be on the ocean side of the dune and will increase moving inland. The transition from foredune to mid-dune will be recorded for each transect. In this way each transect can be separated into foredune and mid/upper dune, and the overall cover of plant species, bare sand and litter can be estimated for these zones.

2. **Parallel transects (percent cover and species richness).**

Transects will be laid parallel to the coast within restoration areas. One randomly placed quadrat (1m<sup>2</sup>) will be sampled within every 100-meter segment along transects. Percent cover will be estimated within each quadrat. Further, rare species along the entire transect will be noted. These transects will quantify the diversity on the site to capture the presence of rare species.

3. **Treatments in replicates.**

A study will be set up to help investigate best practices for eradicating iceplant and establishing natives on dunes. During initial monitoring, five large contiguous areas of iceplant (over 30 square meters) will be flagged to become replicate study plots. Within each plot, several restoration

treatments will be determined based on priority research questions. Each treatment will be replicated across each of the five study plots. Treatments may include clearing space around planting vs. planting directly into decomposed iceplant, driwater vs. no supplemental water, and planting at different densities of plant species. The individual treatments will be implemented within 2m diameter circular plots, which will be delineated using a central point and a 2m string or tape. These points will be marked with flags and the GPS location recorded. Percent cover and survivorship of plantings will be recorded during each sampling event.

## Sampling Schedule

Sampling events will occur twice a year during the project period (2016–2018), and then once a year post-implementation dependent by CSUMB students. Surveys will occur outside of the plover season, so the fall data collection will be after September 30<sup>th</sup> and the spring data collection will be before March 1<sup>st</sup>.

## TOPOGRAPHIC SURVEYS

### Methods

Dune profile surveys will be conducted before and after project implementation using differential GPS equipment. LiDAR data will also be collected to document beach and dune profiles. Future surveys will document topographic profiles and dune elevation changes expected within naturally evolving dune complexes.

A beach/dune morphology baseline of the study area will be created before project implementation. DEMs of the entire section of the beach between the mouth of the Salinas River and the head of the Monterey Canyon and adjacent dunes will be created based on the stereophotogrammetric analysis (~2cm resolution) of surveys recently conducted (October 2015) with an Unmanned Aerial Vehicle (UAV).

Terrestrial Laser Scanner (TLS)-based, beach/dune morphology baselines to measure beach/volume change will be produced using a Trimble VX Spatial Station. This state-of-the-art spatial station is equipped with Direct Reflex (DR) technology, a direct drive system with robotic servo-mechanisms and a built-in digital camera. The instrument is operated via radio-link by a controller unit, it can acquire accurate (<3 mm), multiple (15 points/s) spatial data (point clouds), and the range of operation of the DR laser is 2- to 500 m while on target mode (optical prism mounted on a survey rod) the acquisition can work as far as 2 km.

The TLS surveys will occur along 8 transects (spaced about every 500m). The survey areas will cover a coast-parallel band of approximately 200m centered at the survey benchmark. For each survey area 2 stable benchmarks (physically a ~5 foot long rebar hammered in the ground) will be determined using a differential GPS (horizontal and vertical accuracy ~2cm). The point cloud produced will include a cross-shore transect from the dune crest(s) to the beach. Scanning resolutions will range between 10 and 50cm with approximately 10,000 points collected per survey (Datums WGS84, NADV88). DR-technology and

single point measurements with a survey rod will be combined to account for geomorphological features (e.g. slope of the foredune) not directly visible from the TLS or for areas covered by intense vegetation.

Post-processing of the TLS data will be done with Real Works (software by Trimble). Post-processing operations include editing of the point clouds, merging of point clouds and survey points collected from different fore-sights, interpolation and contouring, creation of surface meshes, and photographic rendering of three-dimensional (3D) surface models. Real Works will also be used for the analysis/parameterization of the surface scans (e.g. volumes, slope angles), to compare TLS and UAV data and for the serial scans to identify and quantify areas subjected to volume changes. The vertical datums of the beach and dunes will be defined relative to the operational MHW elevation datum for the Monterey Bay area (MHW for the closest tidal station Monterey Harbor is 1.40m NADV88).

## **Sampling Schedule**

Sampling events will occur once a year during implementation (2016–2018) and will coincide with vegetation surveys. Post-implementation surveys will be conducted once a year dependent on additional funding. Surveys will occur outside of the plover season, so the fall data collection will be after September 30<sup>th</sup> and the spring data collection will be before March 1<sup>st</sup>.

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# APPENDIX A

## TABLES & FIGURES

Table 1. Iceplant cover estimates for project locations at SRSB (see Figure 2 for map locations)

Dune Restoration Section	% Cover of Dune Habitat	% of Total Veg Cover
Potrero Section 1	11%	35%
Potrero Section 2	25%	65%
Molera Section	25%	60%
Salinas River Section 1	25%	70%
South River Section 2	17%	50%

Table 2. Native dune plants at SRSB and prescribed % of total plant cover for revegetation efforts.

Species	Common name	Germ Rate	Foredune % Plant Cover	Mid-dune % Plant Cover
<i>Abronia latifolia</i>	yellow sand verbena	LOW	15%	0
<i>Abronia umbellata</i>	pink sand verbena	LOW	0	3%
<i>Achillea millefolium</i>	yarrow	MED-HIGH	0	5%
<i>Acmispon glaber</i>	deer weed	LOW	0	5%
<i>Ambrosia chamissonis</i>	beach bur	LOW	15%	3%
<i>Armeria maritima</i>	sea thrift	MED-HIGH	2%	4%
<i>Artemisia pycnocephala</i>	beach sagewort	HIGH	5%	5%
<i>Astragalus nuttallii</i>	Nuttall's milkvetch	MED-HIGH	0	5%
<i>Atriplex leucophylla</i>	beach saltbush	UNK	15%	0
<i>Calystegia solanella</i>	beach morning glory	MEDIUM	10%	5%
<i>Camissonia cheiranthifolia</i>	beach primrose	MED-HIGH	15%	5%
<i>Cardionema ramosissimum</i>	sand mat	UNK	0	5%
<i>Castilleja latifolia</i>	seaside painted cup	LOW	0	5%
<i>Chorizanthe pungens ssp. pungens</i>	Monterey spineflower	UNK	0	2%
<i>Corethrogyne filaginifolia</i>	California aster	MED-HIGH	0	5%
<i>Dudleya caespitosa</i>	coast dudleya	MEDIUM	0	5%
<i>Ericameria ericoides</i>	mock heather	MEDIUM	0	5%
<i>Eriogonum latifolium</i>	coast buckwheat	HIGH	0	10%
<i>Eriophyllum staechadifolium</i>	lizard tail	HIGH	0	5%
<i>Eschscholzia californica maritima</i>	beach poppy	MEDIUM	0	2%
<i>Extriplex californica</i>	California salt bush	HIGH	5%	0
<i>Gilia tenuiflora ssp. arenaria</i>	sand gilia	UNK	0	1%
<i>Lathyrus littoralis</i>	Beach pea	MEDIUM	3%	0
<i>Leymus mollis</i>	American dune grass	CUTTINGS	15%	0
<i>Lupinus chamissonis</i>	silver dune lupine	HIGH	0	5%
<i>Lupinus arboreus</i>	yellow bush lupine	HIGH	0	5%
<i>Phacelia ramosissima</i>	branching phacelia	MEDIUM	0	5%
			<b>100%</b>	<b>100%</b>

