Final Results of the Environmentally Sensitive Habitat Area Study Conducted for the City of Carmel-by-the-Sea

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Executive Summary

Jones & Stokes Associates was retained by the City of Carmel-by-the-Sea (City) to conduct an environmentally sensitive habitat area (ESHA) study and resource management evaluations at five undeveloped sites in the city: Pescadero Canyon, Rio Park, Mission Trails Park, Forest Hill Park, and Carmel Beach. The purpose of the study is to establish background information to assist the City in its formulation of policy and programs regarding ESHAs and its management of ESHAs, as required by the California Coastal Act (Public Resources Code, Sections 30240[a], [b)] and 30107.5).

In summary, the following sites support areas that would qualify as environmentally sensitive under the California Coastal Act (criteria used to identify ESHAs are described in Section 2 of this report):

- Pescadero Canyon supports Monterey pine forest on middle-aged dunes that provides watershed protection and a buffer for Pescadero Creek and is part of an important local wildlife habitat corridor, wetland drainage (Pescadero Creek), central coast arroyo willow riparian forest, and wet meadow.

- Rio Park supports central coast arroyo willow riparian forest along the Carmel River.

- Mission Trails Park supports Monterey pine forest (habitat for Monterey dusky-footed woodrat); central coast arroyo willow riparian forest along wetland drainages; coastal terrace prairie; wet meadow; and occurrences of Hickman's onion (*Allium hickmanii*), a federal candidate for listing as endangered (C1) and a species considered rare and endangered by the California Native Plant Society (CNPS) (List 1B), and Monterey dusky footed woodrat, a federal candidate for listing (C2).

- Carmel Beach supports dune scrub; unvegetated dunes; a known occurrence of Tidestrom's lupine (*Lupinus tidestromii* var. *tidestromii*), a state- and federal-listed endangered species and a species considered rare and endangered by CNPS (List 1B), and a reported occurrence of black legless lizard, a federal candidate for listing (C2) and a state species of special concern.

No environmentally sensitive habitat areas were identified at Forest Hill Park.

Section 1. Introduction and Regulatory Setting

The purpose of this environmentally sensitive habitat area (ESHA) study is to provide the City of Carmel-by-the-Sea (City) with background information that will assist in its formulation of policy and programs regarding ESHAs and its management of ESHAs, as required under the California Coastal Act (Public Resources Code, Sections 30240[a] and [b] and 30107.5). The City will use the information in this report to prepare its local coastal program land use plan and implementation plan. The City may also use this information during subsequent review of documents prepared in compliance with the California Environmental Quality Act.

ORGANIZATION OF STUDY

This ESHA study consists of eight sections:

- Section 1, "Introduction and Regulatory Setting", identifies the study sites and describes state and local policies related to environmentally sensitive habitats.
- Section 2, "Criteria Used to Identify Environmentally Sensitive Habitat Areas", describes the criteria used to identify ESHAs.
- Section 3, "Study Methods", identifies the goals and objectives of this study and the study methods.
- Section 4, "Regional and Local Setting", provides the regional and local setting for the city.
- Section 5, "Study Results and Resource Management Recommendations", discusses the results of the study, identifies which habitats are considered environmentally sensitive, and recommends management actions to protect and enhance ESHAs.
- Section 6, "Conclusions", presents the conclusions of this ESHA study.
- Section 7, "Citations", lists printed references and personal communications that are cited in this study.
- Section 8, "List of Preparers", identifies individuals involved in preparing this study.

STUDY SITES

This ESHA study evaluates the following five study sites (Figure 1):

- **Pescadero Canyon.** Pescadero Canyon consists of 10 acres of privately owned land (zoned R-1 [single-family residential]), divided into east and west segments, along the city's northern boundary.

- **Rio Park.** Rio Park includes 6.24 acres of undeveloped land that was recently acquired by the City and could be developed as a city park or parking lot or sold for development. This site is crossed by the Carmel River near its outflow to the Carmel Lagoon.

- **Mission Trails Park.** Mission Trails Park includes 36 acres that were acquired by the City in 1971 and zoned as a passive-use park (P-1 and P-2a) (except Flanders Mansion). This park is subdivided into four study units, identified by the City as Flanders Mansion/Arboretum, Park Proper, Martin Road Parcel, and Outlet Meadow.

- **Forest Hill Park.** Forest Hill Park consists of 2.4 acres zoned as an active-use park (P-2) and contains tennis courts and playground equipment.

- **Carmel Beach.** Carmel Beach includes 21.5 acres zoned as a passive-use park (P-1).

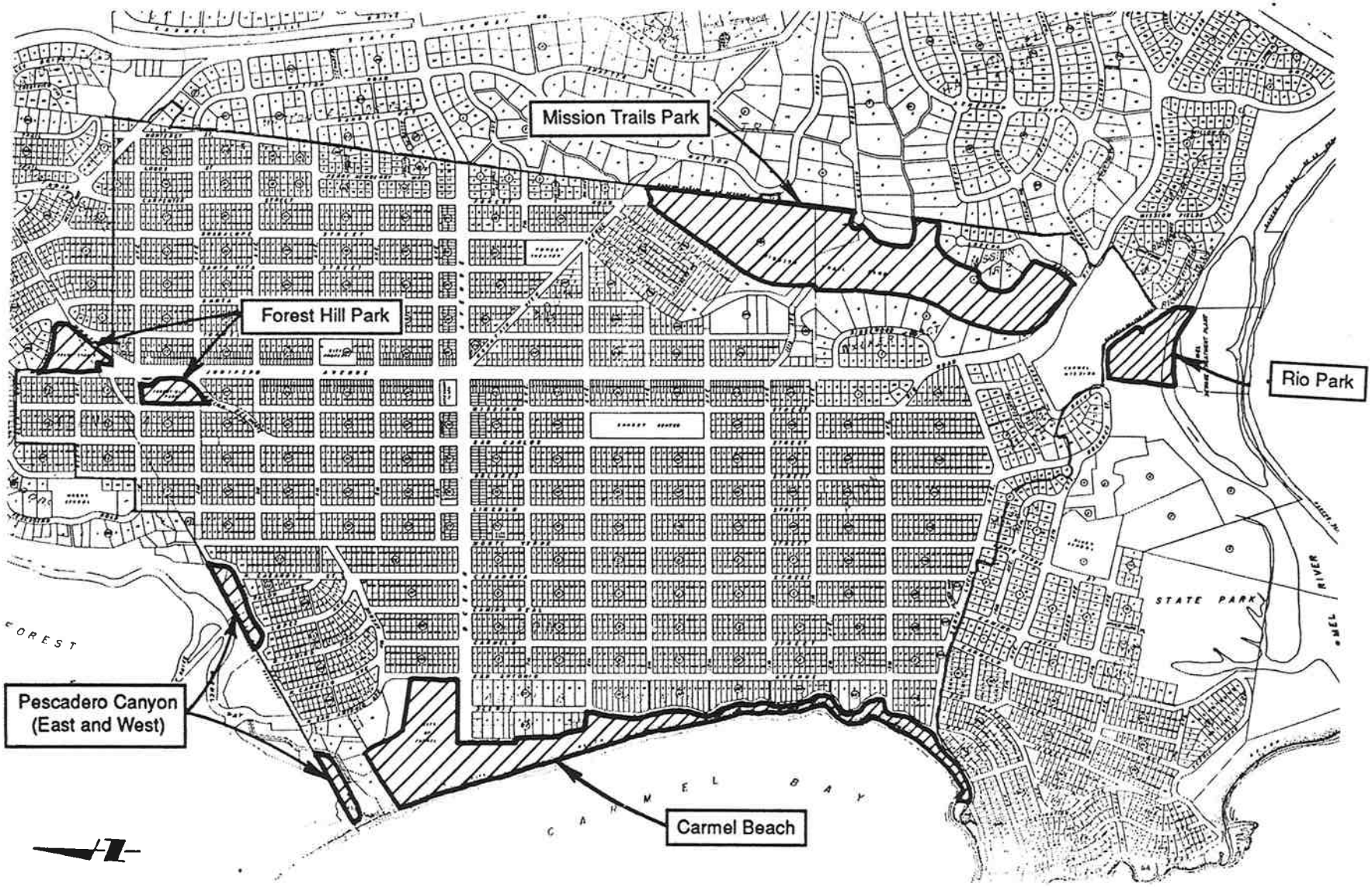
POLICIES GOVERNING ENVIRONMENTALLY SENSITIVE HABITAT AREAS

Several state and local policies provide guidance on appropriate activities and restrictions in designated ESHAs. Applicable policies are identified in the California Coastal Act (Public Resources Code, Sections 30240[a] and [b]); the City of Carmel-by-the-Sea Local Coastal Program Land Use Plan (1981); the City of Carmel-by-the-Sea General Plan (1990); and the Guide to the Management of Carmel's Forests, Parks and Beaches (Taylor and D'Ambrosio 1981). Each of these state and local policies that pertain to the ESHA study are discussed briefly below.

California Coastal Act

The California Coastal Act (Public Resources Code, Section 30107.5) defines ESHAs as:

> 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



Jones & Stokes Associates, Inc.

Figure 1.
Location of Environmentally Sensitive Habitat Area Study Sites, Carmel-by-the-Sea

of these sensitive habitats require further protection from disturbance, and this subset of sensitive habitats is called environmentally sensitive habitat areas.

The following sections from the California Coastal Act pertain to the preservation and enhancement of natural habitat areas in the coastal zone.

Section 30231

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Section 30240

(a) ESHA[s] shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas; and

(b) Development in areas adjacent to ESHAs and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade such areas, and shall be compatible with the continuance of such habitat areas.

Public Resources Code, Section 30240(a) states that only uses dependent on ESHA resources will be allowed in these areas. *Dependent uses* is applied and interpreted in different ways by the California Coastal Commission (Otter pers. comm.). Examples of activities that may be considered compatible with ESHAs include habitat restoration and enhancement (relating to indigenous plants), interpretive trails, and informative signs (Otter pers. comm.). Most resource management recommendations that are provided in this report were discussed with individuals at the California Coastal Commission and would most likely be considered consistent with Public Resources Code, Sections 30231 and 30240(a) and (b).

Applicable City Policies

The City has identified the following policies and resource management plans as part of its local coastal plan to protect environmentally sensitive habitats (City of Carmel-by-the-Sea Community Planning and Building Department 1981):

1. **Public Park Uses and Zoning.** Environmentally sensitive habitats that occur in city parks are zoned as P-1 and P-2. In passive-use parks (P-1), the focus is on maintaining the park in its natural state, allowing only maintenance activities or improvements that would enhance or enable better enjoyment of this natural state. In addition to including all uses permitted in parks zoned as P-1, recreational parks (P-2) allow facilities and structures that are devoted to public recreation.

2. **Structures on Carmel Beach.** It is unlawful to construct, erect, or place any building, structure, or improvement of any kind on, over, or under any part of Carmel beachlands, except those determined by the City Council to be essential for public health, safety or welfare.

3. **Developable Lots.** Development of a lot with a slope greater than 30 degrees requires a use permit. The City reviews each submittal for compliance. This requirement applies to the environmentally sensitive habitat at Second Avenue that is zoned R-1.

4. **The Guide to the Management of Carmel's Forests, Parks and Beaches.** The City adopted a policy of continuously inventory the supply, mix, and condition of all trees in the City to preserve the quality and nature of its urban forest (Taylor and D'Ambrosio 1981). This plan includes environmentally sensitive habitats within the City's jurisdiction.

The net effect of these policies is to:

- prohibit alteration of the natural land forms;
- preserve the existing plant and marine life;
- encourage passive recreation within the P-1;
- prohibit structures or intensive development in the P-1 zone;
- limit structures to recreation facilities in the P-2 zone;
- replace trees that must be removed on public and private property[1]; and

[1]Under municipal ordinances, the City regulates the cutting of trees on certain private property. This applies to trees on vacant lots and trees on lots with an existing building that are proposed for expansion during remodeling or rebuilding. City regulations state "it shall be unlawful to cut down or otherwise destroy, or authorize the cutting down or destruction of any living tree of an average diameter greater than two inches, or a circumference greater than six and one-fourth inches, measured at a point 4.5 feet above the ground level." As a condition of the tree removal permit, the Forestry Commission may require replacement trees of a specific species and size. Other measures that apply to the protection of trees not permitted for removal on private property, including Monterey pine, are outlined under municipal ordinances. Several measures are presented to avoid and minimize impacts on trees during construction activities.

- establish "mini-parks", greenbelts, improvements, and sprinkling systems to further enhance the urban forest of the City.

5. **Acquisition of Private Lots.** The City's general plan supports acquiring available lots along Pescadero Canyon.

In addition to the policies described above, the City has adopted the following policies to further protect environmentally sensitive habitats:

- The City should prohibit the conversion of any portion of the Flanders/Doolittle property in Mission Trails Park and maintain the property as a passive recreation area.

- The City requires that a use permit be obtained before developable lots fronting on public open space and on Pescadero Canyon may be developed. Use permit standards are to be developed to minimize grading and other alteration of natural landforms, minimize coverage, maximize the retention of important public views, and maximize setbacks.

The City will continue to coordinate with agencies having jurisdiction over the Pescadero Canyon wetlands, the Carmel River wetlands, and the Carmel Bay Ecological Reserve, as recommended in the City's General Plan.

Section 2. Criteria Used to Identify Environmentally Sensitive Habitat Areas

For the purpose of this study, it was necessary to determine whether certain habitats would be subject to the California Coastal Act, Sections 30231 and 30240. ESHA criteria were identified based on a review of the ESHA definition provided in the California Coastal Act, Section 30107.5; contacts with the California Coastal Commission (Loomis and Otter pers. comms.) and California Department of Fish and Game (DFG) (Hillyard pers. comm.); a review of selected local coastal programs completed for sites in Monterey and Santa Cruz Counties; a review of state and federal regulations and policies that protect sensitive biological resources; and a consideration of local and regional sensitivity or uniqueness of biological resources found in the city.

Based on the sources described above, sites are considered environmentally sensitive in this ESHA study if they support one or more of the following:

- special-status species and habitats important to those species,
- wetlands,
- riparian habitats,
- dune habitats,
- coastal terrace prairie, or
- Monterey pine forest on uncommon geomorphic surfaces and soils in the Monterey region.

Definitions of these resources are provided in the following sections.

SPECIAL-STATUS SPECIES AND HABITATS IMPORTANT TO THOSE SPECIES

For the purpose of this study, the category "special-status species" includes plants and wildlife identified as rare, endangered, or threatened under state or federal endangered species acts. Habitats that are locally or regionally important for these species are also included in this category. After further evaluation, additional locally rare or unique species that may be considered endemic, relict,

or disjunct species may be included in this category. Other species to be considered may include plants and wildlife that are candidates for federal listing (Candidate 1 and Candidate 2) and plants that are considered rare and endangered in California (List 1B) by the CNPS.

Although the native Monterey pine is considered rare and endangered by CNPS (List 1B) and a candidate for federal listing (C2), this report focuses primarily on Monterey pine as part of a forest ecosystem rather than as an isolated species. Monterey pine located on uncommon geomorphic surfaces and associated soils are considered sensitive for the purpose of the ESHA study.

WETLANDS

Wetlands are considered environmentally sensitive habitats because they are a valuable natural resource that provide habitat for a variety of dependent plant and wildlife species. By one estimate, agricultural and urban development has resulted in the loss of nearly 90% of California's wetlands (Dahl 1990).

Under the U.S. Army Corps of Engineers' (Corps') definition, wetlands are a type of waters of the United States that support hydrophytic vegetation, hydric soils, and wetland hydrology. Plant communities that lack one of these criteria are referred to as "other waters of the United States" (e.g., unvegetated drainages, lakes, and rivers). The Corps regulates the discharge of dredged or fill material into waters of the United States, including wetlands, under Section 404 of the Clean Water Act. Development projects that would result in the discharge of dredged or fill material into waters of the United States, including wetlands, require a Section 404 permit from the Corps. The federal government supports a policy of minimizing "the destruction, loss, or degradation of wetlands" (Executive Order 11990, May 24, 1977).

The California Coastal Commission defines *wetlands* as lands in the coastal zone that may be covered periodically or permanently with shallow water, including saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens (Public Resources Code, Section 30121).

RIPARIAN HABITATS

Riparian habitats are considered environmentally sensitive because they provide essential habitat for a variety of common and special-status wildlife in California and the Monterey region. Additionally, riparian habitats provide important ecological functions, such as streambank stabilization and flood control. DFG has a policy of "no net loss of riparian acreage or value" and regulates riparian habitats under Sections 1600-1607 of the California Fish and Game Code.

DUNE HABITATS

Vegetated and unvegetated dune habitats are considered environmentally sensitive because they are restricted in distribution compared to their historical extent along the California coast. In addition to habitat loss from agriculture and development activities, the introduction of non-native species (e.g., African ice plant and European beach grass) for dune stabilization has changed the ecological functions in natural dune systems and displaced native dune vegetation. Dune habitats in the Monterey Bay region also provide habitat for several special-status plant and wildlife species, including Tidestrom's lupine and black legless lizard, species found in the dune scrub habitat on Carmel Beach.

COASTAL TERRACE PRAIRIE

Similar to dune habitats, coastal terrace prairie is considered a sensitive natural community because substantial amounts of the habitat have been severely altered or lost as a result of agricultural and coastal development. Coastal terrace prairie community typically supports a diverse and unique assemblage of plant species, including some special-status species (e.g., Hickman's onion at Mission Trails Park).

MONTEREY PINE FOREST

Monterey pine forest is a habitat that has been the topic of many ecological studies and the focus of recent conservation efforts. Most recently, the primary issues surrounding Monterey pine forest are historical and potential future losses from development projects, lack of natural pine regeneration because of fire suppression activities, introduction and spread of diseases such as pitch canker, and genetic contamination from nursery stock.

A recent ecological study was commissioned by DFG and The Nature Conservancy to gain a better understanding of and acquire more information on:

- Monterey pine as a species,
- Monterey pine forest as a community,
- the extent and character of the contemporary Monterey pine forest,
- the extent and character of historical Monterey pine forest, and
- the nature and extent of alterations to the native Monterey pine forest (Jones & Stokes Associates 1994).

This ecological study presented new findings on the relationships between Monterey pine forest and geomorphic surfaces and associated soil types on the Monterey peninsula. Variations in Monterey pine forest on the different geomorphic surfaces were characterized and divided into ecological subtypes (Jones & Stokes Associates 1994). For a detailed discussion of these ecological subtypes, refer to the Monterey Ecological Staircase: The Nature of Different Geomorphic Surfaces of the Monterey Peninsula with an Emphasis on Monterey Pine (Jones & Stokes Associates 1994).

