# 4. CRITICAL SPECIES AND HABITAT

One of the most critical functions of the southern Monterey Bay dune and beach system is its role as a habitat for a unique flora and fauna. As the dune system has been reduced and fragmented, the risk of extinction has increased for some of these species. For this reason, evaluation of potential impacts to these fragmented population remnants needs to be considered in the larger context of cumulative impacts as well as site specific impacts. The beaches of southern Monterey Bay are habitat for numerous invertebrate species, which provide an important food source for shorebirds, seabirds, marine mammals, and fish. A key factor that needs to be considered as part of the feasibility for beach nourishment is the potential for smothering or temporary loss of marine life or habitats when placing the sand. The locations of critical species and habitat are available as GIS data files in CSMWs GIS database and are discussed in this section. The impacts of beach nourishment on critical species and habitat are explained in Section 5.1.

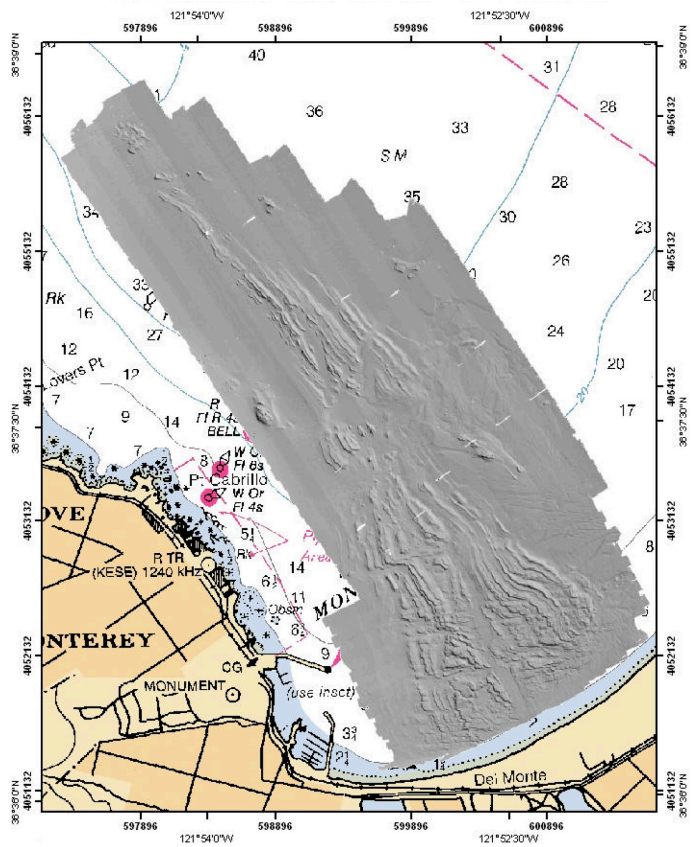
## 4.1 SENSITIVE HABITAT

The Corps requires a sensitive habitat survey for beach nourishment projects, which includes pre- and post-project monitoring and proposals for mitigation for any impacts to sensitive habitats adjacent to and down coast of the receiver site. In southern Monterey Bay, these habitats would include rocky reef, kelp forest, eelgrass meadow, sandy beaches, sandy subtidal, and coastal dunes.

### 4.1.1 Rocky Reef

A low relief rocky reef of shale known as Del Monte Shale Beds (or Tanker Reef) lies off the south end of Del Monte Beach (approximately 1.5 miles from Wharf II and stretching almost to the Monterey Beach Resort), approximately 600 feet from the beach in 30-230 feet of water (Kvitek et al., 2004; Iampietro et al., 2005). The shale outcrop covers an area of over 3.5 square miles (stretching over three miles offshore, Figure 26) and is composed of Miocene Monterey Formation. The reef supports a kelp forest and other submerged aquatic vegetation as well as a number of species of fish and invertebrates. In 2005, the Natural Resources Defense Council (NRDC) submitted a proposal to the California Resources Agency which included nominating this reef for Marine Protected Area (MPA) status as a marine park. The proposed MPA was not adopted by the CDFG as part of the central coast MPAs and therefore does not appear in the published 2007 MPA network. Since then, the NRDC has not further pursued designation of this area.

