

City of Carmel-by-the-Sea



Del Mar Master Plan

Master Plan Steering Committee:

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Final Adoption by City Council: September 1, 2009

Final Certification by California Coastal Commission: January 14, 2010

DEL MAR MASTER PLAN

A. INTRODUCTION

Carmel Beach is owned and maintained by the City of Carmel-by-the-Sea and includes over 22 acres of white sand beach. At the foot of Ocean Avenue is the Del Mar parking area. The parking area is "L" shaped in design and extends from San Antonio Avenue on the east to Del Mar Avenue on the west and includes approximately 120 parking spaces.

The North Dunes and Del Mar Dunes are the last remaining undeveloped dunes within the City limits. The North Dunes are located on the north end of the beach adjacent to the Del Mar parking lot at the foot of Ocean Avenue. This is a 4 to 5 acre tract of substantially disturbed dunes. The Del Mar Dunes are a thin stretch of disturbed dunes extending from the Del Mar parking area to approximately Eighth Avenue.

While the North Dunes and Del Mar dunes are host to several exotic and invasive species, a small amount of native dune scrub still occurs. Species observed in the dunes habitat in past field surveys include mock heather, bush lupine, beach sagewort, California blackberry, Tidestrom's lupine and others.

Special status species found in the area include the Tidestrom's lupine, which is listed by the State of California and the Federal Government as endangered, the central dune scrub, which the State of California considers a sensitive habitat, and the black legless lizard, which the State of California considers a species of special concern.

(For more information on the habitat and species in the North Dunes and Del Mar Dunes please see Local Coastal Implementation Plan Appendix "A" Shoreline Management Plan, Local Coastal Land Use Plan Appendix "F" Environmentally Sensitive Habitat Area Study, and the attachments to this plan.)

B. MASTER PLAN

Goal 4-2 of the General Plan/Coastal Land Use Plan encourages the development of a Master Plan for the Del Mar and North Dunes area. Several objectives and policies are identified in the General Plan/Coastal Land Use Plan addressing the content of the Master Plan. The purpose of this Master Plan is:

- 1) To provide a framework for improving parking, circulation, pedestrian flow, handicap accessibility, aesthetics and environmental resources in the Master Plan area.
- 2) To establish and maintain long-range goals for preservation and use of the Del Mar and North Dunes.

The identification number order of goals, objectives and policies in the Del Mar Master Plan is correlated to the numbering order in the adopted Local Coastal Program of Carmel-by-the-Sea and thus may not appear in sequential order in this Plan. Some of the goals, policies and objectives listed are not fully implemented in this plan. A section at the end of the plan identifies future implementation measures.

C. PARKING AREA

Policies and Objectives:

- P4-42** Develop a design plan for the Del Mar parking area that improves circulation, reduces congestion, enhances visual quality, and enhances community character. The redesign shall avoid or minimize any loss of parking spaces.
- P4-15:** Address circulation and parking problems.
- P4-17:** Consider reallocating parking so it will flow in a more efficient manner. Consider a regular shuttle from downtown or from a designated parking area.
- P4-18:** Improve the pedestrian experience through the Del Mar parking area for those arriving on foot and from parked vehicles to the beach. Consider construction of boardwalks or other improvements to aid beach circulation, protect tree roots and protect the sensitive vegetation in the North Dunes area.
- P4-19:** Provide disabled access consistent with ADA requirements. Provide access that blends with the beach and allows disabled individuals the opportunity to enjoy a more natural beach experience.
- P4-21:** Provide secure bicycle racks.
- O5-16** Remove or reduce unnecessary or excessive hardscape and other nonconforming encroachments on City parklands and within street rights-of-way to provide for and promote planting of trees and native vegetation.
- O5-22** Maximize retention of surface water on each site through site design and use of best management practices.
- P5-109** Where feasible, direct street runoff to open space areas on public or private property for percolation into the soil.

Implementation

Implementation will be in general conformance with the site plan prepared by RBF Consulting (see figure 1) and will include the following improvements:

Circulation: The existing handicap parking spaces will be relocated to accommodate a turn-around at the bottom of Ocean Avenue. This will allow vehicles to avoid proceeding on Del Mar Avenue and will improve circulation.

Parking: Several spaces in the Del Mar Avenue portion of the parking area will be reoriented and/or removed to accommodate the new turnaround. Three new angled spaces are proposed at the intersection of Ocean Avenue and Scenic Drive. Four new motorcycle spaces are proposed at the southwest corner of Scenic Drive and Ocean Avenue. Parking of vehicles 20 feet in length and/or exceeding seven and one-half feet in height are prohibited from parking the Del Mar parking area and on the west side of San Antonio Avenue between Ocean and Fourth Avenues. The plan will maintain 120 parking spaces along with four new motorcycle spaces.

Pedestrians: Sand-set pavers or similar material sidewalks are proposed along the north and south sides of the parking area to replace the aggregate walkways. This will improve the appearance and safety of the walkways. The cross walk at the foot of Ocean Avenue will include alternate materials or new painting to clearly identify the crosswalk. Improved bike racks are proposed near the restrooms.

Aesthetics: The parking area will be repaved to improve its appearance, durability and safety. The parking area will be made more level to reduce the height of the curbs. During the repaving process, conduit will be installed in preparation of under-grounding the utility lines. Several planters will be expanded, decreasing hardscape areas and increasing potential landscaped areas of the parking area.

Vegetation: All new landscaping in the parking area shall be native, drought tolerant species. A planting plan shall be reviewed and approved by the Forest and Beach Commission prior to installation.

E. DUNE RESTORATION

Policies and Objectives:

P5-103 Identify and protect environmentally sensitive habitat areas against any significant disruption of habitat values. Only uses dependant upon those resources shall be allowed. For private lots of record

within ESHA, establish a transfer of development rights program using credits of water, floor area, density or some other development parameter to relocate development to less sensitive areas.

- P4-48** Discourage any further incursion of recreational activities into the North Dunes habitat. Sensitive resources in the North Dunes habitat area shall be protected.
- P5-28** Restore dune areas to improve habitat for Tidestrom's lupine and other native dune plants.
- O5-7** Protect the fragile dunes and sensitive plants in the Del Mar Dunes and North Dunes against any significant disruption of habitat values.
- P5-27** Maintain an attractive mix of plant material that favors native species and other, drought-tolerant, noninvasive species.
- P5-29** Control the spread, and prohibit planting of, invasive non-native plants.
- P5-30** Improve habitat values for the preservation of the California black legless lizard.
- O5-40** Ensure that long-term management activities maintain the natural dune ecology of Carmel Beach in a manner consistent with public safety. Protect areas of the beach from the loss of habitat, where special status plant species are growing.
- P5-173** Retain a qualified botanist to monitor the population of Tidestrom's lupine and other special status species on the North Dunes of Carmel Beach. The population should be assessed annually (or based upon a schedule agreed upon by the Department of Fish and Game, Coastal Commission and U.S. Fish and Wildlife Service) to determine if the population is stable and if measures to protect the population should be instituted. If the population appears heavily affected by public use, the City should consider fencing or placing barriers around the lupine habitat on the beach.
- P5-174** Prevent further planting and spread of invasive horticultural species within the dunes at Carmel Beach.
- P5-175** Remove any non-native invasive vegetation from special status habitat to eliminate competition and implement a dune restoration plan.

- P5-176** Implement a Dune Restoration Plan.
- P5-178** Conduct black legless lizard surveys and manage appropriately.
- P4-34** Post educational/interpretive signs where appropriate along Scenic Road and in the North Dunes area.

Implementation

Implementation of the dune restoration efforts will be in general conformance with the Habitat Restoration Plan prepared by Botanical Consulting Services (see Appendix “A”). This Plan is designed to recreate a self-sustaining native dune habitat with thriving populations of the special status species, while providing safe visitor access and enjoyment of the dunes.

The restoration program will take a phased approach. The restoration area has been divided into three manageable phases for implementation (see figure 2). In each phase, aggressive non-native species will be eliminated, native dune scrub will be restored, populations of Tidestrom’s lupine will be propagated and the habitat for the black legless lizard will be improved and expanded.

Monitoring

The City shall take the following steps to monitor the dune restoration efforts after completion of the project (see page 23 of Appendix “A” for more information):

- Monitor the Tidestrom’s lupine populations on an annual basis.
- Prepare a survey once every five years to evaluate the population of Black Legless Lizards.

F. DUNE AND BEACH ACCESS

Policies and Objectives:

- P4-3** Improve and sign the vertical access at Fourth Avenue. Consider development of a pedestrian path from the foot of Jane Powers walkway to the Fourth Avenue beach access through Sand and Sea. Investigate and implement opportunities to establish or reestablish additional vertical access from North San Antonio to the beach to the extent feasible.
- P4-15** Address circulation and parking problems. Make the area more pedestrian/people friendly and protect the environment.
- P4-18** Improve the pedestrian experience through the Del Mar Pparking area for those arriving on foot and from parked vehicles to the beach. Consider construction of boardwalks or other improvements

to aid beach circulation, protect tree roots and protect the sensitive vegetation in the North Dunes area.

- P4-19** Provide disabled access consistent with ADA requirements. Provide access that blends with the beach and allows disabled individuals the opportunity to enjoy a more natural beach experience.
- P4-11** Improve pedestrian circulation between the north end of the Beach Bluff Pathway at Eighth Avenue and the beach facilities at Ocean Avenue and the Del Mar Avenue parking lot as part of the Del Mar and North Dunes Master Plan.
- O4-2** Establish a local segment of the California Coastal Trail through Carmel-by-the-Sea by connecting existing pedestrian paths and developing new pedestrian paths or routes as required to create a continuous trail through the City.

