

3.3 NATURAL RESOURCES

A rich diversity of natural resources is found throughout the Presidio, many of which represent remnants of once vast ecosystems found on the San Francisco peninsula. These native plant communities, clear views of the Bay, and sounds of birds singing throughout creeks and springs all contribute to the complexity of the Presidio's natural values. Natural resources of the Presidio include biological and physical resources such as vegetation and wildlife, water resources (including wetlands), visual resources, air quality, and noise. The Natural Resources Affected Environment section discusses the existing conditions as related to natural resources and sensitive areas.

3.3.1 BIOLOGICAL RESOURCES

INTRODUCTION

This description of biological resources addresses vegetation and wildlife (native, exotic and protected species), and provides background information on integrated pest management practices and ecological restoration projects affecting these resources. Relevant information regarding the regulatory framework is also provided.

The study area for this section includes Area A (coastal), as well as Area B (non-coastal) of the Presidio. Although not under the administrative jurisdiction of the Trust, Area A is included in these discussions because PTMP-related activities could have an indirect effect on adjacent and downstream habitats and species occurring in Area A, as well as the Bay and ocean environment. Except for the southern shore of Mountain Lake (described in the next section), which is under the jurisdiction of the City of San Francisco, Area A contains the only natural habitats adjacent to Area B.

VEGETATION

Applicable Laws, Regulations, and Policies

The Federal Endangered Species Act of 1973 (FESA) defines an endangered species as any species or subspecies “in danger of extinction

throughout all or a significant portion of its range.” A threatened species is defined as any species or subspecies of fish, wildlife, or plants “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” Threatened or endangered species and their critical habitat are designated through publication of a final rule in the *Federal Register*.

Section 7 of the FESA requires that federal agencies ensure that their actions (including funding or permitting of various projects or activities) are not likely to jeopardize the continued existence of a listed species or destroy or adversely modify its critical habitat. This obligation requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) on any federal actions (including issuing Section 404 permits by the U.S. Army Corps of Engineers [the Corps]) that may affect listed species to ensure that reasonable and prudent measures will be undertaken to mitigate impacts on listed species. Consultation with the USFWS and NMFS can be either formal or informal depending on the likelihood of the action to adversely affect listed species or critical habitat. Once a formal consultation is initiated, the USFWS or NMFS will issue a Biological Opinion (either a “no jeopardy” or a “jeopardy” opinion) indicating whether the proposed agency action will jeopardize the continued existence of a listed species or result in the destruction or modification of its critical habitat. A permit cannot be issued for a project with a “jeopardy” opinion unless it is redesigned to lessen impacts, resulting in a “no jeopardy” opinion.

Executive Order 13112 of February 3, 1999, defines “alien species,” recognizes the ecological impacts of invasive species, discusses control measures to be taken to prevent the introduction of invasive species, and outlines the duties of each federal agency whose actions may affect the status of invasive species. It essentially directs federal agencies to prevent the introduction of potentially invasive exotic species and to control invasive exotics on lands for which they are responsible. To assist federal agencies and other landowners in directing their exotic control activities, the California Exotic Pest Plant Council (CEPPC) has compiled lists of exotic pest plants of greatest ecological concern in California; List A-1 contains the Most Invasive Wildland Pest Plants: Widespread; List A-2 contains the Most Invasive Wildland Pest Plants: Regional. Wildland Pest Plants of Lesser Invasiveness are contained in List B.

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The VMP was formulated within the context of the GMPA. The VMP was prepared jointly by the Trust and NPS, with the environmental review process and final publication completed in December 2001. Restoration strategies and mitigation measures in the VMP were adopted by the Trust through the signing of a Finding of No Significant Effect by the Trust Executive Director. The plan guides the management of all native and introduced vegetation by the organizations operating within the Presidio. The VMP divides the Presidio's vegetation resources into the three landscape types (native plant communities, historic forest, and landscaped - Figure 17), based upon resource characteristics and values, historic land uses, and practical management concerns. For example, the Historic Forest Management Zone is generally the area that was planted as a result of the forestation plan, as estimated from the extent of the original planted forest. The delineation of this zone was based upon 1935 aerial photographs and records. This zone will be managed to preserve and rehabilitate the health and sustainability of the forest stands. Trees also exist in the two other vegetation zones, landscape and native plant communities, and will be managed accordingly to the objectives set forth in the VMP. For example, "to ensure the protection and expansion of remnant native plant communities and special-status species... and their remaining habitat from past development,... non-native species, and non-native trees outside of historic forest management zone would be removed."(VMP, p.21)"

VMP objectives for management of the Native Plant Communities Zone, covering about 394 acres on the Presidio, are:

- to protect and enhance existing native plant communities and their remaining habitat by removing threats to native species, repairing damage to habitat, and increasing reproductive success; and
- to restore and enlarge native plant communities by reclaiming habitat from past development.

These objectives would be accomplished by the implementation of a long-term community-based habitat restoration program and by developing protective buffer areas between native plant community and historic forest management zones.

Management objectives for the 264-acre Historic Forest Management Zone include:

- to maintain the unique cultural landscape and character of the historic forest as guided by the NHPA;
- to preserve healthy trees;
- to rehabilitate the aging forest;
- to increase structural and species diversity, and encourage natural regeneration; and
- to protect and enhance valuable forest wildlife habitats.

VMP objectives for the 778-acre Landscape Vegetation Management Zone are:

- to maximize sustainable practices in plan development, implementation, and maintenance of landscape vegetation projects;
- to identify, document, and map historic and existing landscape plantings and plant species;
- to retain existing historic landscapes and historic plants whenever feasible;
- to select appropriate replacement plant material considering historic use, design intent, function, potential impacts to native plants, and sustainability;
- to identify and treat hazardous tree conditions; and
- to identify and maintain heritage landmark trees.

The VMP also designates a Special Management Zone in the southwest area of the Presidio, which is subject to further planning before a determination of treatment is made.

History of Vegetation on the Presidio

Historically, natural communities thrived throughout the Presidio and occupied sandy habitats of dune origin, particularly in the Lobos basin, serpentine-derived uplands or cliffsides exposed to the ocean, and serpentine slopes on the western Bay side of the Marina basin. Both dune and serpentine soils supported many specially adapted plant species, some of which are largely or exclusively restricted to these soil types. At one time, stands of native forests composed of prominent groves of coast live oak, California bay, madrone, and California



Figure 17: Vegetation Management Plan and Wildlife Corridors

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buckeye, could have been scattered within pockets of the Presidio (Vasey 1996). Now the only native upland tree-dominated community, coast live oak woodland, occupies about six acres (Presidio Trust 2001).

Native plant communities on the Presidio currently consist of approximately 171 acres of remnant and restored indigenous natural vegetation (Vasey 1996, Presidio Trust 2001). Recent restoration efforts have increased native vegetation by approximately 10 acres at Lobos Dunes, 5 acres at Feral Dunes, and 25 acres at Crissy Field.

Because the distinctions between plant communities boundaries are often not clearly defined on-site, synonymous names used to identify vegetation resources by varying authors of past reports prepared for the Presidio are given in parentheses. Further information about the native plant communities continued below is contained in the GMPA and in the VMP.

Native Plant Communities

Native plant species and communities are those that occurred as a result of natural processes on the Presidio and its general vicinity prior to European settlement. Approximately 90 percent of the native vegetation of the Presidio has been displaced by the initial forest plantings and their subsequent expansion, previous Presidio land management activities, urban expansion, and the spread of invasive exotic species. Native plant species and communities on the Presidio have undergone progressive degradation because of habitat fragmentation, ecosystem conversion from sand and serpentine-based vegetation communities to artificial forest, and competition from invasive exotic species. The Presidio's remaining native plant communities currently occupy approximately 10 percent of the Presidio land area (171 acres) occurring primarily on west- and north-facing coastal bluffs extending from Crissy Field to Baker Beach, and as scattered habitat fragments in the southwestern and southeastern portions of the Presidio. Although most of the Presidio's remaining natural communities are small, and often isolated, they provide an essential refuge for a diversity of native plants communities and associated special-status plant species, some of which have been almost entirely lost in San Francisco (Vasey

1996). Figure 18 shows the location of native plant communities in both Areas A and B.

Non-native plant communities are those that are predominantly composed of species that were deliberately or inadvertently introduced by humans during and post European settlement. A survey found 161 non-indigenous species representing 41 percent of the 389 plant species, many of which are highly invasive, within the Presidio's natural areas (Vasey 1996). Several trees and shrub species are native to other parts of California, but not native to the Presidio. Many species are garden "escapes." Most are invasive weedy species that constitute threats to indigenous habitat and native species. Where ice plant, riggut brome, or soft chess have overwhelmed the native species, the community is categorized as "ice plant mats and non-native grasses on dunes" (Vasey 1996). On the Presidio, ice plant mats occur on sandy soils above Baker Beach, between Washington Boulevard and the PSHS, and north of Lobos Creek. There are also areas dominated by Cape, English, and Algerian ivies.

Plant Communities Occurring only in Area A

Wetland Communities

In Area A, tidal action was introduced behind part of the foredune system on Crissy Field, restoring about 15 acres of tidal prism. Subsequent planting efforts, which reintroduced approximately 22 native plant species over the past few years, have resulted in the restoration of 3 acres of coastal salt marsh vegetation.

Upland Communities of Area A

The northern foredune community forms a transition along the coastline between the marine habitat of the Pacific Ocean and terrestrial habitats farther inland. The foredunes are composed of active sand dunes that have not been stabilized by vegetation, and are subject to movement of sand from wind and wave erosion. As dunes move inward, they become vegetated and more stable. On the Presidio, the foredune community covers a total of approximately 14.2 acres, occurring near the mouth of Lobos Creek, and extending north to the cliffs beyond the shoreline at Baker Beach and to the Crissy Field dunes.

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Remnants of the northern foredune community persist between the Crissy Field wetland and San Francisco Bay. It is dominated by beach sagewort, sand verbenas, silver beach weed, coast buckwheat, Chamisso's lupine, beach primrose, American dune grass, and strawberry. Plants associated with this community are tolerant of desiccating, salt-bearing winds. Coastal dune systems on the San Francisco peninsula also support unique plant and insect communities (Vasey 1996; Hafernik 1994). The extent of the foredune community has been greatly reduced from its historic distribution and this community is now rare in California (CDFG n.d.).

Plant Communities Occurring in both Areas A and B

Wetland and Riparian Communities of Areas A and B

To date, 34 areas of fresh water wetland and riparian vegetation, totaling about 39 acres, have been identified in both Areas A and B (see Figure 19). Palustrine emergent wetlands (represented by freshwater marsh and freshwater seep communities, discussed below) are found in the vicinity of permanent seeps and pond margins. Palustrine shrub-scrub wetlands (represented by the central coast riparian scrub community) and palustrine forest communities (represented by arroyo willow riparian forest and coast live oak riparian forest) occur along the margins of creeks and Mountain Lake. In addition, 15 additional wetland-like areas, totaling 43.3 acres, have been identified (Wood 1999). Although these areas may not meet the criteria required for classification as jurisdictional wetlands, they provide important wetland habitat values for wildlife, such as seasonal water sources, cover, and food.

Coastal freshwater marsh – This is an herbaceous community occurring in areas with perennial inundation or soil saturation in the root zone. On the Presidio, it covers 1.8 acres dominated by emergent wetland plants such as tules or bulrushes, rushes, and sedges. Much emergent and aquatic vegetation grows along the edges of Mountain Lake in the South Hills Planning District.

The 18-acre Crissy Field wetland is one component of the larger Crissy Field Restoration Project, designed to restore approximately 100 acres of bayfront shoreline to enhance natural, cultural, and recreational values.

Construction of the wetland and adjacent foredune habitat was completed in November 1999. The wetland is designed to function as a tidal salt marsh. Over 35,000 native salt marsh and upland plants presenting 25 species have been planted in the wetland.

Four plant communities occur on the restored site. The salt marsh community is dominated by cordgrass, pickleweed, salt grass, and marsh gumplant. The foredune community is comprised of sand verbenas, beach sagewort, beach bur, beach strawberry, beach salt bush, morning glory, beach pea, and American dune grass. The backdune scrub community has been restored with plantings of shrubs including coyote brush, mock heather, lizard tail, buckwheat, beach primrose and sticky monkey flower. Dune gilia and San Francisco spineflower, special-status plant species indigenous to the Presidio, have been established in the backdune. About one-third of the restored wetland consists of a freshwater wetland, or dune swale that supports silverweed, water parsley, yellow and arroyo willows, dogwood, cow clover, and several species of rushes and sedges.

Freshwater seeps – These are composed of vegetation similar to that of a freshwater marsh, occur at sites with seasonal or perennial soil saturation resulting from groundwater seepage. On the Presidio, small seeps and springs occur in northern coastal scrub in Areas A and B and on permanently moist or wet soils found north of the PHSH tennis courts in the South Hills Planning District, and within the East Housing District. Although they cover little area, these small wetlands provide a rich species diversity (Vasey 1996). For example, the special-status Franciscan thistle occurs only in this community, and a small willow-wax myrtle grove and other seasonal wetland grassland species have established in the seasonal dune slack north of the PHSH. This evolving dune slack wetland vegetation is the only remnant example of its kind on the northern San Francisco peninsula.

Riparian communities – These are dominated by native plants, such as willows and alders, that are adapted to moist growing conditions along streams and other drainages. In general, riparian communities throughout California and especially in the San Francisco region are considered sensitive because of very high wildlife values, limited extent in this arid region, and substantial losses of extent and values resulting from historic and recent human activities and