**Figure 26. Location of Del Monte Shale Beds**




Source: Kvitek et al. (2004)

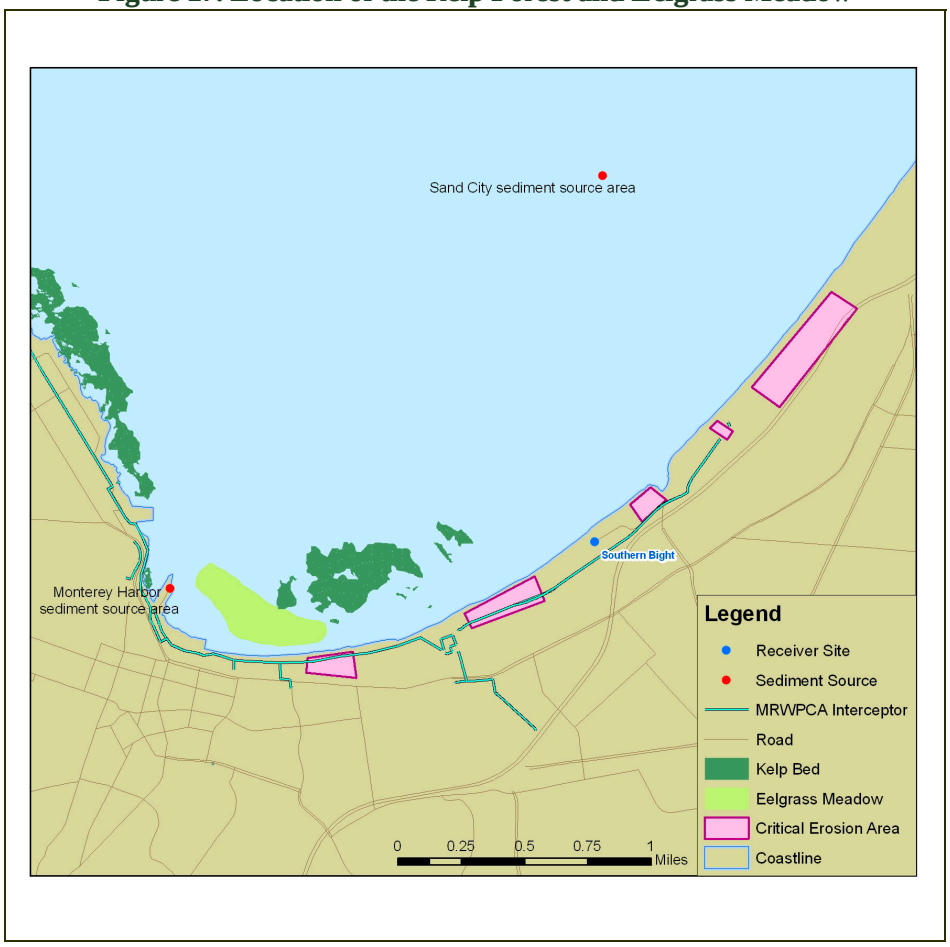
The reef is home to over 20 species of rockfish (*Sebastes* spp.), several of which have been identified by the National Marine Fisheries Service (NMFS) as over-fished. It provides juvenile fish habitat for deeply depleted species such as yelloweye and canary rockfish, and habitat for vermilion, and blue and copper rockfish adults and juveniles. All rocky subtidal areas are considered Essential Fish Habitat for managed fishery species. This reef is also known for worms and beds of boring clams that inhabit the soft shale substrate.