Table 3. Sensitive species list

<b>Within Project Boundaries</b>		
	<b>Common Name</b>	<b>Scientific Name</b>
<b>Animals</b>	Bank swallow	<i>Riparia</i>
	Black legless lizard	<i>Anniella pulchra nigra</i>
	Globose dune beetle	<i>Coelus globosus</i>
	Longfin smelt	<i>Spirinchus thaleichthys</i>
	Salinas harvest mouse	<i>Reithrodontomys megalotis distichlis</i>
	Short-eared owl	<i>Asio flammeus</i>
	Tidewater goby	<i>Eucyclogobius newberryi</i>
	Western snowy plover	<i>Charadrius nivosus</i>
<b>Plants</b>	Menzies' wallflower	<i>Erysimum menziesii</i> spp. <i>menziesii</i>
	Monterey gilia	<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>
	Monterey spineflower	<i>Chorizanthe pungens</i> var. <i>pungens</i>
	Sand-loving wallflower	<i>Erysimum ammophilum</i>
<b>Plant Communities</b>	Central dune scrub	
	Northern coastal salt marsh	
<b>Outside Project Boundaries (2 mi radius)</b>		
	<b>Common Name</b>	<b>Scientific Name</b>
<b>Animals</b>	Burrowing owl	<i>Athene cunicularia</i>
	California clapper rail	<i>Rallus longirostris obsoletus</i>
	California red-legged frog	<i>Rana draytonii</i>
	California tiger salamander	<i>Ambystoma californiense</i>
	Mimic tryonia	<i>Tryonia imitator</i>
	Monarch butterfly	<i>Danaus plexippus</i>
	Santa Cruz long-toed salamander	<i>Ambystoma macrodactylum croceum</i>
	Silvery legless lizard	<i>Anniella pulchra</i>
	Smith's blue butterfly	<i>Euphilotes enoptes smithi</i>
	Western pond turtle	<i>Emys marmorata</i>
<b>Plants</b>	Choris' popcornflower	<i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i>
	Congdon's tarplant	<i>Centromadia parryi</i> ssp. <i>congdonii</i>
	Pajaro Manzanita	<i>Arctostaphylos pajaroensis</i>
	Saline clover	<i>Trifolium hydrophilum</i>
	Seaside bird's-beak	<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i>
<b>Plant Communities</b>	Woodland woollythreads	<i>Monolopia gracilens</i>
	Coastal brackish marsh	
	Coastal and valley freshwater marsh	



Figure 1. Salinas River State Beach vicinity map



Figure 2. Work sites targeted for invasive species removal and reestablishment of native dune vegetation. Left panel shows overview of all field sites. Three right panels show closeups of individual restoration sites.



Figure 3. Distribution of special status plant species within SRSB.



Figure 4. Distribution of special status mammal and bird species within SRSB.



Figure 5. Distribution of special status reptile, fish and insect species within SRSB.