Implementation

Implementation of dune and beach access improvements will be in general conformance with figures 3 and 4 and will include the following improvements:

Viewing Platform: An ADA accessible boardwalk is proposed at the south end of the Del Mar parking area that leads to a bluff-top viewing platform. This will provide expansive views of the ocean and coastline and enhance the opportunities for disabled individuals to enjoy a more natural beach experience.

Trails: A trail is proposed on the west side of San Antonio Avenue connecting Ocean Avenue with the Pebble Beach Gate to the north. This will also allow a pedestrian connection with the Fourth Avenue Pathway and the Jane Powers Walkway. Reconstruction of a staircase is proposed at the north end of the beach providing direct access to the beach from the existing pathway on the north side of the Sand and Sea Development (see Figure 3).

G. BEACH/DUNE USE

Policies and Objectives:

- P4-22** Continue to support passive beach activities that are consistent with maintaining the natural beach setting. Active recreational opportunities need not be enhanced.
- P4-23** Do not install formal picnic tables or benches. Rather, provide driftwood logs for seating. Picnicking on the beach should be conducted in a traditional manner with blankets, etc.
- P4-24** Retain the informal atmosphere of the volleyball courts.

P4-48 Discourage any further incursion of recreational activities into the North Dunes habitat. Sensitive resources in the North Dunes habitat area shall be protected.

H. SIGNAGE

Policies and Objectives:

- O4-5** Establish a uniform signage program for the beach and bluffs to better inform beach users of regulations governing activities on the beach.
- P4-29** Post “beach access/pedestrians only” signs at the top of pedestrian easements to help visitors locate these access routes including North Dunes access routes and the easement from San Antonio through Sand and Sea.
- P4-31** Use as few signs as possible to accomplish the desired purpose. Rely on design features and/or public education to influence behavior first. Establish standards for the total number of informational signs along the shoreline.
- P4-32** Consider locating signs at the bottom of the bluff if appropriate.
- P4-33** Use signs that are aesthetically pleasing, easily seen, minimal in size, brief in content, of muted color and uniform in design.
- P4-34** Post educational/interpretive signs where appropriate along Scenic Road and in the North Dunes area.
- P4-35** Post signs warning beach users about dangerous ocean conditions.
- P4-36** Use international symbols whenever possible, along with a brief explanation of prohibitions and Municipal Code Section citations.
- P4-37** Maintain all signs to ensure that they are legible. Signs that are vandalized or defective shall be replaced or repaired as soon as possible.
- P4-38** Maintain signs at each stairway indicating fires must be at least twenty-five feet from the base of the bluffs and that they are not allowed north of Tenth Avenue.
- P4-39** Use trash containers as a location for educational and regulatory signs.

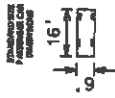
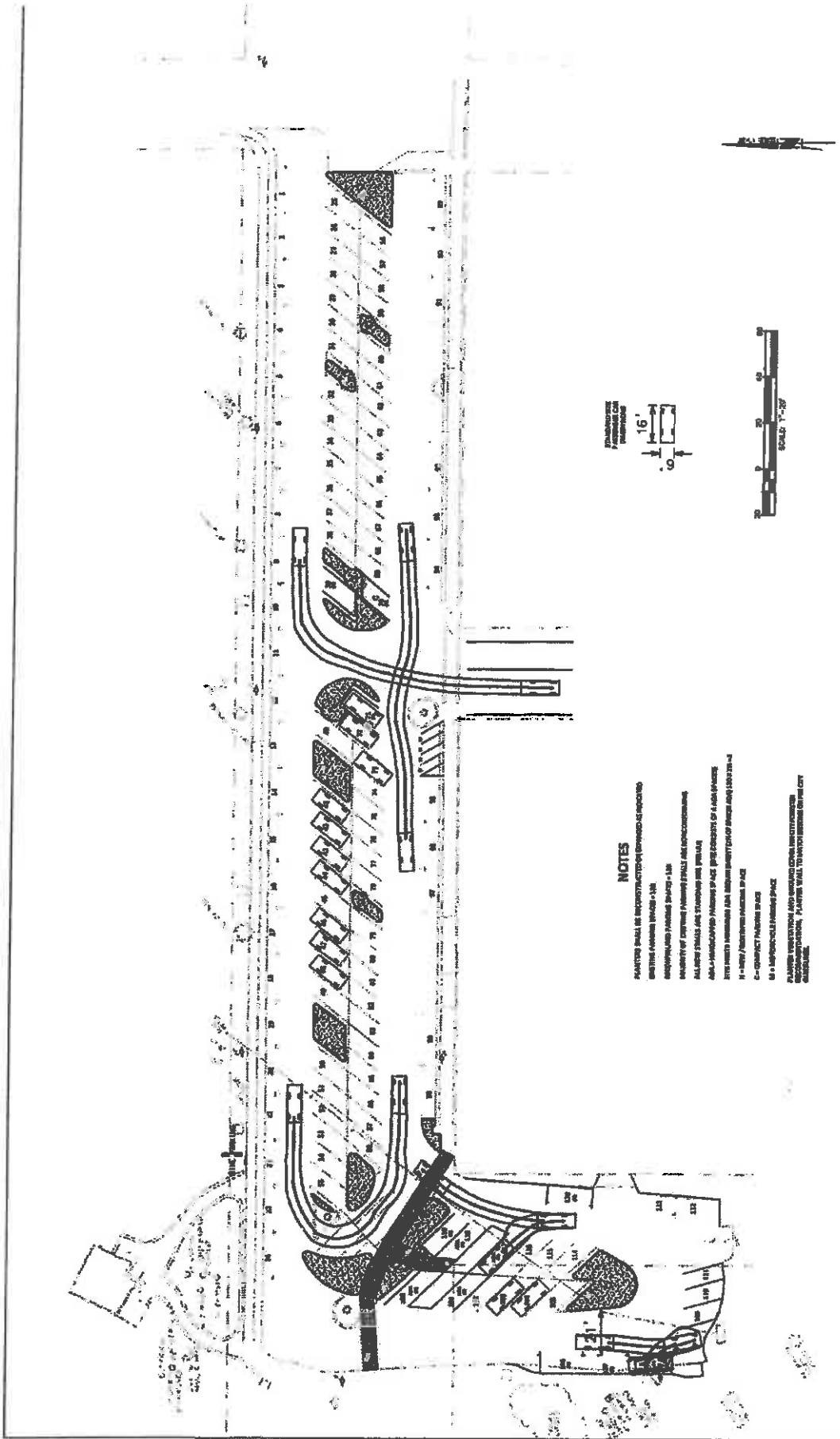
P5-40 Provide signage prohibiting fires in the dunes area. Consider using doors on restroom stalls for posting beach rules and regulations.

I. FUTURE IMPLEMENTATION

Del Mar Dunes: Based on the experience gained from dune restoration efforts in the North Dunes, the City shall evaluate whether restoration efforts in the Del Mar Dunes are appropriate.

Signs: The Forest and Beach Commission shall be tasked with developing recommendations on a signage plan for the interpretive signs throughout the dunes and an overall uniform signage program for the area based on the policies and objectives of this plan.

Figure 1



NOTES

- 1. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, SEVENTH EDITION, 2003, AND THE LATEST EDITIONS OF THE STANDARD SPECIFICATIONS FOR STRUCTURES, SEVENTH EDITION, 2003.
- 2. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, SEVENTH EDITION, 2003, AND THE LATEST EDITIONS OF THE STANDARD SPECIFICATIONS FOR STRUCTURES, SEVENTH EDITION, 2003.
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STANDARD GAR TRUCKING TEMPLATE
 100' x 100' x 100' x 100' x 100' x 100'
 EXHIBIT 3 OF 3