### 4.1.2 Kelp Forest

Attached to the rocky reef is a kelp forest consisting of giant kelp (*Macrocystis pyrifera*) and bull kelp (*Nereocystis leutkeana*). Kelp favors nutrient-rich, cool clear water through which light penetrates easily, and generally occurs near the closure depth (Figure 27). The kelp forest may support thousands of invertebrate individuals, including polychaetes, amphipods, decapods, and ophiuroids, that are prey for birds and marine mammals and support commercial fisheries.

California sea lions, harbor seals, sea otters, and whales feed in the kelp or escape storms or predators in the shelter of kelp, which help weaken currents and waves. Kelp forests are considered a submerged aquatic vegetation of special interest in California and Essential Fish Habitat. The distribution of this kelp forest varies seasonally and from year to year in the southern bight.

**Figure 27. Location of the Kelp Forest and Eelgrass Meadow**



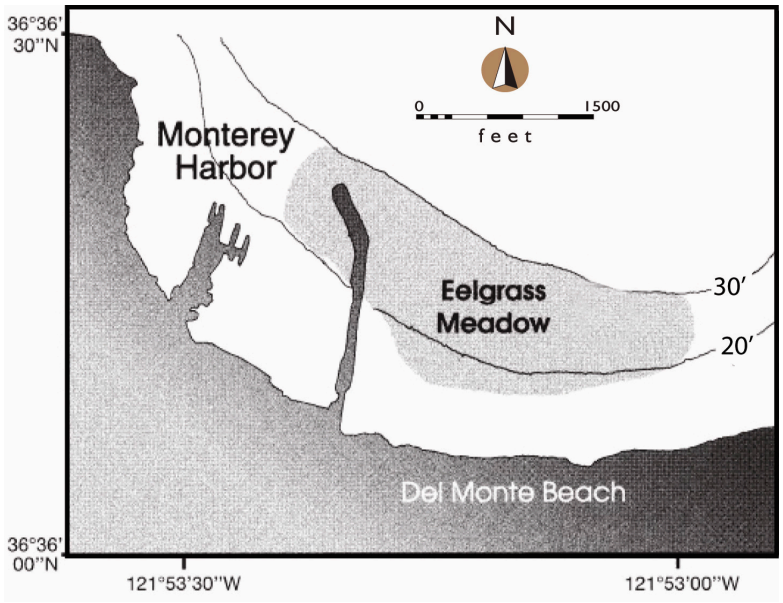

### 4.1.3 Eelgrass Meadow

Eelgrass (*Zostera marina*) is considered important submerged aquatic vegetation of special interest in California, special aquatic sites (SAS) (vegetated shallows) under the federal Clean Water Act of 1972 (SAIC, 2007), and Essential Fish Habitat. Cutting and disturbing eelgrass is prohibited by California fishing regulations. Eelgrass provides habitat for a variety of invertebrates and fishes, including nursery habitat. The primary factors controlling eelgrass growth are light availability, substrate composition, temperature, salinity, nutrient availability, and wave/current energy. Light affects the depth distribution of eelgrass through its role in

photosynthesis. The degree to which light is attenuated with depth in the water column is a strong determinant of the lower limit to which eelgrass can grow. Eelgrass can grow in a wide variety of substrates, but generally they flourish in medium to fine sands that contain relatively high levels of organic matter and nutrients.

Prior to 1993, the Del Monte eelgrass meadow covered a continuous 0.1 square miles (30 hectares) of the sea bed in water depths of 10-30 feet inshore and west of the rocky reef and kelp forest and east of Wharf II (Figures 27 and 28). Zimmerman et al. (2001) indicated that the bed was fragmented and reduced to less than 50% of its total size following heavy grazing by a southern species of limpet that began in 1993. The prospects for recovery of the bed to its former size were not considered favorable due to the limpet grazing. However, data after 2001 are limited and the status of this eelgrass meadow was not known as of 2005 (CDFG, 2005).