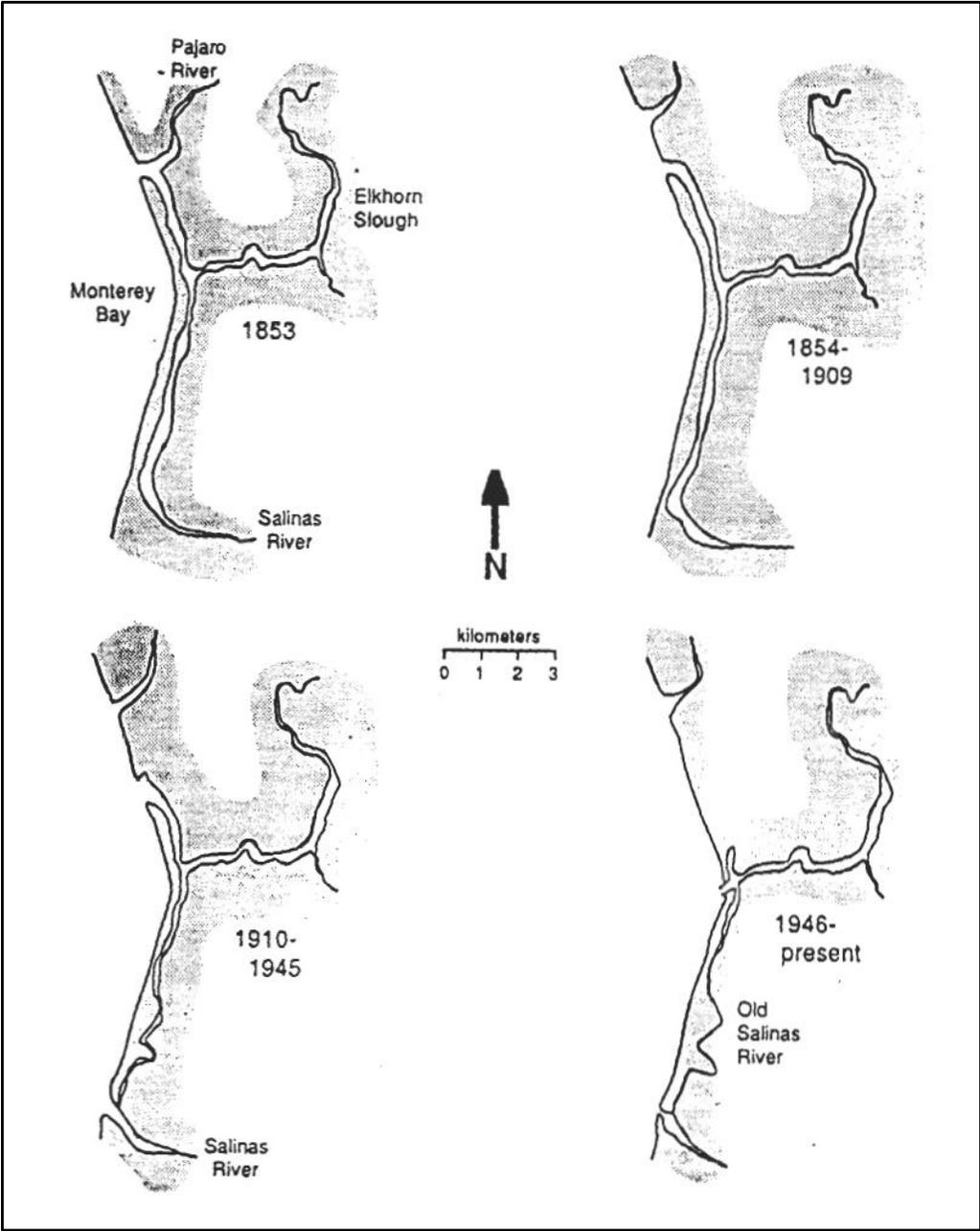


Figure 6. Historical flows of the Salinas River

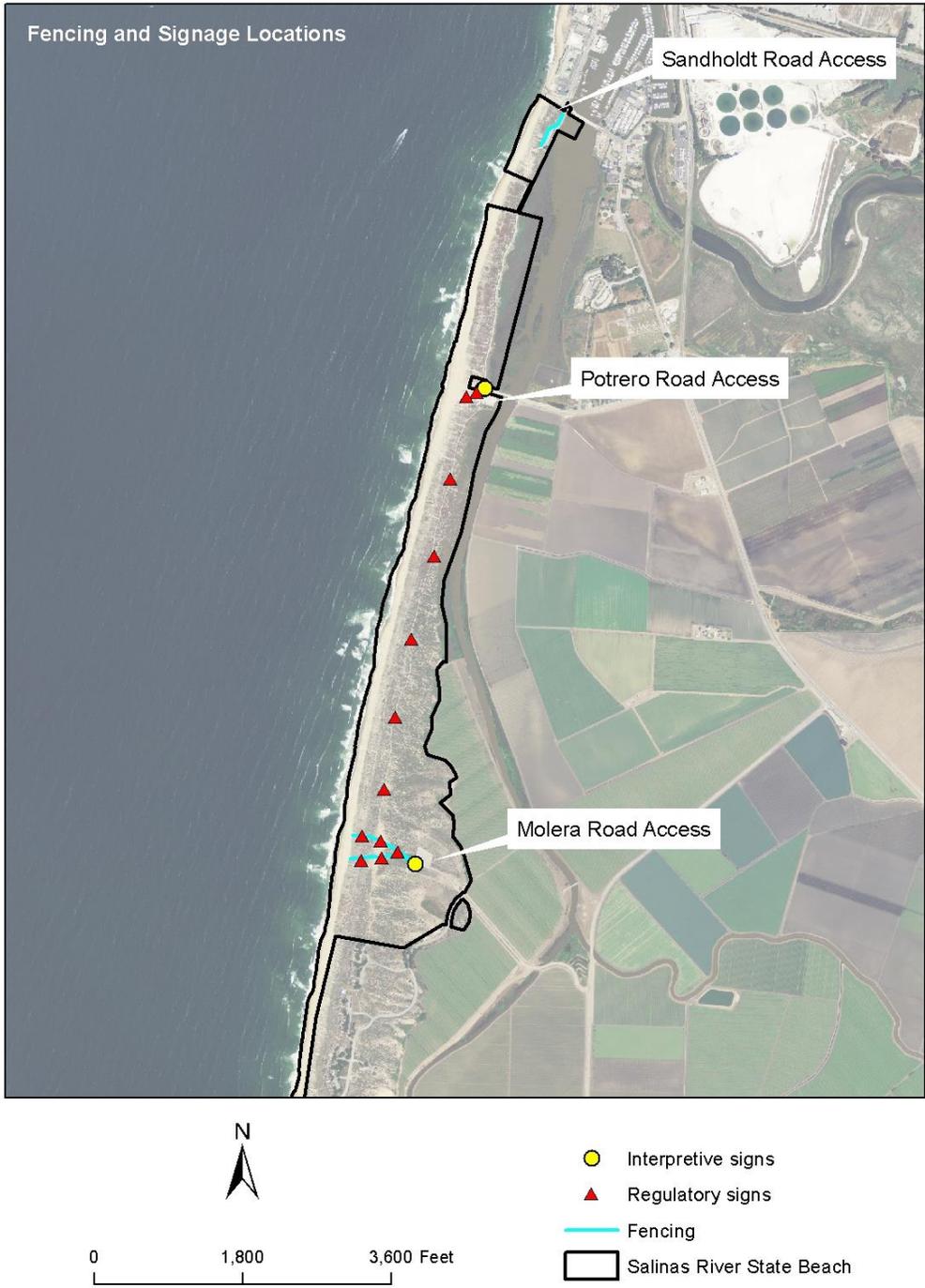
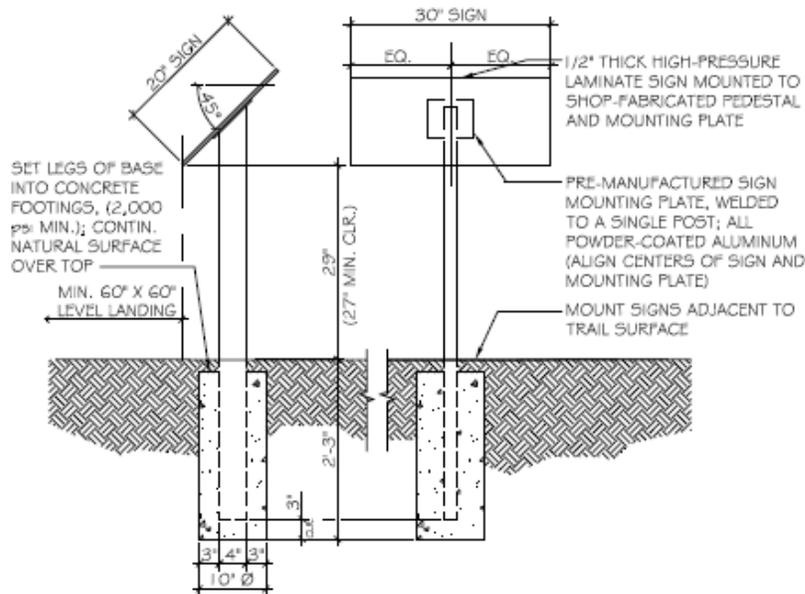