Figure 3

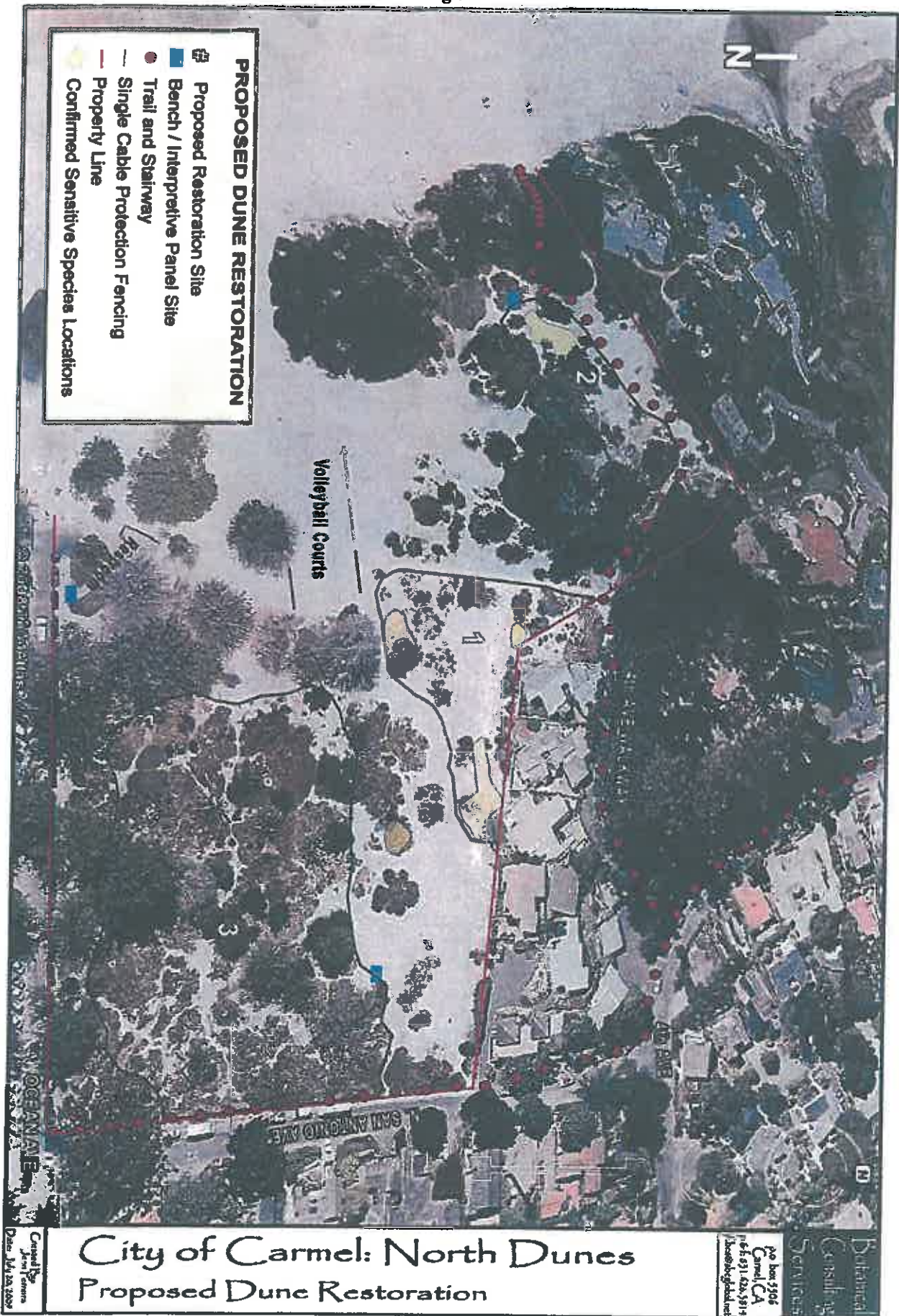


Figure 4



Appendix "A"



North Dunes & Del Mar Dunes Habitat Restoration Plan

City of Carmel-by-the-Sea

Written for:
Mr. Sean Conroy
Senior Planner

Written By:
Jean Ferreira
Botanist

April 1, 2009

Note: This appendix contains findings and recommendations from a professional Botanist contracted by the City. The information in this appendix is meant to provide background and assist in the dune restoration efforts. Not all recommendations from this appendix have been incorporated into the final Del Mar Master Plan.

Background

The North Dunes and Del Mar Dunes on the City of Carmel's shoreline have been greatly altered from their natural state over the past century by various human activities. The City of Carmel's 1990 General Plan recognized this situation and established the following policy to address the impacts.

P-5-42 Restore, maintain and enhance the degraded habitat in the North Dunes area to enhance environmental resources and aesthetics. Protect sensitive habitat and special-status species through development and implementation of the Del Mar and North Dunes Master Plan.

The General Plan also outlines ten additional policies specifically calling for long-term maintenance and management of the sensitive species, native plants and the dune habitat in general.

In 1995, a study was commissioned by the City of Carmel to study five undeveloped sites within the city, including Carmel Beach, to identify any sensitive resources and environmentally sensitive habitat areas (ESHA). ESHA as defined by the California Coastal Act (PRC 30107.5) are:

"areas in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem, and which could be easily disturbed or degraded by human activities and developments. In addition, some of these sensitive habitats require further protection from disturbance, and this subset of sensitive habitats is called environmentally sensitive habitat areas."

The 1995 study, conducted by Jones and Stokes, identified Carmel Beach as ESHA. The City of Carmel designated both the North Dunes and the Del Mar Dunes as ESHA.

In 2003, the City of Carmel created and adopted a comprehensive Shoreline Management Plan, consolidating three previous plans: the Beach Master Plan (2000), the Shoreline Emergency Plan (1989), and the Beach Bluff Pathway Landscape Plan (1985-88). The creation of the Shoreline Management Plan fulfilled a CA Coastal Commission condition to permit repairs on the shoreline damage received during the 1997-8 El Nino storms.

The Shoreline Management Plan also addresses the impacts to the North and Del Mar Dunes. Below are listed a few of the applicable management policies:

O5-40: Ensure that long-term management activities maintain the natural dune ecology of Carmel Beach in a manner consistent with public safety. Protect areas of the beach from loss of habitat where special status plant species are growing.

O5-7: Protect the fragile dune and sensitive plants in the Del Mar Dunes and North Dunes against any significant disruption of habitat values.

G-5-12: Identify, protect and manage Environmentally Sensitive Habitat Areas to ensure their long-term integrity and the biological productivity of these habitats.

O5-36 Monitor, study and develop effective management programs for the City's parks and ESHA. Endeavor to reduce conflicts between environmental protection and use of public and private property within ESHA.

Study Methods

A review of the City of Carmel's Shoreline Management Plan and the Jones and Stokes report "Final Results of the Environmentally Sensitive Habitat Area Study Conducted for the City of Carmel", was completed for this study. Prior to the field survey, information from the California Department of Fish and Game's RareFind data base was compiled to determine the sensitive biota in the Carmel shoreline area. Historical and current aerial photographs of the Carmel Beach area were obtained from the UC Santa Cruz Science and Engineering Library. Aerial photographs, USGS topographic map and City parcel boundary maps were used for the mapping portion of the survey results. The City of Carmel's Harrison Memorial Library provided historical photographs from their collection documenting early vegetation patterns on the dunes and beach in Carmel.

The dunes were surveyed numerous times between April 15, 2008 and July 15, 2008. The field work included identifying all plant species present, surveying for the presence of any sensitive plant or animal species, mapping non-native species coverage, noting use patterns, and human impacts to the dunes. Access was easily gained by foot over the entire dune areas except in dense acacia hedges. Due to the high density of the shrubs, the acacia hedges were observed from existing trails wherever possible to gain access.

Findings

The Carmel Beach, owned by the City of Carmel, includes over 22 acres of white sand beach and dunes. More than eight decades ago, residential development claimed most of the ocean front areas of the City, and now only two natural dune areas remain within the city limits.

The North Dunes covers the beach property north of Ocean Ave, west of San Antonio Ave, and east of the high tide line. It is about 4 to 5 acres in size and has the most diverse dune habitat remaining in the City. The North Dunes range in elevation from about 50 to 100 ft. There is a north-south aligned dune hummock, or mound, at the rear of the active beach at the high tide line; this area is typically referred to as the foredune. Just to the east of the foredune, the dunes drop in elevation to a low area protected from the high winds, behind the foredune ridge called the dune swale. Moving east, the dunes gradually rise in elevation back to the developed city edge at N. San Antonio Ave. This area to the east of the swale is the reardune. The majority of the dunes are west facing with the exception of the leeward side of the foredune hummock facing east. The strong coastal winds not only shape the dunes with wind carried sand, but define zones on the dune which are colonized with plants species adapted to the different degrees of wind exposure. Plants growing on the foredune are much better adapted to high winds and salt spray than those found in the dune swales or reardunes.

The Dei Mar Dunes are a linear ridge of foredunes, about an acre in size, just east of the high tide line between Ocean and Eighth Avenues.

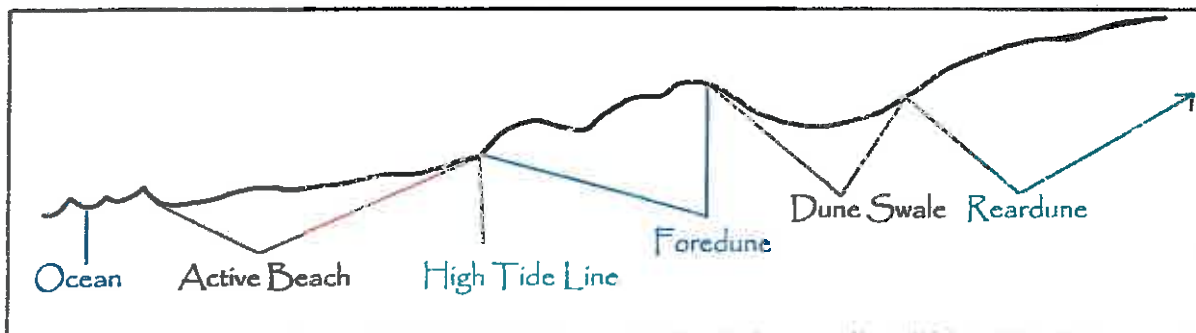


Figure 1. Generalized Carmel beach & dune profile.

Central Dune Scrub

Prior to human disturbance of the Carmel Beach dunes, the sand dunes originally supported a plant community of central dune scrub. The composition of the central dune scrub varies around the Monterey Bay, with some common plant species found at all sites. The original composition of the Carmel dunes may never be completely known, however, remnants of the community still present and use of the historic photographs of the area, allows general descriptions to be drawn. The foredune was probably a mix of *Leymus mollis* (dune grass), *Camissonia cheiranthifolia* (beach primrose), *Ambrosia chamissonis* (beach bur) and *Abronia latifolia* (yellow sand verbena). The dune swale, low areas out of the high winds with typically more moisture available to the plants, supported *Carex pansa* (dune sedge) and *Juncus effusus* var. *brunneus* (common rush). The rear dune had the most plant diversity, with *Artemisia pynoccephala* (dune sagewort), *Ericameria ericoides* (mock heather),

and *Lupinus arboreus* (bush lupine) providing the dominant cover, with occasional stands of *Croton californicus* (croton), *Eriogonum parvifolium* (dune buckwheat), *Erigeron glaucus* (seaside daisy), *Poa douglasii* (dune bluegrass), *Lotus scoparius* (deerweed), *Phacelia ramossima* (branching phacelia), *Abronia umbellata* (pink sand verbena), and beach primrose. In the reardunes, coast live oaks established where conditions were right: stable sand, an established duff layer from long-term plant growth, and shelter from the prevailing winds. Plants associated with the coast live oaks were *Marah fabaceus* (wild cucumber), *Pteridium aquilinum* (bracken fern), and *Rubus ursinus* (CA blackberry).