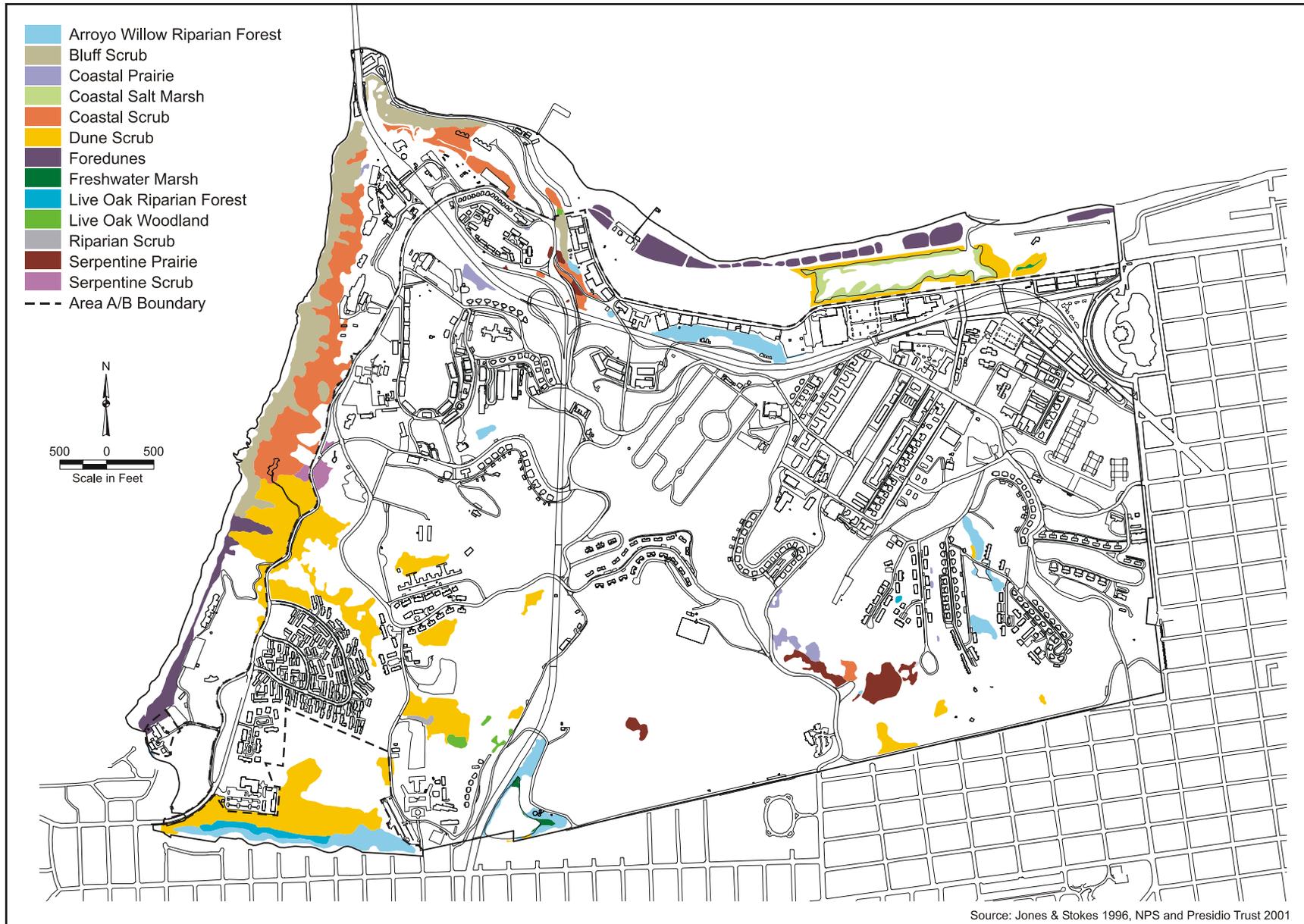


Figure 18: Native Plant Communities

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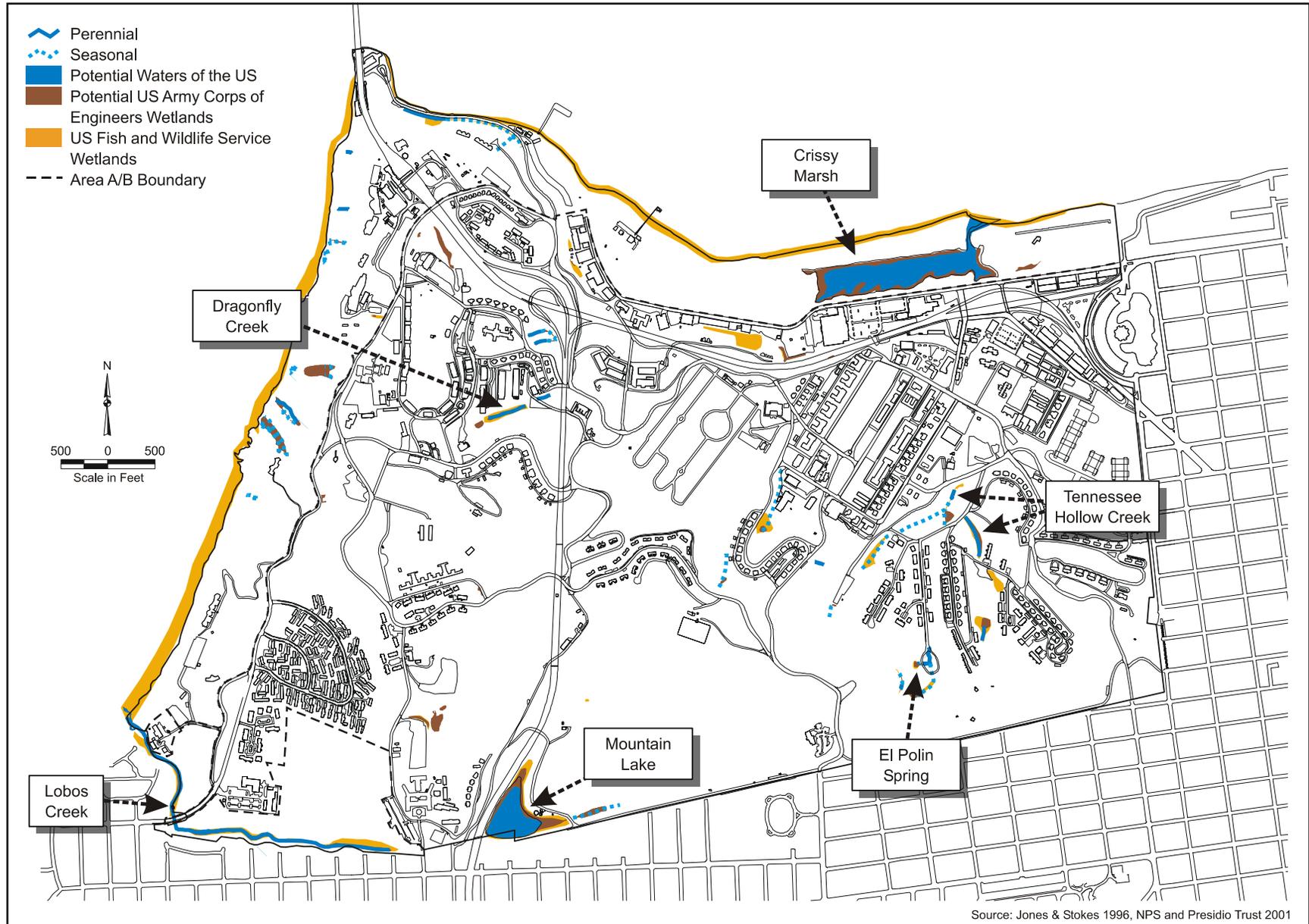


Figure 19: Wetlands and Stream Drainages

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development. Riparian communities provide shelter, nesting sites, forage and water for a wide variety of wildlife species, including migratory bird species.

In the Presidio, riparian vegetation is represented by three native plant communities (Figure 18), described below.

Central coast live oak riparian forest, - Covering 1.8 acres of the Presidio, is a hardwood forest dominated by coast live oak trees that occurs along drier, outer floodplains of perennial streams. This community generally occupies a transitional zone between moist, willow-dominated areas and drier, upland shrublands. The oak riparian forest adjacent to Lobos Creek in Area A is the last stand associated with a riparian area within the northern San Francisco Peninsula. Lobos Creek supports one of the least fragmented pieces of undeveloped riparian habitat in the city and one of the areas of highest wildlife habitat value in the Presidio (Harding Lawson Assocs. 1996). Its understory supports a diversity of plant species, but in some areas it is degraded by a dense cover of English and Cape ivies.

Central coast arroyo willow riparian forest, - Often occurring in pure dense stands of arroyo willow trees, these develop in the wettest zones of perennial and intermittent creeks and ponds below the zone where live oak riparian forest is established. Arroyo willow riparian forest occurs over 5.7 acres along the central reach of Lobos Creek and the northern margin of Mountain Lake, and in a few scattered locations along the El Polin Spring/Tennessee Hollow drainage in the East Housing Planning District. Arroyo willow riparian forest is relatively uncommon at the Presidio and in San Francisco, and is the richest existing indigenous native community on the Presidio (Vasey 1996).

Central coast riparian scrub – This is a dense stream- or lake-associated community with sandy soils and gravel bars dominated by large native shrubs including California blackberry and small trees, such as willows adapted to high moisture levels and frequent flooding. Central coast riparian scrub occurs on 0.4 acre in association with arroyo willow riparian forest at Mountain Lake and in a small section of the eastern tributary of the Tennessee Hollow Drainages System. An isolated stand of riparian scrub occurs east of Battery Caulfield Road, north of the PSHS. This stream- or

lake-associated community is dominated by shrubs and small trees including California wax myrtle, coyote brush, and arroyo willow.

Upland Communities of Areas A and B

Bluff scrub – In the Presidio this is relatively continuous along the steep bluffs facing the ocean from Battery Crosby to south of Fort Point, and along the bayshore from Fort Point to west of Crissy Field, covering a total of 22.1 acres on the Presidio. It is more fragmented on the bayshore side and on the more interior upland cliffsides. Bluff scrub also occurs on serpentine outcrops at Fort Point and north of Baker Beach. Bluff scrub is dominated by low shrubs and prostrate herbaceous species including California blackberry, poison oak, lizard tail, and toyon. The bluff scrub community has the highest concentration of native species and natural diversity on the Presidio (Vasey 1996).

Northern coastal scrub – This occurs at a slightly higher elevation on adjacent gentle slopes and inland areas. Coastal scrub extends inland of bluff scrub from Battery Crosby to west of Crissy Field, and at 3 scattered locations in the south central portion of the Presidio in the Main Post and residential Planning Districts. Much of the 43.6 acres mapped as coastal scrub occur on serpentine soils and could support inclusions of serpentine scrub. This community is dominated by California blackberry, poison oak, prostrate and erect coyote brush, golden yarrow, toyon, and arroyo willow.

Central dune scrub – This is an inland sand dune community of shrubs and annual and perennial wildflowers that is characterized by densely packed shrubs interspersed with scattered grassy openings. The largest remaining patches of dune scrub occur on the bluffs below Lincoln Boulevard south of Battery Crosby, between Lincoln Boulevard and Washington Boulevard, on the restored Lobos Creek dunes north of Lobos Creek, and on sites east of the PSHS north parking lot. The Lobos Creek dunes were a playing field and disturbed area that was restored in 1995. Dune scrub occurs on the sand terrace slopes above Baker Beach and extends up sandy inland dunes east toward and beyond Mountain Lake. Dune scrub occurs over a total of 48.5 acres in Area A and Area B within the South Hills Planning District and the East Housing Planning Districts. It is dominated by mock heather, lizard tail, bush monkeyflower, coyote brush, bush lupine, Chamisso's lupine, poison oak, California coffeeberry, and California blackberry. Several special- status plant species (San Francisco campion, San

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Francisco wallflower, San Francisco spineflower, dune gilia, and San Francisco lessingia) are found in association with this community. The extent of the dune scrub community has been greatly reduced from its historic distribution, and it is considered to be a rare community in California.

Serpentine scrub (Chaparral) – This covers 3.5 acres on the Presidio and intergrades with serpentine grassland and serpentine barrens. Serpentine (a soil derived from serpentinite rock) contains low levels of nutrients, such as nitrogen, that are essential to plant growth, and high levels of minerals that are toxic to most plants, such as nickel. Many plant species, including several special-status species described below, are considered “serpentine endemics.” Small patches of serpentine scrub occur on well-developed serpentine soils southwest of Crissy Field in the Main Post Planning District, south of the World War II Memorial on either side of Lincoln Boulevard in Area A, and the South Hills Planning District. The indigenous serpentine natural communities on the Presidio are more diverse than natural communities occurring on sandy substrates, and support many rare plant species (Vasey 1996).

Coastal terrace prairie – This was once the most common plant community on the Presidio but now covers less than 3 acres in the western area of the Presidio (Vasey 1996). Coastal prairie is dominated by California oatgrass, purple needlegrass, foothill needlegrass, and many non-native grasses. Coastal prairie is considered to be a sensitive community because its extent has been drastically reduced in California due to agricultural practices and urban development. (CDFG n.d.)

Serpentine bunchgrass grassland (Prairie) – This is a sensitive grass- and herb-dominated community restricted to well-developed serpentine soils in more protected, drier, less windy, and more sunny uplands. On the Presidio, the serpentine bunchgrass community occurs on about 4 acres within the South Hills Planning District. The upper portions of the rocky serpentine ridge running south from Fort Point to the southern Presidio entrance at Arguello Boulevard once contained large areas of serpentine bunchgrass prairie (Vasey 1996). It is dominated by purple needlegrass and

foothill needlegrass as well as serpentine-endemic special-status species such as the Presidio clarkia and Marin western flax.

Coast live oak woodland – This develops in moist, sheltered sites away from the immediate coast. A total of 5.3 acres of live oak woodland occur on the Presidio. Only small, scattered stands of coast live oaks with an understory of shrubs or grass occur on the Presidio. A stand of short, multitrunked coast live oaks occurs on about 1.7 acres of stabilized dunes northeast of the PHS in the South Hills Planning District. Historically, other native trees (such as buckeye, madrone, or California bay) could have occurred with coast live oak.

Special-Status Plant Species

Special-status species of plants are those legally protected under FESA, species proposed or candidates for listing under FESA, and “sensitive” species that are considered sufficiently rare by the scientific community to qualify for such listing. As a federal agency, in accordance with Section 7 of the FESA, the Trust is required to consult as necessary with the USFWS to ensure that its actions do not jeopardize the continued existence of species listed as endangered or threatened under FESA or their designated Critical Habitats. Section 7 consultations with the USFWS was initiated during the scoping phase for the PTMP, and will continue to ensure that the plan is in compliance with federal law and will not jeopardize the continued existence of any special-status species nor its habitat.

Thirteen endangered, threatened, and sensitive plant species listed, proposed, or candidates for listing under FESA, Species of Special Concern designated by the USFWS, and species considered sensitive by the California Native Plant Society (CNPS) known to occur on the Presidio are designated in Table 4 and shown on Figure 20 (USFWS 2001). Four plant species listed as endangered under FESA occur on the Presidio: Raven's (Presidio) manzanita, Presidio clarkia, California sea-blite and San Francisco lessingia. One species, Marin dwarf flax, is listed as threatened under the FESA. Two species, Franciscan thistle and dune gilia, are proposed for listing under FESA. Six other plant species are considered Species of Special Concern by the USFWS. Coast rockcress is included on CNPS List 4, a watch list of plants that are declining in numbers in California. Five of these plant species are also listed as endangered, and one is listed as threatened by the State of California. The State of California's Endangered Species Act

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(CESA) protects endangered species, although state law is not applicable to federal lands.

The Raven's Manzanita Recovery Plan was published by the USFWS in 1984. The focus of the recovery effort for this federally-listed endangered species is protection of the existing wild manzanita plant and identification of new receptor sites for establishment of daughter clones. An update to the management objectives for the Raven's manzanita is expected later this year, as described below.

Recovery plans for two federally-listed plant species occurring on the Presidio are also contained in the Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area (USFWS 1999). The plan addresses the recovery of the Presidio clarkia and the Marin dwarf flax. It outlines protection and management strategies and actions for the remaining populations to ensure the long-term survival of the species. Strategies include preserving the largest possible block of serpentine habitat, establishing protective buffer areas, reducing trampling and disturbance, and allowing for potential expansion of the population. In addition, unoccupied suitable habitat would be protected, and the effectiveness of various techniques for opening new habitat would be evaluated. Although not discussed in the Recovery Plan, these measures would also benefit the Franciscan thistle, San Francisco wallflower, and the coast rock cress.

In addition, the USFWS is preparing a Draft Recovery Plan for Coastal Plans of the Northern San Francisco Peninsula. The recovery plan will address two species: San Francisco lessingia (*Lessingia germanorum* Cham.) and Raven's manzanita (recently treated taxonomically as *Arctostaphylos hookeri* G. Don ssp. *ravenii* P. Wells). The recovery plan is expected to be released in Fall 2001. Once approved, this recovery plan will provide an update for and merge with the 1984 Raven's manzanita plan described above. The plan will include actions that would benefit other federally-listed species that are ecologically associated with these principal species.

Special-status species within the native plant communities on the Presidio are concentrated in central dune scrub, serpentine scrub, and serpentine grassland communities, discussed in the previous text on plant communities

(Table 4 and Figure 18). The rapid spread of invasive exotic plant species is one of the most critical threats to the function of these communities and the viability of the Presidio's native flora (Vasey 1996).

California Sea-blite – This was recently reintroduced into the Crissy Field marsh by the GGNRA. It is a wind-pollinated, succulent-leafed, perennial shrub in the goosefoot family. The historic range of this species was limited to the San Francisco estuary and the vicinity of Morro Bay. California sea-blite had been extirpated from San Francisco Bay; there have been no valid reports or collections of this species from the Bay since the mid-twentieth century. Prior to its reintroduction, Morro Bay hosted the only surviving population, where it is restricted to the upper-intertidal zone within coastal salt marsh habitat.

Coast rock cress – This is a perennial plant with rose-purple flowers borne on a stalk arising from a basal rosette of leaves. It occurs in scattered locations in bluff scrub and coastal scrub communities. In the Year 2000 survey, 3 formerly located populations were not found. However, 2 new populations were mapped on the coastal bluffs.

Dune gilia – This is an annual plant with a skunk-like odor and bright blue-violet flowers. It occurs in open sandy areas within the central dune scrub plant community habitats.