Figure 7. Fencing and signage priority locations



2 SIGN A: 30" X 20" INTERPRETIVE DISPLAY SIGN AND BASE  
SCALE: 1/4" = 1'-0" AT 20'x34"  
 SCALE: 3/4" = 1'-0" AT 11'x17"



NEW TRIPLE PANEL INTERPRETIVE SHELTER, PROVIDE STABILIZED DECOMPOSED GRANITE PAD AT PANEL AND TO ACCESSIBLE TRAIL; SLOPE 2% MAX. IN ANY DIRECTION - SEE 4/3

Figure 8. Sample kiosk and low-profile designs for interpretive signage



Figure 9. Vegetation monitoring methodology map

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APPENDIX B  
PROJECT REQUIREMENTS &  
MITIGATION MEASURES

## PROJECT REQUIREMENTS

Under CEQA, the Department of Parks and Recreation (California State Parks) has the distinction of being considered a lead agency, a public agency that has the primary responsibility for carrying out or approving a project and for implementing CEQA. A responsible agency is a public agency other than the lead agency that has responsibility for carrying out or approving a project and for complying with CEQA. A trustee agency is a state agency having jurisdiction by law over natural resources affected by a project that are held in trust for the people of the State of California. With this distinction comes the responsibility to ensure that actions that protect both cultural and natural resources are always taken on all projects. Therefore, DPR maintains a list of Project Requirements that are included in project design to reduce impacts to resources.

### Aesthetics

1. Projects will be designed to incorporate appropriate park scenic & aesthetic values including signage and fencing materials and colors and development of appropriate revegetation using native plants. The park scenic and aesthetic values will also consider views into the park from neighboring properties.
2. CCWG and CCR will store all project-related materials outside of the viewshed of SRSB.

### Air Quality

1. All trucks or light equipment hauling soil, sand, or other loose materials on public roads will be covered or required to maintain at least two feet of freeboard.
2. All gasoline-powered equipment will be maintained according to manufacturer's specifications, and in compliance with all State and federal requirements.

### Biological Resources

1. Plants and plant communities – Menzies' wallflower, Monterey gilia, Monterey spineflower, sand-loving wallflower, central dune scrub plant community, northern coastal salt marsh plant community
  - a. All personnel engaged in restoration activities with the potential to harm special status plants and plant communities will be instructed by the project manager or a DPR-approved biological monitor in the identification of such special status plants and plant communities and how to avoid them.
  - b. Special status plant and plant community distributions were mapped using the CNDDDB. Prior to work in project sites that overlap with special status plant and plant community distributions, special status plant and plant community boundaries will be identified in the field at the beginning of the work day and instruction on how to operate in these areas to avoid plants and plant communities will be given to workers.
  - c. If special status plants and plant communities listed in (1) above are located within 50 ft (15.2 m) feet of the project area, they will be flagged by the project manager or biological monitor prior to the start of restoration activities, and completely avoided.

- d. No herbicide will be used within 50 ft (15.2 m) of special status plants.
  - e. Care will be given to ensure that root systems of special status plants and plant communities are not dislodged where invasive plants are hand-pulled.
  - f. In locations where avoidance of special status plants is not possible, the following conditions will be imposed:
    - i. Prior to construction plants will be carefully excavated and transplanted nearby in suitable habitat. All transplant work will be conducted under the direction of a DPR-approved biologist.
    - ii. Transplanting will occur during the dormant season (i.e. late fall) when the plants are least disturbed and can be watered by natural precipitation.
  - g. To maintain genetic integrity, only plant stock collected within the SRSB will be used for revegetation in the project area.
  - h. All herbicides will be handled, applied, and disposed of in accordance with the MSDS Fact Sheet and all local, state, and federal laws.
  - i. CCWG and CCR will employ Best Management Practices (BMPs) for erosion control to avoid runoff of project-related sediments, tool or vehicle fluids, and other liquids into special plant communities.
2. Wildlife – invertebrates, including globose dune beetle
- a. The project manager or DPR-approved biological monitor will relocate any globose dune beetles encountered during ground-disturbing activities into adjacent, suitable habitat.
3. Wildlife – fish, including tidewater goby and longfin smelt
- a. Ponds, lagoons, and wetland areas will not be used as equipment staging or refueling areas. Equipment will be stored, serviced, and fueled away from ponds, lagoons, and wetland areas.
  - b. Erosion control measures to prevent sedimentation will include leaving herbicide treated invasive species in place to help stabilize dunes while native plants are growing and may include the use of straw bales (after review and approval by DPR and Point Blue biologists) in advance of plantings.
4. Wildlife – amphibians and reptiles, including legless lizard
- a. Project personnel will be instructed by the project manager or a DPR-approved biological monitor regarding the life history and habitat requirements of legless lizards and other amphibians and reptiles, and instruction in the appropriate protocol to follow in the event that a legless lizard or other amphibian or reptile is found on site.
  - b. The project manager or a DPR-approved biological monitor will be on site during all activities to ensure there are no impacts to legless lizards or other amphibians or reptiles.

- c. Immediately prior to the start of work each morning the project manager or a DPR-approved biological monitor will conduct a visual inspection of the project zone where activities will take place.
  - d. In the event that a legless lizard or other amphibian or reptile is found during project activities, work in the vicinity of the animal will be delayed until the organism moves out of the site of its own accord, or is temporarily relocated to nearby suitable habitat by the project manager or other DPR-approved personnel.
5. Wildlife – birds, including short-eared owls and bank swallows
- a. The project manager will schedule all work between October 1 and February 28 each year to avoid nesting season for birds including short-eared owls and bank swallows.
  - b. If work is required during the nesting season on the mid or rear dune, the project manager or a DPR-approved biological monitor will survey the project areas and surrounding habitats for nesting birds within 7 days prior to the start of onsite work. Work in this location will be performed at the discretion of DPR biologists in consultation with Point Blue ecologists.
  - c. If nesting raptors, including short-eared owls, are found in the project area, no onsite activities will occur within a 500 ft. (152 m) radius of the nest location between March 1 and September 30, or until the young have fledged and the young would no longer be impacted by project activities, as determined by the DPR-approved biologist, and there is no evidence of a second attempt at nesting.
  - d. If nesting migratory birds are found in the mid or rear dune, no onsite activities will occur within a 100 ft (30.5 m) radius of the nest tree or nest location between March 1 and September 30, or until the young have fledged and the young will no longer be impacted by project activities, as determined by the DPR-approved biologist.
6. Wildlife – western snowy plovers
- a. No project activities will be scheduled in western snowy plover breeding habitat during breeding season, March 1 to September 30.
  - b. Outside of the breeding season, if vehicles or mechanized equipment are used on the beach or dunes, each day prior to the start of project work, all areas within 1000 ft (300 m) of project activities will be surveyed for the presence of snowy plovers. The first survey will be conducted the day before the start of the project. Surveys will be conducted by DPR or Point Blue staff.
  - c. If vehicles or mechanized equipment are used on the beach or dunes and plovers are not seen in the survey area, the project manager will be given direction to proceed, with the condition that a plover surveyor be present to monitor the project while it is ongoing if Point Blue ecologists or DPR biologists deem it necessary.