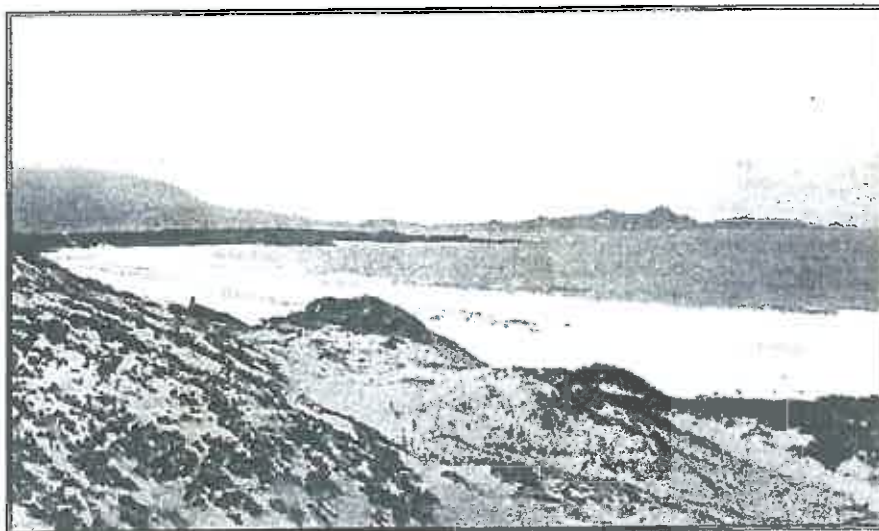


Photo 1. Native foredune vegetation on Carmel's North Dunes. Harrison Memorial Library Collection.

Today, the dune scrub of the Carmel dunes, looks and functions very differently than the original natural habitat. Most of the native dune plants listed above are still present in the dunes, but only in small isolated patches, surrounded by large expanses of iceplant, acacia or bare sand. The two dominant plant species are a South African native, *Carpobrotus edulis* (hottentot fig or iceplant) and an Australian native plant, *Acacia longifolia* (Sydney golden wattle or acacia). Both species spread rapidly on their own, out-competing the native species for light, space, water and nutrients.

A large percentage of the North Dunes is dominated by Monterey Cypress, some planted over 100 years ago, along with younger trees more recently added to replace the original plantings that have died (Shoreline Management Plan). A small grove of Monterey Pines were planted in the North Dunes sometime after 1939; the trees are absent in the 1939 aerial photograph. Some of these original planted pines have died, some have re-seeded, and the City has recently planted five new pine saplings in the same area. Many non-native grasses have also colonized the disturbed areas in the reardune including wild oat, rattlesnake grass, rip-gut brome, veldt grass and foxtail barley. All are invasive and difficult to eradicate. Veldt grass has become the number one weedy grass in the City over the last decade, increasing by leaps and bounds each spring. A large blue gum eucalyptus tree dominates the corner of Ocean & N. San Antonio Ave. According to the Shoreline Management Plan it is the largest eucalyptus in the City. All dune plants have been destroyed under the eucalyptus canopy by shade and eucalyptus leaf litter. There are also many horticultural species found on the North Dunes, primarily near the adjacent residences. Some have 'escaped' cultivation and spread to

the dunes, but most are 'trespass landscaping' from overzealous gardeners not minding the property lines. A complete plant list compiled during the spring field work for this report is found in Table 1.

Table 1. Native & Naturalized Plant Species of North/Del Mar Dunes, Carmel, California. Survey Date: May 13, 2008.

<i>Family</i>	<i>Species</i>	<i>Common Name</i>
Asteraceae (Sunflower)	<i>Artemisia pycnocephala</i> <i>Baccharis pilularis ssp. consanguinea</i> <i>Ericameria ericoides</i>	Dune Sagewort Coyote Bush Mock Heather
Aizoaceae (Iceplant)	* <i>Carpotrotus edulis</i> * <i>Conicosia pugioniformis</i>	Hottentot Fig Conicosia
Brassicaceae (Mustard)	* <i>Cakile maritima</i>	Sea thrift
Cucurbitaceae (Gourd)	<i>Marah fabaceus</i>	Wild cucumber
Cyperaceae (Sedge)	<i>Carex pansa</i>	Dune sedge
Dennstaedtiaceae (Bracken)	<i>Pteridium aquilinum</i>	Bracken fern
Euphorbiaceae (Spurge)	<i>Croton californicus</i>	Croton
Fabaceae (Pea)	* <i>Acacia longifolia</i> <i>Lotus scoparius</i> <i>Lupinus arboreus</i> <i>L. chamissonis</i> <i>L. tidestromii</i>	Sydney golden wattle Deerweed Bush lupine Silver beach lupine Tidestrom's lupine
Fagaceae (Oak)	<i>Quercus agrifolia</i>	Coast live oak
Hydrophyllaceae (Waterleaf)	<i>Phacelia ramosissima</i>	Branching phacelia
Juncaceae (Rush)	<i>Juncus effusus var. brunneus</i>	Common rush
Malvaceae (Mallow)	* <i>Malva parviflora</i>	Cheeseweed
Nyctaginaceae (Four O'Clock)	<i>Abronia latifolia</i> <i>A. umbellata</i> <i>A. latifolia X umbellata</i> (hybrid)	Yellow Sand Verbena Pink Sand Verbena White Sand Verbena
Onagraceae (Evening Primrose)	<i>Camissonia cheiranthifolia</i>	Beach Evening Primrose
Oxalidaceae (Oxalis)	* <i>Oxalis pes-caprae</i>	Bermuda buttercup
Polygonaceae (Knotweed)	<i>Eriogonum parvifolium</i> * <i>Rumex acetosella</i>	Dune buckwheat Sheep sorrel
Poaceae (Grass)	* <i>Avena sp.</i> * <i>Briza major</i> * <i>Bromus diandrus</i> <i>Distichlis spicata</i> * <i>Ehrharta erecta</i> * <i>Hordeum jubatum</i> <i>Leymus mollis</i> <i>Poa douglasii</i>	Wild oat Rattlesnake grass Rig-gut grass Salt grass Veldt grass Foxtail barley Dune grass Dune blue grass
Rosaceae (Rose)	<i>Rubus ursinus</i>	CA blackberry
*Horticultural species planted on City of Carmel dunes		
Monterey Cypress	Bermuda grass	
Fountain Grass	Flowering plum	
Broom	Pride of Madera	
Australian Tea Tree	Agave	
Aloe	Rosemary	
Allium	Honeysuckle	
Nasturtium	Sydney golden wattle	

* = species not native to Carmel dunes

Sensitive Biotic Species & Habitats

The sensitive biotic species and habitats listed in Department of Fish and Game's database (CNDDDB) for the Monterey Quadrangle or found on dunes in the Monterey Bay area were considered during the survey of North & Del Mar Dunes. The sensitive species information from the 1995 Jones and Stokes study was also reviewed prior to the field work. The Jones and Stokes report was based on field work during a limited window in the month of April. They acknowledged the limits of the survey and note three additional potential sensitive plant species that might be found in the Carmel Beach dunes. The survey for this Habitat Restoration Plan was more comprehensive, stretching through the full blooming season of the dune plants.

Two sensitive species and one sensitive habitat were found in the Carmel Dunes. They are listed below and their locations are mapped on Map 3.

Table 2. Sensitive Biota Found at North Dunes, Spring 2008.

Scientific Name	Common Name	Federal	Listing Status California	CNPS	CDFG
<i>Lupinus tidestromii</i> var. <i>tidestromii</i>	Central Dune Scrub Tidestrom's Lupine	Endangered	Endangered	1B.1	
<i>Aniella pulchra nigra</i>	Black Legless Lizard				SC

Federal Listing = U.S. Department of Interior, Fish & Wildlife Service

California Listing = State of California, Department of Fish & Game

CNPS Listing = California Native Plant Society, List 1B.1: Seriously Endangered in California

CDFG: Species of Special Concern: Vertebrates that have declining population levels, limited ranges and/or continuing threats making them vulnerable to extinction.

Central Dune Scrub is the natural community found on the coastal sand dunes on the central coast of California. It is recognized by the State of California and the County of Monterey as a rare community and therefore, a sensitive habitat. The central dune scrub has a naturally limited distribution. However, it has also suffered a loss of distribution area due to residential and agricultural development, and degradation of habitat due to human use and introduction of non-native plant species. Central dune scrub within the City of Carmel historically extended from the high tideline up to Camino Real Street, and from Pescadero Creek, south to Santa Lucia. (J. Rodriguez, pers. comm.) Today, it is limited to the North Dunes and Del Mar Dunes.

Lupinus tidestromii* var. *tidestromii, the Tidestrom's lupine is a rhizomatous herb in the pea family that grows only in coastal dunes in Monterey County. It is listed as endangered by the Federal (1992) and State (1987) governments and the California Native Plant Society. In 1997 only five occurrences in Monterey County, with less than 400 individuals were considered extant: Pt. Pinos lighthouse, Aislomar, Bird Rock, Carmel North Dunes and Spyglass Hill. An additional population was planted as mitigation on artificial dunes at Spanish Bay. The Tidestrom's lupine populations have been seriously threatened by development, trampling, non-native plants, and hybridization with *Lupinus chamissonis*, the silver beach lupine (CNPS web site). The North Dunes population has been subjected to all of these threats.