Franciscan thistle – This is endemic to the San Francisco Bay region. It is a short-lived, perennial plant found in serpentine seeps, streamsides, slope wetlands and coastal sites where the soil is saturated perennially, or nearly so. On the Presidio, 1 population of the Franciscan thistle occurs along the coastal bluff at Fort Point, and several populations occur along the serpentine seeps of the coastal bluffs immediately south of the Golden Gate Bridge in Area A.

Marin dwarf flax – This is a small annual with pink to rose-colored petals. One population occurs on serpentine barrens in serpentine scrub and grassland

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Table 4: Known Occurrences of Special-Status Plant Species on the Presidio

Common Name	Scientific Name	Federal/State/ CNPS Status	Habitat	Area
Coast rock cress	<i>Arabis blepharophylla</i>	--/--/4	Coastal Scrub, Serpentine Scrub	A
Raven's manzanita	<i>Arctostaphylos hookeri</i> ssp. <i>ravenii</i>	FE/CE/1B	Serpentine Scrub	A,B
San Francisco Bay spineflower	<i>Chorizanthe cuspidate</i> var. <i>Cuspidata</i>	(FSC)/--/1B	Lobos Creek Dunes, Dune Scrub	A,B
Franciscan thistle	<i>Cirsium andrewsii</i>	--/--/proposed 1B	Coastal Bluff Serpentine Seeps	A
Presidio clarkia	<i>Clarkia franciscana</i>	FE/CE/1B	Serpentine Coastal Prairie, Serpentine Barrens and Rock Outcrops	B
San Francisco wallflower	<i>Erysimum francisanum</i>	(FSC)/--/4	Dune Scrub, Coastal and Bluff Scrub, Serpentine Grassland	A,B
Dune gilia	<i>Gilia capitata</i> ssp. <i>chamissionis</i>	--/--/proposed 1B	Serpentine Grassland	A,B
San Francisco gumplant	<i>Grindelia hirsutula</i> var. <i>maritima</i>	(FSC)/--/1B	Dune Scrub, Coastal Scrub	A,B
Marin western flax	<i>Hesperolinon congestum</i>	FT/CT/1B	Serpentine Scrub	A,B
San Francisco lessingia	<i>Lessingia germanorum</i>	FE/CE/1B	Serpentine Grassland and Barrens	B
San Francisco popcorn flower	<i>Plagiobothrys diffusus</i> (<i>P. reticulatus</i> var. <i>rossianorum</i>)	(FSC)/CE/1B	Lobos Creek Dunes, Dune Scrub	A,B
(a)			see footnote a.	
San Francisco campion	<i>Silene verecunda</i> ssp. <i>verecunda</i>	(FSC)/--/1B	Dune Scrub	A,B
California seablite	<i>Suaeda californica</i>	(FE/CE/1B)	Brackish marsh	A
San Francisco owl's-clover	<i>Triphysaria floribunda</i>	(FSC)/--/1B	Serpentine Scrub	B

Source: California Department of Fish and Game Natural Diversity Database Special Vascular Plants, Bryophytes and List, January 2001 and National Park Service (1995b).

Notes:

Status definitions:

- = no listing status
- Federal:** U.S. Fish and Wildlife Service (50 CFR 17.12, 61 FR 40:7596-7613, Feb. 28, 1996)
- FE = listed as endangered under the Federal Endangered Species Act
- FT = listed as threatened under the Federal Endangered Species Act
- (FSC) = Federal Special Concern Species (former Category 2 candidates)
- State:** California Department of Fish and Game (1995)
- CE = listed as endangered under the California Endangered Species Act
- CT = listed as threatened under the California Endangered Species Act
- CNPS:** California Native Plant Society (Skinner and Pavlik 1994)
- 1B = List 1B species: rare, threatened, or endangered in California and elsewhere
- 4 = List 4 species: a "watch-list" of plants of limited distribution

(a) Last known occurrence at the Presidio (1933), not included on Figure 20.

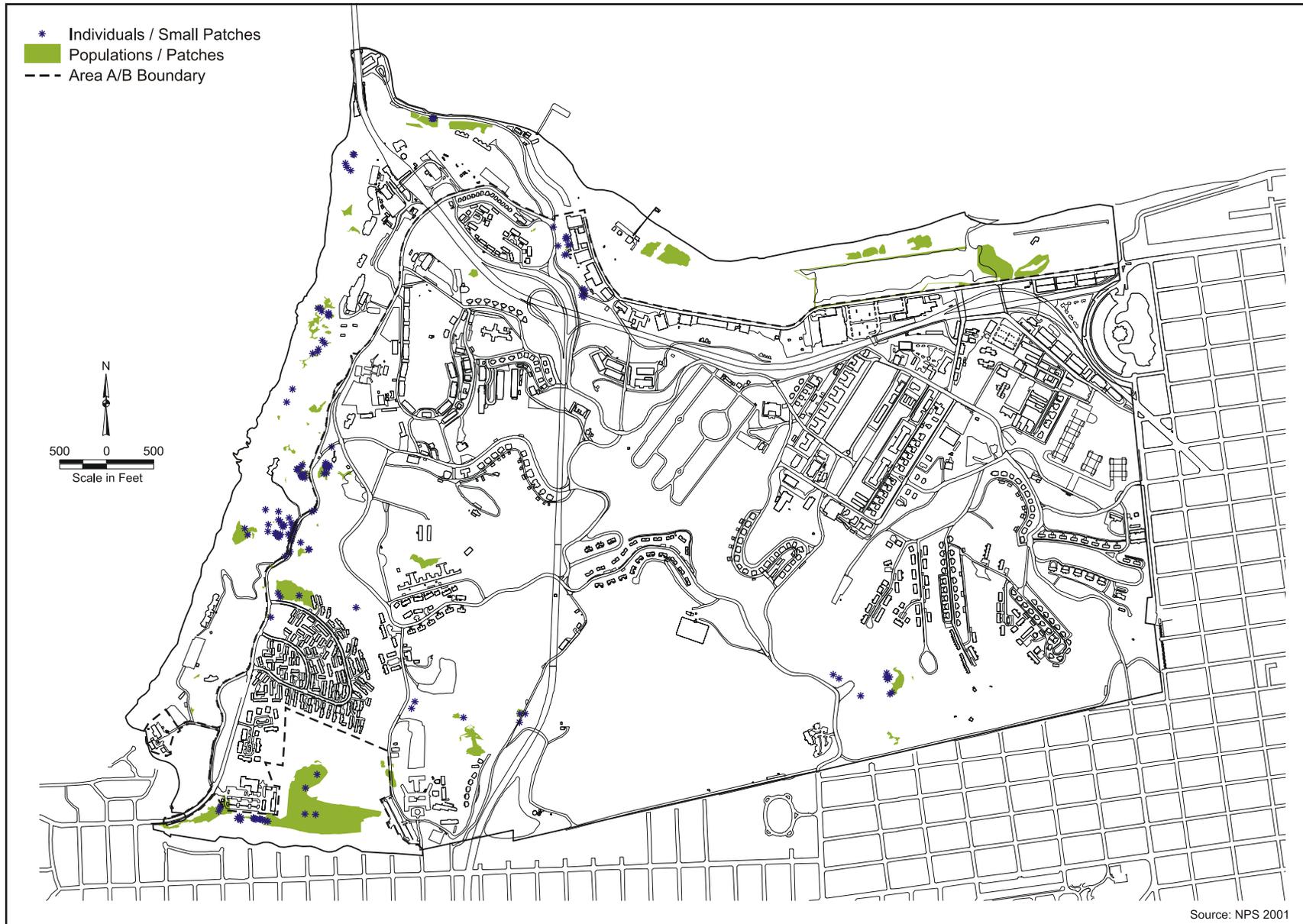


Figure 20: Special Status Plants

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habitats in Area A. A population was recently extirpated (last seen in the early 1990s) from Inspiration Point in the South Hills Planning District.

Presidio clarkia – This is an annual with lavender-pink petals shading to white near the middle and a bright reddish-purple base. It is endemic to serpentine coastal prairie and serpentine rock outcrops. Only 3 populations are known, 1 located in the Oakland Hills in the East Bay, and 2 on the Presidio. Of the 2 Presidio populations, only the Inspiration Point population in the South Hills Planning District is a natural historic population; the second population at the World War II Memorial was established by direct seeding in the 1970s. Habitat for the *Presidio clarkia* is affected by the establishment of non-native vegetation, resulting in increased competition for water and light and a build-up of organic material, and creating low-light and high-nutrient conditions less favorable for the *clarkia* (Bode 2000).

Raven's manzanita – This is a mat-like, perennial shrub, with prostrate stems. It is endemic to the Presidio. The only known single natural surviving individual of Raven's manzanita was rediscovered by Peter Raven in the early 1950s, and is estimated to be well over 60 years old. It occurs on a small portion of a 0.6-acre serpentine outcrop in the general vicinity of the World War II Memorial in Area B (USFWS 1984). Clones from this plant have been introduced in several places in the adjacent area and across Lincoln Boulevard in Area B (although the parent plant is in Area B, clones were planted in both areas). Habitat for this species is degraded by trampling, by social trail development, and invasion by exotic plants, especially Cape ivy and iceplant (GGNRA 1994). In addition, predation by a recent invasion of tussock moth larvae and an infectious fungus have partially to fully defoliated some plants, and could be responsible for the dieback of some clones. The current focus of the recovery effort for the species is protection of existing manzanita plants and identification of new receptor sites for transplants. The 1984 USFWS Raven's Manzanita Recovery Plan is currently being updated, and will include the publication of additional management objectives and recovery actions (Baye 2000).

San Francisco campion – This is a perennial with white to rose flowers. It occurs in dune scrub habitat. Two populations are known to occur in the

South Hills Planning District, and 1 population in Area A at North Baker Beach.

San Francisco gumplant – This is a perennial with gray-green leaves and yellow flowers borne in a head. It occurs in serpentine scrub in the Fort Scott Planning District and on serpentine soils in bluff and coastal scrub communities.

San Francisco lessingia – This is an annual with deep lemon-yellow flowers borne in a terminal head. It is endemic to the northern San Francisco peninsula from San Mateo County north to the Presidio. It was formerly widespread regionally throughout open sandy habitats. Today, 6 of its 7 remaining sites supporting small populations of *lessingia* are within the Presidio. One of these sites near Battery Caulfield was reintroduced in the 1980s by the U.S. Army. *Lessingia* occurs naturally in early central dune scrub habitat on remnant and re-created dunes in the Lobos Valley and at Crissy Field. In Area B, *lessingia* is found at Rob Hill in the South Hills Planning District along the Presidio Hills Golf Course Road cut in the South Hills Planning District, and north of the PHSH. *Lessingia* thrives within areas of small-scale natural disturbances and gaps, and is interspersed within the larger dune vegetation community itself. On the Presidio, it occurs only on coastal sand in small-scale blowouts or land slippages, eroding areas, or habitat disturbed by the removal of invasive exotic plant species. The populations are found on stable, mature, partly lithified dunes, such as those occurring on the Oceanview and Colma formations north and south of the mobile dune sheet, at the tip of Baker Beach. The entire northern San Francisco recovery area for this species is located within the Presidio, because *San Francisco lessingia* requires specific aspect (exposure to wind), elevation, slope, and soil conditions that are geographically specific, and cannot be duplicated elsewhere (personal communication Baye).

San Francisco owl's clover – This is a short annual with small creamy white flowers borne in a dense spike. It is a Central Coast endemic that was once widespread on the San Francisco peninsula, but is now restricted to 2 populations occurring on serpentine scrub in the South Hills Planning District, and serpentine-derived soils north of the Log Cabin in the Fort Scott Planning District. The Fort Scott population of approximately 500 individuals was found in April 2001.

San Francisco spineflower – This is an annual with decumbent, soft-hairy stems and hairy, white-to-rose flowers with a central tooth on the petal. It occurs in

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sandy openings in dune scrub. On the Presidio, populations are known to occur at the Crissy Field dunes and swales, Battery Caulfield, North Baker Beach, Baker Dunes and the Lobos Creek dunes in Area A, and the Presidio Hills Golf Course and Rob Hill in the South Hills Planning District.

San Francisco wallflower – This is a biennial to subshrub with cream-colored to yellow flowers. It occurs in foredune, dune scrub, bluff scrub, and coastal scrub communities in both Areas A and B.

Exotic Plant Species

Exotic species are non-native species that were deliberately or indirectly introduced as the result of human activities. All remnant natural communities on the Presidio are vulnerable to invasion by exotic species. Non-native plant species can alter the biological diversity of native communities by outcompeting and displacing native vegetation, changing natural successional patterns, and altering soil composition. Introduced trees have affected the Presidio's microclimates by limiting natural processes, such as wind movement, by acting as windbreaks, collecting moisture from summer fog, increasing shade, and altering soil conditions. Because fire has been suppressed on the Presidio, fire-intolerant non-native species are increasing. Additionally, non-native plants do not usually provide optimum forage for native wildlife because they did not evolve together.

In 1883, the U.S. Army initiated a tree-planting program to establish a forest on the Presidio. The survivors of these plantings are primarily blue gum eucalyptus, Monterey cypress, Monterey pine, and acacias (Vasey 1996).

Following disturbance to foredune and dune scrub communities, non-native species, such as ice plant, exotic annual grasses, and forbs, have become dominant species at many sites, often approaching 100 percent cover. Ice plant was planted by the U.S. Army in many of these areas to provide cover and to stabilize soils to correct erosive conditions resulting from over-grazing and disturbance. The most invasive exotic plant species currently affecting remnant native habitat include European annual grasses, such as tall fescue, orchard, purple velvet and erhartia grasses; Cape,

English, and Algerian ivies; oxalis; iceplant and narrow-leafed iceplant; pampas grass; French broom; acacias; prickly ox-tongue; sow thistle; and Italian thistle.

Ecological Restoration and Habitat Enhancement

The goal for ecological restoration efforts is to restore both natural processes and function. The VMP identifies sites proposed for native species and native habitat restoration. Most of these sites are adjacent to existing native plant communities, located on sandy and serpentine soils, which support a number of special-status plant species, or are riparian or aquatic habitats that have high value to wildlife. Following the identified actions in the VMP could expand the current native ecosystems of the Presidio from almost 170 acres to 394 acres, an increase of approximately 220 acres.

Ecological restoration activities consistent with the goals and objectives of the VMP are occurring on approximately 210 acres of the Presidio, including Lobos Creek Dunes, North Baker Beach, the PHS Planning District, Rob Hill, Inspiration Point, and the Crissy Field Marsh (see Figure 21). These natural resource stewardship efforts are supported and accomplished by shared resources between the NPS, the Trust, and the Golden Gate National Parks Association through integrating community participation and educational opportunities into all phases of restoration. Some of these habitat restoration activities include removal of non-native vegetation, native plant propagation, revegetation, and monitoring.

Additional areas proposed for restoration under the VMP include existing dune, bluff, coastal scrub, and grassland areas; the Mountain Lake and Lobos Creek drainage areas; the three tributaries and associated riparian corridor of the Tennessee Hollow creek; serpentine grassland and scrub communities; areas suitable for rare plant species in dune and riparian areas; and areas where remnant native plant communities and wetland areas can be enhanced or enlarged. To preserve the unique genetics of the Presidio flora, all plant material will be derived from populations of native species presently or historically occurring on the Presidio. All ecological restoration sites will be monitored until the established success criteria are met.



Figure 21: Habitat Restoration Sites

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Vegetation management actions identified in the VMP include:

- removing threats to native species, repairing damage to habitat, and increasing reproductive success;
- the restoration and enlargement of native plant communities by reclaiming habitat from past development, non-native species, and non-native trees outside of the historic forest management zone;
- the preservation and enhancement of rare plant species habitats by evaluating species-specific habitat needs, and giving high priority to actions that preserve and enhance those habitats; and
- protection and enhancement of wildlife habitat by expanding habitat for native plants, increasing native species and habitat diversity, avoiding disturbance to non-native forests with high-wildlife value, and avoiding disturbance to wildlife habitat during critical times of the year (e.g., nesting bird season).