- d. If vehicles or mechanized equipment are used on the beach or dunes and plovers are seen within 660 ft (200 m) of the work area, plover behavior will be monitored by the plover surveyor, and activities in that area will be cancelled if plover behavior is affected. Work will resume the next day, and another survey will be conducted. If plovers are seen on the second survey but no nest is found, and breeding behavior is not observed, the project activities will proceed at the discretion of the plover surveyor.
- e. Plover surveyors will be responsible for directing the project manager to stop or modify activities if plovers exhibit disturbance behavior that is related to the project activity.
- f. If at any time a nest or brood is located near enough to project activities that bird behavior is affected, project work in that area will be cancelled until the end of the breeding season or until further monitoring activities document that the nest is no longer active or the broods have moved out of the area.
- g. Project work, including operation of vehicles, will occur no earlier than ½ hour after sunrise and conclude at least ½ before sunset.
- h. DPR may consult with USFWS or Point Blue ecologists and request technical assistance for site-specific avoidance or mitigation measures. Any such changes will be amended into the Mitigated Negative Declaration if necessary.

#### 7. Wildlife – Salinas harvest mouse

- a. Project work, including operation of vehicles, will occur no earlier than ½ hour after sunrise and conclude at least ½ before sunset.
- b. Immediately prior to the start of work each morning the project manager or a DPR-approved biological monitor will conduct a visual inspection of the project zone where activities will take place.
- c. In the event that a Salinas harvest mouse is found on the project site, work in the vicinity of the animal will be delayed until the organism moves out of the site of its own accord, or is temporarily relocated by the project manager or other DPR-approved personnel.

### Cultural and Tribal Cultural Resources

1. Prior to the start of construction, a DPR archaeologist will consult with the contractor and project manager to identify all resources that must be protected.
2. No track-mounted or heavy-wheeled vehicles will be allowed in identified environmentally sensitive areas. If foot traffic is necessary, this will only be allowed with specific permission from the DPR's Representative after clearance with the project manager.
3. Prior to the start of construction, a DPR cultural resources specialist or their designee will train project personnel in cultural resource identification and protection procedures.

4. Any locations where ground disturbing activities are proposed for the removal of invasive plant species or the installation of fencing and signage will require additional archaeological review. This will include archival research and/or possible field investigations to identify previously undocumented archaeological resources in specified treatment areas.
5. A DPR archaeologist familiar with the project will review and authorize all vehicle and equipment staging and material storage sites except those staging/storage locations situated on the currently paved surface of the parking lots or those locations outside of the park.
6. If a contractor, project manager, or other staff member discovers previously undocumented cultural resources during project construction work within 82 ft (25 m) of the find will be temporarily halted until the archaeologist designs and implements appropriate treatments in accordance with the Secretary of the Interiors Standards and Guidelines for archaeological resource protection.
  - a. The project manager working with the DPR archaeologist will modify the project to ensure that construction activities will avoid cultural resources upon review and approval of the DPR archaeologist.
  - b. If ground disturbing activities uncover intact cultural features (including but not limited to dark soil containing shellfish, bone, flaked stone, groundstone, or deposits of historic ash), when a DPR Qualified cultural resources specialist is not on-site, the project manager will contact the DPR State Representative immediately and will temporarily halt or divert work within the immediate vicinity of the find until a DPR-qualified cultural resources specialist evaluates the find and determines the appropriate treatment and disposition of the cultural resource.
7. In the event that human remains are discovered, work will cease immediately in the area of the find and the project manager/site supervisor will notify the appropriate DPR personnel. Any human remains and/or funerary objects will be left in place or returned to the point of discovery and covered with soil. The DPR Sector Superintendent (or authorized representative) will notify the County Coroner, in accordance with §7050.5 of the California Health and Safety Code, and the Native American Heritage Commission (or Tribal Representative). If a Native American monitor is on-site at the time of the discovery, the monitor will be responsible for notifying the appropriate Native American authorities.
8. The local County Coroner will make the determination of whether the human bone is of Native American origin.
9. If the Coroner determines the remains represent Native American interment, the NAHC in Sacramento and/or tribe will be consulted to identify the most likely descendants and appropriate disposition of the remains. Work will not resume in the area of the find until proper disposition is complete (PRC §5097.98). No human remains or funerary objects will be cleaned, photographed, analyzed, or removed from the site prior to determination.

10. If it is determined the find indicates a sacred or religious site, the site will be avoided to the maximum extent practicable. Formal consultation with the State Historic Preservation Office and review by the Native American Heritage Commission/Tribal Cultural representatives will occur as necessary to define additional site mitigation or future restrictions.

## Geology/Soils

1. CCWG, CCR and DPR will decommission volunteer trails in the dunes by replanting native trees and shrubs in the volunteer trails
2. CCWG and CCR will clearly block both ends of volunteer trails with native plants to discourage continued use and degradation of the decommissioned volunteer trails.

## Hazards and Hazardous Materials

1. Prior to the start of on-site construction activities, the project manager will inspect all equipment for leaks and regularly inspect thereafter until equipment is removed from the project site. All contaminated water, sludge, spill residue, or other hazardous compounds will be contained and disposed of outside the boundaries of the site, at a lawfully permitted or authorized destination.
2. A Spill Prevention and Control Plan (SPCP) will be prepared prior to the start of the project and an appropriate spill kit maintained onsite throughout the duration of the project. The SPCC Plan will include a map delineating project staging or storage areas and areas where refueling, lubrication, and maintenance of equipment may occur. In the event of a spill or release of any chemical on or adjacent to the project site, the contractor or equipment operator will immediately notify appropriate DPR staff and implement the Monterey County Hazardous Materials Incident Response Plan. Appropriate agencies will be notified in the event of significant spillage.
3. Prior to the start of construction, CCWG and CCR will develop a Fire Safety Plan for DPR approval. The plan will include the emergency calling procedures for both the California Department of Forestry and Fire Protection (CAL FIRE) and local fire department(s).
4. Prior to the start of on-site construction activities, CCWG, CCR, and contractors will clean and repair (other than emergency repairs) all equipment outside the project site boundaries.
5. The project manager will designate and/or locate staging and stockpile areas within the parking lots to prevent leakage of oil, hydraulic fluids, etc. into native vegetation, ponds, the Salinas River Lagoon, or the old Salinas River Channel.
6. When not in use, hazardous materials will be stored in a locked storage area. Materials will be transported to the work site in spill proof containers and will be secured in the vehicle so as to prevent spillage.
7. All heavy equipment must be equipped with spark arrestors or turbo-charging (eliminates sparks in exhaust). At the end of each workday, heavy equipment must be parked over asphalt or concrete to

reduce chance of fire. If no local asphalt or concrete is available, heavy equipment shall be parked over bare ground with drip pans to inhibit petroleum discharges to soil.

