

BASELINE BIOLOGICAL ASSESSMENT

MISSION TRAIL NATURE PRESERVE

Carmel-by-the-Sea, California



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Prepared for:
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PROPERTY PROFILE

DATE: October 10, 2015

PREPARED BY: Nicole Nedeff, Consulting Ecologist. nikki@ventanaview.net
11630 McCarthy Road, Carmel Valley, CA 93924. 831.659.4252

SITE NAME: Mission Trail Nature Preserve, City of Carmel-by-the-Sea

APN: 009-341-001, 2.005 acres
009-341-008, 17.5 acres
010-061-006, 13.265 acres (includes the Lester Rowntree Native Plant Garden)
010-061-007, 1.252 acres (includes the Flanders Mansion and grounds)

ACREAGE: Total acreage in property = 34.022 acres

USGS QUAD: Monterey 7.5'. T16S, R1W, unsurveyed sections

OWNER: City of Carmel-by-the-Sea
Project Contact, Mike Branson, City Forester, 831.620.2073
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CARMEL CITY ZONING: Natural Parklands and Preserves, with an inholding zoned Improved Parklands (APN 010-061-007 – Flanders parcel). The entire site is designated Environmentally Sensitive Habitat Area (ESHA), except APN-010-061-007 (Flanders parcel) and the Lester Rowntree Native Plant Garden, which are ESHA buffer lands within the Coastal Zone administered by the California Coastal Commission.

SITE LOCATION: The southern edge of the Preserve fronts Rio Road at the Carmel Mission, approximately 0.25 miles west of Highway 1 and 0.25 miles north of the Carmel River. The Preserve extends northwards for about 3200-feet (0.6 miles) along a narrow, unnamed drainage to the junction of Mountain View Avenue and Forest Road. The western margin of the Preserve generally corresponds to the riparian bottomlands, while the eastern side extends up onto adjoining marine terrace uplands. The entire Preserve is within the City Limits and includes the Lester Rowntree Native Plant Garden and an inholding parcel where the Flanders Mansion is situated. The Preserve is accessed from four signed trailheads, which are located at Rio Road on the south, Martin Road on the east, 11th Avenue on the west and Mountain View/Forest on the north. The Preserve can also be accessed from the driveway to the Flanders Mansion and Lester Rowntree Native Plant Garden, 25800 Hatton Road. Numerous unsigned neighborhood footpaths also connect into the formal trail network in the Preserve. Improved residential properties entirely surround the Preserve and the property abuts rural residential parcels in unincorporated Monterey County land along the northeasterly border.

PROJECT DESCRIPTION: The City of Carmel-by-the-Sea proposes to implement projects pursuant to the City's "Mission Trail Nature Preserve Master Plan", which was prepared by City

staff and volunteers and adopted by the City Council in 1996. The Baseline Biological Assessment is designed to serve as an over-arching, programmatic biotic assessment for future management projects in the nature preserve. Within the ESHA, projects which have the potential for substantial alteration of existing development require a Coastal Development Permit issued by the Carmel Planning Department. Programmatic recommendations are included to minimize and remediate potential environmental impacts associated with the implementation of projects, pursuant to carrying out the Preserve Master Plan under Carmel Municipal Code requirements.

SITE VISITS: April through August 2015.

HABITAT IN PRIMARY PROJECT AREA: Central Lucian Coastal Scrub, Coastal Prairie, Annual Grassland, Monterey Pine Forest, Central Coast Arroyo Willow Riparian, Coast Live Oak Woodland, Wetland, manipulated gardens, and significant areas invaded by non-native, weedy species.

SIGNIFICANT BIOLOGICAL ATTRIBUTES:

- ✓ Wetland
- ✓ Central Coast Arroyo Willow Riparian
- ✓ Coastal Prairie
- ✓ Monterey Pine Forest
- ✓ Yadon's rein-orchid, *Piperia yadonii*, Federally Endangered
- ✓ California Rare Plant Rank* 1B plants observed:
 - Monterey pine, *Pinus radiata*
 - Hickman's onion, *Allium hickmanii*
- ✓ Monterey Dusky-footed Woodrat, *Neotoma macrotis (fuscipes) luciana*, Species of Concern
- ✓ Foraging habitat for raptors observed: White-tailed Kite, Red-tailed Hawk, American Kestrel, Red-shouldered Hawk
- ✓ Winter roosting habitat for Monarch Butterfly, *Danaus plexippus*

* The California Rare Plant Ranking system developed by the California Native Plant Society is defined in Section 2, Table 1.