**Figure 28. Location of the Eelgrass Meadow**




Source: Zimmerman et al. (2001)

4.1.4 Sandy Beaches

Dune-backed sandy beaches exposed to surf are the most prevalent habitat in southern Monterey Bay. Beaches are primary habitat for a variety of invertebrate species including crustaceans, mollusks, polychaetes and insects, as well as meiofauna that can reach high abundance and biomass. These species are prey resources for fishes, seabirds, shorebirds and marine mammals. Beaches also provide roosting areas for shorebirds, pelicans, gulls, and other seabirds and haul-

out habitat for pinnipeds, such as harbor seals and sea lions. Western snowy plovers (a threatened shorebird species) nest and rear chicks on beaches in southern Monterey Bay, and California grunion are known to use the beaches of southern Monterey Bay for spawning.

#### 4.1.5 Sandy Subtidal

Extensive sandy subtidal and surf zone habitats bound most of the southern Monterey Bay coast. This dynamic habitat is not well studied but can support a diversity of fish and invertebrate species including, flatfish, surfperch, amphipods, isopods, mole crabs, Dungeness crabs, swimming crabs, Pismo clams, northern razor clams, sand dollars, sea pansies, sea stars and polychaetes, many of which are prey for seabirds and marine mammals.

Two sandy subtidal benthic infaunal communities are recognized along a gradient of wave activity in Monterey Bay. Closest to shore and characterized by strong water motion and sandy sediments is the crustacean zone. This zone is occupied by small, mobile, deposit-feeding crustaceans, such as amphipods, which do not build permanent burrows. In deeper waters, characterized by more stable, fine sand with a significant amount of mud, is the polychaete zone which is generally well developed in depths of 60 feet or more. Polychaete worms living in relatively permanent tubes and burrows dominate this zone. Many other relatively sessile and suspension-feeding groups, including brittle stars, clams, tube anemones, sea pens, are common here. The depth limits of these two benthic zones vary with wave activity with zones extending deeper with higher wave energy. For example, off a high-energy beach in Monterey Bay, the transition between the two benthic zones occurred at a depth of approximately 40 feet.

Subtidal sands are primary, foraging, and reproductive habitat for a variety of invertebrates and demersal fish including juvenile lingcod, white croaker, plainfin midshipman, staghorn sculpin, sand sole, English sole, speckled sand dab and curlfin sole. Marine mammals including otters, pinnipeds and cetaceans forage on water column and benthic fish and invertebrates over sandy subtidal habitats. Subtidal sands are also important as habitats that support commercial and recreational fisheries for marine invertebrates (e.g. Dungeness crabs, sea cucumbers) and fish (e.g. California halibut, sanddabs).

#### 4.1.6 Coastal Dunes

The coastal dune system of southern Monterey Bay is one of the most important in California. Native coastal strand and dune vegetation is designated as rare in California. Much of the area of active sand dunes with or without vegetative cover is designated as Ecologically Sensitive Habitat Area (ESHA). The stable vegetated dunes south of the Salinas River also qualify as ESHA because of the presence of 1) typical sand dune species, 2) species and plants that are ESHA in their own right, and 3) physical substrates that support or could support the above species. Coastal dunes are vulnerable to trampling, erosion and invasion by exotic species. Dune restoration and conservation is actively ongoing in southern Monterey Bay, including the

southern three miles of coast. A number of endangered and threatened plant and animal species inhabit the dunes.

## 4.2 NATIVE ANIMALS

A number of native animals inhabiting the dunes and beaches of southern Monterey Bay have special status, are already listed, or are on the candidate list for the federal register. A few other animal species of interest as prey resources for endangered species or as fishery species are also considered.

### 4.2.1 Western Snowy Plover

The western snowy plover (*Charadrius alexandrinus nivosus*) was listed as a threatened species in 1993 by the U.S. Fish and Wildlife Service (USFWS). In 2005, the USFWS published a final rule on snowy plover critical habitat along the coast of California, which did not include any of the southern Monterey Bay shoreline. The final recovery plan for the species was published in 2007, in an attempt to remove the Pacific coast population from the list of endangered and threatened wild life and plants.