In summary, the ecological study determined the following:

- Monterey pine forest cannot be treated as a single entity but should be divided into ecological subtypes.
- Subtle but clear differences exist between Monterey pine forest subtypes on different geomorphic surfaces and soils.
- Historical losses of Monterey pine forest have not been distributed evenly across the various forest subtypes.
- Preserving representative stands of Monterey pine forest on each geomorphic surface would best achieve the goal of protecting the full range and diversity of Monterey pine forest.

For the purpose of this ESHA study, Monterey pine forest types on uncommon geomorphic surfaces and soils (that have not been substantially altered and have potential for restoration) in the Monterey region are considered environmentally sensitive. Monterey pine forests on the following geomorphic surfaces and soils are considered environmentally sensitive habitats because large amounts of these forest subtypes have been removed and little natural forest remains on these substrates: marine terraces 2, 3, 4, 5, and 6; middle-aged dunes; and oldest dunes (Jones & Stokes Associates 1994). Table 1 provides an estimate of remaining acres of undeveloped Monterey pine forest on each geomorphic surface. Also provided in this table is the percentage of Monterey pine forest on each geomorphic surface remaining compared to historical extent.

By one estimation, only 51% (approximately 9,405 acres) of the historical extent of undeveloped Monterey pine forest remains on the Monterey Peninsula (Jones & Stokes Associates 1994). Approximately 20 acres of indigenous Monterey pine forest occur on private and public lands in the city, which is less than 1% of the remaining undisturbed Monterey pine forest on the Monterey Peninsula.

The conservation and preservation of Monterey pine forest will undoubtedly be an evolving issue over the next few years. For this reason, the status of Monterey pine forest as an environmentally sensitive habitat will need to be reevaluated as new ecological information becomes available.

Table 1. Estimate of Extent of Monterey Pine Forest in Undeveloped Areas by Geomorphic Surface

Geomorphic Surface	Areas (acres)[a]	Percentage of Historical Extent
Marine terrace 1	43	--
Marine terrace 2	170	16
Marine terrace 3	161	12
Marine terrace 4	318[b]	20
Marine terrace 5	457	37
Marine terrace 6	82	31
Undetermined marine terraces	219	52
Youngest dunes	15	--
Middle-aged dunes	123	15
Oldest dunes	229	20
Inland shale	4,722	79
Inland granite	1,194	49
Other surfaces	1,430	92
Undetermined surfaces	242	43
Total extent of undeveloped forest	9,405	51

[a] Estimates based on the overlap between areas mapped by Jones & Stokes Associates as undeveloped Monterey pine forest (forest with natural understory) and geomorphic surfaces as mapped by Dupre (1990).

[b] Of this total, 80 acres are on granite-derived terraces and 238 on shale-derived terraces.

Section 3. Study Methods

GOALS AND OBJECTIVES

The City is conducting this ESHA study to:

- evaluate the resource values of each site relative to the ESHA criteria (identified in Section 2) and identify potential ESHA boundaries,
- assess whether biological resources can be sustained without management, and
- identify resource management requirements or mitigation measures needed for resource protection or enhancement.

To accomplish these goals, the following field survey objectives were identified:

- map habitats (vegetation types), landforms, and soil types for each site;
- conduct special-status plant surveys at each of the five sites during spring 1995;
- conduct special-status wildlife surveys at Pescadero Canyon East and West, Mission Trails Park, and wildlife habitat assessments at Forest Hill Park and Carmel Beach;
- evaluate current use, resource management practices, and resource management problems (e.g., erosion, introduction of invasive horticultural plant species, and habitat degradation) for each site;
- evaluate the potential to widen the zone of riparian vegetation along the Carmel River at Rio Park;
- evaluate the Martin Road parcel (Unit 1) and the Flanders Mansion/Arboretum parcel (Unit 2) at Mission Trails Park to determine whether they are appropriately designated as ESHAs;
- identify opportunities for mitigating impacts from single-family home development adjacent to Mission Trails Park;

- perform a visual survey to evaluate the effects of current use on Carmel Beach, and recommend further studies if the visual survey identified special resource issues or special-status species; and

- determine whether any invasive horticultural plant species are present in the dunes area north of Ocean Avenue.

STUDY METHODS

Study methods included a prefield survey investigation to review existing information, followed by field surveys.

Prefield Survey Investigation

Jones & Stokes Associates reviewed existing information to identify potential resource issues and develop a field strategy. The following sources of information were reviewed during the prefield survey investigation:

- Soil Survey of Monterey County (Cook 1978),

- geologic mapping of the study area (Dupre 1990),

- infrared aerial photographs (scale of 1 inch = 1,000 feet),

- DFG's Natural Diversity Data Base 1994 and 1995,

- existing and available local coastal program land use plans for Santa Cruz and Monterey Counties,

- existing and available biological studies and resource evaluations conducted for the study sites (Bainbridge, Behrens, Moore 1974; Cowan 1991; The Habitat Restoration Group 1990; Yadon 1994; Bury 1985; and Roseth pers. comm.),

- City documents and maps, and

- Jones & Stokes Associates in-house file data.

Before field surveys were conducted, preliminary habitat and soils maps were completed for each site (excluding Carmel Beach).

Field Surveys

A Jones & Stokes Associates plant ecologist and soil scientist conducted field surveys on November 29 and 30 and December 1, 1994, to gather baseline vegetation and soils information on each of the study sites. Special-status plant surveys were conducted on April 24 and May 4-6, 1995. Special-status wildlife surveys and habitat assessments were conducted on May 11 and 19, 1995. Field methods used to gather information on vegetation, soils, and special-status species are described below.

Vegetation

During the November and December 1994 field surveys, each of the study sites was walked to identify dominant plant species, map and characterize habitat types, and identify resource management issues. The preliminary habitat maps prepared during the prefield survey investigation were refined further in the field and transferred onto base maps provided by the City.

Soils

Geologic formations were identified based on a 1990 geologic study of the Monterey area by William R. Dupre (1990). Field verification of geologic formations resulted in minor changes to mapping by Dupre. The geologic formation mapping was used to develop the Monterey pine forest soil-vegetation associations that correlate with specific geomorphic surfaces. The specific geomorphic surfaces were detailed in an earlier report, The Monterey Ecological Staircase (Jones & Stokes Associates 1994), which is the basis for the geologic and soil classification and associated Monterey pine forest types used in this report.

Site-specific soil type identification was performed by using a shovel and auger or by cut bank or other exposed soil profiles where available. Soil morphologic description followed National Cooperative Soil Survey methods as detailed in the Soil Survey Manual. Soil series were identified by comparing observed soil profiles with standard profile descriptions contained in the Soil Survey of Monterey County (Cook 1978). Because of the greater level of detail of this study, some areas varied from the existing soil maps.

Areas were surveyed for soil erosion or other apparent declines in soil quality that would affect site stability or productivity for future vegetation management and survival. Problem areas were noted. Recommendations for corrective measures are discussed in Section 5, "Study Results and Resource Management Recommendations".

Special-Status Species

Special-Status Plant Survey. Special-status plant surveys involved identifying species that could occur on the five study sites, followed by site-specific field surveys.

During a prefield investigation, a list of special-status plants that could occur on the study sites was compiled. Sources reviewed to develop this target list of species included DFG's NDDB (1994 and 1995), CNPS's Inventory of Rare and Endangered Vascular Plants of California (Skinner and Pavlik 1994), and existing and available environmental studies conducted in the Monterey Bay region. Based on species habitat requirements and distribution information, 43 special-status plants were identified during the prefield survey investigation as potentially occurring in the Monterey Bay region (Table 2).

Botanical surveys for early blooming species listed in Table 2 were conducted during April and May 1995. Each of the study sites was walked and a list of plants encountered during the survey was compiled. All plants encountered were identified to the level necessary to determine if they were special-status species. Lists of plants identified during the field surveys on each of the sites is on file at Jones & Stokes Associates.

Each of the sites was also evaluated for its potential to support later-blooming special-status plants. Special-status plants that would not have been identifiable during the April and early May field surveys include one-awned spineflower, robust spineflower, seaside bird's beak, beach layia, curly-leaved monardella, and Gairdner's yampah (Table 2). A habitat assessment was conducted for these species on each of the study sites.

Special-Status Wildlife Survey. Special-status wildlife surveys involved identifying species that could potentially occur at the five study sites, followed by site-specific field surveys.

During a prefield investigation, a list of special-status wildlife species that could occur on the study sites was developed. Sources reviewed to compile this list of target species included DFG's NDDB (1994 and 1995) and available environmental studies conducted in the Monterey Bay region. Based on species habitat requirements and distribution information, 20 special-status wildlife species and four species of special interest were identified during the prefield investigation as potentially occurring on the study sites. After field surveys were completed, several species were removed from the list because no suitable habitat was observed at the study areas. Table 3 identifies special-status wildlife species remaining on this revised list.

Wildlife surveys were conducted at Pescadero Canyon, Carmel Beach, and Mission Trail Park on May 11, 1995, and at Forest Hill Park on May 18, 1995. No wildlife field surveys were conducted at Rio Park.

Each study site was surveyed on foot, and all wildlife species observed or evidence of occurrence of a particular species (e.g., tracks, scat, nests) was recorded. Downed wood, rocks, and other suitable items were lifted to search for special-status reptiles and amphibians. Factors affecting

Table 2. Special-Status Plant Species Identified as Having the Potential to Occur at the Five ESHA Study Sites, Carmel-by-the Sea

Scientific and Common Name	Listing Status* Federal/State/CNPS	Habitat	Period Identifiable	Distribution	Occurrence in the ESHA Study Sites
Allium hickmanii Hickman's onion	C1/--/1B	Closed-cone conifer forest, chaparral, and grasslands	April	Monterey Peninsula and near Jolon, Monterey County	One population located on coastal terrace prairie at Mission Trails Park
Arctostaphylos montereyensis Toro manzanita	C2/--/1B	Chaparral, oak woodland, and coastal scrub	Year round	Monterey and San Luis Obispo Counties	
Arctostaphylos pajaroensis Pajaro manzanita	C2/--/1B	Sandy hills in chaparral	Year round	Monterey County	
Arctostaphylos hooveri Hoover's manzanita	--/--/4	Chaparral	Year round	Monterey and San Luis Obispo Counties	
Arctostaphylos edmunsii var. *edmundsii* Little Sur manzanita	C2/--/1B	Coastal bluff scrub and chaparral	Year round	Monterey County	
Arctostaphylos pumila (*A. uva-ursi* var. *pumila*) Sandmat manzanita	C2/--/1B	Closed-cone conifer forest, coastal scrub, and coastal dunes	Year round	About Monterey Bay	
Arctostaphylos edmundsii var. *parvifolia* Hanging gardens manzanita	C2/--/1B	Chaparral	Year round	Monterey County	
Arctostaphylos hookeri ssp. *hookeri* Hooker's manzanita	--/--/1B	Chaparral, closed-cone coniferous forest, and coastal scrub	Year round	Near the coast in Monterey and Santa Cruz Counties	Individual shrubs located at Forest Hill Park and Mission Trails Park
Astragalus tener var. *titi* Coastal dunes milk vetch	C1/E/1B	Coastal dunes	May-May	Monterey Bay and San Diego Bay	
Calystegia collina ssp. *venusta* South Coast Range morning-glory	C2/--/4	Unknown	May-Jun	Monterey to Fresno Counties and in Santa Barbara County	
Ceanothus cuneatus var. *rigidus* Monterey ceanothus	C2/--/4	Widespread in maritime chaparral; closed-cone conifer forest on sandy hills and flats	Year round	Monterey Peninsula	
Centrostegia insignis Indian Valley spineflower	--/--/4	Cismontane woodland	Feb-Sept	Monterey and Santa Cruz Counties	
Chorizanthe douglasii Douglas' spineflower	--/--/4	Cismontane woodland and lower coniferous forest on sandy or gravelly slopes	Apr-Jun	San Benito and Monterey Counties to San Luis Obispo County below 500 feet	

Table 2. Continued

Scientific and Common Name	Listing Status* Federal/State/CNPS	Habitat	Period Identifiable	Distribution	Occurrence in the ESHA Study Sites
Chorizanthe rectispina One-awned spineflower	C2/--/1B	Chaparral, oak woodland, and grassland	Jun-Aug	Coast Ranges of Monterey and San Luis Obispo Counties	
Chorizanthe robusta var. *robusta* Robust spineflower	PE/--/1B	Coastal dunes and scrub on dry, sandy places below 1,000 feet	May-Sept	Coastal Santa Cruz and Monterey Counties	
Chorizanthe pungens var. *pungens* Monterey spineflower	PE/--/1B	Chaparral, oak woodland, and grassland	Apr-Jun	Monterey Peninsula and coastal north Monterey County	
Clarkia lewisii Lewis' clarkia	--/--4	Coastal scrub	May	Monterey County	
Collinsia franciscana San Francisco collinsia	--/--/4	Dry, stony and grassy slopes in coastal scrub and closed-cone coniferous forest	Apr-May	San Francisco County to San Mateo County	
Cordylanthus rigidus var. *littoralis* Seaside bird's-beak	C1/E/1B	Coastal scrub, closed-cone conifer frst, oak woodland, and chaparral on dry, sandy soils below 3,000 feet	Aug-Sept	Coast Ranges of Monterey and Santa Barbara Counties	
Cryptantha rattanii Rattan's cryptantha	--/--/4	Grassland and cismontane woodland	Mar-Jun	Watershed of Salinas and Carmel Rivers, Monterey and west Merced Counties	
Delphinium hutchinsoniae Hutchinson's larkspur	C2/--/1B	Coastal scrub, coastal prairie, and mixed evergreen forest	Unknown	Monterey County	
Delphinium umbraculorum Umbrella larkspur	--/--/4	Cismontane woodland; usually shaded places	Year round	Monterey and San Luis Obispo Counties	
Eriastrum virgatum Virgate eriastrum	--/--/4	Coastal dunes	April-June	Monterey, San Benito, Ventura, and Los Angeles Counties	
Ericameria fasiculata Eastwood's ericameria	C2/--/1B	Closed-cone conifer forest, chaparral, and coastal scrub	Year round	Monterey and Carmel Bays	
Eriogonum butterworthianum Butterworth's buckwheat	C2/R/1B	Chaparral	Unknown	Monterey County	
Erysimum menziesii Menzies' wallfower	E/E/1B	Coastal dunes	Mar-Jun	Monterey County and from Fort Braff to north of Humboldt Bay	
Erysimum ammophilum Coast wallflower	C2/--/1B	Coastal dunes	Feb-May	Coastal areas of Montery and Santa Cruz County, and Santa Rosa Island	
Fritillaria liliacea Fragrant fritillary	C2/--/1B	Coastal scrub and grassland; often on ultramafic soils	Feb-Apr	Sonoma County to Monterey County	

Table 2. Continued

Scientific and Common Name	Listing Status* Federal/State/CNPS	Habitat	Period Identifiable	Distribution	Occurrence in the ESHA Study Sites
Gilia tenuiflora ssp. *arenaria* Sand gilia	E/T/1B	Coastal dunes and scrub	Apr-May	About Monterey Bay	
Horkelia cuneata ssp. *sericea* Kellogg's horkelia	C2/--/1B	Sandy and gravelly places in coastal scrub and closed-cone coniferous forest	Apr-Sept	Along the coast from Sonoma County to Santa Barbara County	
Layia carnosa Beach layia	E/E/1B	Widely scattered stations on coastal sand dunes	May-Jun	Humboldt County to San Francisco County and historically to Point Concepcion	
Layia jonesii Jones' layia	C2/--/1B	Chaparral and grassland	Mar-May	Monterey and San Luis Obispo Counties	
Lomatium parvifolium Small-leaved lomatium	--/--/4	Closed-cone conifer forest	Mar-Jun	Monterey, Santa Cruz, and San Luis Obispo Counties	
Lupinus tidestromii var. *tidestromii* Tidestrom's lupine	E/E/1B	Coastal dunes	May-Jun	Monterey Peninsula	One population at Carmel Beach
Malacothrix saxatilis var. *arachnoidea* Carmel Valley cliff-aster	C2/--/1B	Rocky open banks of chaparral and mixed evergreen forest	May-Sept	Monterey and Santa Barbara Counties	
Monardella undulata var. *undulata* Curly-leaved monardella	--/--/4	Chaparral and coastal dunes and scrub below 500 feet	May-Aug	Near the coast from Marin County to Santa Barbara County	
Perideridia pringlei Adobe yampah	C3c/--/4	Canyons and open slopes of chaparral, coastal scrub, and cismontane	Apr-Jun	North Los Angeles County to Monterey County	
Perideridia gairdneri ssp. *gairdneri* Gairdner's yampah	C2/--/4	Chaparral and broadleafed upland forest, typically on wet, heavy soils	Jun-Jul	San Diego County north to Sonoma County	
Piperia yadonii Yadon's piperia	C1/--/1B	Chaparral and coastal scrub	May-Sept	Coastal Montery County	
Plagiobothrys uncinatus Hooked popcornflower	C2/--/1B	Chaparral and possibly grassland and cismontane woodland	Apr-May	Monterey and San Benito Counties	
Potentilla hickmanii Hickman's cinquefoil	C1/E/1B	Scrub, closed-cond coniferous forest and vernally mesic sites	April-August	Known from only two occurrences on the Monterey Peninsula	
Sidalcea hickmanii spp. *hickmanii* Hickman's checkerbloom	C3c/--/1B	Hillsides in chaparral	May-June	Monterey County	
Trifolium polydon Pacific Grove clover	C1/R/1B	Closed-cone coniferous forst, coastal prairie, meadow	May-June	Known only from three occurrences on the Monterey Peninsula	

* Status definitions:

-- = no listing available.

Federal

E = listed as endangered under the federal Endangered Species Act.

PE = proposed for federal listing as endangered under the federal Endangered Species Act.

C1 = Category 1 candidate for federal listing. Category 1 includes species for which USFWS has on file enough substantial information on biological vulnerability and threat to support proposals to list them.

C2 = Category 2 candidate for federal listing.Category 2 includes species for which USFWS has some biological information indicating that listing may be appropriate but for which further biological research and field study are usually needed to clarify the most appropriate status.Category 2 species are not necessarily less rare, threatened, or endangered than Category 1 species or listed species; the distinction relates to the amount of data available and is therefore administrative, not biological.

C3 = no longer a candidate for federal listing.Category 3 species have been dropped from the candidate list because they are extinct (C3a), taxonomically invalid or do not meet the USFWS definition of a "species" (C3b), or too widespread or not threatened at this time (C3c).