Under the VMP, threats to all biological resources will be removed or mitigated to the greatest extent feasible. Habitat fragmentation and loss of biological diversity often result from the invasion of non-native plants into native plant communities. To address the control of invasive non-native plants the Trust will follow the objectives in the VMP including preventing introduction of non-native species, and controlling and removing existing non-native species. Exceptionally invasive plants, such as Andean pampas grass, Australian fireweed, Bermuda buttercup, French broom, Cape ivy, gorse, European dune grass, and sow thistle, have the highest priority for eradication, and will be controlled or removed wherever they are found on the Presidio. Iceplant, albizia, wattles (acacia), velvet grass, orchard grass, bentgrass, European annual grasses, prickly ox-tongue, and myoporum will also be actively managed as they particularly threaten serpentine communities. Control activities will be limited in areas where the non-native plant material is considered important to the preservation of the historical integrity of cultural resources.

Restoration actions will be planned and evaluated on a site-specific basis by a multidisciplinary team so that impacts on sensitive resources can be minimized. All restoration and Trust operational activities will use current best-management practices to provide the highest level of protection for

both physical and biological resources. All restoration planning will be coordinated with the future area planning efforts.

In addition, ecological restoration activities will focus on the recovery of federally listed species. The 13 special-status plant species described in Table 4 will be protected and their populations will be monitored. Actions to recover the species and restore their associated habitats identified in USFWS Recovery Plans will be undertaken in coordination with the USFWS to ensure that actions comply with the FESA.

Integrated Pest Management

On the Presidio, Integrated Pest Management (IPM) practices developed by the University of California Statewide Integrated Pest Management Project are followed to control exotic pest plants, outbreaks of damaging insects, and plant pathogens. IPM develops and promotes the use of integrated, ecologically-sound pest management programs in California. IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Approved pesticides are used only after there is indication that they are needed, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment (UC Davis n.d.).

IPM practices for general pests have been developed, and plans for the Golf Course are almost complete. An integrated program emphasizing nonchemical methods will be used to control exotic plants and encourage the establishment and growth of native plants. Non-native species with the potential to threaten native species and ecosystems, and that can be successfully controlled, will also be managed and eradicated where possible. Animal pests to facilities and human health will also be controlled using IPM practices. Non-native wildlife pests will be controlled in order to conserve rare species, preserve historical integrity of cultural resources, conserve facilities in developed areas, or manage a human health hazard

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Compared to vegetation and wetlands resources, only limited wildlife studies have been completed on the Presidio and more information is needed. Despite its isolation from large corridors of natural habitats, the Presidio is a valuable refuge, providing habitat for amphibians, reptiles, invertebrates, birds, and mammals. Although species diversity is often low for much of the wildlife, the diversity and richness of bird species is remarkably high for such a small acreage of habitat. Many of the areas, both natural and landscaped, provide important habitat structure for birds. The native scrub habitat, open spaces, riparian woodlands, available water, and cultural forest provide a variety of important habitat values.

In Area A, Crissy Field Marsh provides important aquatic habitat open to San Francisco Bay. Invertebrate species, such as crabs and aquatic insects that colonize the marsh, provide significant foraging opportunities for wildlife, especially shorebirds. These wildlife values will be affected by stormwater changes, outfalls, and noise and light pollution conditions. Bay and ocean dwelling special-status wildlife species that could be affected by spills of toxic materials, pollutants discharged through storm drains, or sediment resulting from erosion, include fish, such as steelhead and salmon, as well as the river lamprey, Pacific lamprey, and green sturgeon. Vegetation, microorganisms, and filter-feeding invertebrates occurring in the Crissy Field Marsh remove some sediment and pollutants from waters discharged into the marsh before they enter the ocean or bay; however, such discharges should be addressed and mitigated prior to reaching the marsh habitat.

Threats also affect the diverse wildlife within Area B of the Presidio. Habitat fragmentation and the isolation of open space by urban interfaces are inherent characteristics of Presidio. As fragmentation and isolation of wildlife habitat continues throughout the larger Bay Area, the importance of the Presidio's open space areas as a refuge increases. The Presidio's native wildlife resources could also be affected by non-native species such as Norway rats, bullfrogs, carp, spotted bass, feral cats, European starlings, pigeons, and red foxes. Native problem species include unnaturally elevated populations of skunks, raccoons, corvids, and the brown-headed

cowbird, which parasitizes open-cup nests of neotropical-migratory birds. Disturbances to wildlife and/or their habitats can result from park operations, visitors and their pets, off-trail bikes, dogs, hikers, special events, excessive lighting and noise, vehicle hits, tree and scrub removals, unpermitted collections, wildland fire suppression, erosion, construction, and environmental contaminants.

Applicable Laws and Regulations

The Federal Endangered Species Act of 1973, as previously described under the Vegetation section, would also be applicable for certain wildlife species known to, or with the potential to occur, at the Presidio.

In addition to FESA, the Migratory Bird Treaty Act of 1918 makes it unlawful to "take" (e.g., kill, harm, harass) any migratory bird listed in 50 CFR 10, including their nests, eggs, or products. Migratory birds include geese, ducks, shorebirds, raptors, songbirds, and many others.

The Migratory Bird Executive Order of January 11, 2001 directs executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act, and defines the responsibilities of each federal agency taking actions that have, or are likely to make, a measurable affect on migratory bird populations. All project actions within the Presidio must comply with this act; therefore, they cannot result in unauthorized take of migratory birds.

Wildlife History

Since the late 1800s, at least 262 vertebrate species have been recorded at the Presidio: 8 amphibians, 15 reptiles, 224 birds, and 14 mammals (Presidio of San Francisco 1997). These wildlife species are consistent with what is known about wildlife habitat relations in the communities present today. Other species, such as deer, could have occurred, but are no longer present on the Presidio. Historical land management practices on the Presidio displaced, altered, and reduced approximately 90 percent of the native vegetation, and have resulted in an associated loss of native plant species and diversity and diminished wildlife habitat. Extensive areas of native habitat were altered by the introduced forest stands or removed for development. Nonetheless, the Presidio provides

important remnant wildlife habitat within the urban environment of San Francisco, where wildlife and wildlife habitat are scarce, and serves as an important link to coastal forests to the north and south. Wildlife corridors and bird locations are shown in Figures 17 and 22. Current forest areas and tree resources are shown on Figure 23.

Wildlife-Habitat Relationships

Mountain Lake supports a range of native-resident bird species, such as ducks, gulls, and grebes, as well as spring and fall migrants. Exotic species of fish, such as carp and spotted bass, as well as non-native bullfrogs and turtles, are the only fish, amphibians, and reptiles that occur in the Lake. These exotic species have successfully outcompeted the local aquatic fauna, such as the California red-legged frog and western pond turtle, that historically occurred in the Lake. Surrounding woodland provides habitat for red-shouldered hawks and willow flycatchers (special-status bird species).

The diverse community types occurring in the vicinity of Lobos Creek provide a range of habitats that support a number of aquatic and terrestrial wildlife species. Dune community plants provide habitat for birds and reptiles, as well as breeding and foraging sites, nectar sources, and host plants for insects, including butterflies and bees. Riparian scrub provides valuable habitat for wildlife. On the Presidio, riparian scrub occurs along Lobos Creek and in a small 0.5-acre patch at a sandy seep (spring) north of the PHSH tennis court. The diversity of species in riparian habitat is highly dependent on structural characteristics and extent of habitat. Remnant patches of riparian vegetation, although isolated and small in size, provide resting sites for migratory birds and limited habitat for resident species of birds, such as warblers. Such vestiges of riparian vegetation exist in Tennessee Hollow and at Dragonfly Creek as well as at the PHSH, Mountain Lake, and Lobos Creek. A population of California quail is established in dense willow cover adjacent to a seep-fed seasonal wetland located north of the PHSH. Native shrubs, such as toyon and coyote brush, provide structural diversity and increased habitat value wherever they occur. Replacement of native habitat by lawns and landscaping, the spread of invasive exotic animals and plants, predation by domestic cats and dogs,

and trampling and digging by dogs have altered wildlife communities occurring in the Presidio significantly by affecting ecosystem function, reducing vascular plant species richness, reducing insect abundance in certain plant communities, and reducing habitat for indigenous wildlife. Playfields, lawns, non-native plantings, and invasive plants provide little habitat value for wildlife other than generalist, opportunistic species, such as jays, blackbirds, starlings, house sparrows, raccoons, opossums, gophers, and small rodents. The populations of several of these opportunistic species have increased significantly due to human influences (primarily increased refuse) on the Presidio. Tall eucalyptus, pines, and cypresses provide nesting sites for raptors, although suitable undisturbed open grassland habitat and riparian forest foraging habitat for raptors is limited on the Presidio. These tree species also provide valuable habitat for woodpeckers, owls, flycatchers, and other songbirds. Exotic wildlife species, including the red fox and fish and bullfrogs at Mountain Lake, have a negative affect by preying on indigenous wildlife and reducing their populations.

Wildlife Resources Within the Presidio

Despite its isolation from undeveloped natural habitats, the Presidio is a valuable refuge-providing habitat for a variety of amphibians, reptiles, birds, and mammals, although species diversity is often low. The Trust will reduce threats to existing native wildlife populations and restore extirpated native animal species whenever feasible.

Birds

For many years, members of the Golden Gate Audubon Society have conducted informal year-round surveys of birds occurring on the Presidio. More than 200 species of birds are known to use the Presidio, as many as 50 of these for nesting. Because the Presidio is located along the Pacific Flyway, a route heavily used by spring and fall migrants, vegetated areas on the Presidio provide valuable resting places, as well as food and water sources for migrating birds. Figure 22 shows locations of sensitive birds in both Areas A and B. Figure 17 shows corridors used by wildlife.

Year-round resident and migrant birds account for the greatest number of wildlife species observed on the Presidio. The dunes provide foraging opportunities and nesting sites for shorebirds such as snowy plover and black

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oystercatcher. The mixed evergreen forest provides shelter and nest sites for a variety of birds, including great-horned owl, red-shouldered hawk, hairy woodpecker, purple finch, red crossbill, Steller's jay, American goldfinch, lesser goldfinch, Say's phoebe, olive-sided flycatcher, and Pacific-slope flycatcher. Of particular importance is the use of the Presidio native and non-native forests by neotropical migrants, for which the Presidio is an island of suitable habitat bounded by water on three sides, and by urban development on the south. Species that use these forests include the orange-crowned warbler, common yellowthroat, Wilson's warbler, Bewick's wren, and Swainson's thrush. The Presidio's tree and shrub dominated communities also provide essential habitat for wintering birds and for locally declining resident bird species that have been extirpated elsewhere in San Francisco, such as the California quail, western screech owl, wrentit, and Hutton's vireo. Furthermore, because urban development in the Bay Area has resulted in removal of many old trees, dead and decadent conifers in the Presidio's historic forest provide important habitat for cavity-nesting birds such as the barn owl, chestnut-backed chickadee, red-breasted nuthatch and pygmy nuthatch. Other bird species that could use habitats on the Presidio include pied-billed grebe, Virginia rail, sora, red-tailed hawk, American kestrel, band-tailed pigeon, tree swallow, violet-green swallow, cliff swallow, barn swallow, spotted towhee, and hooded oriole. For a description of special-status birds that are found on and within the vicinity of the Presidio, please see below.

Mammals

The mixed evergreen forest within the Presidio provides shelter and den sites for a variety of medium to small mammals. The riparian forest provides cover and breeding sites for opossums, skunks, and raccoons, which may forage in dunes or grassland (Harris 1993).

The most prevalent and diverse group of mammals within the Presidio appear to be bats. Ultrasound monitoring conducted on the Presidio from January to December 1994 indicated that 6 bat species known from pre-existing records for San Francisco County—red bat (*Lasiurus blossevillii*), hoary bat (*Lasiurus cinereus*), California myotis (*Myotis californicus*), Yuma myotis (*Myotis yumanensis*), Mexican free-tailed bat (*Tadarida*

brasiliensis), and the big brown bat (*Eptesicus fuscus*)—forage in the Presidio. Mountain Lake had the highest level of bat activity and was the primary foraging area for the Mexican free-tailed bat, the most abundant bat species on the Presidio, accounting for 70 to 90 percent of all identified acoustic events. At Polin Spring and Hicks Athletic Field, the forest edge, at the interface between multi-aged forest stands and open areas had the greatest diversity of bat species.

Typically, bat activity is at a peak in mid-summer. The Presidio however, has extremely low levels of bat activity in summer suggesting that none of the species detected maintains breeding populations there. Greater levels of bat activity in the Presidio in fall-winter-spring could be due to a large increase in the population of Mexican free-tailed bats, which have large summer breeding colonies in hotter inland areas, and then migrate to the margins of San Francisco Bay where moderate temperatures allow winter foraging. The Presidio is important fall-winter-spring habitat for the Mexican free-tailed bat and hoary bat. Observations suggest that the Presidio is located on a migratory flyway for the red bat and hoary bat (Pierson 1995).

For a discussion of special-status mammals that could occur on or within the vicinity of the Presidio, please see below.

Amphibians and Reptiles

There have been few studies to document the amphibians and reptiles occurring on the Presidio. Although 8 amphibians and 15 reptiles have been reported since the 1800s (Jones & Stokes 1997), additional inventory and monitoring, and further field studies are lacking, as there is no wildlife specialist at the Presidio. However, a few area-specific surveys have occurred, including at Mountain Lake, which supports only non-native reptiles and amphibians. Although museum specimens of the native California red-legged frog and western pond turtle have been collected at Mountain Lake, these native species have been replaced through habitat modifications and exotic species competition. The non-native red-eared slider and other non-native turtles have replaced the western pond turtle, and the bullfrog has replaced native tree frogs and red-legged frog. The bullfrog, together with the non-native fish in Mountain



Figure 22: Common Bird Locations

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Figure 23: Current Forest/Tree Resources

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Lake, are strong predators of other amphibians that otherwise could live there. The Mountain Lake Enhancement project does not specifically address how to approach this problem; however, it does support research on control methods. A survey of the Baker Beach area in the late 1890s (Howell, unpublished) documented the presence of an unknown snake, most likely the coast garter snake, and the western fence lizard. Other native species commonly observed on the Presidio are California slender salamanders, western fence lizards, and alligator lizards. Salamanders are often seen in the Presidio, and recently Pacific tree frogs have been observed in the Fort Scott Planning District.

Aquatic Animals

Aquatic resource data have been gathered at Lobos Creek for several purposes. The University of San Francisco has collected field data at Lobos Creek as part of an environmental monitoring class, as well as for a thesis project. Taxa common in slow-moving water (e.g., *Argia* sp., amphipods) were the major components of the benthic macroinvertebrate collected (Codemo et al. 1995). Fish consist of 1 species: threespine stickleback (*Gasterosteus aculeatus*). Other than flow considerations, existing habitat conditions are good for threespine stickleback. These fish are closely associated with emergent vegetation and slow water, which are characteristic of much of Lobos Creek. Minimum fish densities at four sites sampled in 1998 ranged from 22 to 560 fish per 100 m³. Major fish passage barriers are present at several locations along Lobos Creek, and preclude movement of fish between the creek and the Pacific Ocean. Fish known to occur in Area B are found at Mountain Lake. These non-native fish include carp, mosquito fish, and spotted bass. No native fish have been identified. Non-native fish disrupt natural aquatic systems by preying on native fish and amphibians. The Mountain Lake Enhancement Plan does not specifically address measures that provide for control of non-native fish and amphibian populations, nor reintroduction strategies for native wildlife within the Lake; however, the PTMP does acknowledge the problem and defines treatments to create a deeper and cleaner lake.

Arthropods

Little is known about arthropods that have no special status. One study conducted at Lobos Dunes in 2000 identified much diversity at that site (Lacabanne 2000). This study found that human impacts affecting wind and wind “blowouts” were major factors affecting dune ecology. The introduction of non-native grasses also has had a great negative effect on biodiversity at Lobos Dunes and the PHSH. Non-native grasses colonize open sand, use nutrient resources, soil, and water, and result in the loss of plant and animal diversity, and the progression of natural succession. Planted or accidental introductions of other non-native plant species, habitat fragmentation by construction of the coastal highway, and military occupation are some human influences that have altered the natural terrain and ecosystem processes that native central dune habitat requires to function properly. These activities changed natural wind disturbances, interrupted the progression of sand movement inland, changed soil chemistry, and affected resources needed for the reproduction of native species, including arthropods.