Western snowy plovers forage on the shoreline and nest on the beaches and dunes along southern Monterey Bay, and are present year round in the area. Southern Monterey Bay is an important nesting area for snowy plovers, with 61 to 104 nesting birds each year. It is also an important wintering area, with up to 190 birds using this area of coast each winter. Chicks leave the nest to forage soon after hatching. Adults move chicks along the beach (even miles) to reach suitable foraging areas. Habitat features essential to the species include areas of sandy beach above and below the high tide line with surf-cast macrophyte wrack and other debris supporting small invertebrates (for nesting and foraging) and generally open barren to sparsely vegetated terrain (for foraging and predator avoidance). Although excluded from the USFWS critical habitat designation for this species in the final rule in 2005, the southern portion of Monterey Bay provides suitable or potentially suitable habitat for snowy plover foraging and nesting. The distribution, including nesting sites, of this endangered species in this area is expected to vary with beach conditions and the dynamics of the snowy plover population.

At the Sanctuary Beach Resort, the dunes between the bluff edge and resort wall are being preserved to provide dune habitat for the western snowy plover. The dunes to the north of the Ocean Harbor House condominiums are also protected from human and canine disturbance to provide mating and nesting habitat for the western snowy plover.

### 4.2.2 Shorebirds

Many species (17) of shorebirds use the beaches of southern Monterey Bay during migration periods and over the winter months (Table 11). The average abundance of shorebirds is 119 birds per kilometer of shoreline with peak use occurring between August and March (Neuman et al., 2008). The rich and productive invertebrate prey resources of sandy beaches are critical to the survival and success of breeding and nonbreeding shorebirds in coastal ecosystems. Shorebirds have high metabolic rates and relatively high daily energy requirements (Kersten and Piersma, 1987) and are capable of consuming a large percentage (49-65%) of the annual production of invertebrate prey on beaches. The beaches of southern Monterey Bay provide important foraging and roosting habitat for shorebirds particularly when wetlands, such as Elkhorn Slough, are inundated during high tides. Many shorebird populations are declining in the U.S. and the maintenance of high quality foraging habitats is considered important to their conservation.

**Table 11. Bird Counts in Monterey Bay (Neuman et al., 2008)**

| Common name | Scientific Name | Maximum | Density (birds km$^{-1}$) | |
|---|---|---|---|---|
| | | | Low Tide Mean | High Tide Mean |
| Sanderling | *Calidris alba* | 6,796 | 83.70 (37.4) | 73.00 (31.8) |
| Willet | *Tringa semipalmata* | 2,299 | 19.10 (16.3) | 5.40 (6.6) |
| Marbled Godwit | *Limosa fedoa* | 805 | 10.50 (5.5) | 5.90 (4.4) |
| Black-bellied Plover | *Pluvialis squatarola* | 497 | 3.20 (3.5) | 1.70 (1.7) |
| Whimbrel | *Numenius phaeopus* | 535 | 2.70 (4.2) | 1.40 (1.9) |
| Snowy Plover | *Charadrius alexandrinus* | 330 | 2.50 (1.7) | 3.20 (2.2) |
| Western Sandpiper | *Calidris mauri* | 1,175 | 0.78 (1.72) | 4.80 (9.7) |
| Long-billed Curlew | *Numenius americanus* | 94 | 0.50 (0.64) | 0.19 (0.26) |
| Ruddy Turnstone | *Arenaria interpres* | 42 | 0.17 (0.29) | 0.22 (0.29) |
| Killdeer | *Charadrius vociferus* | 85 | 0.17 (0.32) | 0.34 (0.68) |
| Dunlin | *Calidris alpina* | 61 | 0.14 (0.30) | 0.21 (0.41) |
| Dowitcher spp. | *Limnodromusspp.* | 43 | 0.14 (0.31) | 0.03 (0.06) |
| Semipalmated Plover | *Charadrius semipalmatus* | 60 | 0.03 (0.05) | 0.30 (0.50) |
| Red Knot | *Calidris canutus* | 9 | 0.03 (0.07) | 0.01 (0.04) |
| American Avocet | *Recurvirostra americana* | 14 | 0.03 (0.10) | 0.01 (0.03) |
| Black Turnstone | *Arenaria melanocephala* | 9 | 0.02 (0.05) | 0.03 (0.06). |
| Least Sandpiper | *Calidris minutilla* | 89 | 0.01 (0.02) | 0.28 (0.67) |
| All Shorebirds | | 7,586 | 123.80 (44.5) | 97.0 (37.6) |