State

E = listed as endangered under the California Endangered Species Act.
R = listed as rare under the California Endangered Species Act. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.
T = listed as threatened under the California Endangered Species Act.

California Native Plant Society

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.
4 = List 4 species: plants of limited distribution that may be considered rare under CEQA.

the suitability of each site for various wildlife species were also recorded, and a field assessment was made of the overall habitat suitability for special-status species in Table 3.

Table 3. Special-Status Wildlife Species Identified as Having the Potential to Occur on the Five ESHA Study Sites, City of Carmel-by-the Sea

Common and Scientific Name	Legal Status[a] State/Federal	Habitat	Distribution in California	Known or Potential Occurrence on the Five ESHA Study Sites
Monterey ornate shrew *Sorex ornatus salarius*	--/C2	Found in a variety of riparian, woodland, and upland communities where there is thick duff or downed logs	Restricted to the Monterey Bay region; historical occurrences at the mouth of the Salinas River and Moss Landing in Monterey County	Low potential for occurrence at all sites except for City of Carmel Beach
Monterey dusky-footed woodrat *Neotoma fuscipes luciana*	--/C2	Uses habitats with moderate to dense cover and abundant dead wood for nest construction; maritime chaparral and coastal live oak woodland at Fort Ord	Restricted to Monterey County and northern San Luis Obispo County	Observed nests in the Monterey pine forest at Mission Trails Park; high potential for occurrence; no potential for occurrence at Carmel Beach; very low potential for occurrence at remaining three sites
American badger *Taxidae taxus*	SSC/--	Uses open, grassy areas with scattered shrubs or trees for cover and loose soil for digging	Found throughout California except in parts of Del Norte, Humboldt, and Siskiyou Counties; widespread throughout the United States west of the Mississippi River	Not expected to occur at any site
Sharp-shinned hawk *Accipiter striatus*	SSC/--	Found in riparian forests, conifer forests, and oak woodlands	Permanent resident in the Sierra Nevada, Cascade, Klamath, and north Coast Ranges, as well as along the coast in Marin, San Francisco, San Mateo, Santa Cruz, and Monterey Counties; winters over the rest of the state except at high elevations; breeds and winters throughout North America	Low to moderate potential for foraging at Mission Trails Park, Pescadero Canyon East, and Forest Hill Park; very low potential for nesting at these sites
Cooper's hawk *Accipiter cooperi*	SSC/--	Nests in riparian forests and dense canopy oak woodlands; forages in open woodlands	Found in all parts of California except high altitudes in the Sierra Nevada; winters in the Central Valley, southeastern desert regions, and the plains east of the Cascade Range; permanent resident throughout the lower 48 states	Low to moderate potential for foraging at Mission Trails Park, Pescadero Canyon East, and Forest Hill Park; very low potential for nesting at these sites

Table 3. Continued

Peregrine falcon *Falco peregrinus anatum*	SE/FE	Nests and roosts on protected ledges on high cliffs, usually adjacent to water sources that support large bird populations	Permanent resident on the north and south Coast Ranges; winters in the Central Valley south through the Transverse and Peninsular Ranges and the plains east of the Cascade Range; occurs along both coasts of the United States and parts of Alaska, Arizona, Colorado, and the borders of Idaho	Has been recorded using riparian forest along Carmel River in the vicinity of Rio Park (The Habitat Restoration Group 1990); very low possibility of all sites being used for foraging; no nesting habitat is available
Western snowy plover *Charadrius alexandrinus nivosus*	SSC/FPT	Found along beaches above the high tide limit; also uses shores of salt ponds and alkali or brackish inland lakes	Intermittent nesting sites along the Pacific Coast from Washington to Baja California	Not expected to nest at Carmel Beach because of frequent disturbance by humans and dogs
Coast horned lizard *Phrynosoma coronatum*	SSC/--	Occurs in areas with sandy soils and moderate cover	Uses Central Valley from Tehama County south to Tulare County and Coast Ranges from Sonoma County south to San Diego County	Low potential to occur at Mission Trails Park and Carmel Beach
Yellow warbler *Dendroica petechia*	SSC/--	Nests in riparian areas dominated by willows, cottonwoods, sycamores, or alders; may also use oaks, conifers, and urban areas if they are near streamcourses	Nests throughout California except the Central Valley, the Mojave Desert region, and high altitudes in the Sierra Nevada; winters along the Colorado River and in parts of Imperial and Riverside Counties; also has small permanent populations in San Diego and Santa Barbara Counties; occurs throughout North America except in the southeast states	Potential habitat identified in the riparian forests at Mission Trails Park and Rio Park; not expected to occur at any other site
California tiger salamander *Ambystoma tigrinum californiense*	SSC/C2 (LP)	Favors open woodlands and grasslands; requires water for breeding and burrows or cracks in the soil for summer dormancy	Occurs only in California from the coastline to the Sierra Nevada crest and from Sonoma County to Santa Barbara County	Very low potential to occur at Mission Trails Park; no potential breeding habitat available at any other sites
California black legless lizard *Anniella pulchra nigra* Silvery legless lizard *Anniella pulchra pulchra*	SSC/C2	Requires moist, warm habitats with loose soil for burrowing and prostrate plant cover; may be found on beaches, in chaparral, pine oak woodland, or riparian areas	Restricted to small populations along the coast in Monterey and northern San Luis Obispo Counties; one population in Contra Costa County	High potential to occur at Carmel Beach; has been observed in coastal scrub (Bury 1985); not expected to occur at any other sites

Table 3. Continued

Salinas harvest mouse *Reithrodontomys megalotis distichlis*	None (special-interest species)	Inhabits freshwater and saltwater marshes, annual grasslands, scrub, and oak woodlands	Known to occur near the mouth of the Salinas River	Potential habitat available at all sites except Carmel Beach
Swainson thrush *Catharus ustulatus*	None (special-interest species)	Riparian habitats and dense shrubs	In California nests in the Cascade, Klamath, north and south Coast, and Transverse Ranges, also the eastern Sierra Nevada	Potential habitat identified in the riparian forests at Mission Trails Park and Rio Park; not expected to occur on the other study sites, based on lack of suitable habitat
Common Yellowthroat *Geothlypis trichas*	None (special-interest species)	Riparian habitats and marshlands	Nests throughout California except in the Sierra Nevada and the southeastern deserts; widespread across North America	Potential habitat identified in the riparian forests at Mission Trails Park and Rio Park; not expected to occur on other study sites, based on lack of suitable habitat

[1] Status definitions:

-- = No designation.

FE = listed as endangered under the federal Endangered Species Act.

FPT = federally proposed for listing as threatened.

LP = listing package being reviewed by U.S. Fish and Wildlife Service.

C2 = Category 2 candidate for federal listing. Category 2 includes species for which USFWS has some biological information indicating that listing may be appropriate but for which further biological research and field study are usually needed to clarify the most appropriate status. Category 2 species are not necessarily less rare, threatened, or endangered than Category 1 species or listed species; the distinction relates to the amount of data available and is therefore administrative, not biological.

SE = listed as endangered under the California Endangered Species Act.

SSC = California Department of Fish and Game species of special concern.

Section 4. Regional and Local Setting

The City of Carmel-by-the-Sea is located in a region of California's central coast that is known for its floristic diversity and unique assemblage of plant communities. The region surrounding the city supports a wide range of climatic, topographic, and soils conditions, resulting in a high diversity of plant communities in a limited area. This diversity provides microhabitats for a wide range of endemic plants and wildlife. As an example of this diversity, 146 plant species reach their most southern and 156 plant species reach their most northern distributional limits in Monterey County, and at least 34 plant taxa are endemic to Monterey County (Howitt and Howell 1964).

Residential development occurs on almost all land in the city, except for eight parks (including the proposed Rio Park), several miniparks, and some privately owned segments of Pescadero Canyon in the City. Approximately 68 acres of public open space and approximately 10 acres of privately owned undeveloped land are under the City's jurisdiction. Most of the parks in the city are developed and provide passive and active recreation activities (City of Carmel-by-the-Sea Community Planning and Building Department 1990). Of the City's public lands, Carmel Beach, Missions Trails Park, and the proposed Rio Park support the most intact and the highest quality natural resources. Forest Hill Park also supports natural habitat but has been substantially altered from historical land-disturbing activities and continues to be maintained for public recreational uses. The privately owned section of Pescadero Canyon is a part of a larger watershed for Pescadero Creek that supports Monterey pine forest.

The landform of the Monterey Peninsula is an ascending series or staircase of six marine terraces of increasing geologic age, rising from the seashore to the inland (Jones & Stokes Associates 1994). The marine terraces reflect the changes in sea level and the general uplift of underlying bedrock in this section of the central coast in roughly the last half-million years or more. The city is built on the first five of the six marine terraces. The marine sediment of the first four terraces is covered by the sand dunes, which themselves are of increasing age with ascending elevation and distance from the ocean. The greater degree of soil development in the older dunes, such as organic matter accumulation, and clay and iron weathering and translocation to the subsoil, reflect the age of the dunes.

Drainages have cut through the dunes and marine terraces of Pescadero Canyon and Mission Trails Park to expose the underlying bedrock. Shale of marine deposition is exposed in Pescadero Creek Canyon, and granitic bedrock is exposed in the lower slopes and stream channel in Mission Trails Park.

Uplifted alluvial terraces formed by the Carmel River are found along the southern boundary of the city. The Carmel Mission is located on an alluvial terrace, just north of the Rio Park site.

Other older alluvial terraces are found on the elevated flats on the upper slopes of Mission Trails Park and outside the park boundaries.

Section 5. Study Results and Resource Management Recommendations

This section discusses the results of the ESHA study and recommends measures to manage sensitive resources at each of the study sites. Vegetation, soils, and special-status species are discussed for each study site.

PESCADERO CANYON

Overview

Pescadero Canyon, located along the northern boundary of the city, supports two undeveloped segments referred to in this study as Pescadero Canyon East and Pescadero Canyon West. These two segments are part of the larger Pescadero Canyon that extends eastward beyond the City's jurisdiction. Pescadero Canyon in general supports Monterey pine forest along its slopes and riparian and wetland habitat at the bottom of the canyon, along Pescadero Creek. Pescadero Canyon is privately owned and supports some residential development.

The Pescadero Creek watershed begins on marine terrace 6 at the top of Huckleberry Hill and extends down through a succession of geomorphic surfaces to the Pacific Ocean shoreline. The succession of marine terraces and dune-covered terraces can be observed along the steep canyon created by Pescadero Creek. Exposed in the canyon bottom and adjacent side slopes are the soils and shale bedrock of the Monterey formation.

Under natural conditions, a high rainfall runoff rate and consequent high runoff influx into Pescadero Creek would be expected on the Narlon soils of the marine terraces. The natural runoff rate and streamflows in Pescadero Creek have increased with development in the Pescadero Creek watershed.

Existing Studies and Resource Evaluations

During preparation of the Draft Results of the Environmentally Sensitive Habitat Area Study conducted for the City of Carmel-by-the-Sea, Jones & Stokes Associates reviewed a Botanical/Biological Report prepared by Bruce Cowan (1991), Environmental Landscape Consultant,

for a proposed single-family residential development on Pescadero Canyon. Since this time, a biological report prepared for a site on the north side of the Pescadero Canyon in Pebble Beach (Yadon 1994) and a visual evaluation of conditions in Pescadero Canyon (Roseth and Kelley 1993) were received and reviewed by Jones & Stokes Associates. These reports and memorandum are not discussed in detail in this report.

PESCADERO CANYON EAST

Vegetation and soils types mapped at Pescadero Canyon East are presented in Figures 2 and 3.

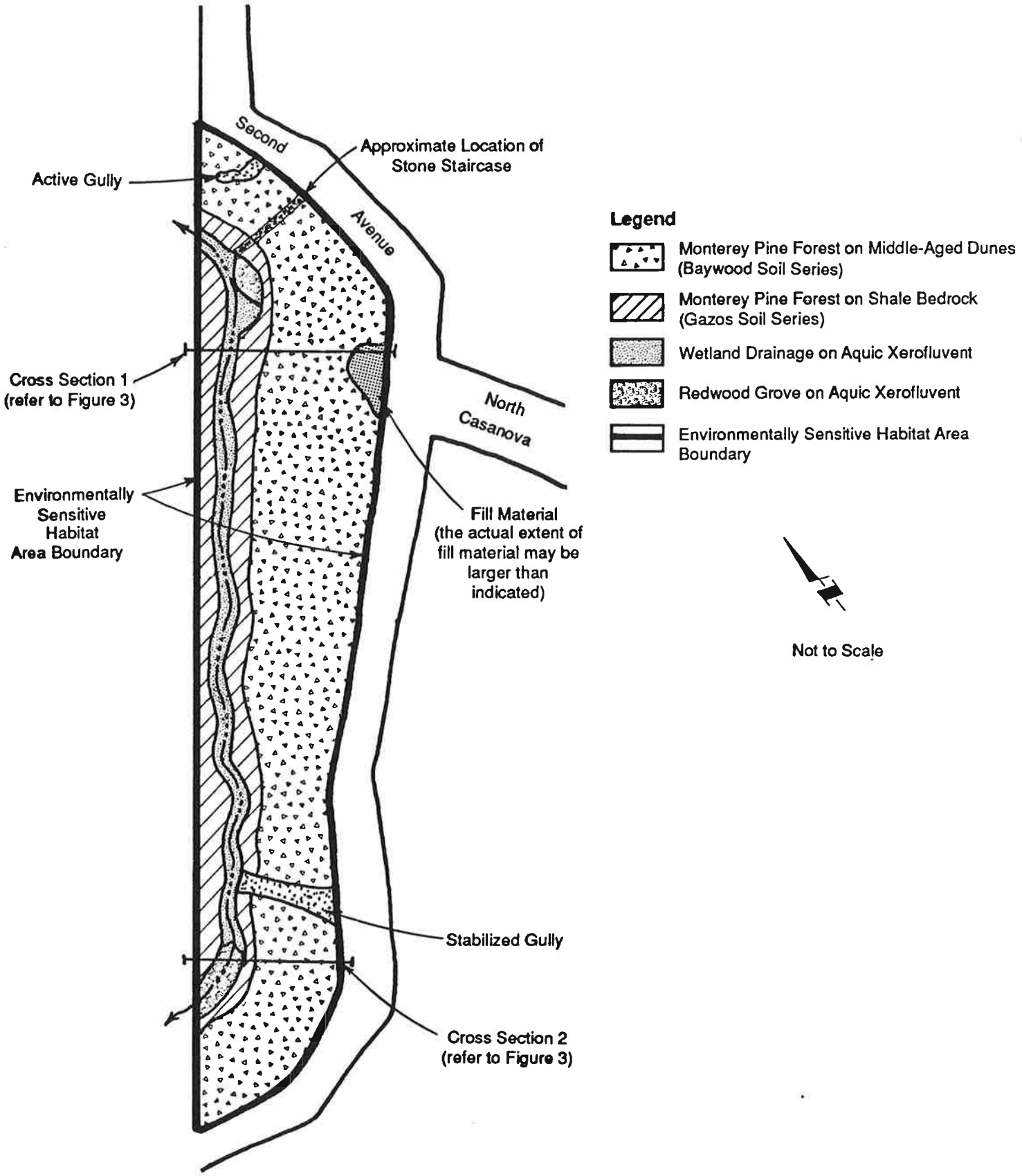
Vegetation

Pescadero Canyon East supports Monterey pine forest along the steep slopes of the canyon and wetland drainage (Pescadero Creek with wetland species along the banks) and two small redwood groves at bottom of the canyon (Figure 2).

Monterey Pine Forest

There are two Monterey pine forest subtypes in Pescadero Canyon East: Monterey pine forest on middle-aged dunes (an uncommon forest subtype, refer to Table 1) and Monterey pine forest on shale bedrock (a common forest subtype) (geomorphic surfaces are described below under "Geology and Soils"). Monterey pine forest on middle-aged dunes is the dominant subtype, occurring along the upper north-facing slope of Pescadero Canyon, along Second Avenue. Monterey pine forest on shale bedrock forms a narrow band on both sides of Pescadero Creek (Figure 2).

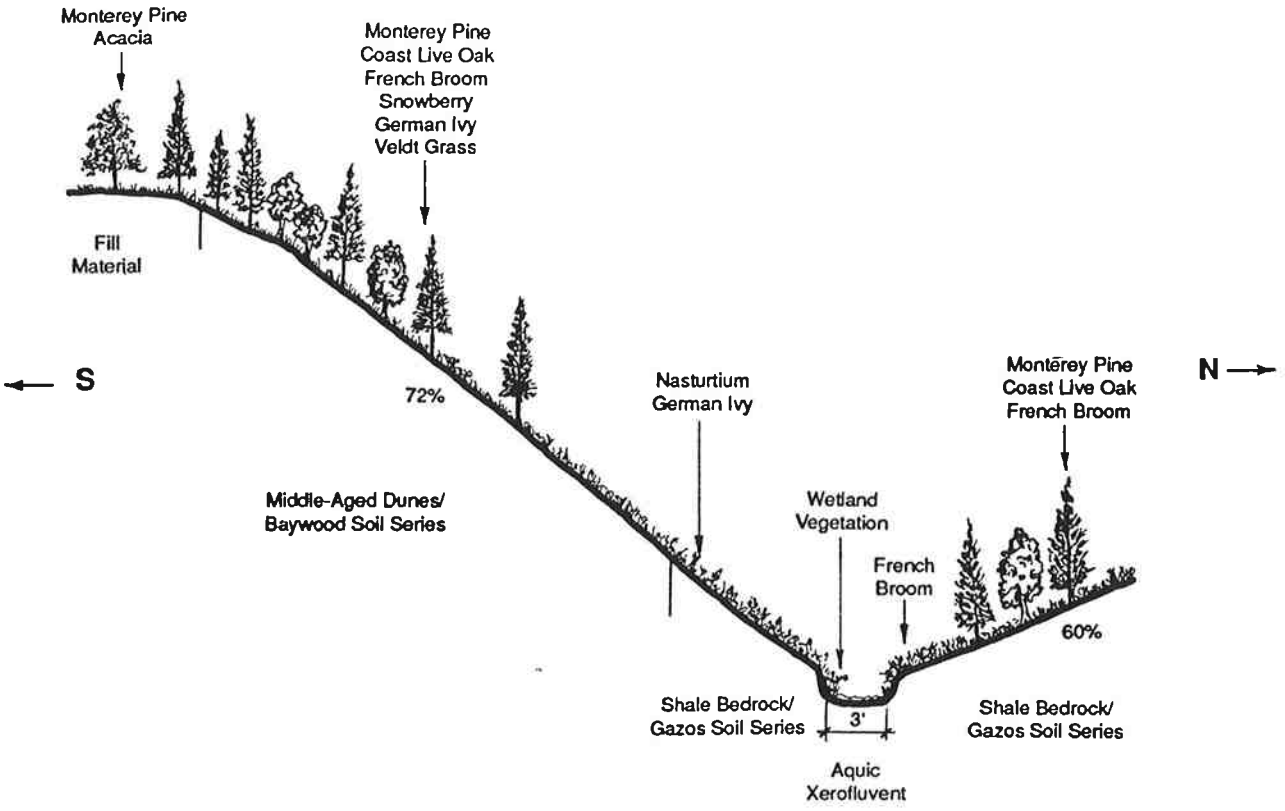
At Pescadero Canyon East, planted and native Monterey pines (*Pinus radiata*) and coast live oak (*Quercus agrifolia*) form a generally open forest canopy along the steep canyon slopes (the slopes vary from 40% to 72%). The dense forest understory is dominated by invasive horticultural species with occasional native shrub and herbaceous species. Dominant non-native horticultural species include acacia (*Acacia longifolia*) (along Second Avenue), French broom (*Genista monspessulana*), pampas grass (*Cortaderia jubata*), nasturtium (*Tropaeolum majus*), English ivy (*Hedera helix*), German ivy (*Senecio mikanoides*), periwinkle (*Vinca major*), and veldt grass (*Erharta erecta*). Native shrub and herbaceous species that occur sporadically in the Monterey pine forest include California blackberry (*Rubus ursinus*), flowering current (*Ribes sanguineum*), coffeeberry (*Rhamnus californica*), sticky monkeyflower (*Mimulus auranticus*), snowberry (*Symphoricarpus mollis*), bracken fern (*Pteridium aquilinum* var. *pubescens*), and California hedge nettle (*Stachys bullata*).