8. Restoration crews must park vehicles away from flammable material, such as dry grass or brush.
9. All internal combustion engines used for any purpose at the job site must be equipped with a muffler of a type recommended by the manufacturer and that all equipment and trucks used for construction utilize the best available noise control techniques (e.g., engine enclosures, acoustically attenuating shields or shrouds, intake silencers, ducts, etc.) whenever feasible and necessary.
10. Personnel must have firefighting hand tools on site and each vehicle shall have an appropriately-sized and fully charged fire extinguisher.
11. No herbicide will be used within 50 ft (15.2 m) of special status plants or animals.
12. All herbicides will be handled, applied, and disposed of in accordance with the MSDS Fact Sheet and all local, state, and federal laws.
13. Herbicide spraying will be timed to coincide with the late fall dormancy period of native plants, prior to native seedling germination.
14. Spot-spraying of herbicide will be used within special status plant communities (central dune scrub and northern coastal salt marsh) to eliminate individual, persistent non-native plants.
15. Only handheld, targeted spraying will be done, avoiding spraying during windy or rainy conditions.
16. Sprayed areas will be closed for 24 hours to limit visitor exposure to herbicides.
17. Use will be restricted to the least hazardous herbicides and surfactants that will accomplish the task of killing ice plant and other non-native plants.

## Hydrology/Water Quality

1. The project will comply with all applicable water quality standards as specified in the North Central Coast Air Basin Plan.

## Land Use/Planning

1. Conditions and requirements identified through the Coastal Development Permit process will be incorporated into the project design and specifications, and implemented as part of the project scope to avoid potential natural resource impacts.

## Noise

1. Internal combustion engines used for project implementation will be equipped with a muffler of a type recommended by the manufacturer. Equipment and trucks used for Project-related activities will utilize the best available noise control techniques (e.g., engine enclosures, acoustically attenuating shields or shrouds, intake silencers, ducts, etc.) whenever necessary.

2. The project manager will locate stationary noise sources and staging areas as far from potential sensitive noise receptors, as possible. If they must be located near potential sensitive noise receptors, stationary noise sources will be muffled or shielded, and/or enclosed within temporary sheds.
3. Project activities will be limited to the daylight hours. No work will occur before 7:30 a.m. or after 8 p.m.

## MITIGATION MEASURES

The following mitigation measures would be implemented as part of the Project.

### Biological Resources

#### Plants

Plant surveys will be conducted prior to work beginning in project areas so that the locations of any special status plants (Menzies' wallflower, Monterey gilia, Monterey spineflower, sand-loving wallflower) can be flagged and incorporated into a project GIS database. Only hand weeding will occur in the vicinity of flagged plants. Herbicide spraying will be timed to coincide with the late fall dormancy period of native plants, prior to native seedling germination. Spot-spraying of herbicide will be used within special status plant communities (central dune scrub and northern coastal salt marsh) to eliminate individual, persistent non-native plants.

#### Short-eared owl and bank swallow

Onsite weeding, planting, and fence building activities will be largely scheduled during the non-breeding season, October 1 to February 28 each year. If onsite activities must be scheduled on the mid to rear foredune during the short-eared owl or bank swallow breeding seasons, March 1 to September 30, a DPR-approved biologist will conduct surveys at project sites for nesting bird presence within 7 days prior to the start of onsite work under the following conditions:

- Raptors, including short-eared owls: if nesting raptors are found, no onsite activities shall occur within a 500 ft (152 m) radius of the nest tree or ground nest location between March 1 and September 30, or until the young have fledged and the young would no longer be impacted by project activities, as determined by the DPR-approved biologist, and there is no evidence of a second attempt at nesting.
- Migratory birds, including bank swallows: if active nests are located, no onsite activities shall occur within a 100 ft (30.5 m) radius of the nest tree or nest location between March 1 and September 30, or until the young have fledged and the young will no longer be impacted by project activities, as determined by the DPR-approved biologist.

### **Western snowy plovers**

The sparsely vegetated dunes, beach and river mouth area of SRSB provide important breeding habitat for the western snowy plover. The snowy plover breeding season occurs from March 1 to September 30 each year. No project activities will be scheduled within the breeding habitat during the breeding season. Some project activity may be conducted in the mid to rear dune coastal scrub during the plover breeding season, but only at the discretion of DPR biologists in consultation with Point Blue ecologists.

Because this project proposes to install native vegetation in sparsely vegetated areas, it will be important not to decrease the amount or quality of breeding habitat available for western snowy plovers at SRSB. Area-specific planting plans will be reviewed and approved by DPR and Point Blue biologists in advance of plantings. Plans will be altered if they appear to significantly alter plover habitat. Additionally, plants may be removed if important breeding areas are inadvertently planted too densely.