The population of Tidestrom's lupine was first discovered on the North Dunes in 1995 during the Jones & Stokes survey. The presence of Tidestrom's lupine was a major factor in recognizing the

North Dunes as ESHA. The Jones & Stokes surveyor noted 280 plants (168 seedlings, and 112 mature) found in four areas in the dunes. The survey for this report (2008) found 340 plants (124 seedlings/216 mature) in only two of the four areas that had plants in 1995. Although it is unknown why only 2 of 4 location in the North dunes support the lupine this season, the two areas without Tidestrom's lupine have been heavily impacted by non-native plants, including shading by non-native trees, and human trampling.

The current location of the Tidestrom's lupine on the North Dunes is shown on Map 3. The plants are growing with *Abronia umbellata*, *Leymus mollis*, *Conacosia pugioniformis*, and *Poa douglasii*, and *Lupinus chamissonis*. The location of the Tidestrom's lupine with the silver lupine is adjacent to the western most residence of the Surf and Sea development. There has been some speculation that the silver lupine was planted when the house was built, since it presently does not occur anywhere else in the Carmel dunes. Since the two lupines can hybridize, the presence of the silver lupine could threaten the continued survival of Tidestrom's lupine in the North Dunes.

Past taxonomic treatments of the Tidestrom's lupine separated similar plants found in Sonoma and Marin Counties from the Monterey County populations as *Lupinus tidestromii* var. *layneae*, and based on this treatment, the State of California listed only the Monterey County populations as Endangered in 1987. More recent taxonomic treatments combine the two variations into one species (Sholars & Riggins in Jepson Manual, 1993). The 1993 Federal listing included both the Monterey County plants (*L. tidestromii* var. *tidestromii*) and the Marin and Sonoma plants (*L. tidestromii* var. *layneae*). Genetic studies are need to sort out the relationship of the two variations; however, both variations occur on impacted sand dunes and qualify for the Endangered status.

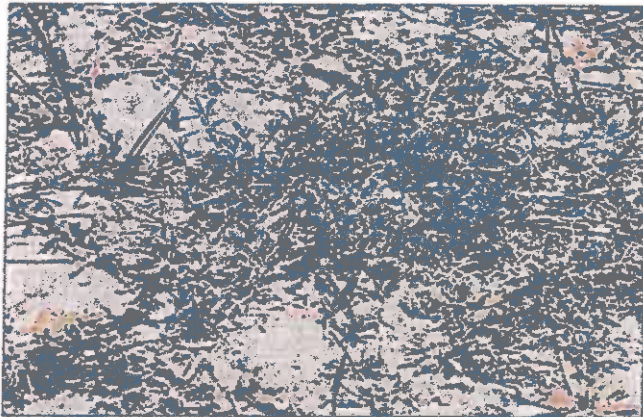


Photo 2 & 3. Tidestrom's lupine (*Lupinus tidestromii*) plant and flower on North Dunes, 26 April 08.

Aniella puichra nigra, the Black legless lizard is a species of special concern in the State of California. It inhabits coastal dunes in Monterey County, between the Salinas and Carmel Rivers. The lizard burrows in loose sand under mature plants including *Ericameria ericoides*, *Lupinus arboreus*, and *Eriogonum parvifolium*, where a developed leaf litter layer attracts many insects and their larvae (prey of the lizards) and helps to moderate soil temperature and conserve soil moisture. A 1984 USFWS survey by Bury captured 12 black legless lizards at Carmel Beach. Bury noted the problems of frequent human use of the habitat and the encroachment of non-native

plants. In 1995, the Jones and Stokes surveyors failed to locate any black legless lizards in the North or Del Mar Dunes. On June 20, 2008, a survey for this Habitat Restoration Plan located 2 adult black legless lizards in one hour of search. Both were found in the North Dunes under mature mock heather. North Dunes and Del Mar Dunes are habitat for the lizards, and restoration and management recommendations will be designed to avoid impacting the lizards or their habitat.

Recent taxonomic studies suggest the Black legless lizard is not a sub-species of the California legless lizard, *Aniella pulchra*, but only a color variation. However, to date genetic studies are inconclusive and the taxonomy remains unchanged. The CA Department of Fish and Game recognizes both *A. pulchra* and *A. pulchra nigra* as species of special concern.



Photo 4 & 5. Black Legless Lizard. City of Carmel, North Dunes. 20 Jun 08.

Impacts to the Dunes

Human impact to the Carmel beach and dunes began before the turn of the century. The area has been a popular spot for picnics, camping, and beach recreation for over a hundred years. In 1889, a bath house was constructed at the base of Ocean Avenue in the vicinity of the where the beach parking lot sits today. It was a popular spot for the forty years that it operated. Photographs taken in 1922, show a denuded foredune around the Bath House after over 30 years of concentrated recreational use of the area. The photograph below shows the Bath House in its early days. Note the only visible transportation to the beach are the horses tethered behind the building. Also the boardwalk which ran from Monte Verde Ave. to the beach (C. Buckminster, per. communication) is barely visible to the right of the main building. The figure sitting on a bench on the right side of the photograph is probably resting before their climb up the hill to town.

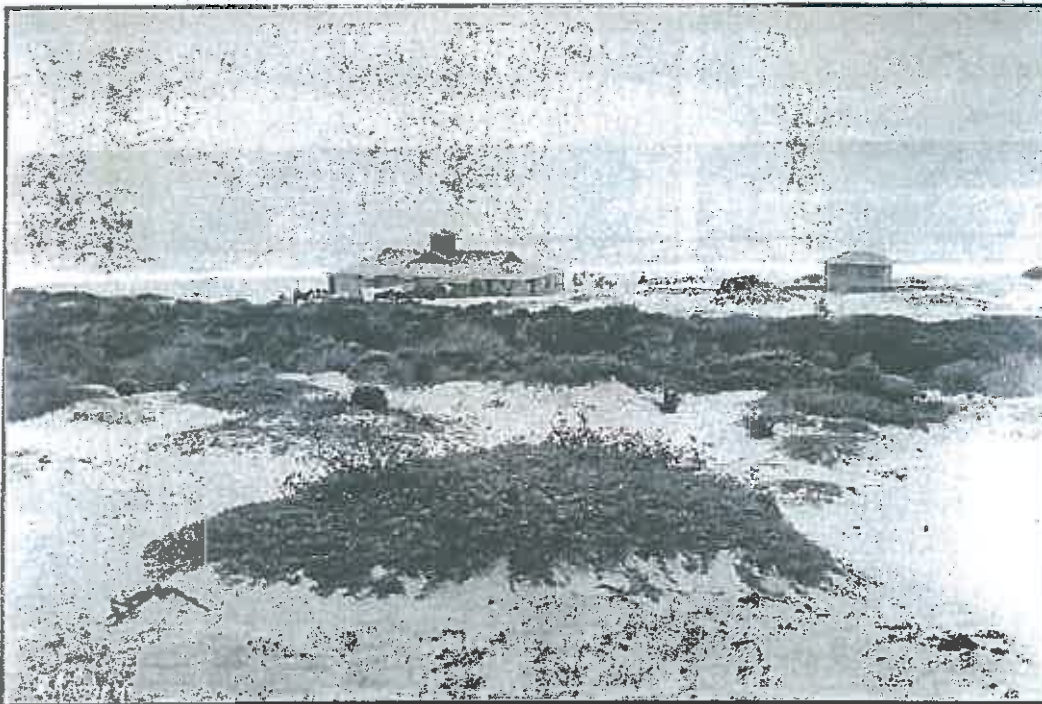


Photo 6. East side of the Bath House at Carmel Beach. Constructed in 1888-9, it operated for 40 years before being torn down in 1929. The reardune plant coverage is still well developed at this point in time. Harrison Memorial Library Collection.

The reardune vegetation, behind the Bath House, appears to have diverse composition and fairly dense cover. In the foreground of the photograph, the dunes have received some sort of disturbance that has resulted in a more open plant community with more bare sand. One of the greatest points of interest in this photograph is the hummock of sand front and center, when magnified, appears to be covered with dune buckwheat (*Eriogonum parvifolium*), beach bur (*Ambrosia chamissonis*), and seaside daisy (*Erigeron glaucus*). Only a few dune buckwheat plants are remaining on North Dunes and both seaside daisy and beach bur no longer grow naturally within the City of Carmel.



Photo 7. Bath House in later years (cars and electrical lines that were installed ~1916 are present). The fore-dune vegetation is still fairly intact to the south of the Bath House. The gentle grade of the foredune is the natural formation, as opposed to the steep banks today formed by the non-native acacia. Harrison Memorial Library Collection.

In addition to the early recreational use of the dunes and beach, in 1941-42, a temporary military camp was erected in the North Dunes area, to provide on-site military protection of the coast (C. Buckminster, pers. communication). Although some bare sand is natural in the dynamic dune scrub plant community, the intensity of use of Carmel's beach and dunes was well established by the time the following 1939 aerial photograph was taken.

Over the last fifty years the impacts to the Carmel dunes have continued. Non-native plants have been planted on the dunes or have spread to the dunes by other means. Most of the bare sand that was the result of intense use between 1889 and 1950, has been colonized by non-native plants, especially ice-plants, acacia, and non-native grasses. The dune scrub in the vicinity of the planted Monterey cypress, Monterey pine, and eucalyptus has gradually died out from the shading and leaf litter. As the trees have died, the litter from dying leaves branches and trunks add an abnormal amount of organic matter to the dune system. Adjacent to the shared property line with the Surf and Sea development, five of the homes have landscaped on the City's sand dunes adjacent to their homes. This trespass has reduced the native dune scrub, the Tidestrom's lupine distribution, and the black legless lizard habitat. There also appears to be a fairly high amount of gopher activity in North Dunes, in addition to dogs digging and neighborhood cats hunting the wildlife. Cats are also a threat to black legless lizards.