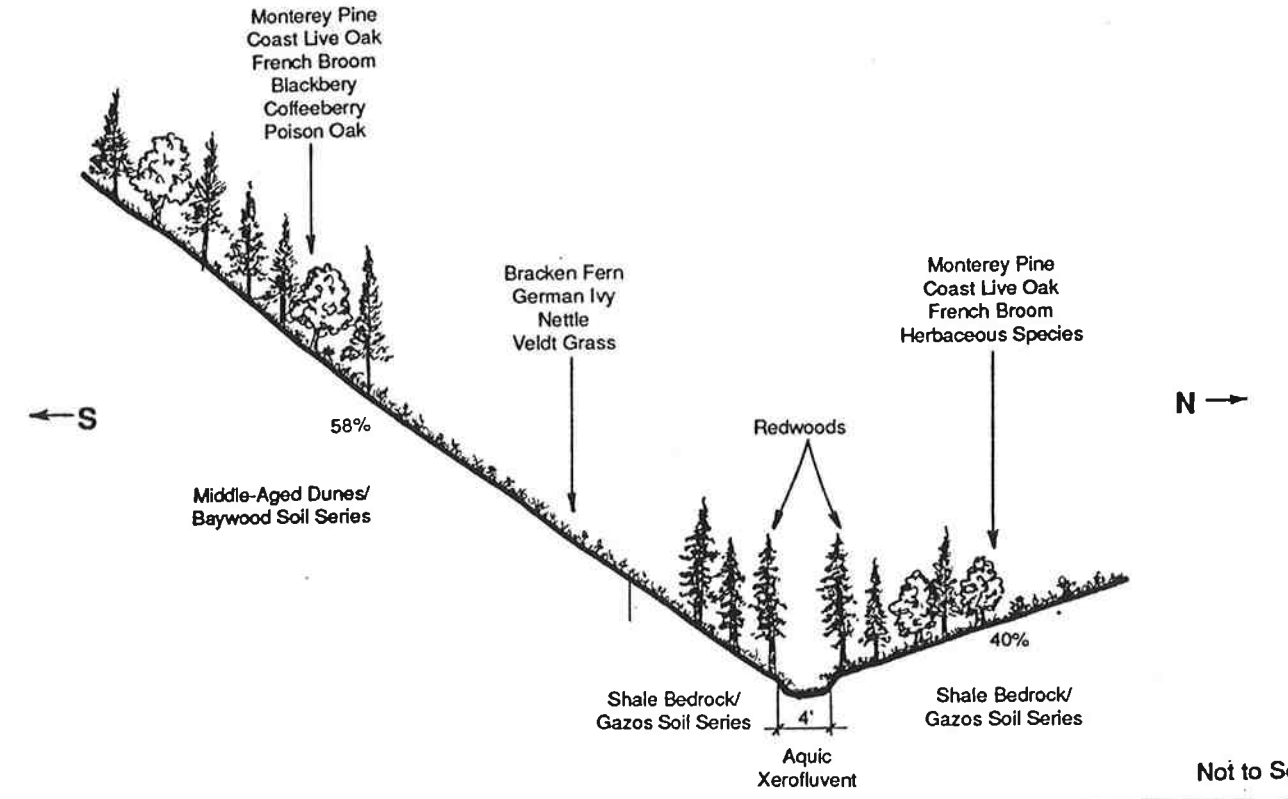
Jones & Stokes Associates, Inc.

Figure 2.
Vegetation, Soil Types, and ESHA Boundary at Pescadero Canyon East

Cross Section 1



Cross Section 2



Not to Scale

Jones & Stokes Associates, Inc.

Figure 3.
Cross Sections 1 and 2 at Pescadero Canyon East

In contrast to the south side of the canyon, the north side supports Monterey pine forest on shale bedrock (a common forest subtype). The Monterey pine forest on this south-facing slope supports a mix of Monterey pine and coast live oak with an understory composed primarily of grassland species and French broom. The north side of the canyon was not studied in detail because it is outside the City's boundary.

According to two sources, some Monterey pine trees along Second Avenue were planted from nursery stock (Roseth and Barber pers. comms.). The genetic origin of these planted Monterey pine and the extent of planting are unknown and were not determined as part of this study. The phenotypic differences between the planted and naturally occurring Monterey pine trees on the Pescadero Canyon East site were not evident during the field survey.

Most of the Monterey pines on the Pescadero Canyon East site appear mature (age unknown) and little natural regeneration (pine seedlings and saplings) was observed in the Monterey pine forest during the field visit. This lack of regeneration is due to the presence of invasive horticultural species in the forest understory, which are aggressive competitors for resources (e.g., water, light, nutrients) and due to fire suppression (fire causes cones to open, clears overstory and understory cover, and returns nutrients to the soil [Jones & Stokes Associates 1994]).

Wetland Drainage

Pescadero Canyon East is traversed by Pescadero Creek, a perennial drainage that conveys runoff from the upper reaches of Pescadero Canyon to Carmel Bay. The drainage bottom varies from 3 to 6 feet and is generally unvegetated. Wetland plants that occur sporadically along the drainage edge include panicled bulrush (*Scirpus microcarpus*), rush (*Juncus* sp.), poison hemlock (*Conium maculatum*), and horsetail (*Equisetum telmateia*). Willow (*Salix* sp.), bigleaf maple (*Acer macrophyllum*), and dogwood (*Cornus sericea* ssp. *occidentalis*) also occur in scattered locations along the drainage.

Redwood Groves

Two sites along Pescadero Creek support small groves of redwoods (Figure 2). This species is not native to the site or region, but has been introduced as a horticultural species.

Geology and Soils

Pescadero Canyon East is located in a deeply entrenched segment of the canyon that is incised into middle-aged dunes overlying shale bedrock. The steep slopes support Monterey pine forest and are stable, but show some indications of past disturbance and erosion.

A narrow and discontinuous band of recent alluvium occurs along Pescadero Creek. The soil type of the narrow alluvial band is an Aquic Xerofluvent that has no series designation in Monterey County. This soil type consists of layers of sandy loam and coarse sand with hydric mottles and imbedded debris.

The mapped soil type at the bottom of the canyon slope is the Gazos series, typically silt loam weathered from shale bedrock, with surface horizon organic matter accumulation and minimal soil horizon development. Detailed soil profile descriptions for the Gazos series and other named soil series in this report are found in the Soil Survey of Monterey County (Cook 1978). Onsite observations showed lower slope outcrops of shale bedrock with dark-colored sandy loam soil. The observed onsite high sand content of the Gazos soil is a result of colluvium accumulation from the down slope movement of dune sand from the upper canyon slope. The dune sand soil covering most of the site is the Baywood series: sand with no soil development other than some surface horizon darkening from organic matter.

An area of fill occurs on the upper slope of the site. The fill material is dune sand and does not differ from the native soil. Dune sand may be recognized by the abundance of quartz over other minerals, uniformity of particle size, and lack of weathered clay. The fill material is locally derived and from the same Baywood soil series (characteristic of middle-aged dunes) and may be distinguished only from changes in slope microtopography. The excavation and placement of fill might be expected to alter the accumulation and distribution of organic matter in the soil profile, yet little variation was observed due to the original organic matter content and the length of time the fill has been in place. Thus, there is no ecological or productivity distinction to be made between the natural and fill soils in Pescadero Canyon East. The exact boundary between natural and fill soils is indefinite and, in this case, of no ecological significance.

Special-Status Species

No special-status plant or wildlife species were located on the Pescadero Canyon East site.

Special-Status Plant Species

No special-status plant species were located during field surveys and none have been reported for the site (NDDB 1995). The overall potential for the site to support special-status plants (Table 2) was determined to be low based on the presence and extent of invasive horticultural species on the site and the lack of suitable habitat conditions.

Special-Status Wildlife Species

No special-status wildlife species were observed during the field survey at the Pescadero Canyon East site and none have been reported for the site (NDDB 1995).

As an isolated segment of Pescadero Canyon, the Pescadero East site provides minimal habitat value for most special-status wildlife species that could occur in the area. However, the value of the Pescadero Canyon East site for local wildlife habitat lies in its importance as part of a larger habitat corridor. Because the surrounding area is developed, Pescadero Canyon as a whole may provide important habitat and corridor functions for local populations of forest and riparian-adapted raptors and other common wildlife species. The contiguous forest habitat along the canyon would provide foraging and nesting opportunities for local wildlife species.

The following habitat assessments for special-status wildlife species that could occur on the Pescadero Canyon East site are based on limited field surveys:

- Soils are suitable for black and silvery legless lizards; however, the dense ground vegetation and cool heavily shaded conditions probably exclude these species.

- Pescadero Creek could be considered potential breeding habitat for special-status amphibians; however, the heavy water flows that likely result during storms would wash eggs and larvae away.

- No evidence of Monterey dusky-footed woodrats was observed and most dead and downed wood favored by the Monterey ornate shrew had fallen down the steep slopes of the canyon into Pescadero Creek.

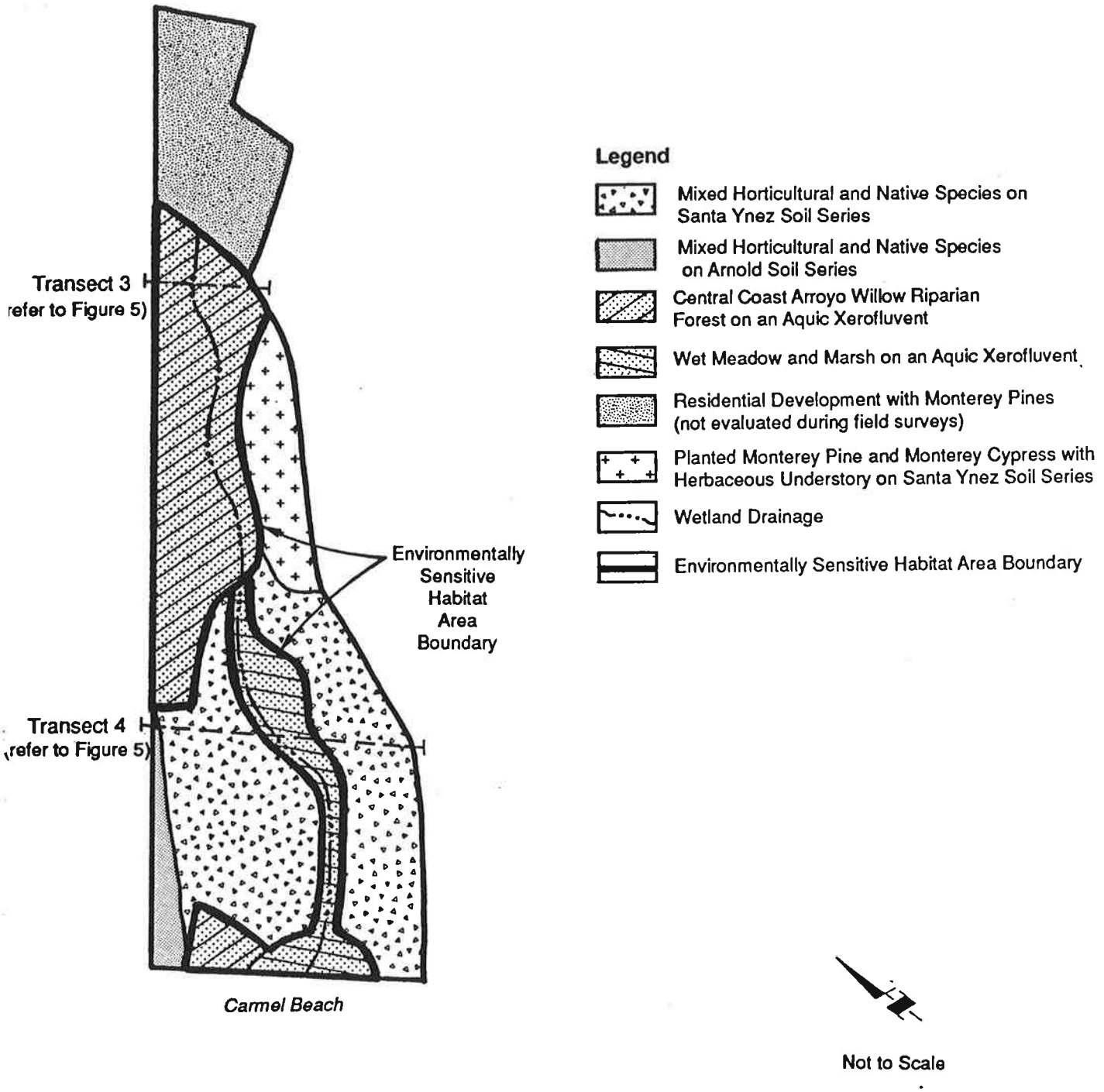
- The large Monterey pines on the study site could provide potential nesting habitat for special-status raptors that may forage in the area, such as Cooper's hawk and sharp-shinned hawk.

PESCADERO CANYON WEST

Vegetation and soils types mapped at Pescadero Canyon West are presented in Figures 4 and 5.

Vegetation

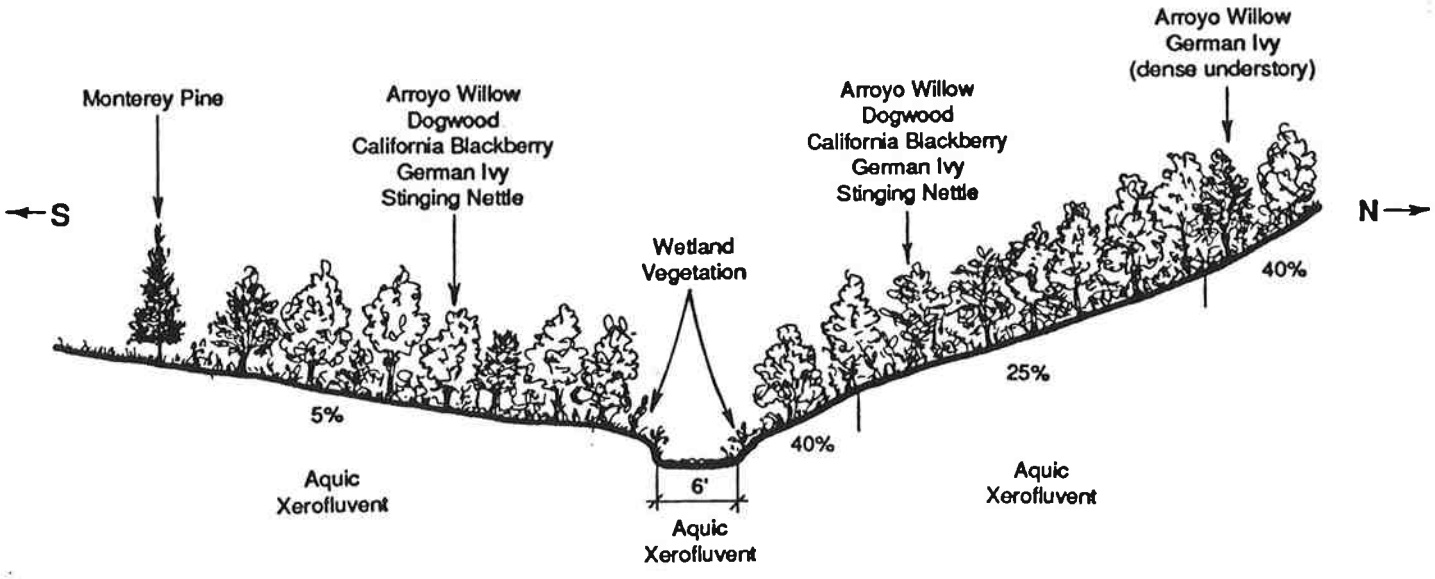
In contrast to the steep slopes of Pescadero Canyon East, Pescadero Canyon West is characterized by less-extreme slopes and supports a mosaic of wetland drainage, central coast arroyo willow riparian forest, wet meadow, and mixed horticultural species (Figure 4).