Special-Status Animal Species

Special-status species of animals are those legally protected under the FESA, species proposed or candidates for listing under FESA, and “sensitive” species that are considered sufficiently rare by the scientific community to qualify for such listing. As a federal agency, in Accordance with Section 7 of the FESA, the Trust is required to consult as necessary with the USFWS to ensure that its actions do not jeopardize the continued existence of species listed as endangered or threatened under FESA or their designated Critical Habitats. Section 7 consultation with the USFWS was initiated during the scoping phase for the PTMP and will continue to ensure that the plan is in compliance with federal law and will not jeopardize the continued existence of any special-status species nor its habitat. Special-status animal species that could potentially occur or are known to occur on the Presidio are designated in Table 5.

Surveys have been conducted for the California red-legged frog (*Rana aurora draytonii*), San Francisco forktail damselfly (*Ischnura gemina*), Leech’s skyline diving beetle (*Hydroporous leechi*), and Ricksecker’s water scavenger beetle (*Hydrochara rickseckeri*). Surveys were conducted in 1992 and 1994 by Dr.

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Table 5: Occurrence and Potential Occurrence of Special-Status Wildlife Species on the Presidio

Common Name	Scientific Name	Federal/State Status	Habitat	Area
San Francisco forktail damselfly	<i>Ischnura gemina</i>	(FSC)/-	Observed near Fort Point (Potential habitat at Seeps and Springs in Area B)	A
Globose dune beetle	<i>Coelus globosus</i>	(FSC)/-	Dunes and sandy areas such as Crissy Field, Baker Beach. None observed.	A
Ricksecker's water scavenger beetle	<i>Hydrochara rickseckeri</i>	(FSC)/-	Riparian areas such as Lobos Creek. None observed.	A
Bumblebee scarab beetle	<i>Lichnanthe ursina</i>	(FSC)/-	Dunes and sandy areas such as Crissy Field, Baker Beach. None observed.	A
Mission blue butterfly	<i>Icaricia icariodes missionensis</i>	FE/- CDFG overwintering	Coastal scrub with populations of <i>Lupinus albifrons</i> , <i>L. variicolor</i> (known from the Presidio), and <i>L. formosus</i> . None observed.	A
Monarch butterfly	<i>Danaus plexippus</i>	phenomenon	Eucalyptus Grove North of Kobbee Drive in winter.	
Winter-run Chinook salmon	<i>Oncorhynchus tshawytscha</i>	FT/SE	San Francisco Bay, Lobos Creek. None observed.	A
California red-legged frog	<i>Rana aurora draytonii</i>	FT/CSC, Protected	*Recorded from Mountain Lake; following restoration, Lobos Creek may be suitable, but prefers ponds and lakes. None observed.	(A)
Southwestern pond turtle	<i>Clemmys marmorata pallida</i>	(FSC)/CSC, Protected	*Mountain Lake, but now extirpated. None observed.	(A)
San Francisco garter snake	<i>Thamnophis sirtalis tetrataenia</i>	FE/SE, Fully Protected	Never occurred in San Francisco; requires ponds or marshes with emergent vegetation and red-legged frogs. None observed.	Ø
Brown pelican	<i>Pelecanus occidentalis</i>	FE/SE, Fully Protected	Occurs along coastal areas of Presidio	A
Bald eagle	<i>Haliaeetus leucocephalus</i>	FT Delisted/SE, Fully Protected	Migrates through San Francisco and Presidio	A,B
Peregrine falcon	<i>Falco peregrinus</i>	FT Delisted/SE,	Migrates through San Francisco and Presidio	A,B
Yellow warbler	<i>Dendroica petechia brewsteri</i>	CSC		
Saltmarsh yellowthroat	<i>Geothlypis trichas sinuosa</i>	FSC	Mountain Lake	B
Loggerhead shrike	<i>Lanius ludovicianus</i>	FSC	Rare winter visitor	A,B
Willow flycatcher	<i>Empidonax trailii</i>	-/SE	*Recorded from Lobos Creek	A
Yuma Myotis	<i>Myotis yumanensis</i>	(FSC)/CSC	Potentially detected over Mountain Lake in 1994	A

Source: California Department of Fish and Game Special Animals (January 2000).

Notes:

Status definitions:

- = no listing status
- Federal:** U.S. Fish and Wildlife Service (50 CFR 17.12, 61 FR 40:7596-7613, Feb. 28, 1996)
- FE = listed as endangered under the federal Endangered Species Act
- FT = listed as threatened under the federal Endangered Species Act
- (FCS)= Federal Special Concern Species (former Category 2 candidates)
- State:** California Department of Fish and Game (1995)
- CE = listed as endangered under the California Endangered Species Act
- CT = listed as threatened under the California Endangered Species Act
- CSC = California Special Concern Species

*Historical occurrence

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John Hafernik of San Francisco State University at Mountain Lake, Lobos Creek, and other areas within the Presidio (Hafernik and Mead 1992; Jones & Stokes Assoc. 1995). Additional surveys have been conducted for the Lobos Creek restoration plan (PWA 1995). More recent surveys for the forktail damselfly have been conducted by Presidio staff. Surveys for sensitive amphibians (western pond turtle and California red-legged frogs) were conducted in 1994 by E. Ely and later by Presidio staff.

Based on the above surveys for listed sensitive species, only the San Francisco forktail damselfly has been found to occur on the Presidio. A small population of San Francisco forktail damselflies has been located in a drainage feature near Fort Point.

At Mountain Lake, no confirmed western pond turtles were found in surveys conducted for the Presidio Management Plan (Jones & Stokes 1995) nor in visual surveys conducted in 1996 by the Park and in 2000 by California Academy of Science (personal communication Laws). Only introduced red-eared sliders (more than 30 individuals) and soft-shelled turtles have been observed at Mountain Lake.

Historically, the federally threatened California red-legged frog (*Rana aurora draytonii*) and Federal Species of Concern western pond turtle (*Clemmys marmorata*) were likely abundant at Mountain Lake. The California Academy of Science has a record of a red-legged frog collected from Mountain Lake prior to 1906 (personal communication Vindum). Currently, there is only one known population of California red-legged frogs in San Francisco (personal communication Ely). No historic references to western pond turtles at Mountain Lake have been found, although references to western pond turtles collected in San Francisco between 1856 and 1892 have been found in museum collections (M.R. Jennings and M.P. Hayes 1994).

The cause of native turtle and frog absence at Mountain Lake could be related to overharvesting for food sources (Lockington 1879; Jennings and Hayes 1984), introduced predators, abnormally high densities of native predators, and loss of adjacent terrestrial habitat. Pre-1900 frog harvest data

suggest a short-lived, but heavy exploitation to supply demand in San Francisco markets. As with the California red-legged frogs, a considerable market was present for turtles in the late 1800s (Holland 1991). Depletion of native turtle populations within San Francisco and adjacent areas resulted in hunters moving as far away as the San Joaquin Valley to supply demand (Holland 1991). Turtles also face almost certain reproductive failure in areas of abnormally high predators. Raccoon predation has reportedly resulted in the loss of up to 97 percent of turtle nests in a given area (Holland 1994).

Special-Status Arthropods

Seven special-status arthropod species have the potential to occur on the Presidio, because the Presidio is within their known geographic range, and specific habitats required by these species are present (Table 5). In 1994, surveys were conducted to provide presence or absence data for Federal Species of Concern, including the San Francisco forktail damselfly (*Ichnura gemina*), the globose dune beetle (*Coelus globosus*), Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*), Leech's skyline diving beetle (*Hydroporus leechi*), the bumblebee scarab beetle (*Lichnanthe ursina*), the tree lupine moth, and the federally endangered mission blue butterfly (*Icaria icariodes missionensis*).

Neither the globose dune beetle nor the bumblebee scarab beetle was found in coastal sand dune habitat on the Presidio. However, a number of mydas flies (*Nemomydas tenuipes*) were collected in coastal sand dune habitat. The mydas fly has no special legal status. However, it is potentially rarer and more threatened than the federally-listed Mission blue butterfly (Hafernik 1994). The Presidio is the only place where the species has been observed recently.

Although Leech's skyline diving beetle is widely distributed in the western United States, there little published information concerning its natural history. It is believed to have been extirpated from its type locality along Skyline Boulevard in Pacifica, San Mateo County. No skyline diving beetles were observed during surveys of suitable aquatic habitats at Lobos Creek and Mountain Lake.

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The Mission blue butterfly inhabits grasslands and coastal scrub communities. Its larvae feed on three perennial species of lupines occurring in nearby San Mateo County. On the Presidio, *Lupinus albifrons* occurs in native grassland areas and *Lupinus variicolor* occurs on coastal bluffs near the Golden Gate Bridge. Surveys of this area, however, did not detect eggs, larvae, or larval feeding damage. Based on the known distribution of the Mission blue, it is unlikely that the Presidio was ever part of its historic range (Hafernik 1994).

The monarch butterfly's life cycle incorporates a southward migration from northern breeding grounds to warmer, over-wintering areas on the coast. Along the migration route, particular staging grounds have been identified as necessary to the continued survival of this species. Monarch butterflies were observed in a grove of eucalyptus trees located north of Kobbe Drive in 1986. This eucalyptus grove continues to provide a winter roost site for monarch butterflies between the months of November and February or March. An additional over-wintering site is also located south of the roosting site. Under California law (1988 Statutes Chapter 540), over-wintering colonies of the monarch butterfly are recognized as "special resources" in California. The International Union for the Conservation of Nature and Natural Resources has determined that the protection of over-wintering colonies is a top priority and that the colonies should be considered a "threatened phenomenon." The California Department of Fish and Game has been charged with delineating wintering colonies and establishing management plans to maintain the viability of this population. Although the State of California and California Department of Fish and Game regulations do not apply to federal land, the designation of the monarch butterfly as a special resource indicates that it is a species in decline.

Ricksecker's water scavenger beetle is a rare, relatively unknown beetle that has been collected in only six localities in creeks, ponds, and vernal pools in the San Francisco Bay Area. No Ricksecker's water scavenger beetles were observed during surveys of suitable aquatic habitats at Lobos Creek and Mountain Lake.

The San Francisco forktail damselfly is endemic to the San Francisco Bay Area. Populations are known from coastal and bay wetlands from Santa Clara to Marin and Sonoma Counties. The forktail damselfly is one of the most restricted in distribution. However, recent discovery of new populations in Sonoma County have resulted in the status of this species being downgraded from a Federal Species of Concern. The San Francisco forktail damselfly was observed in two consecutive years (Fall 1999 through Spring and Fall 2000) in a seep area along Marine Drive in Area A, near Fort Point. Although closely-related damselfly species have been observed, no forktail damselflies were observed in areas surveyed (i.e., potential aquatic habitat occurring at Lobos Creek, Mountain Lake, and Dragonfly Creek in Area B). In Area B, potential habitat for the San Francisco forktail damselfly (open still-water pools with fringing vegetation and sunny spots for perching) is present in Tennessee Hollow and in a seep behind Building 926. At present, Dragonfly Creek may be too shady to provide optimum habitat for the San Francisco forktail damselfly (personal communication Castellini).

The tree lupine moth (*Grapholita edwardsiana*) occurs in coastal sand dunes in the San Francisco Bay Area in association with its larval food plant *Lupinus arboreus*. Because the adult moth is common where tree lupine occurs, its status has been downgraded from a Federal Species of Concern. The tree lupine moth was found to be common near Lobos Creek in 1988 and continues to be common on tree lupines found throughout the Presidio and at Mountain Lake.

The Xerces blue butterfly (*Glaucopsyche xerces*) lived in coastal sand dunes in the vicinity of San Francisco. It was last observed in the Presidio, and in 1941, was determined to be extinct.

Special-Status Fish

Several special-status fish species occur in San Francisco Bay on their way to spawning grounds in tributaries of the bay and delta (Table 6). However, no spawning habitat for these species is present in the vicinity of the Presidio. Pacific herring are not listed by the State of California or the federal government; however, because they are harvested for their roe, they are an important species in the economy of the San Francisco Bay Area. As such, the

Table 6: Special-Status Marine Species Potentially Affected by Activities in Area A and Area B

Species	Status
Fish	
1 Winter-run Chinook salmon	State and Federal Endangered
2 Fall/late fall-run Chinook salmon	Federal Candidate Species
3 Spring-run Chinook salmon	State Threatened, Federal Threatened
4 Coho Salmon Central California ESU	Federal Threatened (State listing only applies to those spawning populations south of San Francisco Bay)
5 Steelhead South/Central California ESU	Federal Threatened
6 Steelhead Central Valley ESU	Federal Threatened
7 Delta Smelt	State and Federal Threatened
Other Fish Species of Concern	
River Lamprey	(Federal Species of Concern) California State Species of Concern
Green sturgeon	(Federal Species of Concern) California State Species of Concern
Pacific herring	Pacific herring are not listed at either the State or Federal level, however, they are an important economical and ecological species in the San Francisco Bay.
Reptiles	
Sea turtles	All sea turtles are listed as Federal Endangered or Threatened, but the status in San Francisco Bay area is unknown.
Birds	
Included because of human activity in foraging areas.	
1 California Brown Pelican	State and Federal Endangered (nesting colony)
2 Peregrine Falcon	Federal Delisted, State Endangered
3 California Least Tern	State and Federal Endangered
Marine Mammals (a)	

All are protected under the Marine Mammal Protection Act. Harbor seals, California sea lions, and Steller's sea lions potentially occur within the off-shore vicinity of the Presidio.

Source: U.S. Fish and Wildlife Service. Correspondence. September 3, 1998.

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CDFG gives herring special consideration and requires use of protective measures during sensitive times of the year. The only project-related impacts on fish occurring in San Francisco Bay or the Pacific Ocean would be impacts from stormwater runoff.

Special-Status Reptiles and Amphibians

Lobos Creek is within the historic range of the California red-legged frog, the southwestern pond turtle, and the legless lizard. However, these species have not been observed in recent surveys and are not expected to occur in the Lobos Creek corridor or elsewhere on the Presidio. Non-native bullfrogs, non-native fish, and red-eared sliders that prey on red-legged frogs and turtles occur in Mountain Lake. At this time, San Francisco County has not been proposed by the USFWS as Critical Habitat for the California red-legged frog (USFWS 2000).

Special-Status Birds

A total of 29 special-status and watchlist bird species have been observed on the Presidio (Jones & Stokes 1997). Almost half of these species are seasonal visitors or rare or uncommon migrants flying over the Presidio during their spring and fall migration along the Pacific flyway. Migratory birds could rest at Mountain Lake. Many of the special-status bird species occur in the ocean or San Francisco Bay. Six special-status bird species have been known to occur along Lobos Creek.

Four special-status passerines (song birds) have been recorded at the Presidio: loggerhead shrike, willow flycatcher, yellow warbler, and saltmarsh yellowthroat. The loggerhead shrike occurs throughout the United States, Mexico, and central Canada, and is a year-round resident in California. The shrike prefers open grassland with interspersed patches of scrub or wooded habitat. The loggerhead shrike formerly occurred in open areas in San Francisco such as Lake Merced, Golden Gate Park, McLaren Park, and Candlestick Park. There are no nesting records for San Francisco County. The willow flycatcher and yellow warbler are summer and fall migrants, using dense willow habitat within the north and east arms of Mountain Lake for roosting areas. Neither nests on the Presidio because nesting habitat is limited. Although observed in all seasons, common

yellowthroats are uncommon visitors to Mountain Lake. It is suspected that they nest in emergent vegetation surrounding the Lake. The saltmarsh yellowthroat is the most likely subspecies of common yellowthroat to occur on the San Francisco peninsula. However, the subspecific status of yellowthroats at Mountain Lake has not been determined. In addition, the olive-sided flycatcher, sharp-shinned hawk, Coopers hawk, and merlin occur in the vicinity of Mountain Lake. Figure 22 shows areas where special-status bird species occur, including habitat considered sensitive because it is used by breeding resident and migratory birds, resting for fall migrants, and a population of California quail.