Storm runoff from San Antonio Ave. is concentrated and piped across the southeast corner of the North Dunes. Installation of the 4th Ave. sewer outfall, left a large scar across the very north end of North Dunes. Volleyball courts have also been designated in the North Dunes, and their use intensely



Photo 8. This 1939 aerial of Carmel shows the large amount of bare sand present in the North Dune 70 years ago. Most of the bare area is now filled with non-native plants.

Photo 9. A sunbather relaxes on a patch of iceplant with a few yards of unprotected Tidestrom's lupine plants.



disturbs the courts and sideline areas. The bare sand in the court area is moved by the prevailing winds onto the reardune. Most sand movement in the dunes is carried by the strong spring winds, which pelt or bury the seedlings that have germinated with the winter rains. The more sand movement in the dunes, the less natural plant establishment, resulting in a degradation of the habitat. The dunes are also open to foot-traffic, with dogs frequently accompanying their owners. Trails criss-cross everywhere across the dunes, including through the Tidestrom's lupine stands. Because the dunes offer shelter from the wind and more privacy than the beach, many sun-bathers opt for a quiet spot in North Dunes, unaware of the sensitive biotic resources. Although most visitor and resident use of the Del Mar and North Dunes is as an area to cut through on the way to the beach, the proximity of the dune areas to the parking lot and restroom will continue to draw some curious beach-goers to explore the dunes. Having an environmentally sensitive habitat areas so close to a high use recreational area, requires protective measures to ensure the long-term maintenance of the sensitive biological features of the Del Mar and North Dunes.

Dune Restoration & Management Program

THE MISSION of this restoration & management program is to recreate a self-sustaining native dune habitat with thriving populations of the special status species, while providing safe visitor access and enjoyment of the dunes.

THE OBJECTIVES are to eliminate all aggressive non-native species, restore the native dune scrub, expand the population of Tidestrom's lupine, and the quantity and quality of available habitat for Black Legless Lizards, establish a trail system to provide safe visitor access without compromising the health of the dune habitat and provide interpretation of the North Dunes, Del Mar Dunes and Carmel Beach to enhance the visitors experience and knowledge of the Carmel dunes.

THE SPECIFIC GOALS to achieve these objectives are outlined below and described further in the following sections of this plan.

1. Providing protection for existing populations of the special status species during the implementation of this plan and for management of the populations in perpetuity.
2. Elimination of all aggressive exotic species on the dunes. The two species with the greatest cover and opportunity for restoration are iceplant and Sydney golden wattle. The weedy components of the dune scrub adjacent to the roads and restroom will also be addressed.
3. Identify Monterey Cypress landscaping areas in North Dunes that will be maintained as historical landscaping including the one landmark-sized Eucalyptus tree at the corner of Ocean and N. San Antonio Ave.
4. Stabilize drifting sand in areas to be planted with straw or jute.
5. Plant and seed native dune plants in areas of bare sand or where exotics were removed.
6. Use only local plant sources for the revegetation. Seeds and plants shall be propagated from plant material collections within two miles of the site.
7. Establish thriving new stands of Tidestrom's lupine in the dunes to add stability and long-term survival to the population.
8. Improve the quality of habitat for the black legless lizard by establishing large stands of native dune scrub, and creating a habitat corridor between North Dunes and Del Mar Dunes.
9. Establish short (5-year) and long range (on-going) monitoring program for the special status species and dune scrub.
10. Establish a maintenance program to follow-up on the exotic plant control, sand stabilization and respond to all needed actions noted during monitoring.
11. Provide safe pedestrian access to the dunes, minimizing impact to the dune habitat. Con-

sider constructing an ADA compliant boardwalk in North and Del Mar Dunes.

12. Through information panels, interpret the natural and cultural history of the dunes and Carmel Bay.
13. Consult with the CA Department of Fish and Game for plan review and approval. Obtain a permit from CA Fish and Game for collection, propagation and planting of a State Listed plant species. Submit special status species information to CA DFG on Tidestrom's lupine population surveys and any sitings of Black legless lizards.

Restoration Implementation Methods

Access

Presently, all foot traffic through the dunes is uncontrolled, and is negatively impacting the native dune scrub and sensitive species. The dunes, designated as ESHA, are subjected to a high concentration of human use due to the proximity of the Del Mar parking lot and the beach. By designating trails, people and their leashed dogs can visit the dunes or pass through on their way to the beach with only a minimal impact, if any.

The size of the North Dunes presents the opportunity to provide a loop trail for viewing the dune habitat, access to the beach from San Antonio Ave. and a vista point of the Carmel Bay and Point Lobos. Providing a ADA compliant boardwalk on some of the North Dunes trails would open the dunes to disabled persons and others not inclined to trudge through the sand. Coastal dune boardwalks have proven to not only provide access to those not able to physically maneuver in the sand but many people who bypass sand dunes for an easier path. Coupling the boardwalk with interpretive panels or programs will increase the general understanding and appreciation of the very special habitat found in the City of Carmel's dunes.

The Del Mar Dunes, although limited in size could provide an exciting addition to the assets of Carmel Beach. An ADA compliant boardwalk leaving the south end of the parking lot, running south into the Del Mar dunes, would provide an avenue for the disabled, seniors and visitors not prepared for deep sand walking to experience views of the ocean, the Carmel Bay, Point Lobos, Pebble Beach and of course the beach strollers and their dogs. Extending this trail with a sand path to the Eighth Ave. stairs would complete the City of Carmel's portion of the California Coastal Trail, a statewide endeavor to provide a public coastal trail from Oregon to Mexico.

The sand trails and the boardwalk should be fenced to delineate the pathway and to keep people on the designated trail. One of the most unobtrusive methods of fencing is the eye rod and cable fence shown in the pictures below. Boardwalks can be constructed of a natural wood such as redwood or a recycled material such as Treks. The width of the trails should be at least 4 ft to allow easy passing. Sand trails can be made wider to provide the City's maintenance staff easy access and to give visitors a spacious feeling. However, the wider the trail, the greater amount of bare sand that will blow with the prevailing winds, especially in the spring. Blowing sand is a major cause of plant seedling mortality in the late spring, which limits reproduction and establishment of the native dune scrub.

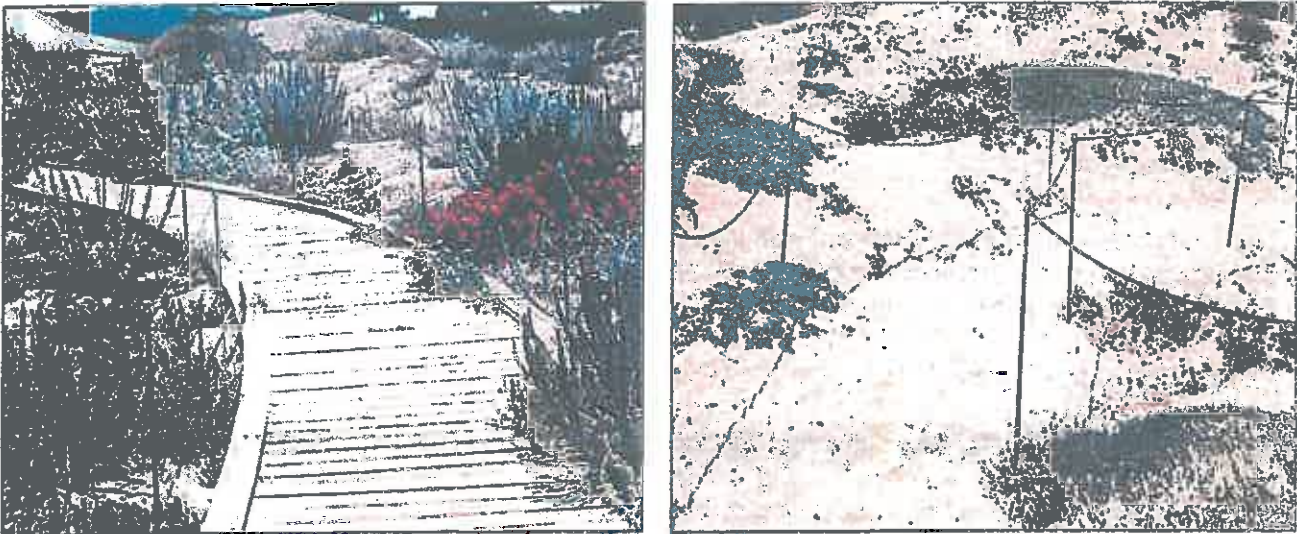


Photo 10. Wooden boardwalk with eye rod & cable fencing. Photo 11. Sand trail with eye rod & cable fencing.

Non-native Plant Control

All aggressive non-native plant species will be removed from the dunes though an initial control followed by a maintenance program. The main focus of the non-native control will be on the iceplants (*Carpobrotus* and *Conocosia* sp.), Sydney golden wattle (*Acacia longifolia*) and the invasive grasses and forbs on the roadside edges of the North Dunes. The control methods will vary with species and more than one method may be needed with a single species. The control program will include removal of solid stands of the non-native plant and individuals within stands of native dune scrub.

When herbicide is used, the handler must strictly adhere to the label, have been trained properly to safely handle pesticides and report the use to the County of Monterey. All herbicide use shall be carefully planned to provide complete control over the treatment site until the spray is dry. Wind is almost a constant on the dunes, very calm mornings offer short windows of opportunity to spray without drift. This is especially important in areas with native plants proximate to non-native plants.

Iceplants • *Carpobrotus* & *Conocosia* sp.

All iceplant mats will be killed with 2% glyphosate during its active growing period, and left in place to desiccate. The mats will be monitored on a monthly basis for need of re-spraying live sprigs. Seedlings and small plants of iceplant will be hand-pulled and disposed of off-site at an appropriate disposal area. Leaving the mats in place while they die will provide sand stability during the period planted native dune plants are becoming established. Iceplant growing within 30 ft of Tidestrom's lupine will be pulled by hand and disposed of off-site.