NB. Table shows maximum bay-wide count and low-tide and high-tide mean density (standard deviation in parentheses) of the 17 shorebird species observed between November 2002 and April 2003.

### 4.2.3 Black Legless Lizard

The black legless lizard (*Anniella pulchra nigra*) is considered a species of concern by the CDFG because of its limited distribution. Much of the habitat for this lizard has been lost to agriculture and other development including recreation, especially in coastal dune areas, and by the introduction of non-native plants such as ice plant. It occurs in the Marina and Ford Ord dunes, although the exact distribution of these populations of the species is not known. Kuhnz et al. (2005) suggested that standard survey methods may not be effective in establishing presence or absence of this species when low densities are present. The Sanctuary Beach Resort has installed a 'lizard crossing' beneath the main entry road to allow the California legless lizard to safely traverse the eastern edge of the property.

### 4.2.4 Smith's Blue Butterfly

The tiny Smith's blue butterfly (*Euphilotes enoptes smithi*) is a species of concern and is federally protected and was listed as endangered by the USFWS in 1976 due to loss of dune habitat. At least 12 reserves for the butterfly have been established on Fort Ord. Coast buckwheat (*Eriogonum latifolium*) and dune buckwheat (*Eriogonum parvifolium*) are host plants for this endangered butterfly. The distribution of coast buckwheat is limited and patchy in southern Monterey Bay, but some patches are fairly extensive. These host plants grow in coastal dunes and are needed by Smith's Blue Butterfly for reproduction in their natural habitat. Coast buckwheat has been or is planned to be planted in a number of restoration projects in the area between Sand City and the Salinas River. The emergence of the butterfly is timed to coincide with the blooming of the host plants (approximately 4-6 weeks in late summer-early fall). Each adult butterfly lives about a week, mating and laying eggs on the host plant.

### 4.2.5 Globose Dune Beetle

The globose dune beetle (*Coelus globosus*) is a Category 2 species of concern for USFWS, meaning it is a potential candidate for listing, but sufficient information to support a proposed rule is lacking. This species of flightless beetle inhabits coastal dune habitats usually within 100 feet of the shoreline. These beetles are primarily subterranean as adults and larvae, tunneling through sand underneath dune vegetation such as sand verbena, beach bursage and sea rocket. This species may be absent from Monterey Bay; however, the exact status of the population is not known.

### 4.2.6 Southern Sea Otter

The southern sea otter (*Enhydra lutris nereis*) occurs along southern Monterey Bay year round. This species is listed as federally threatened and is fully protected by both state and federal regulations. This endangered marine mammal species requires abundant benthic invertebrate prey of large body size including large crabs, sea urchins, abalone, snails and clams. Sea otters feed in rocky and kelp forest habitats as well as low intertidal and surf zones of beaches in southern Monterey Bay. Kelp forests are critical areas for resting, foraging and nursery sites. Otters are important predators on major invertebrate herbivores and thus considered a key factor in the dynamics of kelp forests. The highest density of sea otters occurs in the southern portion of the Bay. Reproduction of otters as indicated by pup numbers is also relatively high in this area.