The establishment of a population of California quail on the Presidio is significant because quail populations have declined dramatically in urban areas due to loss of habitat, and disturbance and predation by domestic dogs and cats. Because they have been extirpated or are extremely rare elsewhere in San Francisco, and are restricted in distribution, the California quail, western screech owl, wrentit, and Hutton's vireo could be considered species of local concern, although they are not state or federally listed. A mated pair of western screech owls might have been historically observed on the Presidio, and recent surveys have indicated their presence at Inspiration Point. Although they are not federal or state-listed species, the CDFG considers some raptors to be a California Species of Concern when nesting. Of these raptors, the Cooper's hawk, sharp-shinned hawk, and northern harrier occur (non-breeding) on the Presidio. The CDFG considers these hawks to be California Species of Concern while they are nesting (CDFG 2001). The merlin is considered to be a California Species of Concern in areas where it spends the winter. Only the more common raptor species, such as red-tailed and red-shouldered hawks and American kestrel, have been confirmed as breeding on the Presidio. However, these species are considered to be special-status species by the Golden Gate chapter of the Audubon Society due to their small populations and restricted available resources within the Presidio.

Special-Status Mammals

Two special-status mammals have been observed on the Presidio (Harris 1993). The salt marsh vagrant shrew is restricted to saltmarsh habitats in the southern and central San Francisco Bay Region, and might have occurred in salt marshes

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located between Fort Point and Crissy Field in Area A, although there are no records documenting its presence there (Jones & Stokes 1997). No suitable habitat for the shrew occurs in that area today, although restoration of the Crissy Field tidal marsh could create new habitat for the shrew in the future.

The *Yuma myotis* is the only bat species known to occur on the Presidio (Pierson 1995). It is somewhat tolerant of human disturbance, and is one of the few species of bats persisting in relatively urbanized areas.

Marine mammals potentially occurring along the shores of the Presidio include harbor seals, California sea lions, and Steller's sea lion. These species are protected by the Marine Mammal Protection Act. Because no haulouts or rookeries of these species occur in the vicinity of the Presidio (CNDDDB 2001), no further discussion of marine mammals is provided in this EIS.

Exotic Animals

Introduced mammal species occurring on the Presidio include the house mouse and Norway rat. Introduced bird species include the rock dove (common pigeon), European starling, and house sparrow. These are aggressive species, which often outcompete native species for nesting sites and food. Introduced bullfrogs and fish also impact native fauna by competing for habitat and preying upon native wildlife. Feral domestic cats prey upon both exotic and introduced wildlife and are responsible for a dramatic decline in native songbirds in urban areas. Dogs, on- or off-leash, could have negative impacts by pursuing wildlife and by scent-marking.

At the Presidio, native pests are defined as animal or plant populations that interfere with the purposes of the Presidio/park. Native pests would be allowed to function unimpeded except where control is desirable to prevent the loss of the host or host-dependent species from the ecosystem; to prevent outbreaks of the pest from spreading outside the Presidio; to conserve threatened, endangered, or unique plant specimens or communities; to preserve, maintain, or restore the historical integrity of cultural resources; to conserve and protect plants and animals in developed

zones; and to manage a human health hazard as defined by the Centers for Disease Control or to protect against a significant threat to public safety.

IPM methods to control exotic animals include habitat manipulation and reduction of food sources. Elimination of sources of visitor-generated food wastes that attract animal pests is (and will continue to be) accomplished by providing an adequate number of waste receptacles and collecting waste on a daily basis. Older buildings will be inspected for holes or cracks providing entry to rodents, and sealed if necessary.

Natural Resource Research, Inventories, and Monitoring

The Trust and NPS have been and will continue to conduct inventories and research on existing wildlife and habitats, allowing for a greater understanding of the value of open space at the Presidio. Monitoring will detect and describe any changes in this fragmented habitat over time. The current joint Trust and NPS effort to restore habitats and corridors for California quail near the PSHS demonstrates the interplay of habitat protection, restoration, and corridor enhancement.

Additional inventories will be performed to determine the presence of terrestrial invertebrate and vertebrate species. Further studies are also needed to gain information about maintaining the health of Presidio wildlife populations and their habitats. Wildlife surveys of the Presidio will be conducted as part of projects and monitoring programs. The Presidio is currently developing a program to monitor migrating and nesting birds. A monitoring system will be established in order to collect information on use of habitats occurring in the Presidio by raptors, bats, mammals, reptiles, amphibians, rare insects, and aquatic species. The feasibility of reintroducing individual native wildlife populations will be explored on an individual basis.

To the extent possible, information will be shared with interested scientific and local communities.

All research, data gathering, and specimen collection will be carried out in accordance with professional standards pertaining to survey, inventory, monitoring, and research. Independent studies conducted in parks are not required to address specifically identified management issues or information

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needs. However, these studies, including data and specimen collection, require scientific collecting permit. Projects will be administered and conducted only by fully qualified personnel. Information gained will be used to prepare and periodically update natural resource management plan that is prepared jointly with the NPS. Similarly, high-quality, scientifically acceptable information, data, and impact assessments will guide planning for Presidio operations, development, and management activities that might affect natural resources.

3.3.2 WATER RESOURCES

WETLANDS, STREAMS, AND DRAINAGES

There are approximately 58.5 acres of water features, including wetlands, and other special aquatic areas described in this section. These areas include those subject to jurisdiction of the Corps under Section 404 of the Clean Water Act of the United States (CWA), and USFWS wetlands according to the Cowardin classification (Cowardin *et al.*, 1979), which will receive protection by the Trust and NPS under Executive Order 11990; and wetland-like areas (Figure 19). Notable water features include Lobos Creek and scattered seeps and drainages in Area A, Mountain Lake, Dragonfly Creek, El Polin Spring, tributaries in the Tennessee Hollow watershed, and a number of seeps in the Fort Scott and South Hills Planning Districts.

Many of the wetland features in the Presidio are subject to Section 404 of the CWA. These potential jurisdictional waters of the U.S., including wetlands total 28.0 acres (Figure 19), and meet all three criteria of supporting wetland soils, wetland vegetation, and wetland hydrology. An additional 30.6 acres of wetlands defined by the USFWS Cowardin classification system. This definition requires that only one criterion (soils, vegetation, or hydrology) be attained. This definition expands wetland areas to include features such as mudflats and rocky intertidal zones, and classifies wetlands rather than delineating them. The Trust uses the USFWS definition, and has adopted a planning principle of protection, enhancement and “no net loss” of existing wetland features; the Trust will strive to achieve a longer-term goal of net gain of wetlands through restoration of previously degraded or destroyed wetlands, such as

Tennessee Hollow, where natural drainage features have been largely eliminated and/or altered by past filling, grading and construction, leaving only isolated segments of the riparian corridor.

Wetlands studies conducted on the Presidio include Presidio of San Francisco Wetland Resources Report, ¹a wetland delineation and vegetation study (Wood 1999), a bioassessment conducted in Presidio watersheds as a baseline study for riparian restoration plans (Castellini 2000), and a wetlands delineation of Mountain Lake (Buisson, E, and L. Castellini 2000).

Applicable Laws and Regulations

The following discussion provides an overview of the CWA and other laws and regulations relevant to wetlands and streams. These laws and policies mandate that the filling of wetlands be avoided to the greatest extent possible. If development activities result in adverse impacts to wetland features, they could result in conditions of approval requiring mitigation. Each permit action is also subject to compliance with NEPA.

Section 404 of the Clean Water Act – Wetlands and other water resources receive protection under Section 404 of the CWA. The CWA requires that a permit be obtained from the Corps prior to the discharge of dredged or fill materials into any “waters of the United States.” Waters of the United States are broadly defined in the Corps’ regulations (33 CFR 328) to include navigable waterways, their tributaries, and adjacent wetlands. The upper limit of jurisdiction in non-tidal streams and lakes is defined by the ordinary high-water mark or the upper boundary of adjacent wetlands, whichever is higher.

Wetlands are defined by the CWA as: “Those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that normally do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.” Under this definition, three criteria

¹ Includes U.S. Army Corps of Engineers Potential Jurisdictional Waters of the U.S., Including Wetlands and U.S. Fish and Wildlife Service Wetlands Inventory (2002)

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must be attained for classification as a jurisdictional wetland: dominance of wetland vegetation, presence of wetland hydrology (inundation or saturation for a specific period of time), and the occurrence of hydric (wetland) soils.

A second wetland definition reflecting the broader habitat values associated with wetlands is the definition of wetlands used by the USFWS for their National Wetlands Inventory. The USFWS Cowardin system classifies wetlands based on vegetative life form, flooding regime, and substrate material. For the purposes of this definition, wetland features must attain one or more of three criteria. The Trust classifies and maps wetlands using this system.

Wetlands and other waters of the United States subject to Section 404 of the CWA in the Presidio include Lobos Creek in Area A (one of the last flowing perennial creeks in the City of San Francisco); Mountain Lake; El Polin Spring; tributaries and portions of the Tennessee Hollow drainage within the East Housing Planning District; and scattered seeps and drainages in Area A, and the Fort Scott and South Hills Planning Districts.

Section 401 Clean Water Act – The California Regional Water Quality Board (RWQCB) and the U.S. Environmental Protection Agency (EPA) set water quality standards that are ecologically protective to aquatic systems (RWQCB, 1995; EPA, 2000). Water Quality Certification or waiver from the RWQCB is required before a Section 404 permit becomes valid. The RWQCB also reviews the project for consistency with Waste Discharge Requirements under the State land disposal regulations. In reviewing the project, the RWQCB may consider impacts to waters of the State, and may recommend mitigation for filling of wetlands and other impacts in accordance with the State wetland policy.

Federal Executive Orders (EOs)

Two EOs require federal agencies to assure the protection of wetlands in undertaking federal actions. These EOs are internal management tools by which the President develops and communicates policy applicable to the executive branch. EO 11990 (Protection of Wetlands) was issued in 1977 “...to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands, and to avoid

direct or indirect support of new construction in wetlands wherever there is a practicable alternative...” This order provides that federal agencies are to take a leadership role in the preservation and enhancement of wetlands. Agencies are directed to include wetlands considerations in their assessments under NEPA. Projects underway and emergency assistance efforts were exempted from this EO. EO 11988 (Floodplain Measurements) was issued in 1977, and instructs federal agencies to avoid undertaking activities that would adversely affect floodplains or floodplain management.

The Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management (October 2000) provides a framework for a watershed approach to federal land and resource management activities. The policy incorporates the following guiding principles: use a consistent and scientific approach to manage federal lands and resources and to assess, protect, and restore wetlands; and identify specific watersheds in which to focus funding and personnel and accelerate improvements in water quality, aquatic habitat, and watershed conditions.

Streams, Lakes, and Wetlands

The Marina watershed, which includes the Tennessee Hollow subwatershed and the Fort Scott watershed (including that of Dragonfly Creek) drain the northerneastern half of the Presidio into San Francisco Bay. Combined, these northeastern slopes of the Presidio produce perennial wetlands draining down valleys, such as Tennessee Hollow, and out of the Fort Scott highlands. Seeps, springs, and streams once drained into a large coastal estuary, approximately 18 acres of which have been recreated by the NPS and Golden Gate National Parks Association in Area A. The Tennessee Hollow subwatershed supports three tributaries, El Polin Spring being the source of the middle tributary. Stream flow of the El Polin/Tennessee Hollow drainage system is mostly confined to open concrete ditches or underground culverts. Groundwater discharge in the form of springs is present in the central tributary (El Polin Spring) and the eastern tributary. Outfall from this subwatershed is discharged on the southeastern shore of the Crissy Field wetland. The Fort Scott watershed supports springs that feed Dragonfly Creek, a perennial stream located east of the parade ground, adjacent to Ralston Avenue. The stream flows over a natural sandy substrate before entering a section of concrete channel leading to an

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underground culvert where it discharges to the bay. These primary watersheds and the Presidio's third watershed, the Lobos Creek watershed, are sub-divided into a total of six subwatersheds². The Lobos Creek watershed drains the southwestern and western areas of the Presidio into the Pacific Ocean. The southern extent of this watershed, a wind-driven build-up of sands from the massive dune system that once occupied western San Francisco dammed up perennial seeps and springs occurring along the southwestern slopes of the Presidio's serpentine divide, forming Mountain Lake, Lobos Creek, and smaller dune seeps. One dune wetland feature within the watershed, located north of the PSHH, supports characteristics of a dune slack wetland. Its associated vegetation assemblage is the only remnant example of this vegetation type on the northern San Francisco peninsula. The northwestern extent of the watershed is comprised of dune and serpentine bluffs. The serpentine bluffs are comprised of steep drainages, many of which support uniquely formed seasonal seeps. Numerous natural wetlands occupied both dune areas of Lobos watershed and the serpentine slopes and lowlands of the Tennessee Hollow subwatershed. Many of these wetlands are now largely altered or gone. Although wetlands are widely distributed throughout the Presidio's natural areas, they are generally very restricted in area. Because the Presidio is one of the last refuges for San Francisco's once widespread and richly diverse wetlands, and because a diversity of resident and migratory wildlife species are dependent upon them, wetlands occurring on the Presidio have a special conservation value regardless of their jurisdictional status.

Mountain Lake, which is in part also under the jurisdiction of the City of San Francisco, is a natural spring-fed, lake in the South Hills Planning District. Because of numerous direct and indirect human impacts over time, Mountain Lake is now 40 percent smaller in area and less than one-third of its original depth. Water quality has declined and periodic algal booms and

² Mapping boundaries were developed such that several smaller drainages located in the western coastal serpentine bluffs were combined into single sub-watersheds (NPS, 2001)

fish kills occur. Water quality and terrestrial habitat enhancement measures are addressed in the Mountain Lake Enhancement Plan (2001).

Lobos Creek is the last free-flowing stream in the City of San Francisco. It is fed by seeps and springs from a sandy aquifer that receives recharge from the golf course and extends south of the Presidio. Lobos Creek is approximately one mile long. From its headwaters near the 17th Avenue, the creek flows westward toward Lincoln Boulevard, where it meanders in a narrow channel and through an approximately 500-foot long underground culvert. In December 1996, the Richmond Transport Project removed the Lobos Creek outfall structure and the creek now discharges directly into the ocean at Baker Beach. The Trust is working the NPS to ensure that adequate streamflow remains in the creek to maintain a channel and to support fish and wildlife.

Activities of early settlers resulted in substantial physical and biological changes that affected the species composition and spatial arrangement of plant communities along Lobos Creek and influenced its present day ecology. However, Lobos Creek supports one of the least fragmented pieces of undeveloped riparian habitat in the City and one of the areas of highest wildlife habitat value in the Presidio (Harding Lawson 1996).

The hydrologic characteristics of many of these wetland features have been substantially altered by the construction of buildings, placement of fill, and the removal and alteration of vegetation cover. Activities proposed under PTMP could further reduce or prevent the restoration of key hydrologic features.

Ocean and Bay

Area B directly affects ocean environments through the withdrawal of water at Lobos Creek. This activity changes the creek and ocean ecological system within that interface. Other activities within the Presidio could lead to contaminated stormwater runoff, which, if allowed to reach the bay or ocean, could adversely affect special-status fish species and marine mammals, as discussed in the previous Biological Resources section.

Water Quality

The Presidio has implemented and is operating under the Presidio of San Francisco Stormwater Management Plan (1994), which includes a detailed Storm Water Pollution Prevention Plan that outlines erosion prevention and sedimentation control measures used by the Presidio to avoid contamination of storm drains and surface water resources. The Stormwater Management Plan is being updated to reflect changes in storm water routing as well as new permitting requirements. Water quality is also addressed for specific water resources, including Lobos Creek, Mountain Lake and Marsh.

The water quality of surface and groundwater resources related to Lobos Creek is monitored regularly. The Lobos Creek Water Quality Management Plan (Urban Watershed Project 2001), produced as a collaborative effort with the NPS, serves as a basis for a joint program to improve water quality of the creek between the Trust, the NPS and the City and County of San Francisco. A new water collection system and culvert under Lincoln Boulevard will be constructed, and will lead to a better natural creek system, as well as more dependable water quality.