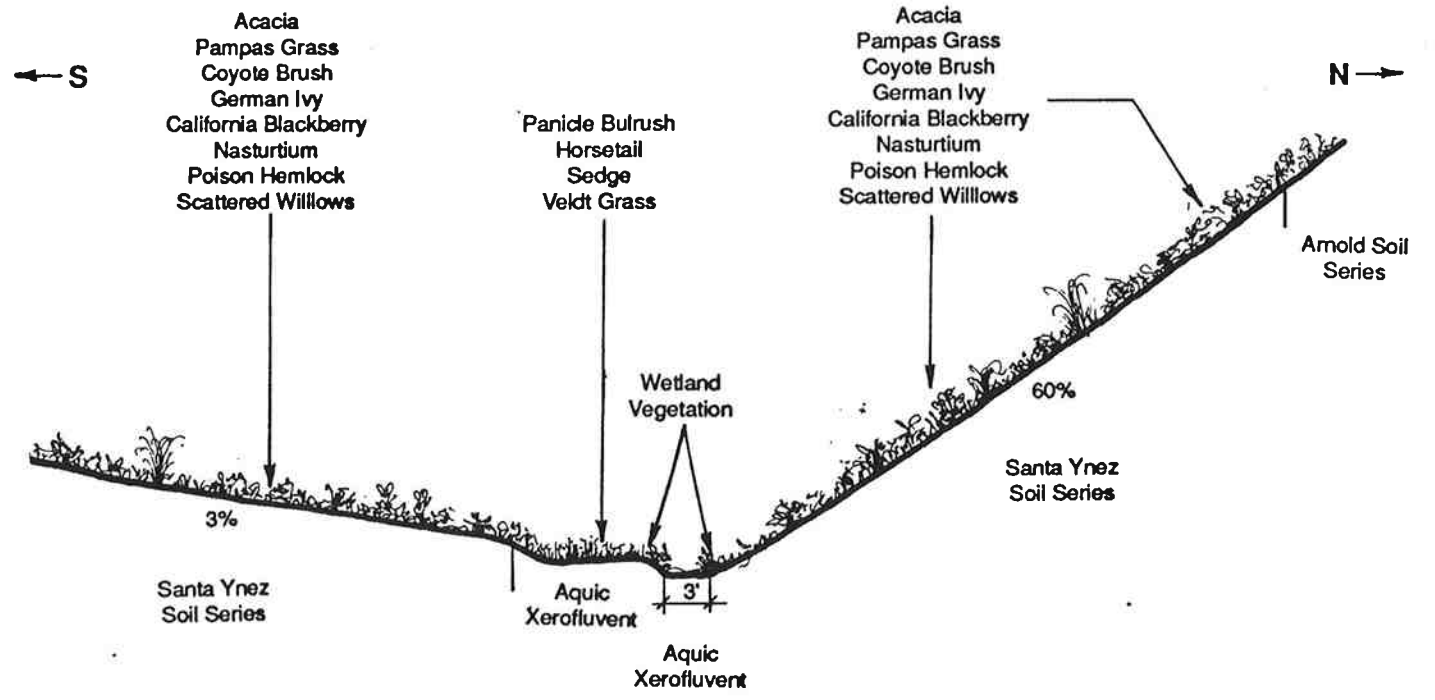
Jones & Stokes Associates, Inc.

Figure 4.
Vegetation, Soil Types, and ESHA Boundary at Pescadero Canyon West

Transect 3



Transect 4



Not to Scale

Jones & Stokes Associates, Inc.

Figure 5.
Cross Sections 3 and 4 at Pescadero Canyon West

Geology and Soils

Pescadero Canyon West consists of a recent alluvial floodplain, adjacent terraces, and terrace slopes. The soil type on the recent alluvial floodplain is classified as an Aquic Xerofluvent. It consists of layers of sand, sandy loam, and sandy clay loam with hydric mottles.

The adjacent terraces are marine terrace 2, which includes the Pebble Beach Golf Course to the north and young- and middle-aged dunes, including private residences, to the south. Although the geomorphic map shows a narrow band of marine terrace 1 above the beach to the north of Pescadero Creek, this terrace was not observed during the field survey.

The soil type of the intervening slopes is the Santa Ynez series, a loamy sand surface horizon over a shallow, dense claypan. In a foot trail descending the slope from the golf course, the claypan has been exposed by erosion. The shallow claypan results in a low permeability and high runoff rate for the terrace slopes. The Monterey County Soil Survey shows this area of marine terrace 2 as the Narlon series. The Santa Ynez series is similar but is characterized by a darker surface horizon and somewhat higher fertility.

The soil type at the top of the slope at the edge of marine terrace 2, and exposed in the seashore bluffs, is the Arnold series. The Arnold series is associated with the oldest dunes and has not been identified previously in this landform. It consists of loamy sand over iron-cemented, red sand at 20 inches or more. Where large areas of this cemented red sand occur further inland, such as at Fort Ord, it is known as the Aromas Formation. Its overall extent in this area near the seashore may be limited.

Special-Status Species

No special-status plant or wildlife species were located on the Pescadero Canyon West site.

Special-Status Plant Species

No special-status plant species were located during field surveys and none have been reported for the site (NDDB 1995). The overall potential for the site to support special-status plants (Table 2) was determined to be low based on the presence and extent of invasive horticultural species on the site and the lack of suitable habitat conditions.

Special-Status Wildlife Species

No special-status wildlife species were observed during the field survey at the Pescadero Canyon West site and none have been reported for the site (NDDB 1995).

The study site has a low potential to support most special-status wildlife species listed in Table 3. However, the dense mix of horticultural species near the west end of the site could provide suitable habitat for the Monterey ornate shrew, Swainson's thrush, common yellowthroat, and Salinas harvest mouse.

Although little downed wood is available on the Pescadero Canyon West site, the dense ground cover could be sufficient to support the Monterey ornate shrew. Terrestrial invertebrates used as prey by the shrew are also highly abundant in some areas.

The Swainson's thrush, common yellowthroat, and Salinas harvest mouse have no special status under the federal or state endangered species acts. However, these species are considered somewhat rare in the Monterey Bay region. The dense brush and vegetation at the site could be considered potential habitat for these three species.

Environmentally Sensitive Habitat Area Consistency Determination

ESHAs identified on Pescadero Canyon East and West are discussed in this section. Based on the criteria provided in Section 2, Pescadero Canyon supports habitats that should be designated as ESHAs and protected, maintained, and enhanced in a manner that is consistent with Public Resource Code, Sections 30231 and 30240. The Pescadero Canyon wetlands have already been identified in the certified Carmel Local Coastal Program Land Use Plan as environmentally sensitive. ESHAs identified for Pescadero Canyon East and Pescadero Canyon West are discussed separately below.

Pescadero Canyon East supports the following ESHA:

- Wetland drainage (Pescadero Creek) feeds into Carmel Bay, a designated Area of Special Biological Significance.

- Monterey pine forest on middle-aged dunes provides watershed protection and a buffer for Pescadero Creek and is part of a larger wildlife habitat corridor provided by Pescadero Canyon as a whole. Monterey pine forest on middle-aged dunes is considered environmentally sensitive in this study because only an estimated 123 acres of undeveloped Monterey pine forest on middle-aged dunes, or 15% of the historical distribution, remains on the Monterey Peninsula (Table 1). Although the habitat quality of the Monterey pine forest has declined because of the prevalence of non-native horticultural species, human activities (e.g., dumping of fill materials), and suppression of fire, the Monterey pine forest has been designated as an ESHA in this study. The presence of this disturbance does not detract from the factors that supported designation of the Monterey pine forest along the slopes of Pescadero Canyon East as an ESHA. The ESHA determination was based on the following:

- the presence of Monterey pine forest on middle-aged dunes (an uncommon forest subtype),

- the functions of watershed protection and a buffer for Pescadero Creek provided by the Monterey pine forest, and

- the Pescadero Canyon East site as part of a larger wildlife habitat corridor connecting the upper reach of Pescadero Canyon to Carmel Beach.

Pescadero Canyon East also has the potential to be restored and enhanced through removal of non-native species and planting of Monterey pine from local genetic stock.

Monterey pine forest on shale bedrock occurs along the lower slope of the Pescadero Canyon East site. Although this forest subtype is common on the Monterey Peninsula (approximately 79% of the historical extent currently exists) and is not considered environmentally sensitive in this report, this small area of Monterey pine forest has been included in the ESHA boundary for Pescadero Canyon East. This area was included in the ESHA boundary because it is a transition habitat between Monterey pine forest on an uncommon geomorphic surface and Pescadero Creek. Additionally, this transition habitat along Pescadero Creek would be included in the Coastal Commission's recommended 100-foot nondevelopment setback buffer from wetland boundaries, described below under "Resource Management Recommendations".

Although the redwood groves are also not considered environmentally sensitive, the two groves were included in the ESHA boundary because they occur along the creek banks and within the creek floodplain.

Pescadero Canyon West supports the following ESHAs:

- Central coast arroyo willow riparian forest

- Wetland drainage (Pescadero Creek) that feeds into Carmel Bay, a designated Area of Special Biological Significance

- Wet meadow

Pescadero Canyon West is also part of the wildlife habitat corridor extending along Pescadero Canyon.

The portion of Pescadero Canyon West that supports mixed horticultural species and planted Monterey cypress and planted or natural Monterey pine trees was not included in the ESHA boundary. However, as stated above, this area would be included in the California Coastal Commission's recommended 100-foot nondevelopment setback buffer from wetland boundaries.

Current and potential future activities in Pescadero Canyon that could affect ESHAs on Pescadero Canyon East and West include the following:

- slope destabilization from foot traffic, residential runoff, and residential development resulting in severe gullying and sedimentation in Pescadero Creek;

- clearing or thinning of riparian vegetation in Pescadero Canyon West; and

- introduction of additional non-native horticultural species from adjacent residential landscapes, resulting in the displacement of native species in the ESHAs.

Resource management recommendations that address these issues are discussed below.

Resource Management Recommendations

Pescadero Canyon East and West ESHAs should be managed through "controlling runoff . . . [,] maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams" (Public Resources Code, Section 30231). Implementing the following measures could protect the ESHAs in Pescadero Canyon from any further "significant disruption of habitat values".

- **Reduce Erosion and Sedimentation.** Cumulative erosion and sedimentation into Pescadero Creek could adversely affect Carmel Bay, a designated Area of Special Biological Significance (designated by the California State Water Resources Control Board). To reduce erosion from runoff, current and future residences along the canyon edge should be required to divert runoff into city drainage system or, as a last resort, pipe runoff to the bottom of the canyon. If the latter alternative is chosen, the pipe should extend to the bottom of the canyon rather than mid-slope to avoid erosion and gullying. Additionally, erosion at the small active gully at Pescadero Canyon East (Figure 2) should be controlled by redirecting street runoff from the gully into the City drainage system.

- **Remove Accumulated Debris from the Drainage.** Accumulated debris in Pescadero Canyon East has caused the drainage channel to widen in the hillslope. Debris accumulated in the drainage should be removed to reduce streambank erosion and hillslope undercutting.

- **Reduce Vegetation Removal and Slope Destabilization.** Vegetation removal and slope destabilization from foot traffic should be reduced by controlling access to the bottom of the canyon. An old rock stairway is located at Pescadero Canyon East. This stairway is covered by dense vegetation but could be restored to direct and control public access to the bottom of the canyon. The City should coordinate with landowners to determine whether this measure is feasible and acceptable. Alternatively, public access could be minimized or prevented because these properties are in private ownership.

- **Prohibit Removal of Vegetation from the Riparian Forest.** Most of the sensitive habitat is currently protected by a Scenic and Habitat Conservation Easement (Roseth pers. comm.). Removal of the central coast arroyo willow riparian forest from Pescadero Canyon West should be further prohibited by placing restrictions on private development and establishing nondevelopment setbacks (at least 100 feet) from the riparian forest. The California Coastal Commission recommends that a minimum buffer width of 100 feet be established along wetland boundaries to incorporate transitional zones and wetland edges (California Coastal Commission 1994).

- **Reduce the Introduction and Spread of Invasive Horticultural Species.** The introduction of horticultural species into the ESHAs should be reduced by providing residences with a list and source of native species (endemic to the central coast region of California) that could be used in residential landscaping and would be compatible with adjacent natural habitats. Residents also should be encouraged to plant Monterey pine from local genetic stock. Native Monterey pine may be more resistant to pitch canker infestation than are nonindigenous nursery stock. However, whether native trees are inherently more resistant than planted trees is unclear because of the limited occurrence of the disease in native stands (Wood pers. comm. in Jones & Stokes Associates 1994).

- **Require Mitigation for Impacts Associated with Development.** Landowners should be required to mitigate impacts associated with partial development of the site or development next to the site. Development next to ESHAs should be compatible with long-term sustainability of the canyon resources. In general, the development should result in a less-than-significant impact on the natural resources, particularly ESHAs, in the canyon. As stated in the City's general plan, "the City may require that a use permit be obtained before developable lots fronting on public open space and on Pescadero Canyon may be developed. Use permit standards would be developed to minimize grading and other alteration of natural landforms, minimize coverage, maximize the retention of important public views, and maximize setbacks." Through the development review process, the City should consider requiring the following measures as conditions of the building permit:

  - Develop agreements with landowners to dedicate and manage the lower slopes along Pescadero Canyon as open space.

  - Site development in areas that would avoid direct loss or indirect effects on native trees.

  - Avoid removal of native vegetation to the fullest extent possible.

  - Require removal of invasive shrub species (those that can be removed without resulting in substantial erosion) and planting of appropriate native species.

  - Restrict the use of heavy equipment in the area, and require that excavation along slopes be conducted by hand.

Performance standards for mitigating impacts on natural resources at Pescadero Canyon would depend on the type and extent of impact. In general, the performance standards that should be required by the City include reestablishment of a 100% vegetation cover within 2 years, composed of at least 75% native species by 5 years. At 5 years, the site should support the same habitat removed (e.g., Monterey pine forest) and consist of at least 75% native plants. Plant species that would provide bank stability and habitat enhancement should be used. Remedial actions (e.g., planting of native species and removal of invasive horticultural species) should be implemented as necessary to ensure that the site will consist of at least 75% native species at the end of 5 years.

- **Investigate the Potential for Enhancing the Monterey Pine Forest.** Opportunities for enhancing the Monterey pine forest on the site are constrained by the necessity to maintain vegetative cover for slope stability for the upslope street and houses. As discussed under "Geology and Soils", Pescadero Canyon East supports dune soils that are highly erodible and unstable. Removal of invasive species may result in slope destabilization and gullying, as observed along Second Avenue. Habitat enhancement, involving the removal of invasive species and replacement with native Monterey pine forest species (including pine seedlings), would require a substantial effort because of the erosive dune soils and aggressive horticultural species (many horticultural species in the forest reestablish quickly after removal).

  Nonetheless, the natural Monterey pine forest could be restored through careful habitat management. If site enhancement is proposed, a detailed plan should be developed by a qualified restoration ecologist. The plan would include removing invasive species in stages and immediately replanting with the appropriate species. Annual monitoring would be required to remove reestablishing horticultural species.

  The most feasible management approach for the Monterey pine forest would be to implement the measures outlined in The Guide to the Management of Carmel's Forests, Parks and Beaches (Taylor and D'Ambrosio 1981) in combination with the recommendations above.

RIO PARK

A biological assessment was prepared for the City by The Habitat Restoration Group in June 1990. This report describes biological resources and provides recommendations for enhancing the riparian forest at Rio Park (called the Hodges Property in the biological assessment). In summary, the report identified two habitat types on the site: central coast arroyo willow riparian forest and ruderal/landscaping. The Habitat Restoration Group determined that the riparian forest covered 2.2 acres and the ruderal/landscaped area covered 3.0 acres of the Hodges Property.

Vegetation and soils mapped during Jones & Stokes Associates' field surveys at Rio Park are presented in Figure 6.

Vegetation

Rio Park supports central coast arroyo willow riparian forest and ruderal/horticultural plantings.

Central Coast Arroyo Willow Riparian Forest

Based on a 1929 aerial photograph, Rio Park naturally supports riparian forest. The riparian forest probably was cleared during construction of the Carmel Mission. Currently, the central coast arroyo willow riparian forest is restricted to the Carmel River and two small tributary drainages that traverse the study site (Figure 6). The riparian forest is a multi-layered community that supports a canopy of arroyo willow, yellow willow (*Salix lucida* ssp. *lasiandra*), and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*). The understory is composed of California blackberry, flowering currant, poison-oak, poison hemlock (*Conium maculatum*), and stinging nettle. German ivy, tree mallow (*Lavatera assurgentiflora*), pampas grass, giant reed (*Arundo donax*), and ice plant (*Carpobrotus edule*) occur in localized areas of the riparian forest.

Ruderal/Horticultural Plantings

The northern side of the Carmel River contains local fill material that appears to have been recently graded. This disturbed portion of the site supports scattered ruderal species, such as plantain (*Plantago lanceolata)*, mallow, sweet clover (*Melilotus indica*), mustard (*Brassica campestris*), wild radish (*Raphanus sativa*), curly dock (*Rumex crispus*), and New Zealand spinach (*Tetragonia tetragonioides*). The northern boundary, along the entrance road, contains introduced Monterey cypress, eucalyptus (*Eucalyptus* sp.), and ice plant.

Geology and Soils

The Rio Park site is located on recent floodplain deposits of the Carmel River. The site is separated from the river by a low artificial levee that provides flood protection although it is subject to intermittent flooding during high-intensity storms. The sediment is unconsolidated, heterogeneous layers of sand and silt with thin, discontinuous layers of sand. Groundwater depth is between 1 and 2 meters from the natural ground surface.

The natural soil type of Rio Park is classified as an Aquic Xerofluvent, with no series designation in Monterey County. It consists of stratified layers of sandy loam, clay loam, and sand. The soil is somewhat poorly drained, with mottling indicative of hydric conditions occurring at a depth of 1 foot. Darkening from organic matter accumulation occurs in the surface horizon.

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The natural soil surface is covered with imported fill to an average depth of 5 feet. The fill is heterogeneous and inconsistently layered, and consists of sand to sandy loam textured soils with occasional clay bands. The fill contains assorted gravels, cement chunks, and large pieces of Monterey Formation shale, along with other debris. The characteristics of various Monterey region soils may be identified in the components of the fill.

Special-Status Species

No special-status plant or wildlife species were located on the Rio Park site. The riparian forest along Carmel River was identified as important habitat for several special-status wildlife species.

Special-Status Plant Species

No special-status plant species were located during field surveys and none have been reported for the Rio Park site (NDDB 1995). The overall potential for the site to support special-status plants in Table 2 was determined to be low based on the disturbed condition of the site and the lack of suitable habitat conditions.

Special-Status Wildlife Species

No special-status wildlife species surveys were conducted by Jones & Stokes Associates. No special-status wildlife species have been recorded for the Rio Park site. However, The Habitat Restoration Group conducted a biological assessment of the site in 1990 and determined that the riparian habitat along the Carmel River provides important habitat for bird species. In this biological assessment, the following special-status species were reported as having been recorded using the riparian corridor in the Rio Park area: peregrine falcon, bald eagle, northern harrier, Cooper's hawk, sharp-shinned hawk, and yellow warbler.