### 4.2.7 California Grunion

The California grunion (*Leuresthes tenuis*) is a beach nesting fish that breeds regularly on Monterey State Beach (Karen Martin, Pepperdine University, personal communication) and may well breed on other beaches in southern Monterey Bay. This fish spawns in the upper intertidal zone between March and August, and occasionally in February and September. Peak spawning is late March to early June. Grunion leave the water at night for four consecutive nights starting the nights of the full and new moons. Spawning begins after high tide and continues for several hours. Eggs incubate in the sand for two or more weeks and during this period are vulnerable to burial and disturbance. Adult fish inhabit shallow nearshore water from the surf zone to a depth of approximately 60 feet. The most critical problem facing the grunion resource is the loss of spawning habitat caused by beach erosion. By the 1920's the fishery was showing definite signs of depletion and a regulation was passed in 1927 establishing a closed season of three months, April through June. The fishery improved and in 1947 the closure was shortened to April through May. This closure is still in effect to protect grunion during the peak spawning period.

### 4.2.8 Pismo Clam

The Pismo clam (*Tivela stultorum*) is a large heavy-shelled bivalve that inhabits low intertidal and shallow subtidal zones along open sandy coasts from Monterey Bay to Baja California. This clam can reach shell lengths of greater that 6 inches and can exhibit zonation by size, with juvenile clams located higher in the intertidal zone than older adults. Southern Monterey

Bay is close to the northern range end for this species. This long-lived (>50 years) and delectable bivalve formerly supported large commercial and recreational (sport) fisheries in the Monterey Bay area and other parts of the California coast until population numbers declined and the fishery collapsed. This shallow-burrowing and slow-moving clam is important prey for sea otters in southern Monterey Bay.

### 4.2.9 Beach Invertebrates

Beach invertebrates including spiny and common sand crabs, beachhoppers, razor clams, polychaete worms, insects, and a variety of small crustaceans can reach high abundance (>100,000 individuals per meter of shoreline) and biomass on the beaches of southern Monterey Bay These invertebrates are an important prey resource for shorebirds, seabirds, fish and marine mammals. Many of the invertebrate animals inhabiting the lower intertidal and swash zone can be dispersed relatively long distances as planktonic larvae. The upper shore invertebrates are associated with drift seaweed or wrack, avoiding direct contact with the waves. These animals which include beachhoppers, isopods and a number of flightless insects develop directly on the beach and thus can be limited by dispersal and distance from source populations.

## 4.3 NATIVE PLANTS

Several native plants in southern Monterey Bay are either already listed or are on the candidate list for the federal register of endangered and threatened species. These include the seaside bird's-beak, sand gilia, sandmat manzanita, Eastwood's ericameria, coast wallflower, Yadon's wallflower, and Monterey ceanothus. All seven species are recognized as rare by the California Native Plant Society. Of these species, Yadon's wallflower (*Erysimum menziesii ssp. yadonii*) occurs closest to the shoreline. This species is reported to occur on coastal strand close to the high tide line but in areas largely protected from wave action. It is exposed to strong wind, salt spray and occasional wave action. This endangered species is reported to be restricted to four occurrences in the vicinity of the Marina Dunes; two at Marina State Beach and two close to the Marina sand mine. Augmentation, through propagation and reintroduction, has been attempted for populations at Marina State Beach.

Critical habitat is designated by USFWS for the Monterey spineflower (*Chorizanthe pungens var. pungens*) an endangered annual dune plant that occurs in recent dunes and extends along almost the entire southern Monterey Bay coast. Another endangered annual, Monterey gilia (*Gilia tenuiflora ssp arenaria*), also grows in the coastal dunes but generally in locations protected from waves, salt spray and strong winds. The seaside

bird's-beak is protected under the California Plant Protection Act of 1977. The sand gilia is both state-listed (threatened) and federal listed (endangered).