The Mountain Lake Enhancement Plan was recently developed to improve water quality in the lake, restore surrounding native habitat, and improve visitor access. The proposed plan includes dredging and mechanical aeration to improve water quality, exotic species removal, native plant community restoration, trail improvements, interpretive overlooks, and restoration of the lake's former east arm.

Storm water runoff at the Presidio is treated with a series of oil and water separators before discharge into Crissy Marsh. Water quality objectives and numerical water quality standards for Crissy Marsh are established in the RWQCB water quality control plan (basin plan) to protect the established beneficial uses of the water bodies (RWQCB 1995). The beneficial uses for groundwater and surface water at Crissy Field are identified in the Basin Plan and are applied by the RWQCB on a case-by-case basis. Important beneficial uses designated for the bay include contact and noncontact recreation, commercial sport fishing, and shellfish harvesting.

Hydrogeology

This section briefly describes the geologic units found on the Presidio and the occurrences of groundwater.

The Presidio's underlying stratigraphy consists primarily of unconsolidated sediment of the Colma formation that overlies the Franciscan formation, a complex assemblage of sandstone, siltstone, shale, and metamorphic rocks (Schlocker 1974). The Colma formation consists of fine- to medium-grained sand with moderate amounts of clay and silt. Sediments are generally unconsolidated and were deposited in estuarine and coastal environments. Much of the Lobos Creek watershed and northern Presidio support dune and beach sands and estuarine sediments. Serpentinite outcrops and serpentine and Franciscan soils are found along the western coastal bluffs and within parts of the Marina basin.

Groundwater at the Presidio occurs within Colma formation, dunes, in Bay Mud and artificial fill and Franciscan bedrock. It occurs in both the bedrock and overlying unconsolidated sediments. The quantity and quality of groundwater are highly dependent on the type and thickness of the geologic materials present. In addition, the historic land uses within the Presidio have affected groundwater quality in some areas. Subsurface data are currently lacking on the Presidio, and a thorough understanding of the natural groundwater complexity of both the Franciscan bedrock and the Colma formation aquifers is lacking. Some subsurface groundwater data have been collected as a part of the Wetland Feasibility Study (Dames & Moore 1995), the Environmental Remediation Program (Erler & Kalinowski, Inc. 2000), the Doyle Drive Hydrology and Water Resources Technical Report, and is ongoing as a part of the Tennessee Hollow restoration effort.

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3.3.3 VISUAL RESOURCES

OVERVIEW OF THE VISUAL CHARACTER OF THE PRESIDIO

Presidio Setting

Located at the northern tip of the San Francisco peninsula, the 1,490-acre Presidio of San Francisco is bordered by the San Francisco Bay on the north, the Pacific Ocean on the west, and the City of San Francisco on the south and east. The Presidio is visible from many viewpoints around the Bay, including the Marin Headlands, Mount Tamalpais, Angel and Alcatraz Islands, and from San Francisco's waterfront and elevated areas within the city, such as Twin Peaks.

The Presidio of San Francisco is part of the GGNRA and the National Park system. As such, and subject to the Trust Act, the Trust manages the Presidio's significant scenic resources in a manner consistent with sound principles of land use planning and management, and that protects the Presidio from development and uses that would destroy its scenic beauty.

The Presidio is a major visual resource for the San Francisco Bay Area from a variety of perspectives. From a distance, the forested landscape appears as a natural wooded series of low ridges in marked contrast to surrounding urban landscapes.

From a vantage point in the Marin Headlands, the entire Presidio is visible, with the Golden Gate Bridge in the foreground and the City of San Francisco in the background. The western edge of the Presidio slopes steeply from the Pacific Ocean covered with pale, grey-green coastal scrub vegetation that moves upslope to the dark green forest that tops the hills in the park. On the north coastal area, the slopes are steep near the foot of the Golden Gate Bridge, at Fort Point. From the San Francisco Bay, past the level expanse of Crissy Field, warehouse buildings that border the former airfield are framed by the densely vegetated hills. Other buildings are visible within the Presidio in addition to those at Crissy Field, but it is the forested landscape that dominates its visual character. From this or any

other perspective, the dense stands of trees within the Presidio easily differentiate it from the adjacent City of San Francisco.

Entering the Presidio from the Golden Gate Bridge (U.S. Highway 101/Doyle Drive), motorists travel along an elevated roadway that passes through the Presidio. From this roadway, developed areas within the Presidio are visible, but the character of the area is park-like.

Important Views

One of the factors that affected the selection of the Presidio for use as a military post was the availability of strategic views of the Pacific Ocean and the Golden Gate. Those views that were once strategic now offer visitors opportunities for enjoyment of the park. As shown in Figure 24, views from within the Presidio include vistas toward the Golden Gate Bridge, Marin Headlands, Angel Island, and Alcatraz, as well as to the Pacific Ocean and San Francisco Bay. Other vistas that once provided distant views are now obscured to some degree by vegetation, including Inspiration Point, along Washington Boulevard on the western slope of Rob Hill, and on Lincoln Boulevard overlooking Crissy Field. Other important historic and contemporary vista points within the Presidio include Presidio Boulevard, views from the Letterman Planning District, Infantry Terrace, Main Post, Golden Gate Bridge Overlook, coastal overlooks, World War II Memorial, Wherry housing, and the PHSH.

In addition to distant views from the Presidio, visitors experience a sense of visual enclosure within the natural areas and forests of the Presidio, in contrast to the visual experiences of the nearby cityscape outside of the Presidio. Historically, visual links were created between different developed areas within the Presidio, such as between the Officers' quarters on Infantry Terrace and the main parade ground, and between the main parade ground and Crissy Field, although some of these vistas have been obscured by vegetation and new construction.

Views from Bay Area counties surrounding the Presidio are affected from by the amount of light shining into the night sky, especially in areas adjacent to the Golden Gate Bridge, a prime viewing site.

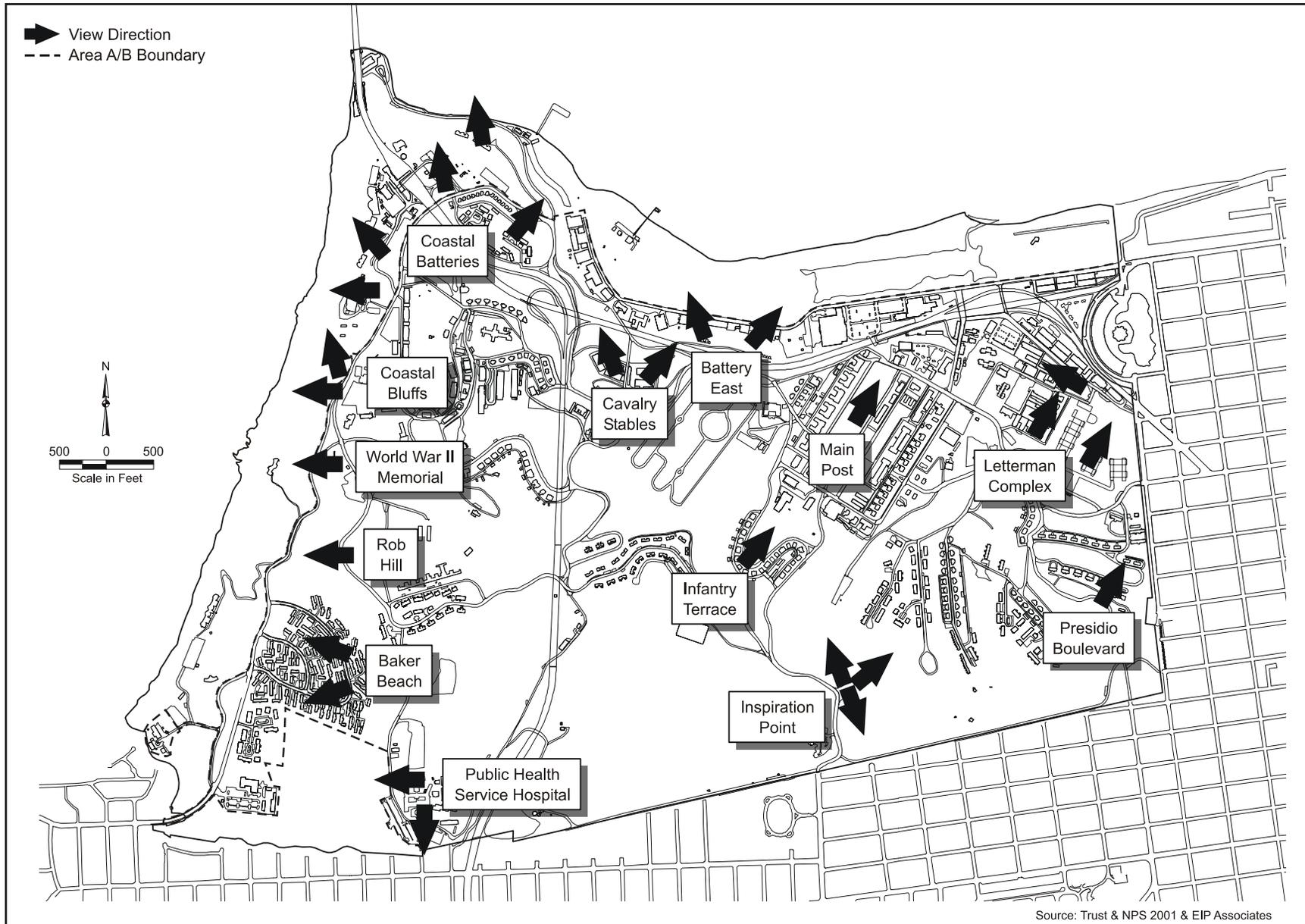


Figure 24: Historic and Contemporary Views and Vistas

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3.3.4 AIR QUALITY

This section discusses regulated pollutants, air quality management plans, air quality conditions and monitoring, and the local emissions source inventory.

REGULATED POLLUTANTS

Through the federal Clean Air Act as amended, and the California Clean Air Act as amended, federal and state regulatory agencies set upper limits on the ambient airborne concentrations of six criteria pollutants. These are ozone, carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter, and lead. Particulate matter is regulated as inhalable particulate matter less than ten microns in diameter (PM₁₀), and fine particulate matter less than 2.5 microns in diameter (PM_{2.5}). Ozone is a secondary pollutant formed by the reactions of nitrogen oxides (NO_x) and reactive organic gases (ROG). Nonattainment status is designated by the agencies for areas where the ambient air quality standards are not met. The nine-county San Francisco Bay Area Air Basin has a history of recorded violations of federal and state ambient air quality standards for ozone, carbon monoxide, and PM₁₀, the attainment status for PM_{2.5} is unknown but will be determined in the coming years. The U.S. EPA has classified the Bay Area a moderate nonattainment area for ozone, and as a maintenance area for carbon monoxide until at least 2008 (40 CFR 81.305).³ The California Air Resources Board (CARB) has given the Bay Area state-level nonattainment status for ozone and PM₁₀. A state-level standard also exists for the optical effects of visibility reducing particles.

Toxic air contaminants, which have the potential to cause cancer or could pose a present or potential hazard to human health, are also regulated through federal, state, and local programs. Unlike criteria pollutants, there are no regional ambient air quality standards for toxic air contaminants, primarily due to the localized nature of the adverse health impacts caused by toxic air contaminant emissions. Control of toxic air contaminants from mobile sources, including organic compounds, particulate matter from

diesel exhaust, and lead, is generally achieved through fuel efficiency or engine performance standards defined at the state or federal level. Stationary sources are regulated through locally managed permitting programs that restrict criteria and toxic contaminant emissions through emission control standards found in federal, state, and local rules.

Odors can affect air quality in densely developed areas where diverse land uses can either cause or be in close proximity to odor producers. While offensive odors rarely cause any physical harm, they can be unpleasant and cause distress among the public, and generate citizen complaints. Outside of developed areas, odors also play a natural role as an air quality-related value capable of transmitting aromatic information. Managing offensive odors is accomplished through Bay Area Air Quality Management District (BAAQMD) regulatory control (Regulation 7, Odorous Substances), and appropriate land use management to provide suitable buffer zones around odor sources.

AIR QUALITY MANAGEMENT PLANS

State Implementation Plan

The federal Clean Air Act, as amended, and the California Clean Air Act are the primary drivers for attaining and maintaining ambient air standards. The federal act contains conformity provisions that help to ensure that individual plans and projects throughout the region do not produce more emissions than are allowed by local air quality plans. These laws also provide the basis for implementing agencies to develop mobile and stationary source performance standards.

The BAAQMD is the primary agency responsible for managing compliance with the ambient air quality standards in the Bay Area. The BAAQMD's planning efforts to attain and maintain the standards are contained within two basic plans: the State Implementation Plan (SIP) and the Clean Air Plan (CAP) specify the means of maintaining the federal and state standards, respectively.

The federally required SIP was last revised in 1999 to respond to exceedances of the federal ozone standard during the mid- to late-1990s.⁴ The SIP is a

³ California Air Resources Board 1996.

⁴ Ozone Attainment Plan for the 1-Hour National Ozone Standard, ABAG, BAAQMD, and MTC, adopted June 1999.

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compilation of plans and regulations that govern how the region and state will comply with the federal Clean Air Act requirements to attain and maintain the ozone standard. Along with the BAAQMD, the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) also contribute to the SIP.

Under Section 176(c) of the federal Clean Air Act, federal actions in nonattainment areas or maintenance areas must conform to applicable implementation plans approved under the Clean Air Act (e.g., the SIP). A formal conformity determination is required for federal actions when the total direct and indirect emissions of nonattainment pollutants from a proposed project exceed specified thresholds. For any federal action in the Bay Area causing more than 100 tons per year ROG, NO_x, or CO, the general conformity rule would apply (40 CFR 51.853). Federal actions causing emissions below these thresholds are presumed to conform with the SIP.

The Clean Air Act requires federal land managers to protect a park's air quality values from adverse impacts. Section 118 of the Clean Air Act requires that federal facilities comply with existing federal, state, and local air pollution control laws and regulations. Through environmental review, permit compliance, and contracting processes, the Trust ensures that activities within its administrative jurisdiction meet existing laws and regulations and that external sources of air pollution are controlled or mitigated to the extent possible to protect the air quality and resource values. Because the Presidio is part of the GGNRA, the area is designated as a Class II area within the federal Clean Air Act and amendments. When compared to a Class III designation, federal Class II designation provides additional protection by reducing the allowable increases in pollutant concentrations that may occur.

Bay Area Clean Air Plan

The Clean Air Plan is a state-level requirement of the California Clean Air Act. The SIP required by the federal Clean Air Act is partially based on control measures from the CAP. The BAAQMD's 2000 Clean Air Plan (adopted December 20, 2000) specifies the means by which the region will meet the state standard for ozone. This plan is updated and reevaluated

every three years. The state PM₁₀ standards are also exceeded in the region. However, no state plan is required to meet state PM₁₀ standards.

The CAP components for attaining the state ozone standards include transportation control measures (TCMs) that may be implemented by local jurisdictions. Additionally, the CAP recommends that local land use plans provide for buffer zones around uses that might be sources of toxic air contaminants or odors. The Trust has jurisdiction to manage land use and provides coordination for potential sources of toxic contaminants or odors. The Trust also manages transportation demand. In the effort to reduce transportation demand by Presidio tenants, residents, and visitors, the Trust developed and is implementing a Transportation Demand Management program that would implement the TCMs of the 2000 CAP. The relevant 2000 CAP TCMs are:

- TCM 1: Support Voluntary Employer-Based Trip Reduction Programs
- TCM 9: Improve Bicycle Access and Facilities
- TCM 12: Improve Arterial Traffic Management
- TCM 15: Local Clean Air Plans, Policies, and Programs
- TCM 17: Conduct Demonstration Projects
- TCM 19: Promote Pedestrian Travel
- TCM 20: Promote Traffic Calming Measures

San Francisco General Plan

Local environmental plans and policies also recognize community goals for air quality. The San Francisco General Plan (City and County of San Francisco n.d.) includes the 1997 Air Quality Element. Objectives include reducing traffic-related emissions, coordinating land use, and reducing road and construction-related dust. While not legally bound, it is the policy of the Trust to achieve consistency with the San Francisco General Plan by managing transportation demand, land use, and construction activities within the Presidio.