Other special-status and special-interest species that potentially could occur in this area include Monterey ornate shrew, Monterey dusky-footed woodrat, Swainson's thrush, and common yellowthroat.

Environmentally Sensitive Habitat Area Consistency Determination

Based on the criteria provided in Section 2, the following habitat should be maintained under its current designated as an ESHA (City of Carmel Local Coastal program 1981) and protected and enhanced consistent with Public Resources Code, Sections 30231 and 30240:

- central coast arroyo willow riparian forest along the Carmel River.

The City has identified three alternative uses for the disturbed and leveled portion of the Rio Park site: establishing an active park, constructing a parking lot, or selling the site for development. As part of this ESHA study, the City requested an evaluation of Rio Park to determine the site's potential for riparian restoration, and the City requested identification of measures to avoid impacts on riparian habitat if the site is developed as a park. The potential for riparian restoration and enhancement at the site is discussed below, followed by resource management recommendations for proposed future uses.

Potential for Riparian Restoration and Enhancement

As mentioned earlier, Rio Park naturally supports riparian forest. The riparian forest was cleared from the site (date unknown) and replaced with approximately 5 feet of fill material that extends up to the riparian forest. Soil samples taken from the fill material indicate high texture variability; slight acidity; low to very low nitrogen, phosphorus, and sulfur; and high chloride levels (Soil Control Laboratory 1991). The high chloride content, low fertility, texture variability, and debris content of the fill material make it an unsuitable medium for planting native riparian vegetation. In addition, the fill material has substantially increased the rooting depth to the water table, further decreasing the suitability of the site for restoration.

The Habitat Restoration Group recommended planting riparian species within 50 feet of the existing riparian forest. However, restoration of the site would require removing the fill and using the underlying native soil.

Although riparian creation may not be feasible, the riparian forests on the site should be enhanced by removing invasive horticultural species (refer to the habitat description above for a partial list of the species). Invasive species should be removed manually (no herbicides should be used in the riparian corridor) between late spring and early summer, when the soils are moist. Removal techniques will vary depending on the species. The riparian corridor should be monitored annually after the first season, with vegetation removal techniques applied as needed. Some riparian planting may be necessary in areas where invasive species are removed.

An enhancement plan that identifies weed removal techniques and planting methods should be developed by a qualified restoration ecologist to ensure that the enhancement plan is successful. Additionally, the City should coordinate with the vegetation ecologist at the Monterey Peninsula Water Management District before developing a final enhancement plan.

Resource Management Recommendations

To avoid degradation and protect the ESHA from any significant disruption of habitat values that may be associated with site development, the following measures should be incorporated into the site plan. These measures would be consistent with Public Resource Sections 30231 and 30240 (a) and (b).

- **Establish a Minimum Buffer along Riparian Forests.** A minimum 100-foot buffer, as recommended by the California Coastal Commission, should be established along the outer edge of the riparian forest. No fertilizers, herbicides, or other chemicals would be allowed in this area.

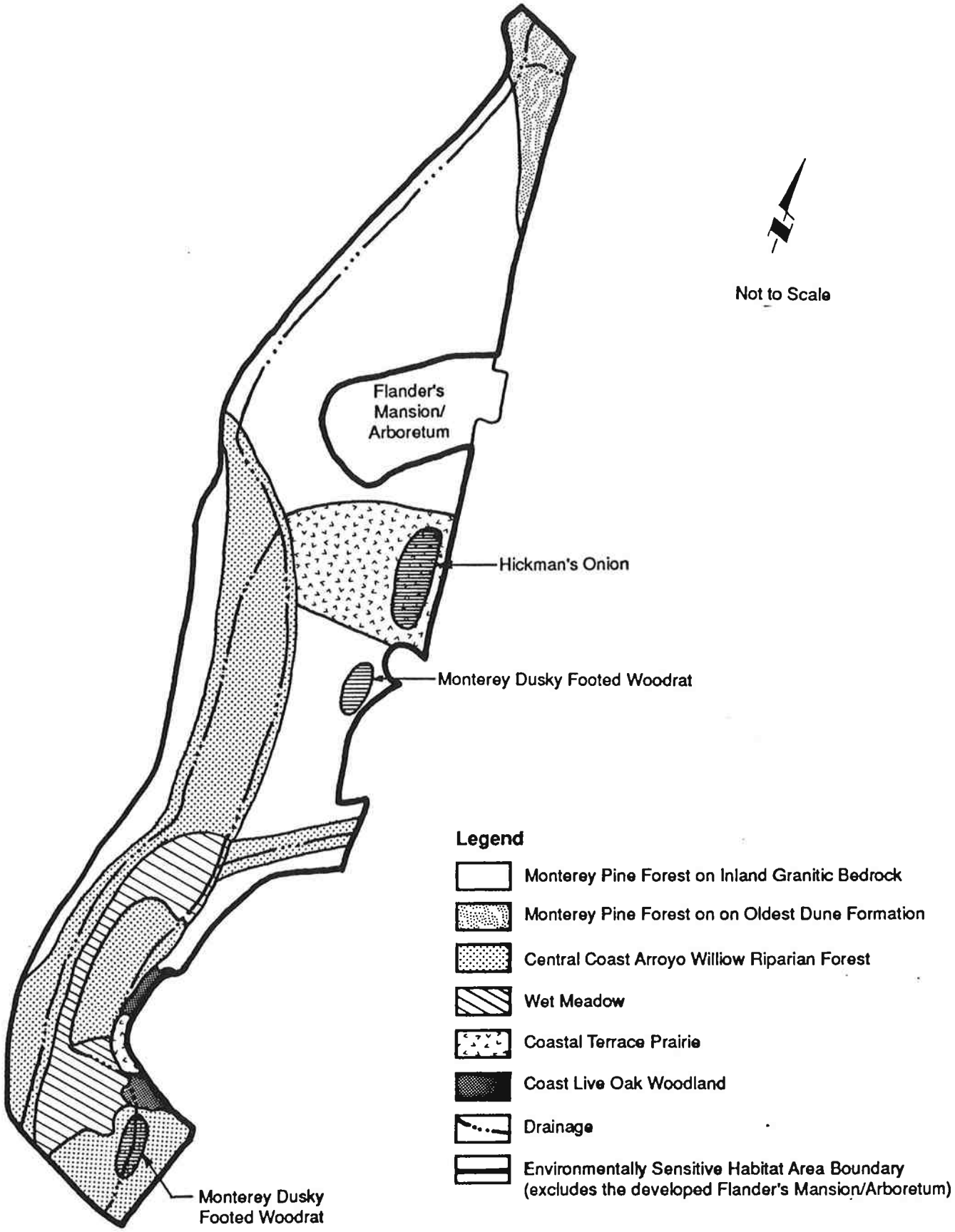
- **Divert Runoff Away from Carmel River.** Opportunities should be explored for diverting park runoff away from the Carmel River and into the city drainage system to the north.

- **Emphasize Native Plants in the Landscape Plan.** The use of indigenous native plant species should be emphasized in the park landscape plan. Use of herbicides and fertilizers in the park should be minimized to the extent possible and alternative biological methods considered.

- **Provide Controlled Access to the Carmel River.** Access to the Carmel River should be controlled and concentrated into two designated areas by constructing two staircase trails along the eastern and western ends of the park. Establishing a trail would discourage the public from trampling vegetation in the riparian corridor. Signs should be posted next to the entrance of the staircase informing the public of the importance of remaining on the trail and placing trash in appropriately designated containers in the park. Signs also could provide ecological information on the riparian forest along the Carmel River and its wildlife habitat value. A nature trail through the riparian habitat could be interpreted by the California Coastal Commission as consistent with Public Resources Code, Section 20240(a) (b) (Otter pers. comm.).

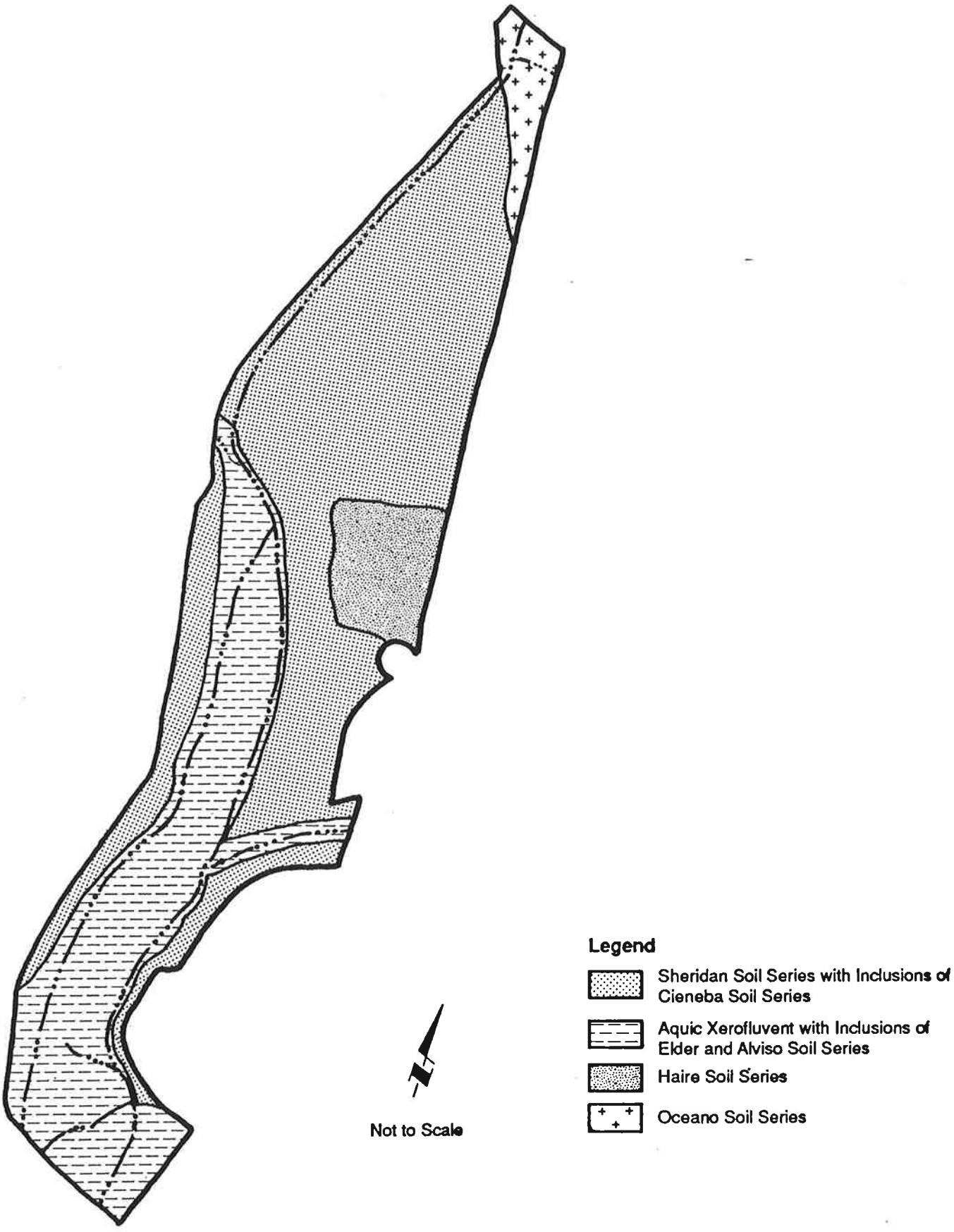
MISSION TRAILS PARK

Vegetation and soils information for Mission Trails Park is presented in Figures 7 and 8. The City subdivided Mission Trails Park into four planning units: Martin Road Parcel, Park Proper, Flanders Mansion/Arboretum, and Outlet Meadow (Figure 9). Information on the vegetation, geology, soils, and special-status species of each of these planning units is presented below.



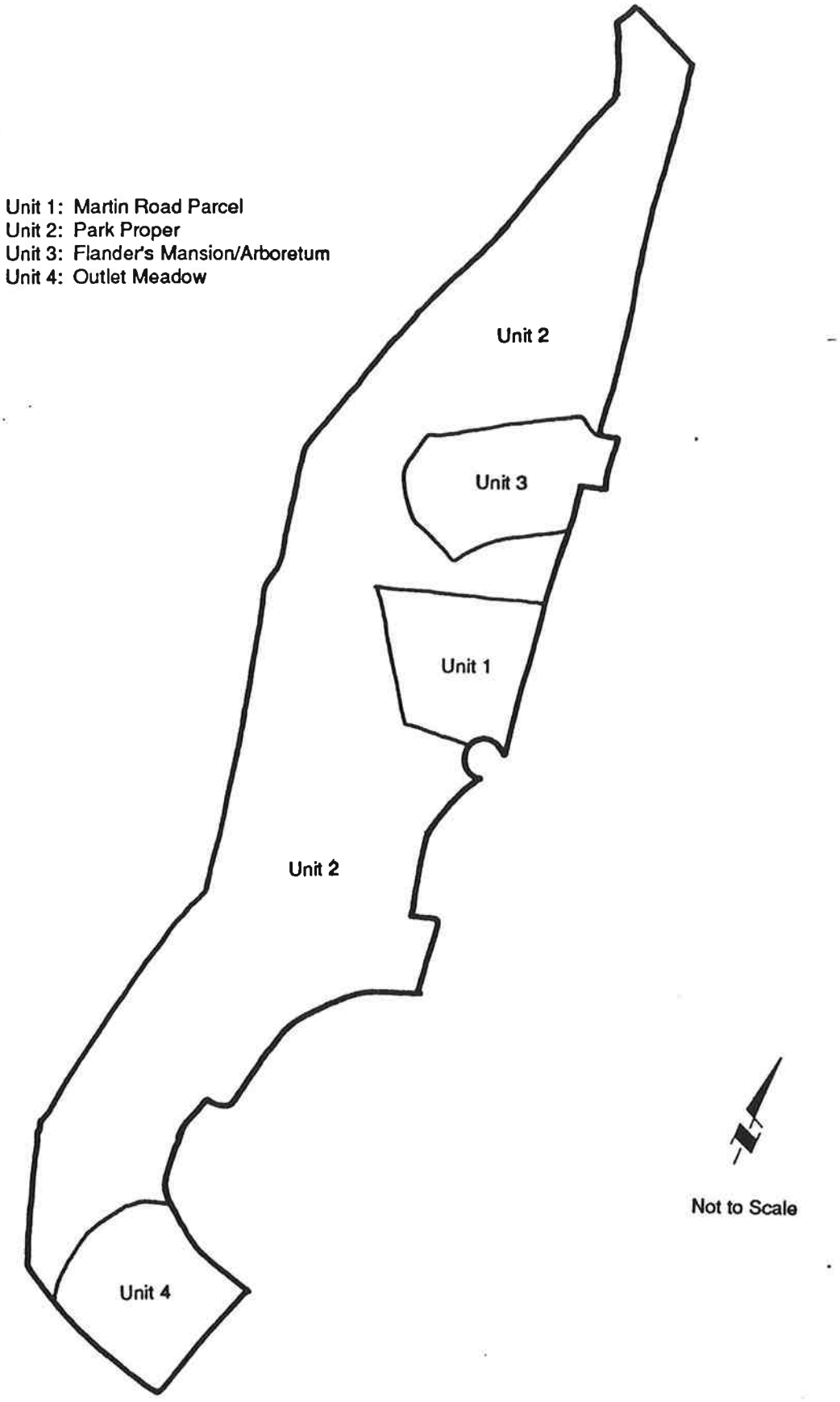
Jones & Stokes Associates, Inc.

Figure 7.
Location of Special-Status Species, Vegetation Types and ESHA Boundary at Mission Trails Park



Jones & Stokes Associates, Inc.

Figure 8.
Soil Types at Mission Trails Park



Jones & Stokes Associates, Inc.

Figure 9
Location of the Four Study Units at Mission Trails Park

Vegetation

Mission Trails Park supports a vegetation mosaic consisting of Monterey pine forest on inland granitic bedrock and oldest dunes, central coast arroyo willow riparian forest, wetland drainage, wet meadow, coast live oak woodland, coastal terrace prairie, and horticultural plantings. The four planning units support the following vegetation:

- Martin Road Parcel (Unit 1) supports coastal terrace prairie and a population of Hickman's onion (a federal candidate [C2] and CNPS List 1B species).

- Park Proper (Unit 2) supports Monterey pine forest on inland granitic bedrock and oldest dunes, central coast arroyo willow riparian forest, wetland drainage, and coast live oak woodland that is suitable habitat for Monterey dusky-footed woodrat (a federal candidate [C2] species).

- Flanders Mansion/Arboretum (Unit 3) supports Monterey pine forest on inland granitic bedrock with horticultural plantings.

- Outlet Meadow (Unit 4) supports central coast arroyo willow riparian forest (suitable habitat for Monterey dusky-footed woodrat), wetland drainage, wet meadow, coastal terrace prairie, and coast live oak woodland.

Vegetation types at Mission Trails Park are described below.

Monterey Pine Forest

Monterey pine forest on inland granitic bedrock is the dominant habitat type in the Park Proper. This geological formation (combined with shale bedrock) supports the most common and best preserved Monterey pine forest associations on the Monterey Peninsula. One small area of Monterey pine forest on oldest dunes occurs in the northern corner of the park (described below under "Geology and Soils"). Only 20% of the historical extent of Monterey pine forest on oldest dunes occurs on the Monterey Peninsula (Table 1).

In general, the forest supports mature large Monterey pine with a subcanopy layer of coast live oak and a dense understory of shrub, vine, and herbaceous species. The shrub and vine layer is dominated by French broom in various associations with blue blossom (*Ceanothus thrysiflorus*), California blackberry, poison-oak, toyon (*Heteromeles arbutifolia*), creeping snowberry, coffeeberry, shaggybark manzanita (*Arctostaphylos tomentosa*), twinberry (*Lonicera hispidula*), vetch (*Vicia sativa*), and bush monkeyflower. English ivy, German ivy, and periwinkle occur sporadically with these shrub species.

The forest herbaceous layer contains a diversity of species, including ripgut brome (*Bromus diandrus*), creeping wildrye (*Leymus triticoides*), bracken fern, California hedge-nettle, and rattlesnake grass (*Briza maxima*).

Flander's Mansion/Arboretum (Unit 3) supports Monterey pine forest on inland granitic bedrock with planted horticultural species from the document understory.

Coast Live Oak Woodland

A small area of coast live oak woodland occurs in the southeastern corner of the park. The woodland is characterized by a closed canopy of coast live oaks with an understory of coyote bush, California blackberry, poison oak, and herbaceous species.