Sydney Golden Wattle • *Acacia longifolia*

During the active growing period, all leaf and top growth will be cut and disposed of off-site at an appropriate disposal site. Short stumps of the main stems of the wattle will be left. Immediately after cut-

ting the stems, 50 to 100% glyphosate shall be applied in an injection or frill method to cuts along the thick stems. Oblique angled cuts should be used to avoid any runoff into the sand. The stumps will be monitored for any re-growth and re-treated along fresh cuts if needed. Once treatment is successful, the aerial portions of the wattle stems can be trimmed to just below the sand surface.

Invasive Grasses & Forbs

The best control method for each site with invasive grasses and forbs will be used. Possible methods include hand-pulling, spraying (especially perennials), mowing, or a combination of shallow tilling and irrigating to reduce the seed bank.

Planted Trees: Monterey Cypress, Monterey Pine, Blue Gum Eucalyptus

All digging in the dunes will be done with caution as to not harm black legless lizards. They are usually found in the top 18 inches of sand under shrubs and trees with a well developed leaf litter. Control of any non-native trees could disturb a legless lizard, so the work must be done slowly, with a watchful eye. Removal of all leaf litter under the tree 48 hours prior to the tree removal will encourage the lizards to move out of the tree root zone. Any lizards observed during non-native plant removal should be reported to the CA Department of Fish & Game's CNDDDB.

Planted Monterey cypress trees along Ocean Ave. and the southern boundary of North Dunes have both historical and landscape significance. However, the planted trees are eliminating dune habitat and therefore negatively impacting ESHA. In order to minimize the impact to the dunes, and retain the historical and esthetic value of the cypress in Del Mar and North Dunes, the Monterey cypress trees adjacent to Ocean Ave. and planted at the base of the Ocean Ave. hill, shall be maintained and replaced as necessary as consistent with the Shoreline Management Plan. Those individual trees planted away from Ocean Ave, more in the central portion of the North Dunes and the Monterey Pines planted at the very north end of the dunes should not be replaced if removed due to disease or death and the area restored to the native dune scrub. Mature cypress and pines should be removed after they died or decline to the point they are no longer esthetic or safe. Young trees should be evaluated to determine if they should be removed now, to begin the restoration of native dune scrub. The mature blue gum eucalyptus at the corner of Ocean Ave. and San Antonio, should also be maintained due to its landmark size. Map 2 delineates the corridor in the dunes to be dedicated to Monterey cypress landscaping.

Stabilizing the Sand

All planting areas will be stabilized with straw or jute to allow the seedlings or seed to get established with a minimum of shifting sands. For straw treatments, bundles of straw will be 'planted' 4 inches into the sand at 12 to 15 inches on-center spacing. Each bundle will consist of a generous fistful of straw, and measure approximately 10 inches long. The bundles will be placed into a 4 inch deep hole, perpendicular to the surface of the dunes and backfilled with sand. The straw bales shall be bundled preferably from rice or wheat. Use of straw from grains that can naturalize on the dunes such as oats, rye, bromes, and barley shall not be used. Jute can be placed on dune slopes with typical installation methods. Jute works well on steep sites or narrow corridors.

In addition to the straw bundle planting or jute, segments of 4 ft high snow fencing, typically made of lath and wire or heavy gauge plastic can be added to problem wind areas to literally bounce the wind upward, offering relief to the ten to twenty feet behind the fence. Multiple segments can be useful in wind tunnel areas. Installation of wind fencing prior to planting an area is advisable.

Planting areas covered with dead iceplant should not require any additional stabilization techniques.

Planting

Bare sand created by human disturbance and non-native plant removal will be planted with native dune species. The exception will be the volleyball courts and viewing areas along the court sidelines and the designated trails through the dunes. Native seedlings will be planted according to Table 2.

Table 3. Dune Scrub Planting Mix and spacing by zone in North Dunes and Del Mar Dunes.

Foredune	Dune Swale	Reardune	CLO Associates
<i>Abronia latifolia</i> 5' oc*	<i>Carex pansa</i> 1' oc	<i>Abronia umbellata</i> 4' oc	<i>Marah fabaceus</i> 5' oc
<i>Ambrosia chamissonis</i> 5' oc	<i>Juncus effusus</i> 3' oc	<i>Artemisia pycnocephala</i> 3' oc	<i>Pteridium aquilinum</i> 3' oc
<i>Camissonia cheiranthifolia</i> 2' oc		<i>Camissonia cheiranthifolia</i> 2' oc	<i>Rubus ursinus</i> 3' oc
<i>Leymus mollis</i> 3' oc		<i>Croton californica</i> 2' oc	
		<i>Ericameria ericoides</i> 4' oc	
		<i>Erigeron glaucus</i> 1' oc	
		<i>Eriogonum parvifolium</i> 3' oc	
		<i>Lotus scoparius</i> 3' oc	
		<i>Lupinus arboreus</i> 5' oc	
		<i>Lupinus tidestromii</i> 2' oc	
		<i>Phacelia ramosissima</i> 3' oc	
		<i>Poa douglasii</i> 1' oc	

* The on-center spacing for planting listed in feet.

The planting shall follow the following guidelines:

- Thinning of dead iceplant mats should be considered to open up the sand surface. At a minimum, planting holes shall be chopped through the dead mat, and a planting hole cultivated in the sand below.
- The plants shall be from local genetic source in the Carmel and Pebble Beach areas.
- The planting should be scheduled during the late fall or early winter, as soon as 2-3 inches of rain has been received and more storms are expected. Winter rains can be supplemented with irrigation, however, the timing of the planting should still be in the winter months.
- A temporary above-ground irrigation system could be installed to provide watering to supplement the winter rains. Each seedling should receive a minimum of ¼ gallon per watering. The goal should be to provide only supplemental water to the rains and water deeply the entire root zone of each plant.

- General guidelines for the scheduling of the water system: up to three times per week during winter and spring months, once a week in June and once per month in July, August and September during the first six months the plants are in the ground only. Irrigation should be monitored to insure the application of usable water within the root zone and to avoid runoff.
- Seedling containers should be a supercell 6", 2 inch pot or of equivalent volume.
- The seedlings shall be spaced according to the table above. The general planting plan will be a random mix of the dune scrub species with some stands of single species.
- Planting holes shall be equal depth to the container. Each planting hole will be back filled with native sand and a tablespoon of slow release fertilizer r.e. E.B Stone Organic All Purpose Fertilizer or Osmocote 14-14-14.

Sensitive Species Management

Tidestrom's Lupine: The goal is to establish thriving new pockets of Tidestrom's lupine in the dunes to add stability and long-term survival to the population. Presently, the Tidestrom's lupine grows in relatively open sand areas with *Abronia umbellata*, *Leymus mollis*, and *Poa douglasii*, but primarily with other individuals of Tidestrom's lupine. In 1995, biologists from Jones & Stokes mapped four Tidestrom's lupine locations in North Dunes. In 2008, only two of the four locations had Tidestrom's lupine. To achieve a stable population that can survive minor changes and disturbances to the dunes, both natural and human caused, at least ten locations scattered throughout North Dunes should be established with each location supporting at least 100 plants.

Collection of seed for propagation of the Tidestrom's lupine shall be limited to the population on the North Dunes. Due to the small size of the population, and therefore limited seed available each year, direct sowing into the dune is not an efficient use of the seed or method of propagation. Lupines generally are easily grown from seed that have been collected when ripe, lightly scarified and sown in a well draining planting mix. Propagation in a supercell 6" container will encourage a healthy tap root to form and the plant will be ready to plant out in the dune within 3 to 4 months after sowing. Younger plants have a better chance of establishing in the wild, provided the proper care after planting. Plant-



Photo 12. Seed pods of the Tidestrom's lupine. Seeds are ripe when the pod cracks open easily and the seeds are dark in color.

ing should follow the methods outlined in the previous section.

The locations of Tidestrom's lupine plants on the North Dunes are being negatively impacted by human and pet trampling. Fencing the plant locations may be necessary to protect the endangered species from disturbance, especially near the volleyball courts. However, if the proposed trail system is installed, and hikers are respectful of the dunes and stay on the designated trails, fencing of the lupine may not be needed. As a part of the annual monitoring of the lupine population, the need for fencing will be considered and if deemed necessary will be added. A simple plastic coated cable and steel eye rod style of fence should be sufficient to give visitors the message to avoid the area and only create a minimal visual impact.