AIR QUALITY CONDITIONS AND MONITORING

The California Air Resources Board (ARB) compiles inventories and projections of emissions for the Bay Area. The projections show the planned reductions in emissions of ozone precursors expected to bring the area into attainment. Substantial reductions in CO emissions from 1996 to 2010 are

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attributed to the stringent emission controls that have been or will be imposed on motor vehicles and stationary sources. PM₁₀ is forecast to increase, mostly due to the growth in motor vehicle travel in the Bay Area. SO₂ is also forecast to increase throughout the region.

The BAAQMD operates two air quality monitoring stations in San Francisco, one near Potrero Hill and one downtown. Both stations are downwind of the Presidio. Therefore, neither station would provide a representative indication of the superior air quality expected at the Presidio. No additional air quality monitoring is conducted within the GGNRA.

At the NPS Point Reyes North District Ranger Station, ozone data exists from November 1987 to December 1992 (NPS Air Resources Division, 2002), and parameters for aerosol and particulate mass are presently monitored (Interagency Monitoring of Protected Visual Environments Program, 2002). Ozone concentrations exceeded the state one-hour standard (90 ppb) during only one hour during 1988 through 1990, and the federal one-hour standard was not exceeded. Annual average concentrations of PM₁₀ at Point Reyes are approximately one-half of the state standards (30 micrograms per cubic meter). Ambient air quality standards for ozone and PM₁₀ are met at this location. Consistency with the state-level standard for visibility is unknown because optical data are not gathered at Point Reyes.

Violations of the state and federal standard for ozone persist further inland. However, in San Francisco, neither federal nor state ozone standards have recently been exceeded. Only state standards for PM₁₀ have been recently exceeded. Pollutants from San Francisco tend to be carried into the more sheltered areas of the region and cause violations of the standards there. Therefore, the region will continue to benefit from further efforts to control emissions that originate in San Francisco.

Toxic air contaminants are monitored by a region-wide network of stations maintained by the BAAQMD. The results of the monitoring indicate that the health risks from ambient toxic air contaminants have been gradually

decreasing over the past ten years. In 1998, the region-wide ambient presence of toxic air contaminants resulted in an estimated average cancer risk of about 200 in one million, based on a lifetime exposure. This is down from approximately 350 in one million based on 1991 data (BAAQMD 1999).

LOCAL SOURCE INVENTORY

Traffic-related emissions of criteria pollutants are generated along the roadways throughout the Presidio including U.S. Highways 1 and 101. Traffic congestion in the Presidio or on the nearby roadways or intersections can occasionally result in localized elevated concentrations (hotspots) of carbon monoxide if heavy traffic coincides with stagnant weather conditions. Diesel trucks, buses, and other equipment, are sources of particulates in diesel exhaust, which are considered to be a toxic air contaminant. Other toxic air contaminants emitted in the Presidio include benzene from motor vehicles and small amounts of ammonia from soils or application of fertilizers.

Odors presently emitted include the odors of human activity (poorly maintained motor vehicles or landscaping equipment exhaust, decomposing landscaping trimmings, cooking food, or discarded waste) along with the natural aromas of vegetation, soils, and the sea.

Existing stationary sources at the Presidio are largely unused. These include equipment in the Letterman Planning District, which is currently not operational and is planned for demolition. The PHSH and other facilities at the Presidio include natural gas-fired boilers for heat and steam generation. These sources are exempt from BAAQMD permitting requirements and federal performance standards because each unit has a heat-input capacity of less than 10 million British thermal units per hour. Other small stationary sources that could be present at the Presidio are also below the thresholds for requiring permits.

3.3.5 NOISE

NOISE TERMINOLOGY

Sound levels are the audible intensities of air pressure vibrations and are most often measured with the logarithmic decibel scale (dB). To consider the human response to the pitch and loudness of a given sound in the context of environmental noise, the A-weighted frequency-dependent scale (dBA) is usually employed. The equivalent energy indicator, L_{eq} , is an average of noise over a stated time period, usually one-hour. The day-night average, L_{dn} , is a 24-hour average, which accounts for the greater sensitivity of most people to nighttime noise. The sound level that is exceeded ten percent of the time is known as L_{10} . Generally, a 3 dB difference at any time is noticeable to most people and a difference of 10 dB is perceived as a doubling of loudness.

NOISE CONTROL REGULATIONS AND PROGRAMS

The Trust requires all facilities to be managed, operated, and maintained to minimize noise pollution in the Presidio by complying with the following standards.

Traffic Noise

Federal management of highway noise can be found in Federal Highway Administration (FHWA) regulations (23 CFR 772). Federal or federally-aided highway projects and construction of highway projects, must conform with the FHWA noise standards. The FHWA Noise Abatement Criteria (NAC), which aims to protect noise-sensitive land uses from highway noise, is summarized in Table 7. The FHWA procedures state that noise impacts from traffic are serious enough to warrant consideration of abatement when noise levels for the project approach or exceed the Noise Abatement Criteria or when they substantially exceed existing noise levels. FHWA regulations do not include specific criteria for noise caused by construction or demolition activities.

Table 7: FHWA Noise Abatement Criteria (Hourly dBA)

Activity Category	$L_{eq}(h)$	$L_{10}(h)$
A Lands on which serenity and quiet are of extraordinary significance and serve as important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.	57 (Exterior)	60 (Exterior)
B Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.	67 (Exterior)	70 (Exterior)
C Developed lands, properties, or activities not included in Categories A or B above.	72 (Exterior)	75 (Exterior)
D Undeveloped lands.	None Applicable	None Applicable
E Residences, motels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.	52 (Interior)	55 (Interior)

Source: 23 Code of Federal Regulations, Part 772, Table 1.

Notes: Either L_{eq} or L_{10} (but not both) may be used on a project.

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General Construction/Demolition Noise

Local noise control for the urban neighborhoods surrounding the Presidio is the San Francisco Noise Ordinance (Article 29 of the San Francisco Police Code, 1994). The noise ordinance regulates construction noise, fixed-source noise, and unnecessary, excessive, or offensive noise disturbances within the city. The construction noise regulations in Sections 2907 and 2908 of the San Francisco Police Code provide that:

- Construction noise is limited to 80 dBA at 100 feet (ft.) from the equipment during daytime hours (7 a.m. to 8 p.m.). Impact tools are exempt provided that they are equipped with intake and exhaust mufflers.
- Nighttime construction (8 p.m. to 7 a.m.) that would increase ambient noise levels by 5 dBA or more is prohibited unless a permit is granted by the Director of Public Works.

The Trust is committed to complying with provisions equivalent to the standards in the San Francisco Noise Ordinance.

Interior Noise

Noise standards for interior spaces are included in Title 24 of the California Code of Regulations (California Noise Insulation Standards, California State Building Code [Part 2, Title 24, CCR], 1995). These standards would govern interior noise levels and apply to all new (permitted after 1974) multifamily residential units (hotels, motels, apartments, condominiums, and other attached dwellings). These standards would also require that acoustical studies be performed prior to construction at residential building locations where the existing exterior L_{dn} exceeds 60 dBA. Such acoustical studies would be required to establish a design that will limit maximum L_{dn} noise levels to 45 dBA in any habitable room. As part of the Trust compliance process, the Trust would enforce the noise insulation requirements equivalent to the standards of Title 24 with building permit conditions.

EXISTING NOISE CONDITIONS

Traffic on the roadways of the Presidio is the major source of environmental noise. Away from roadways, the Presidio is generally quieter than the surrounding urban environment of San Francisco because natural noise sources dominate and there is less urban activity. Other non-traffic noise is caused by human activity (primarily recreational), occasional aircraft overflights, and use of mechanical equipment for building operations (e.g., ventilation systems) or landscaping.

The results of recent noise monitoring are summarized in Table 8. In the vicinity of State Highway 1, and U.S. Highway 101 (including Doyle Drive and Richardson Avenue), existing traffic noise levels are commonly above 67 dBA, the FHWA Noise Abatement Criterion for recreation areas, parks, and residences. Additionally, noise levels above 67 dBA can occasionally occur adjacent to some of the internal roadways of the Presidio and near the entry gates; this noise can be exacerbated by buses accessing the Presidio (Bowlby and Associates 1998). Peak noise levels above 85 dBA were observed outside City residences adjacent to accelerating San Francisco Muni buses leaving Presidio gates. Away from traffic noise and noise from other human activity, the natural environment provides noise levels commonly below 60 dBA.

NOISE-SENSITIVE AREAS

Natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of “the Presidio’s significant natural, historic, scenic, cultural and recreational resources” protected under the Trust Act. They are vital to the natural functioning of areas within the Presidio and may provide valuable indicators of the health of various ecosystems. Examples of areas within the park where quiet is of significance include Crissy Marsh, Tennessee Hollow, El Polin Spring, Inspiration Point, Mountain Lake, and Lobos Creek. The natural soundscapes of these areas include the sound of running water, waves crashing, and birds singing. Intrusive sounds are of concern because they could impede the Trust’s (or in the case of Crissy Marsh, NPS’s) ability to manage and protect these resources. Intrusive sounds are also a matter of concern to park visitors. Noise can also distract visitors from the resources and purposes of cultural areas, i.e., the tranquility of historic settings and the solemnity of monuments. Examples

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of these areas within the Presidio include the Fort Scott parade ground, San Francisco National Cemetery, and the World War II Memorial.

Examples of other resources that need to be protected (known as sensitive uses or sensitive receptors) include residences, schools, day care centers, parks, hospitals, convalescent centers, and recreational facilities. Existing and planned noise-sensitive uses would include:

- recreational users at the Presidio;
- residences within the City of San Francisco and within the Presidio; and
- lodging, day care, or senior-housing uses that may be associated with some of the proposed development alternatives.

The current mix of land uses at the Presidio includes recreational opportunities throughout. Recreational users in some highly developed areas of the Presidio would not be considered noise-sensitive. For example, recreational users in the Letterman Planning District are generally people using the YMCA facilities and/or tennis courts, and they would not be considered noise-sensitive, because the facilities are either indoors or are located in a built environment typical of the urban commercial/residential mixed use areas in San Francisco. Locations of existing noise-sensitive areas in Area B are depicted on Figure 25.

Table 8: Summary Of Short-Term Noise Measurements

Site	Description	Time	Dominating Noise Source	Hourly	
				L _{eq} (dBA)	L ₁₀ (dBA)
R1	Lyon Street at Francisco and Richardson	11:10 a.m.	Richardson/Highway 101	69.4	72.5
R2	3030 Lyon Street (Lombard Street Gate)	11:45 a.m.	Lyon Street	60.5	64.0
R3	Presidio Boulevard at #545	12:25 p.m.	Buses Accelerating	67.9	69.1
R4	Gorgas at Sternberg (LDA)	12:55 p.m.	Shielded from Richardson	61.4	63.9
R5	Marina Boulevard Gate at Lyon Street	12:55 p.m.	Marina Boulevard	71.5	75.6
R6	Presidio Boulevard Gate at Pacific Street	7:10 a.m.	Presidio Gate Traffic	78.5*	69.2*
R7	Arguello Boulevard Gate at Jackson Street	7:45 a.m.	Arguello Gate Traffic	63.3	65.7
R8	El Camino del Mar (Lincoln Gate)	8:25 a.m.	Lincoln Gate Traffic	66.2	69.2
R9	Pershing at #1502	1:30 p.m.	Lincoln Boulevard	60.8	63.5
R10	Public Health Service Hospital at #1810	9:05 a.m.	Park Presidio	59.6	61.4
R11	Kobbe at #1304	9:40 a.m.	Elevated Highway 1	63.1	64.9
R12	Storey at #1290 Backyard	10:10 a.m.	Highway 101/1	68.0	69.6
R13	Armistead at #1253	10:35 a.m.	Highway 101	65.1	66.3
R14	Doyle Drive at #106 (Main Post)	11:10 a.m.	Doyle/Highway 101	72.1	73.8
R15	Moraga at #50 (Officer's Club)	11:55 a.m.	Main Post Activity	59.9	64.0

Source: EIP Associates, *Short-Term Ambient Noise Measurements*, 1999 and 2001.

Notes: * Includes passby of emergency vehicles with sirens.
Tests were duration of 15 to 30 minutes, taken on February 23, 1999 and February 2, 2001.

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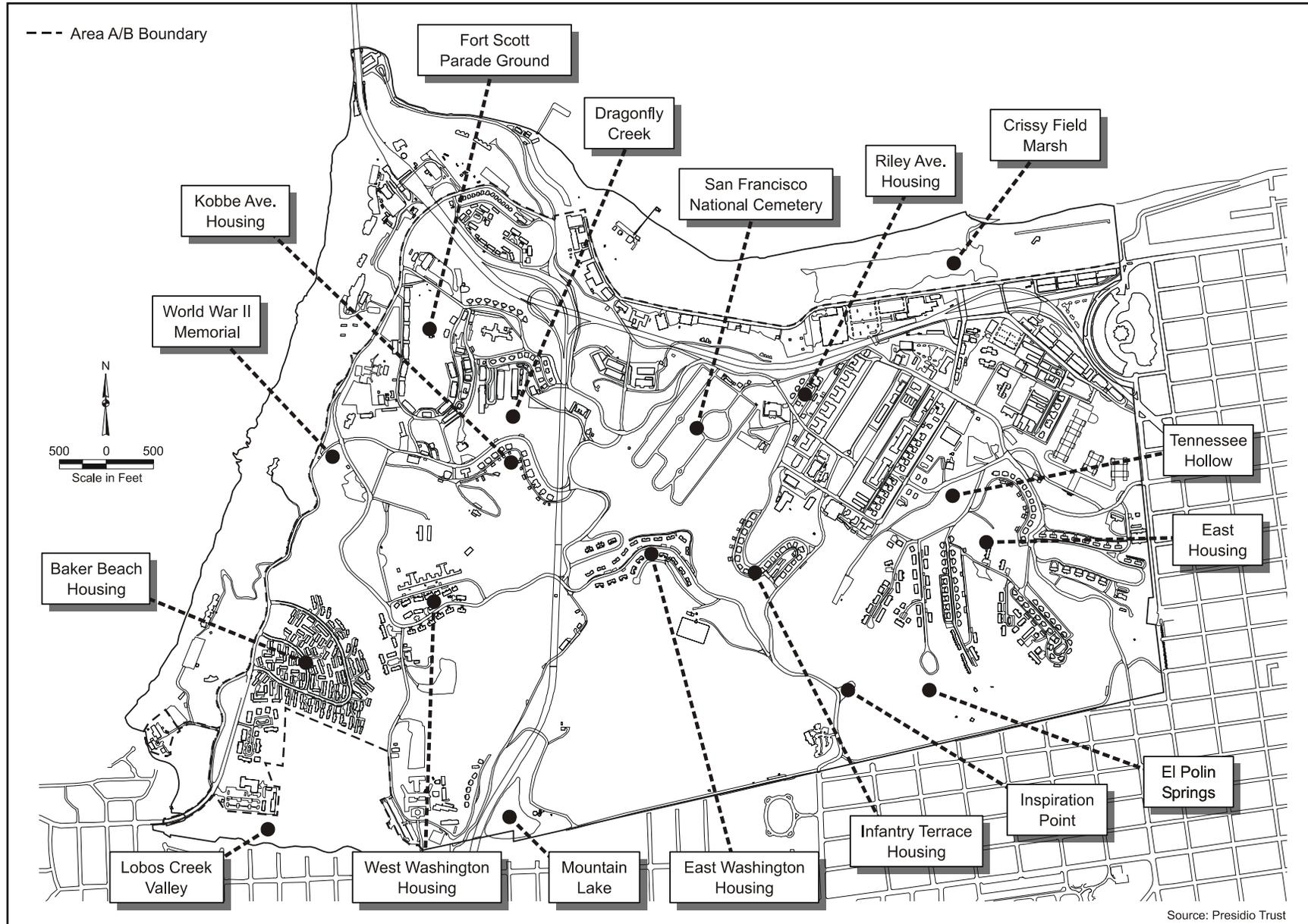


Figure 25: Sensitive Noise Areas