Coastal Terrace Prairie

Coastal terrace prairie occurs along west-facing and south-facing slopes in the Martin Road Parcel and Outlet Meadow (Figure 8). As described under "Geology and Soils", these sites appear to occur on old alluvial terraces of the Carmel River. Coastal terrace prairie typically occurs within the zone of coastal fog incursion, on sandy loams located on marine terraces (Holland 1986). Holland (1986) also notes that most stands are patchy and variable in composition, reflecting local differences in available soil moisture capacity.

The coastal terrace prairie at Mission Trails Park contains a high diversity of annual and perennial grass and herbaceous species. Perennial and annual grass species in this community include needlegrass (*Nasella pulchra*), California oatgrass (*Danthonia californica*), meadow barley (*Hordeum brachyantherum*), rattlesnake grass, fescue (*Vulpia* sp.), and ripgut brome. The coastal prairie also contains a diverse mix of herbaceous species, including soap plant *(Chlorogalum pomeridianum*), cut-leaved plantain (*Plantago coronopus*), yellow sorrel (*Oxalis laxa*), plantain (*Plantago lanceolata*), clustered dock (*Rumex conglomeratus*), mariposa lily (*Calochortus albus*), buttercup (*Ranunculus* sp.), Hickman's onion (*Allium hickmanii*), golden brodiaea (*Tritileia ixioides* ssp. *ixioides*), and filaree (*Erodium cicutarium*). Saturated soil conditions provide favorable substrate for a variety of wetland species, including rush (*Juncus bufonius, J. xiphioides, J. patens*, and another unidentified *Juncus* sp.) and coyote thistle (*Eryngium armatum*).

Saturated soils and flowing water were observed at the upper edge and lower bottom of the coastal terrace prairie during April field surveys. The presence of this wetland hydrology (the underlying claypan described under "Geology and Soils" allows water to pond on the soil surface)and a prevalence of hydrophytic wetland plants (identified above) indicate that part of the coastal terrace prairie may qualify as jurisdictional wetland under Section 404 of the Clean Water Act.

Wetland Drainage

Two main perennial drainages and smaller drainages transect the study site (Figure 8). The main perennial drainage begins at the northern end of the park, runs along the western boundary of the park, and forks near the center of the park. At the northern end of the drainage, the drainage bottom is generally unvegetated. The steep bank sides are vegetated with Monterey pine and coast live oak with a dense understory of French broom, German ivy, English ivy, and California blackberry. French broom dominates the banks along the northern portion of the drainage, grading into a dense central coast arroyo willow riparian forest (near the 11th Street entrance to the park at Willow Trail). Redwood, bay tree (*Umbellularia californica*), and bamboo (*Bambusa* sp.) also occur in localized portions of the drainage.

Another perennial drainage feeds into the park from the east, supporting a dense central coast arroyo willow riparian forest.

Central Coast Arroyo Willow Riparian Forest

Central coast arroyo willow riparian forest occurs as a dense, multilayered forest along the northern boundary of the study site. As mentioned above, riparian forest also occurs along a perennial drainage near the western boundary of the park. The riparian forest is characterized by a canopy layer of black cottonwood and arroyo willow and a subcanopy layer of shrub-size arroyo willow and dogwood. The dense forest understory consists of California blackberry, Himalaya berry (*Rubus procerus*), passion vine (*Passiflora* sp.), German ivy, English ivy, nasturtium, and poison hemlock. In localized areas, invasive horticultural species form a conspicuously dense understory in the forest and have displaced desirable native riparian species.

Wet Meadow

Wet meadow dominates the southern end of the park in the planning unit identified as Outlet Meadow. The wet meadow is characterized by a mix of wet meadow species, grassland species, and seeded grasses. Wet meadow species present in the wetland include rush species (*Juncus balticus, J. xiphioides, J. patens, J. effusus* var. *pacificus*), umbrella sedge, sedge (*Carex herbacenses, C. harfordii*), rabbitsfoot grass, curly dock, and prickly ox-tongue. Grassland (including seeded grasses) species comprise approximately 40% of the total cover and include Italian ryegrass (*Lolium multiflorum*), velvet grass (*Holcus lanatus*), California brome (*Bromus carinatus*), ripgut brome, radish (*Raphinus sativa*), California hedge nettle, and geranium (*Geranium dissectum*). Species from adjacent riparian and oak woodland habitats are colonizing the wet meadow, including California blackberry, arroyo willow, white poplar (*Populus alba*), dogwood, and poison-oak.

Based on the surrounding vegetation and current species composition, Outlet Meadow once supported riparian habitat. The City removed riparian vegetation from part of this area; it maintains the wet meadow as open space by mowing. To enhance Outlet Meadow for aesthetic purposes, the City planted redwood, sycamore (*Platanus racemosa*), and Monterey pine in the meadow. Some of

these species were present in the area before Mission Trails Park was established as a public park (Kelley pers. comm.).

Geology and Soils

The geologic substrate at Mission Trail Park is granodioritic bedrock of the underlying Salinian Block. The associated soil type is primarily the Sheridan series, a moderately deep sandy loam with surface horizon organic matter accumulation. The Cienaba series is included in the Sheridan series and is a thin sandy loam soil that is limited to areas of shallow bedrock or substantial erosion. These and other field-verified soil types in Mission Trails Park differ from those mapped in the park area in the existing Soil Survey of Monterey County (Cook 1978).

One small inclusion of oldest dunes landform that occurs in the northeastern corner of the park is associated with the Oceano series (Figure 7). The Oceano soil consists of moderately weathered loamy sand, with surface horizon organic matter accumulation and darkening, and subsoil clay accumulation in thin bands and sand grain bridges.

The western low-lying region of Mission Trails Park supports a small drainage that is a tributary to the Carmel River. The watershed of the drainage begins outside the park on marine terrace 5. The Mission Trails Park drainage has carved a canyon through the succession of dune-covered marine terraces and Carmel River alluvial terraces into the underlying granitic bedrock.

The upper edge of the coastal terrace prairie at the Martin Road Parcel occurs on part of a marine terrace. The observed soil type best fits the Haire series, which is mapped just to the west on old alluvial terraces of the Carmel River. It has a shallow loam surface horizon over a dense claypan and overlies sandstone probably of the Monterey Formation.

The landform in the lowest portion of the park and next to the stream channel is recent alluvial floodplain. The primary Aquic Xerofluvent occurs in a complex with the sandy Elder and clayey Alviso series. The Alviso series occurs in a basin area at the junction of the west fork and main drainages.

Special-Status Species

Field surveys located one population of Hickman's onion in the coastal terrace prairie and suitable habitat for Monterey dusky foot woodrat in the Monterey pine forest and riparian forest.

One individual plant of Hooker's manzanita was located along the path to Flander's Mansion. This species has been planted in the arboretum and was most likely carried to this site by a bird (refer to the discussion under Special-Status Species presented for the Forest Hill Park site).

Special-Status Plant Species

Hickman's onion is a federal candidate for listing (C1) and is considered rare and endangered in California by CNPS (List 1B). The species is known from fewer than twenty occurrences and is threatened by urbanization, grazing, road construction, and military activities (Skinner and Pavlik 1994). A nearby occurrence of Hickman's onion was reported along the south side of Hatton Road, just east of Mission Trails Park (NDDB 1995).

The population of Hickman's onion at Mission Trails Park is a new occurrence and has not been previously reported in the NDDB. This occurrence occurs along the upper eastern edge of the coastal prairie terrace and contains approximately 100-150 individual plants. The population appeared to viable during the field visit. The area that supports Hickman's onion is maintained by mowing each year. The overall effects on the population from this maintenance activity are unknown and should be assessed through recommended monitoring efforts (refer to the discussion under Resource Management Recommendations).

No other special-status plant species were located at Mission Trails Park during the field survey and none have been reported in the NDDB (1995). However, suitable habitat was identified for late-blooming species listed in Table 2. Plant species that have the potential to occur at Mission Trails Park but would not have been identifiable at the time of the field survey include Gairdner's yampah and seaside bird's beak.

Special-Status Wildlife Species

Evidence of one special-status wildlife species, the Monterey dusky-footed woodrat, was observed during the field survey at Mission Trail Park. Two woodrat nests were observed on the eastern edge of the park, and several potential nests were seen in the Outlet Meadow area. The nests on the eastern edge of the park had obvious entrance and exit holes that showed evidence of use and appeared active.

Because of the relatively large size of Mission Trail Park and areas of habitat isolated from human intrusion by dense vegetation, the park provides the greatest potential habitat value of all the study sites surveyed. The dense riparian areas provide potential habitat for yellow warbler, Swainson's thrush, and common yellowthroat. The fairly frequent downed and decomposing logs could potentially be used by the Monterey ornate shrew. Sharp-shinned hawks and Cooper's hawks could use the Monterey pine forests for foraging and nesting.

A local resident interviewed during the field survey provided information on current and historical wildlife use of the area. The resident said that a pair of red-shouldered hawks had nested in the park in 1992 and that he occasionally sees various raptors foraging in the area, indicating the potential value of the park for Cooper's hawk and sharp-shinned hawk. The resident also verified that no frogs, turtles, or other herpetofauna occurred in the creek (none were observed during the field survey). The occurrence of large surges of water in the creek during storms, which could exclude these species, was also confirmed during the interview.

During the survey, several feeding and watering stations and cardboard shelters used by domestic cats were observed in the Outlet Meadow area of the park. It appears that a nearby resident has been maintaining a circuit of these stations and shelters for domestic cats residing in the park or at nearby residences. Cats, whether feral or domestic, are known to prey on resident wildlife (Caras 1973, Fitzgerald 1988, George 1974). The encouragement of cats to congregate and reside in the park through provision of food, water, and shelter has likely resulted in declines in rodent, bird, reptile, and amphibian populations in the park.

Environmentally Sensitive Habitat Area Consistency Determination

Mission Trails Park has been identified in the Certified Carmel Local Coastal Program Land Use Plan as an ESHA. Based on the criteria provided in Section 2, the following habitats should be maintained as ESHAs and managed consistent with Public Resource Sections 30231 and 30240:

- Monterey pine forest on inland granitic bedrock and oldest dune formation (excluding Flanders Mansion/Arboretum) that provide important habitat for the Monterey dusky-footed woodrat and other local wildlife species,
- wetland drainage,
- central coast arroyo willow riparian forest,
- coastal terrace prairie, and
- wet meadow.

Current and future activities at Mission Trails Park that could affect these ESHAs include the following:

- slope destabilization and accelerated erosion along the lower slopes of the coastal terrace prairie from foot traffic (on and off the designated trails);
- slope destabilization along the park perimeter from substantial vegetation removal for fire control;
- clearing or thinning of riparian vegetation in Outlet Meadow;
- maintaining feeding stations for domestic cats;
- introduction of additional non-native horticultural species from adjacent residential landscapes, resulting in the displacement of native species in the ESHAs; and
- conversion of coastal terrace prairie to a shrub-dominated community.

Resource management recommendations that deal with these issues are discussed below.

Resource Management Recommendations

Mission Trails Park is an important natural resource in the city and should be managed to maintain and enhance the natural integrity of the park. Currently, the park is maintained through a combination of mowing, planting, pruning, and removal of dead trees. The wet meadow and coastal terrace prairie are maintained by mowing for fire control. Horticultural species have been planted in Outlet Meadow for "tree enhancement" (Kelley pers. comm.). Some Monterey pine seedlings also are planted periodically and dead or diseased trees removed in the forest, as prescribed in the City's forest management plan. The riparian forest in the middle of Outlet Meadow has been trimmed in the past to maintain the open nature of this region (Kelley pers. comm.).

The following resource management recommendations would protect the ESHAs at Mission Trails Park from any significant disruption of habitat values:

- **Avoid Future Erosion and Loss of Native Coastal Terrace Prairie Vegetation.** Future erosion and loss of native vegetation from the coastal terrace prairie should be avoided in the Martin Road Parcel by improving the foot trail. This could be accomplished by creating rock steps along the slopes and placing rocks along the edges of the trail that cut across the slope. Signs could be placed along the trail that educate the public on ecology of the coastal terrace prairie and emphasize the importance of remaining on the trails. Additionally, vehicle use should be restricted in the flat portion of the Martin Road Parcel because the claypan soil readily saturates to the surface and is susceptible to compaction and damage.

- **Monitor the Hickman's Onion Population and Implement Measures to Protect the Population.** The City should retain a qualified botanist to monitor the population of Hickman's onion to determine if current management techniques and public use of the coastal terrace prairie are affecting the viability of the population (e.g., determine if the population is increasing or decreasing from mowing and determine the appropriate period for mowing). If public use is adversely affecting the population, the City may consider limiting access in the area during critical periods for the Hickman's onion (e.g., during winter months when the soils are moist and compaction or soil disturbance could affect the species and during the species blooming period, March-May).

- **Enhance Coastal Terrace Prairie.** Non-native shrubs invading the coastal terrace prairie should be removed. Most of the seedlings invading the prairie could be removed manually during late spring when the soils are moist. The California Conservation Corps from Gabbilon Camp could be used to assist in the French broom control. Work groups also could be organized through local conservation groups.

- **Manage a 30-Foot Vegetation Buffer along the Park Perimeter.** Residences along the park perimeter should be encouraged to remove vegetation to the minimum extent necessary to reduce fire hazards. Maintaining vegetation cover along the park hillslopes is important to reduce erosion. Hillslope vegetation adjoining existing homes on the upslope boundaries of the park should be cleared for fire protection no more than the minimum requirement, and the cleared areas should be replanted with suitable native plants. Residences along the park should be provided with information on how to maintain this vegetation buffer for fire control and suggestions on native species that could be planted in the buffer to provide habitat enhancement (this action would be included in the land stewardship program discussed below under "Develop and Implement a Land Stewardship Program").

- **Avoid Removal or Pruning of Riparian Vegetation.** Additional removal or pruning of the riparian vegetation at Outlet Meadow should be avoided. This maintenance activity may be viewed by the California Coastal Commission as a significant disruption of habitat values.

- **Reduce the Introduction of Invasive Horticultural Species.** The introduction of horticultural species into the ESHAs should be reduced by providing residences with a list and source of native species that should be used in residential landscaping and that are compatible with adjacent natural habitats. Local native plant nurseries should be consulted to develop a list of available plants. Residences should be encouraged to plant Monterey pine seedlings (grown from local genetic stock).

  The Guide to the Management of Carmel's Forest, Parks and Beaches (Taylor and D'Ambrosio 1981) discusses the possibility of establishing a city nursery south of the arboretum and east of the Flanders Mansion. A driveway, footpaths, sprinkler systems, and greenhouse would be constructed as part of the nursery project (approved by the Carmel Forestry Commission in 1979). This nursery could provide an excellent opportunity for educating local landowners on native plants and local habitats, and providing the public with local genetic plant stock for landscaping purposes.

- **Maintain and Enhance Habitat for Monterey Dusky-Footed Woodrat**. To enhance habitat for the Monterey dusky-footed woodrat at Mission Trails Park, the City should discourage local residents from feeding cats in the park and remove the feeding stations from Outlet Meadow. Because the species requires forest debris to build nests, the City should leave some woody debris in the forest.

  The exact distribution and areas of high quality and important habitat for woodrat at Mission Trails Park have not been determined. The City may elect to retain a biologist to establish trapping and monitoring stations at the park. Information obtained from this study would be used to develop a long-term management plan for Monterey dusky-footed woodrat at Mission Trails Park.

- **Develop and Implement a Land Stewardship Program.** Because ESHA boundaries could be extended beyond park boundaries to include adjacent private land, a stewardship program should be developed that would target landowners adjacent to the park. The program would be based on the premise that resource management is a cooperative effort between the City and its citizens. The purpose of the stewardship program would be to educate landowners and residents about the importance of maintaining and enhancing ESHAs and other important habitats that cross over park boundaries and into residential neighborhoods. As part of this program, periodic mailings or information sheets would be sent to property owners concerning various topics, such as maintenance of fire buffers, use of native plants in landscaping to enhance adjacent habitats, and removal techniques for common invasive species (e.g., French broom).

FOREST HILL PARK

Vegetation, geology, soils, and location of Hooker's manzanita at Forest Hill Park are presented in Figure 10.

Vegetation

The predominant vegetation type at Forest Hill Park is Monterey pine forest on Terrace 5 and on oldest dunes. One seasonal drainage runs northeast to southwest across the study site (Figure 10).

The Monterey pine forest varies slightly in species composition across the park. At the southern end, large Monterey pines grow along the steep banks of a canyon in association with coast live oak, blue gum, French broom, nasturtium, German ivy, periwinkle, and grassland species.

In the central and northern end of the park, Monterey pine forest contains an overstory of mature Monterey pine and a subcanopy layer of coast live oak. The understory is primarily grassland. Scattered native shrubs that comprise approximately 40% total cover include toyon, black sage, monkeyflower, native manzanita species, shaggy-barked manzanita, blackberry, coffee berry, and chamise. Horticultural species that occur in the northern portion of the park include redwood, green wattle, periwinkle, German ivy, and ice plant. Planted Monterey pine seedlings also occur in the northern region of the park.

The center of Forest Hill Park contains a lawn surrounded by various horticultural plantings. Redwoods have been planted next to this lawn and information center.