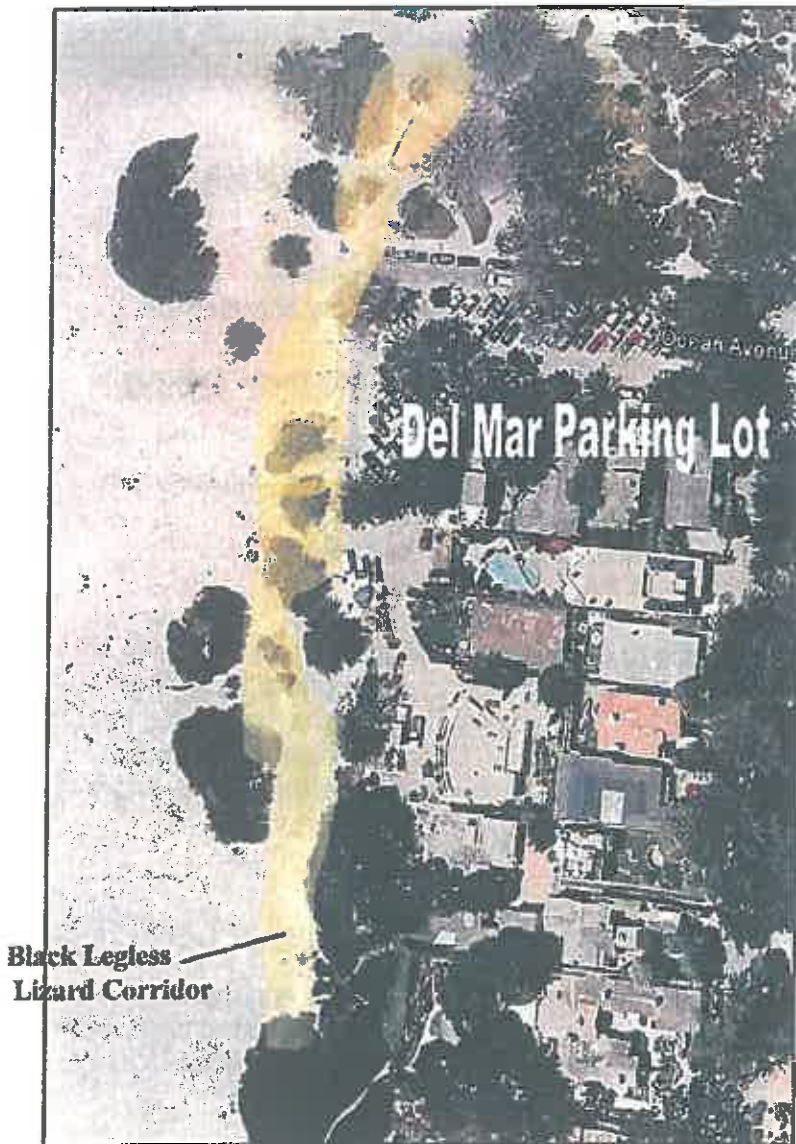


Photo 13: Proposed Black Legless Lizard Corridor.

Black Legless Lizard: The historic photographs of the original dunes behind Carmel Beach (Photo 6) show large expanses of dune scrub that appears to be ideal habitat for the black legless lizards. Today, their habitat is limited to North and possibly Del Mar Dunes. A goal of this restoration program is to improve the quality of habitat for the black legless lizard by establishing large stands of native dune scrub, and creating a habitat corridor between North Dunes and Del Mar Dunes for lizards to be able to move between the two areas.

The restoration methods outlined in the section above will be used to restore the dune scrub to the bare sand areas and where non-native plants are removed. In addition, a habitat corridor between North Dunes and Del Mar Dunes shall be established with some specific planting of *Ericameria ericoides*, *Eriogonum parvifolium*, *Lotus scoparius*, *Lupinus arboreus*, and *Phacelia ramosissima*. These plant species create especially good habitat for the legless lizards due to the size and shading ability of their canopy, and the large amount of annual leaf litter that collects under the shrubs. The litter attracts insects which the legless lizards feed upon. Large bare sand pathways will be necessary to allow visitors to move easily from the Del Mar

parking lot to the beach, but with careful planning and open areas between shrub stands of no more than 75 ft in length, a habitat corridor can co-exist with the primary beach access area. On the aerial photograph in Photo 13, potential corridor planting locations have been highlighted in yellow. Because this planting will need to cross a very high traffic area, protective fencing will be needed to ensure the establishment of the plants. Again, plastic coated wire cable with steel eye posts has minimal visual impact while offering protection to the plants.

Interpretation of the Dunes, Beach and Restoration Program

The dunes are a unique area in the City of Carmel, and sharing the natural and cultural history with the residents and visitors through interpretive panels, can enhance their appreciation of the dunes. Appreciation leads to respect and placing value on the resource, and even becoming a steward of the dunes, through volunteering. Interpretive panels could successfully attract the curious reader adjacent to restroom, at the foot of the boardwalk in North Dunes and at the boardwalk bench area on North and Del Mar Dunes.

The following list contains some broad ideas for interpretive subjects. Many additional ideas can be generated from each theme.

- Fragile dune scrub habitat: the flora, fauna, geology, endangered species present
- Human history of Carmel Beach and the dunes: Bath House, military, and century of recreation, famous artist of Carmel at beach gatherings, etc.
- Ocean habitat of Carmel Bay: the fish, mammal, birds, invertebrates, type of seaweeds that maybe seen on the beach
- Ocean tides, currents, and how they form and shape the summer and winter beach
- The Monterey cypress as the 'sentinel' of Carmel Beach. Its natural distribution, planting history in Carmel, world-wide popularity as a landscape tree, life span, grace
- Restoration of the dune scrub habitat of Carmel, how, why, and how you can help
- Geography of the area: all landmarks you can see from the dunes or beach

In addition to interpretive signing, some general signing to encourage the visitors to use the designated trails through the dunes will probably be necessary during the restoration project. It may be necessary to sign the small volunteer trails off San Antonio Ave. guiding hikers to the designated trail. Small signs asking people to stay off of planting areas can also help. "Dune Restoration in progress - Please stay off the young plants" or something similar has helped on many State Park dune restoration projects.

Maintenance Methods

Timely follow-up maintenance of any restoration project is often the key to success, and dune restoration is no exception. At least quarterly inspections of the treatment areas are needed to identify any problems and schedule maintenance. Maintenance activities may include but not be limited to:

- Repair or replace segments of fence or boardwalk as needed.

- Removal of aggressive exotic plants on the project site, including any live sprigs of iceplant.
- Replant vegetation if necessary until the site is stabilized. Planting should be limited to winter and spring months.
- Addition of organic fertilizer around plantings that have not shown typical growth.
- Repair or adjusting the irrigation system and/or schedule. Inspect the irrigation system during a watering cycle to detect any leaks or malfunctions. Evaluate the emitter placement and the adequacy of the sphere of water delivered at each plant.
- If animal browse is heavy, caging Tidestrom's lupine or fencing the site may be considered.
- Replacement of jute netting or their stakes if used.
- Re-apply straw planting in disturbed areas or areas where new sand deposition has occurred.
- Addition of segments of wind fencing to break up strong wind patterns.
- Consider the addition of fencing around any Tidestrom's lupine locations that are being impacted by foot traffic.
- Other actions identified during the monitoring, necessary to meet the success criteria.

Monitoring Methods

To insure the long-term protection and maintenance of the Tidestrom's lupine and Black Legless Lizard within the dunes in the City of Carmel, on-going monitoring of the populations should be implemented.

Tidestrom's lupine should be monitored annually by a qualified biologist. The information collected each year should include:

1. Direct count of individuals, noting number of mature blooming plants, and number of non-blooming seedlings. These numbers should be compared with previous surveys to determine whether the population is stable, increasing, or declining.
2. Note any impact from human use of the dunes. Considered fencing as a protection measure.
3. Note encroachment from non-native plant species and trigger maintenance actions to remove the weeds.
4. Map locations in North Dunes, analyze reasons for any changes from previous years.
5. Submit annual data collected to CA Department of Fish & Game's CA Natural Diversity Data Base.

Black Legless Lizards are difficult to assess both the population size or population stability. As more information is developed for the species, including what constitutes a viable population, and established methods to estimate population size and stability, these endeavors should be undertaken. In the interim, once every 5 years, a survey for presence/absence should be undertaken to confirm the continued presence of the lizards.

Restoration Program Success Criteria

The mission of this restoration & management program is to recreate a self-sustaining native dune habitat with thriving populations of the special status species, while providing safe visitor access and enjoyment of the dunes. To accomplish a successful project the following criteria should be met:

- Aggressive non-native species shall have less than 1% of coverage in the project area.
- The dune scrub plant coverage should reach at least 70% coverage in the project area, with the other 30% occupied by bare sand or Monterey cypress within the cypress corridor.
- All planted species must be displaying evidence of reproduction.
- The dune scrub shall be comprised of all 22 native species mentioned in this report.
- Successful establishment of 10 locations of Tidestrom's lupine with at least 100 plants each.
- Successful establishment of the quantity and quality of available habitat for Black Legless Lizards, including the habitat corridor between Del Mar and North Dunes.
- Annual monitoring of the Tidestrom's lupine population is performed and results reported to the CA Department of Fish and Game's Data Base.
- The trail system has been established and is being used exclusively for visiting or traversing the dunes. No foot traffic impact is occurring within the Del Mar or North Dunes.
- Interpretive panels are increasing the visitors experience and knowledge of the dune habitat.

Implementation

The implementation of this program can take a variety of paths ranging from full funding contracting all components of the program to a phased approach, installed by volunteers. Reality typically falls somewhere between the two options.

If full project funding were available, the entire area could be treated at one time by contractors. The contracts may need to be divided in a few specialties: carpenter for boardwalk and bench construction, pest control contractor for efficient treatment of iceplant and acacia, and a restoration specialist/landscape contractor for plant propagation and installation.

However, there are many other avenues for accomplishing the work. First is a phased approach where the project is divided into six to ten manageable areas for treatment. Even boardwalks and path ways can be installed sections at a time if necessary. A general rule of thumb for dune restoration projects is to begin in the foredunes and end up in the reardunes, due to the possible inland movement of sand when non-native plants are removed. A great advantage to phasing the work is that the methods of restoration are honed during the first phases, allowing the rest of the project to take advantage of the knowledge. It divides the project site into more manageable sizes, avoiding overwhelming the project manager and volunteers and also spreads costs over time.

Some of the lower cost alternatives include recruiting low or no-cost labor or donations from Carmel Middle School, Carmel High School, the CA Conservation Corp, civic groups such as Scouts, Carmel Garden Club, the CA Native Plant Society, or Return of the Natives program at CSUMB. Groups or individuals can be asked to sponsor a bench, or foot of boardwalk, an interpretive panel, etc.

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