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APPENDIX C  
DETAILED DESCRIPTION OF ON-SITE ACTIVITIES

RESTORATION: INVASIVE ERADICATION AND NATIVE PLANTING AND SEEDING		SCHEDULE
<p>Iceplant Eradication: Spraying/Hand pulling</p>	<p><b>Description:</b> A restoration crew will eradicate invasive species on approximately 20 acres at Salinas River State Beach, focusing on iceplant (<i>Carpobrotus edulis</i>), on the identified highly vulnerable areas of the fore-dunes and on some areas of the mid dune. Eradication will include standard methods demonstrated effective on previous nearby projects. Methods for removing iceplant will focus on herbicide spraying (using prescribed restoration methods), and hand-pulling. Removal efforts will be restricted between March–September on foredunes to avoid Snowy Plover breeding season. The first year will focus on spraying of iceplant using 2% glyphosate/1.5% imazapyr mix + surfactant solution, the second year will focus on hand removal. Sprayed iceplant will be left in place to act as mulch. Natives will be planted within the dead iceplant. Spot checks will be done in subsequent years and any alive iceplant will be resprayed or removed by hand.</p> <p><b>Equipment:</b> backpack sprayer, gloves, herbicide (2% glyphosate/1.5% imazapyr mix + surfactant solution)</p> <p><b>Staging Area:</b> Molera Rd or Potrero Rd parking lots, and farm road by the mouth of the Salinas River</p> <p><b>Days/Hours:</b> Work will occur between the hours of 8am and 5pm. Spraying is estimated to take 2–3 weeks the first year. Minimal spraying will occur the second year in places with dense iceplant mats that will need a second application of herbicide. Hand pulling will occur during the second year. Hours for hand pulling on dependent on amount of iceplant that will need to be pulled.</p> <p><b>Number of people:</b> Max 5</p> <p><b>Additional info:</b> Spraying will be conducted using only handheld, targeted spraying as opposed to aerial spraying; the crew will avoid spraying during windy or rainy conditions; and sprayed areas will be blocking off for 24 hours. Majority of spraying will occur outside of the plover breeding season (after October). Any spraying that will occur during the plover season will be located outside of the snowy plover breeding habitat and will be conducted in consultation with State Parks and Point Blue. Restoration crew will follow MSDSs for each chemical used. All herbicide of will be transported and disposed of in accordance with the specific MSDS.</p>	<p>Spring 2016 and Fall 2016 and 2017</p>
<p>Outplanting</p>	<p><b>Description:</b> Native plants will be established on the dune through out-planting (and seed dispersal, see task 2f). The planting density for propagated out-plants will be 1–3 plants/m<sup>2</sup> in iceplant removal areas. Lower planting densities are needed in areas with established but sparse native plants.</p> <p><b>Iceplant mulch and native planting</b> Desiccated iceplant material will be present throughout the dunes after the herbicide spraying (approximately 6 months after initial application). This mulch material provides enhanced conditions for survival of planted juvenile native species. A four-inch spade will be used to cut through the iceplant mulch and juvenile native plants will be planted. Sand and mulch will be laid around the plant. Plants will be placed at distances of 6 to 18 inches apart, dependent on the expected width of a one-year-old plant.</p>	<p>November– March 2016/2017 and November– February 2017/2018</p>

	<p><b>Planting on bare sand</b> Some native plants will be planted in foredune areas where no plants currently exist. In these areas, plants will be planted within small mounds (3" high) above the base elevation to reduce burial. Plant spacing in this area will be determined in close consultation with DPR and Point Blue to ensure that snowy plover breeding habitat is not negatively impacted.</p> <p><b>Planting in straw bales</b> Straw bales may be placed in low density in areas where excessive human trampling has led to a degradation of dune contours. Straw bales will be placed at low density to encourage rebuilding of foredune habitat that replicates natural topographic variability. Native foredune plants (i.e. <i>Leymus</i>) will be planted within and adjacent to the bales to stabilize the structures and increase foredune roughness and stability.</p> <p><b>Equipment:</b> shovels, trowels, plants, straw bales or other organic material such as locally derived driftwood</p> <p><b>Staging Area:</b> Molera Rd or Potrero Rd parking lots, and farm road by Salinas River Mouth</p> <p><b>Days/Hours:</b> Work will occur between the hours of 8am and 5pm. It is estimated that over the project period the restoration crew will spend approximately 4–5 weeks to install plants.</p> <p><b>Number of people:</b> Max 5</p> <p><b>Additional info:</b> Please see Education and Outreach section to see info about school and community planting days. All planting will occur outside of the plover season.</p>	
Seed Collection for Seed Dispersal	<p><b>Description:</b> Trained botanists and restoration crew members will collect seeds of native species recommended by DPR at the Salinas River State Beach dunes complex to ensure local genetic diversity is supported. Seed will be collected under the supervision of a restoration biologist by permission from DPR. Maximum genetic diversity shall be assured by collecting seed from un-restored sections of the nearby dunes, and by gathering from as many different plants of the same species as possible. No more than 10% of the produced seed from any one plant shall be collected.</p> <p><b>Equipment:</b> paper bags</p> <p><b>Staging Area:</b> none needed</p> <p><b>Days/Hours:</b> Seeds will be collected between the hours of 8am and 5pm. It is estimated that over the project period it will take approximately 40 hours for the crew to collect the seeds.</p> <p><b>Number of people:</b> Max 5</p> <p><b>Additional info:</b> Majority of seed collection will occur outside of the plover season. However, because some plants produce seeds during the Spring or Summer (during the plover season) the restoration crew will work with DPR and Point Blue to identify locations in the dunes where they can collect seed without disturbing breeding habitat.</p>	Spring, Summer, & Fall 2016 and 2017

Broadcast Seeding	<p><b>Description:</b> The restoration crew will hand broadcast local native seeds in areas where the sand is relatively stable and some native vegetation is present. Further broadcast seeding may be feasible where spayed iceplant has been decomposing for over one year. Broadcast seeding will be done prior to the first rains (Nov–Jan). Seed may also be broadcast and raked into barren back dune areas if seed supply is available and if seeding the area is not expected to negatively impact snowy plover breeding habitat per DPR and Point Blue guidance. Seed will be spread by hand onto the sand or fully decomposed iceplant litter and raked in lightly. Two seed mixes shall be created, corresponding to the species diversity of the fore or mid-to-rear dunes. An estimate of 10 pounds per acre of seed is needed where broadcast seeding will occur.</p> <p><b>Equipment:</b> seeds and rake</p> <p><b>Staging Area:</b> none needed</p> <p><b>Days/Hours:</b> Work will occur between the hours of 8am and 5pm. It is estimated that over the project period, hand broadcast seeding will take approximately 30 hours.</p> <p><b>Number of people:</b> Max 3</p> <p><b>Additional info:</b> Seed dispersal will be conducted outside of the plover season.</p>	November–January 2016/2017 and November–January 2017/2018
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TRAIL & ACCESS ENHANCEMENT		Schedule
Signs	<p><b>Description:</b> Interpretive signage will be installed at SRSB at coastal access points and along main access trails to provide information about sea level rise, dune erosion, habitat restoration, and endangered species. All interpretive signs will be made of a material that resists damage by vandals and the weather. Low profile signs and kiosks will be secured into the ground by concrete footings. No signs will be installed on the beach. Signs to be installed: one interpretive 3 paneled kiosk at dune entrance at Molera parking lot, two smaller (2x3 foot) interpretive/educational signs at Potrero Rd parking lot, ten dune interpretive/regulatory signs.</p> <p><b>Equipment:</b> Work will occur between the hours of 8am and 5pm. Sign and posts, post hole diggers, two-man power auger, concrete mix, wheelbarrow, shovels, small hand tools.</p> <p><b>Staging Area:</b> Molera Rd and Potrero Rd</p> <p><b>Days/Hours:</b> It is estimated that it will take no more than 2 days (16 hours) to install signs.</p> <p><b>Number of people:</b> Max 3</p> <p><b>Additional info:</b> Regulatory/signs that will be installed on the back dune trail between Molera Rd and Potrero Rd access points may be bolted to existing fence posts. No signs will be placed on the beach.</p>	June 2016–June 2017