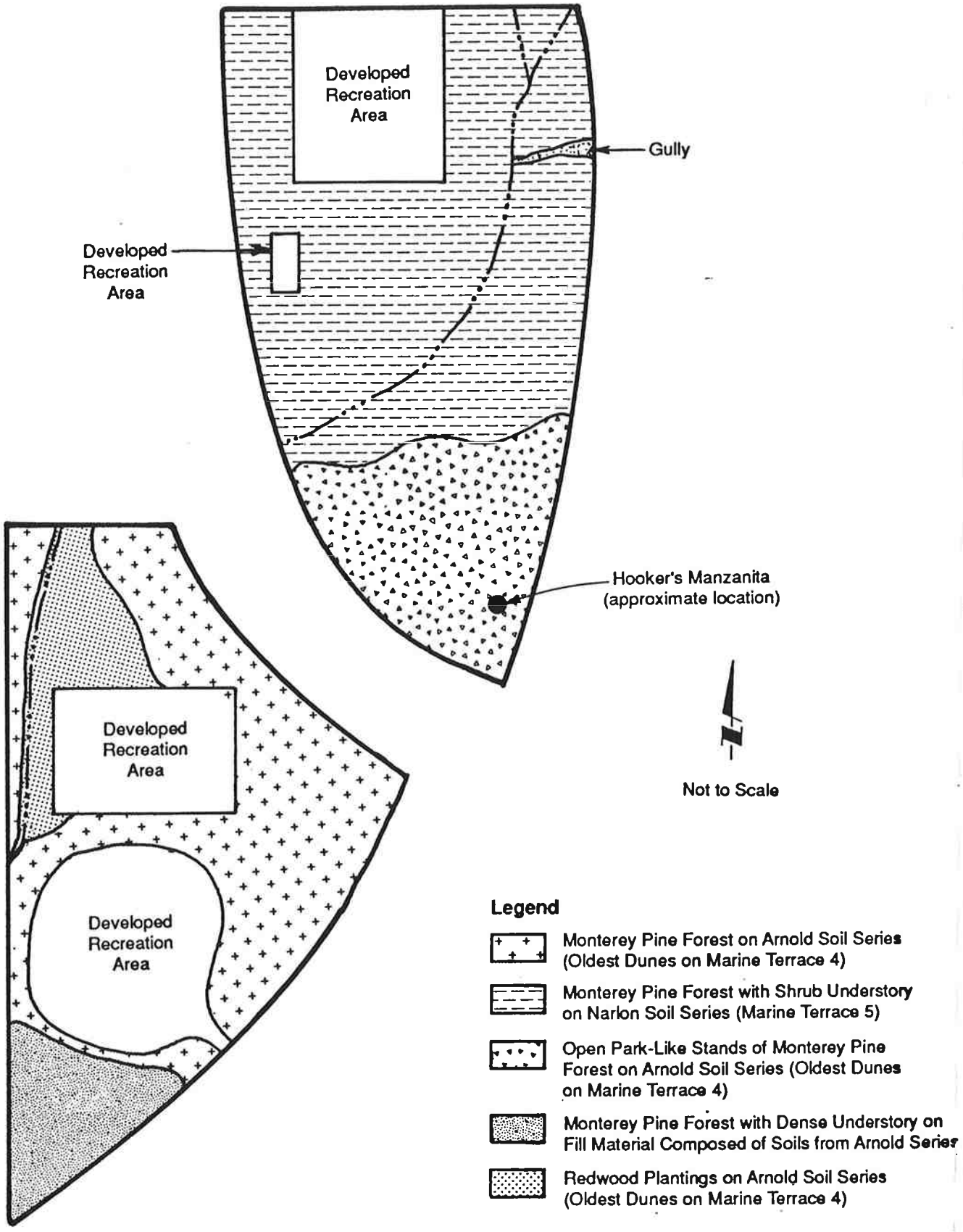


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Figure 10
Vegetation and Soil Types at Forest Hill Park

Geology and Soils

The lower portion of Forest Hill Park is located on the oldest dunes overlying marine terrace 4. The associated soil type is the Arnold series, identified above on the coastal bluffs and marine terrace edge at the Pescadero Canyon West site. Although not previously identified in the Monterey County Soil Survey as occurring specifically in the city, Arnold soil, characterized by the iron-cemented "red" sands, does occur on the oldest dunes landform and most extensively at Fort Ord. This section of the park once supported a city landfill (Kelley pers. comm.).

The upper portion of Forest Hill Park is located on marine terrace 5. The associated soil type is the Narlon series. The Narlon series is a paleosol, or ancient soil, that has a shallow surface horizon of weathered and bleached sand overlay a very thick and dense claypan. Although the soil is extremely acidic, has very low fertility, and has a very low water capacity available to plants, the Narlon series is a wetland soil that readily saturates and ponds water above the infiltration-restricting and root-restricting claypan.

Special-Status Species

One special-status shrub, Hooker's manzanita, was located on the Forest Hill Park site. No special-status wildlife species or important habitat for those species were located field surveys.

Special-Status Plant Species

One individual Hooker's manzanita was located in the northern portion of Forest Hill Park (Figure 10). Hooker's manzanita is considered rare and endangered in California by CNPS (List 1B). This isolated occurrence of Hooker's manzanita on the site could be of natural origin. The manzanita seed could have been dispersed by a fruit-eating bird.

The successful establishment of this species on the site indicates that Forest Hill Park has the potential to support Hooker's manzanita. The single plant occurs on a small isolated patch of Aromas Formation, a geologic formation known to provide suitable habitat for Hooker's manzanita. The City may choose to incorporate more plantings of Hooker's manzanita into the park landscape. Although this species would blend naturally with the Monterey pine forest on the northern end of Forest Hill Park, Hooker's manzanita plantings at the park would not contribute significantly to the long-term conservation of the species. This conclusion is based on the small, isolated condition of the suitable habitat at Forest Hill Park and the presence of other larger core populations.

The largest populations of Hooker's manzanita and suitable habitat areas are protected within the Bureau of Land Management's Natural Resource Management Area at Fort Ord and within Prundale Hills Manzanita Regional Park. Other large populations occur on protected and unprotected

sites at Larkin Valley, Monterey Peninsula, and Lobos Ranch. These five areas provide the best sites for long-term species conservation.

Because Forest Hill Park is maintained for public use and receives a substantial amount of foot traffic, the site has a low potential to support other special-status plants listed in Table 2.

Special-Status Wildlife Species

No special-status wildlife species were observed during the field survey at Forest Hill Park and none have been reported at the site (NDDB 1995).

Because of its small size, frequent use by humans, and isolation from other natural areas by surrounding development, Forest Hill Park has a low potential to support special-status wildlife species or important habitat for those species. The playground portion of the park provides only a small ring of habitat around the developed central portion, and no special-status wildlife species are expected to occur there. Although the portion of the park with the tennis courts provides a slightly larger habitat area, it also has a very low potential of supporting any special-status wildlife species.

Environmentally Sensitive Habitat Area Consistency Determination

Although Monterey pine forest on these geomorphic surfaces (oldest dunes and marine terrace 5) is considered an ESHA in this study, the Monterey pine forest at Forest Hill Park was not determined to be an ESHA for the following reasons: It is heavily used and has been substantially altered, especially at the southern end of the park, and the forest habitat is isolated and surrounded by development. The children's playground, restrooms, and shuffle board court comprise a large component of the southern section of the park. The northern end of the park supports a higher quality Monterey pine forest with a patchy shrub understory layer.

Forest Hill Park has been "disturbed and degraded by human activities and developments" (Public Resources Code, Section 30107.5) and will continue to be maintained to provide opportunities for the public. For these reasons, the Forest Hill Park was not determined to be an "area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role" (Public Resources Code, Section 30107.5).

Resource Management Recommendations

Although the study determined that Forest Hill Park did not support an ESHA, the City could implement the following recommendations to enhance the natural resources at the park:

- **Plant Monterey Pine Seedlings.** The City should continue to plant Monterey pine seedlings in the Monterey pine forest (local genetic stock).

- **Avoid Further Bank Erosion and Gullying.** Further bank erosion and gullying should be avoided at the northern end of the drainage by implementing structural measures and soil bioengineering techniques to stabilize the drainage banks. This gullying is the result of vegetation disturbance and mechanical breakdown of streambanks from park use, increased rates of runoff from impervious surfaces in developed areas adjoining the park, and the high erodibility of the Narlon soil under disturbance conditions.

CARMEL BEACH

Vegetation

Although largely unvegetated, Carmel Beach does support scattered areas of native dune scrub and horticultural plantings (no vegetation figure is provided for this site). Native dune scrub occurs near the corner of Ocean and San Antonio Avenues. Species observed in this scrub habitat during the field survey include mock heather (*Ericameria ericoides*), bush lupine (*Lupinus arboreus*), beach sagewort (*Artemesia pycnocephala*), California blackberry, beach evening primrose (*Camissonia cheiranthefolia*), pink sand verbena (*Abronia umbellata*), croton (*Croton californicus*), California sea rocket (*Cakile maritima*), and ice plant. Six coast live oaks are scattered in the dune scrub.

Horticultural plantings occur in scattered locations along the bluffs of Carmel Beach. One grove of Monterey cypress occurs along Ocean Avenue, near the dune scrub. Other horticultural species that have been planted or have colonized the beach north of Ocean Avenue include acacia, ice plant, and Bermuda grass (*Cynodon dactylon*). Beach dune grass (*Leymus mollis*) has been planted in several areas of the dunes to stabilize erosion problems.

Special-Status Species

Tidestrom's lupine was located in and near the dune scrub habitat at Carmel Beach (Figure 11). In this area, black legless lizards have been reported at Carmel Beach (Bury 1985).

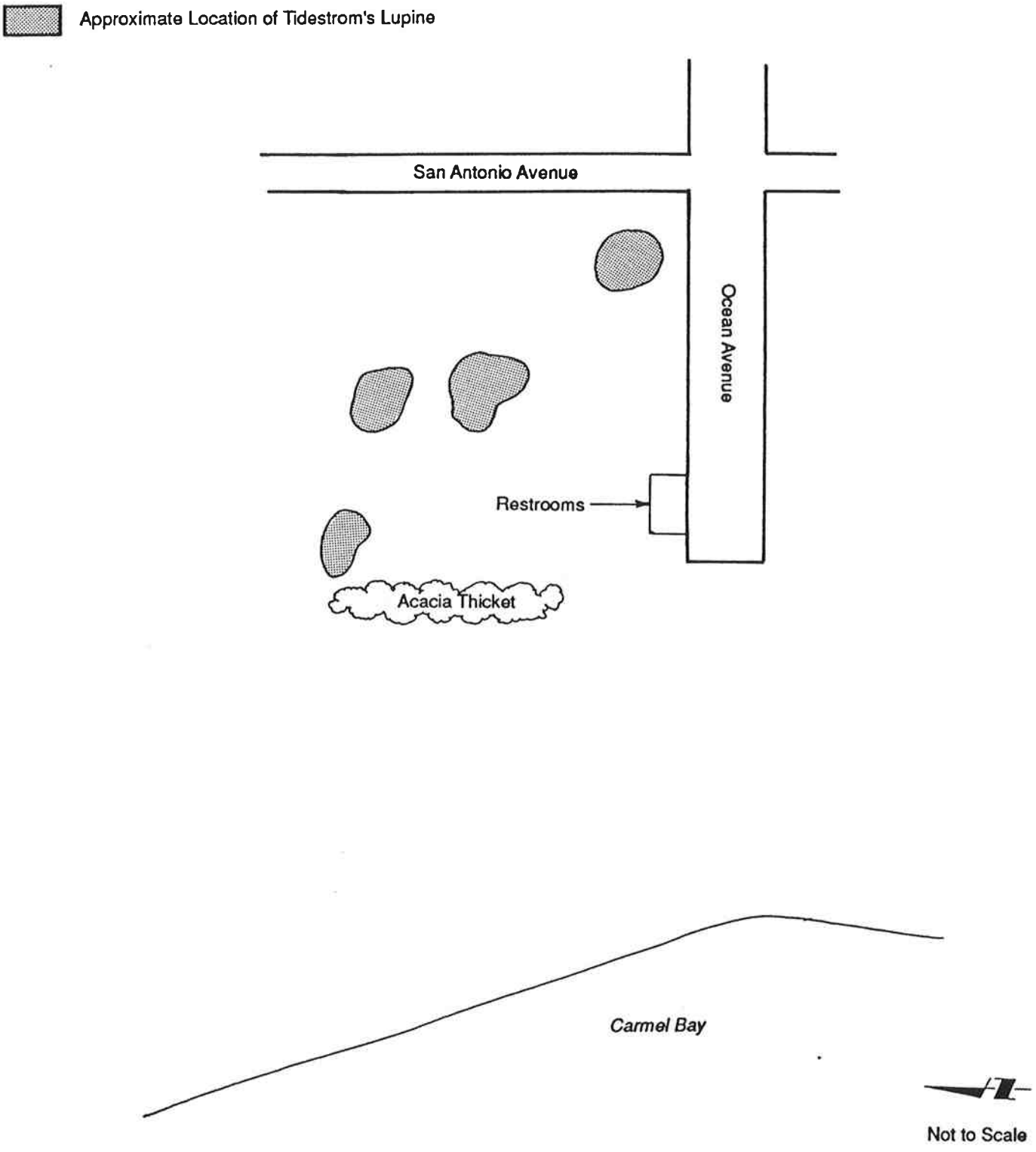

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Figure 11.
General Distribution of Tidestrom's Lupine at Carmel Beach

Special-Status Plant Species

Tidestrom's lupine is a state- and federal-listed endangered and CNPS List 1B plant species. Tidestrom's lupine is a perennial herb that typically occurs in coastal dune habitat. The species is seriously threatened by coastal development, trampling, and non-native plants (Skinner and Pavlik 1994). Other populations that have reported north of Carmel Beach include those located on Asilomar State Beach, on the dunes along Seventeen Mile Drive (west of Spyglass Hill and east of Fan Shell Beach), Pebble Beach, and near Spanish Bay Golf Course (NDDB 1995).

The population of Tidestrom's lupine located on Carmel Beach is a new occurrence and has not been previously reported in the NDDB. This population contains approximately 280 individual plants (168 of these plants were first year seedlings). At Carmel Beach, Tidestrom's lupine is associated with beach sagewort, mock heather, beach evening primrose, bush lupine, and wildrye. The population appears viable and increasing based on the large number of seedlings. However, habitat conditions for Tidestrom's lupine on Carmel Beach are currently and continue to be degraded from public use and the spread of invasive non-native species.

No other special-status plant species were located on Carmel Beach during the field survey and none have been reported in the NDDB (1995). However, suitable habitat was identified in the dune scrub for other species listed in Table 2. Plant species that have the potential to occur on Carmel Beach but would not have been identifiable at the time of the field survey include one-awned spineflower, robust spineflower, and beach layia.

Special-Status Wildlife Species

No special-status wildlife species were observed during the field survey at Carmel Beach and none have been reported in the NDDB. However, 12 black legless lizards were captured at Carmel Beach in 1984 during a USFWS study of legless lizards in the Monterey Bay region (Bury 1985). Data from these 1984 surveys is included in the NDDB; however, the exact locations of black legless lizard observations in the NDDB have been suppressed by DFG. Historical observations of legless lizards cannot be attributed to specific locations from the standard NDDB data.

Currently, potential habitat for black legless lizards exists in the eastern portion of the beach area where a small pocket of native dune vegetation exists. Frequent human use of the area and encroachment of non-native species such as ice plant reduce the area's value for legless lizard. However, Bury (1985) describes similar problems during the 1984 survey and black legless lizards were still located during these surveys. The possibility of black legless lizards still occurring at Carmel Beach is considered moderate.

The beach is considered potential habitat for the western snowy plover although the frequent human use and occurrence of unleashed dogs likely exclude plovers from nesting at the site.

No other special-status wildlife species are expected to occur at Carmel Beach.

Environmentally Sensitive Habitat Area Consistency Determination

Based on the criteria provided in Section 2, the following habitats at Carmel Beach should be designated as ESHAs and protected and maintained consistent with Public Resources Code, Sections 30231 and 30240:

- dune scrub that provides habitat for Tidestrom's lupine and black legless lizard, and
- unvegetated dunes.

Resource Management Recommendations

The Carmel Beach Management Plan (incorporated as an element of "A Guide to the Management of Carmel's Forest, Parks and Beaches" [Taylor and D'Ambrosio 1981]) outlines specific measures to manage and maintain the balance between the natural dune environment and public use. Activities discussed in detail in the Carmel Beach Management Plan include the following:

- restoring and revegetating bluffs and dunes;
- constructing seawalls and rock revetments and improving the Scenic Road stormwater drainage system; and
- installing beach access stairways, shoreline pathway, and informational signs.

If the management and maintenance actions outlined in the Carmel Beach Management Plan are implemented as described in the plan, the balance between maintaining the natural dune ecology and providing public safely may be achieved. The following measures could be incorporated into the management plan to ensure that long-term management activities maintain the natural dune systems:

- **Retain a Qualified Restoration Specialist to Assist in Dune Restoration.** A qualified restoration ecologist or botanist with experience in dune restoration should be retained to assist in developing a planting plan for restoring the dunes. The restoration plan should incorporate habitat characteristics that favor Tidestrom's lupine and black legless lizard. Tidestrom's lupine is a state- and federal-listed endangered species and is protected under the state and federal endangered species acts. Although there are no specific consultation requirements, the City should contact and discuss any future habitat enhancement with DFG and USFWS personnel.
- **Develop Interpretive Signs.** Interpretive signs should be developed to educate the public on dune ecology and the dunes. These signs should be posted to discourage trampling of dune scrub habitat and "shortcuts" down beach bluffs. An ideal location for

an interpretive sign would be near the corner of Ocean Avenue and North San Antonio Avenue.

- **Prevent Further Planting or Expansion of Invasive Horticultural Species.** Although removal of ice plant from the beach bluffs may not be feasible (because of the expense and time required), the City should prevent further planting or spread of existing populations. These actions should be incorporated into the City's beach management plan.

- **Monitor the Tidestrom's Lupine Population**. The City should retain a qualified botanist to monitor the population of Tidestrom's lupine on Carmel Beach. The population should be assessed annually (or based on schedule agreed upon by DFG and USFWS) to determine if the population is stable and determine 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 occurrences on the beach.

- **Retain a Biologist to Determine the Current Status of the Black Legless Lizard at Carmel Beach.** The City should retain a qualified herpetologist to monitor the black legless lizard population and determine if measures to protect the species should be instituted.

Section 6. Conclusions

The California Coastal Act definition of an ESHA was interpreted for this study to develop a list of criteria for identifying environmentally sensitive habitats. The ESHA criteria were based on certain terms used in the definition of an ESHA, including "rare", "especially valuable", and "special nature or role in an ecosystem". Each of the five study sites was evaluated to determine if they support plant or animal life or habitats that are rare or especially valuable or that provide a special role in an ecosystem.

In summary, the habitat types identified as environmentally sensitive in this study include Monterey pine forest on middle-aged dunes, wetland drainage, central coast arroyo willow riparian forest, wet meadow, coastal terrace prairie, and dune scrub and unvegetated dunes. Areas that support important habitat for Hickman's onion, Tidestrom's lupine, black legless lizard, and Monterey dusky-footed woodrat were also identified as environmentally sensitive. These native habitats are regionally unique, and most are protected or monitored by state and federal agencies. During this ESHA study, management recommendations were developed to provide the City with guidance on long-term protection and maintenance of environmentally sensitive habitats.

The ESHA determinations and resource management recommendations provided in this report are subject to further evaluation by the Coastal Commission and city council and are based on the most current biological information. As new information becomes available, ESHA criteria and boundaries should be reevaluated, particularly for Monterey pine forests. Although not all Monterey pine forests were considered environmentally sensitive as defined under the California Coastal Act, Monterey pine forest is a regionally unique habitat that should be managed and preserved to maintain its long-term viability.

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