Trail fencing	<p><b>Description:</b> SRSB has approximately 7,000 feet of existing trails. With direction from State Parks, the project will install or upgrade post and cable or no-climb (or similar) fencing at access points and priority trails in order to protect sensitive habitat, reduce erosion caused by wayward foot and vehicle traffic, and to delineate public access corridors to the beach. Trail fencing is currently prioritized at Molera Rd access trail and Sandholdt Rd parking lot.</p> <p><b>Equipment needed:</b> Fencing, post hole diggers, two-man power auger (needed for areas with hard ground, but not for soft sand), chainsaw fencing stretcher, top wire puller (clamp), come along, digging bar, hand level, hammers, fencing pliers hog ring wrenches, string line, pin flags (for layout), wheel barrows.</p> <p><b>Staging Area:</b> Molera Rd, Potrero Rd and Sandholdt Rd parking lots.</p> <p><b>Days/Hours:</b> Fence installation will occur between 8 am and 5pm. It is estimated that fence installation will take up to ten, 8-hour days (80 hours total).</p> <p><b>Number of people:</b> 3–10 depending on organization installing fencing.</p>	June 2016– June 2017
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MONITORING		SCHEDULE
Vegetation Monitoring	<p><b>Description:</b> CCWG will conduct plant surveys throughout the project period. Vegetation surveys will document successful reestablishment of native plant species, successful eradication of invasive plants and identify areas where greater species diversity is needed. Additional surveys will occur at Moss Landing State Beach where a restoration project is already in place to help compare restoration success. Presence of iceplant during monitoring will be noted and reported to maintenance crew for spraying or hand removal. Vegetation monitoring will occur once before implementation, twice a year during implementation, and once post implementation. Vegetation Transects will be set up in conjunction with dune morphology surveys.</p> <p><b>Equipment needed:</b> Pin flags, quadrat, GPS</p> <p><b>Staging Area:</b> none needed</p> <p><b>Days/Hours:</b> Surveys will be conducted between the hours of 8 am and 5pm. It is estimated that each survey will take approximately three, 8-hour days. Total days throughout project period is estimated to be 10 days (total 240 hours).</p> <p><b>Number of people:</b> 1–2 people</p> <p><b>Additional Info:</b> Surveys will be conducted outside of the plover season.</p>	April 2016–June 2018
Dune Morphology Monitoring	<p><b>Description:</b> CCWG will conduct dune profile surveys before and after project implementation using a Terrestrial Laser Scanner (TLS), and differential GPS equipment. LiDAR data will also be used to document beach and dune profiles. Future surveys will document topographic profiles and dune elevation changes expected within naturally evolving dune complexes. Transects will be set up in conjunction with vegetation surveys.</p>	April 2016–June 2018

	<p>The TLS surveys will occur along 8 transects (spaced about every 500m). The survey areas will cover a coast-parallel band of approximately 200m centered at the survey benchmark. The point cloud produced will include a cross-shore transect from the dune crest(s) to the beach. Scanning resolutions will range between 10 and 50cm with approximately 10,000 points collected per survey. DR-technology and single point measurements with a survey rod will be combined to account for geomorphological features (e.g. slope of the foredune) not directly visible from the TLS or for areas covered by intense vegetation.</p> <p><b>Equipment needed:</b> Terrestrial Lase Scanner, differential GPS, pin flags</p> <p><b>Staging Area:</b> none needed</p> <p><b>Days/Hours:</b> Surveys will be conducted between the hours of 8 am and 5pm. It is estimated that each survey will take approximately 3 days (24 hours). 3–4 survey are expected to occur over the project period.</p> <p><b>Number of people:</b> 1–2 people</p> <p><b>Additional Info:</b> Surveys will be conducted outside of the plover season.</p>	
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OUTREACH AND EDUCATION		SCHEDULE
<p>School Planting or Seed Collection days</p>	<p><b>Description:</b> CCWG will work with the North Monterey County Unified School District to coordinate and hold three planting days for students at dune restoration sites.</p> <p><b>Equipment needed:</b> shovels, trowels, plants, shade tent</p> <p><b>Staging Area:</b> Molera Rd or Potrero Rd parking lots</p> <p><b>Days/Hours:</b> Each planting day will be approximately 4 hours long. There will be 3 school planting days.</p> <p><b>Number of people:</b> Max 60 students, 10 staff</p> <p><b>Additional info:</b> Students participating in planting or seed collection days will be given a lesson on the importance of dune habitat and how to walk through the dunes to minimize disturbance. Students will be broken up into smaller groups and groups will be spread out. Students will work primarily in places without dense areas of native plants to minimize disturbance to existing native species. Students will be supervised by restoration professionals. Planting days will take place outside of plover season.</p>	<p>Winter &amp; Spring 2017 &amp; 2018</p>
<p>Community Planting or Seed Collection Days</p>	<p><b>Description:</b> CCWG will hold three community volunteer planting days at the restoration site.</p> <p><b>Equipment needed:</b> shovels, trowels, plants</p> <p><b>Staging Area:</b> Molera Rd. or Potrero Rd parking lot</p> <p><b>Days/Hours:</b> Each planting day will be approximately 4 hours long. There will be 3 community planting days.</p> <p><b>Number of people:</b> Max 60 volunteers, 10 staff</p>	<p>Winter &amp; Spring 2017 &amp; 2018</p>

	<p><b>Additional info:</b> Volunteers participating in planting or seed collection days will be given a lesson on the importance of dune habitat and how to walk through the dunes to minimize disturbance. Volunteers will be broken up into smaller groups and groups will be spread out. Volunteers will work primarily in places without dense areas of native plants to minimize disturbance to existing native species. Volunteers will be supervised by restoration professionals. Planting days will take place outside of plover season.</p>	
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