Figure 1 – Monterey Dusky-footed Woodrat (Internet image).

City of Carmel-by-the-Sea
Mission Trail Nature Preserve
Baseline Biological Assessment
and
Management Recommendations

1. PART 1 – BASELINE BIOLOGICAL ASSESSMENT

1.1 INTRODUCTION

The City of Carmel-by-the-Sea Mission Trail Nature Preserve is a 34-acre natural habitat area designated in 1979 by the Carmel City Council as a nature park. The Preserve is an ecologically significant open space that provides wildlife habitat, recreational value, educational benefit, utility easement and drainage in an otherwise developed residential locale. The property offers passive recreational opportunities for the general public and the biologically diverse mosaic of natural communities serves as important habitat for a variety of special plants and wildlife species.

The Preserve supports a rich assemblage of natural communities and special status plants and animals, however the property is overrun in many areas with uncontrolled invasive, non-native plants. Weeds threaten the long-term viability of the Preserve's native flora and fauna and have contributed to the loss of significant natural habitat. The active management and systematic removal of invasive plants, as well as the investment in a regular trail and infrastructure maintenance program will enhance the natural biodiversity of the Mission Trail Nature Preserve and fulfill the mission originally set forth in the Preserve's 1996 Master Plan.

The Mission Trail Nature Preserve has a long history of human modification. The unnamed canyon that traverses through the Preserve was farmed and grazed for nearly two centuries before being conserved by the City of Carmel in the early 1970's. The proximity of the site to the Carmel Mission has led to many decades of landscape change in the Preserve environs and the historical ecology of the area can only be inferred from archival photographs and artists' renderings.

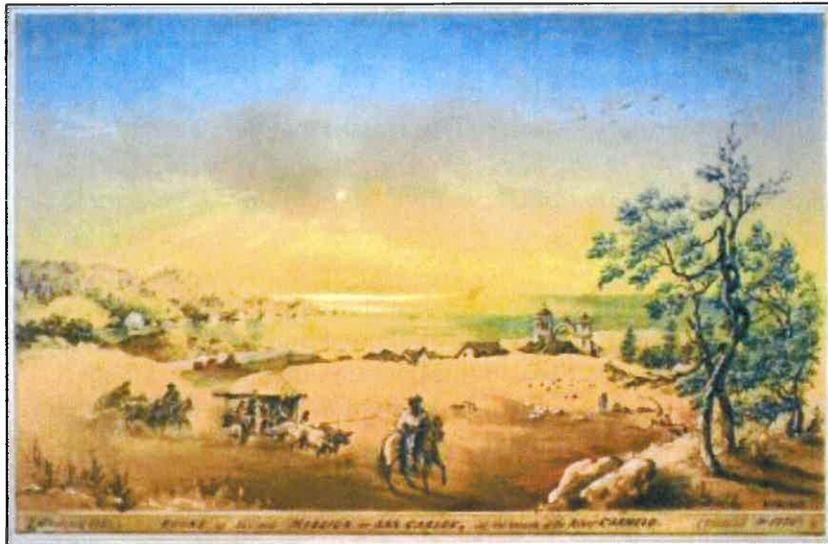


Figure 2 – Artist's view of the Carmel Mission environs. The perspective suggests the view is from near what is today Martin's Meadow below the Flanders Mansion. Note structures to the left of the Mission (Internet image, date unknown).

The local environment during Mission times is depicted in historic drawings and photographs as mostly grassy, with few trees and little to elucidate the intensive cultivation, settlement and landscape modification that happened in the late 1770's and early 1800's. Native American camps, agricultural fields and livestock corrals were clustered in the canyon near the Carmel Mission compound before the lands were secularized and dispersed in 1834. Although no definitive route has been established, parts of the trail through the canyon may have been an access corridor between the Spanish outpost at the Carmel Mission and the garrison at the Presidio of Monterey. This storied pathway endures today along the lower Serra Trail in the Mission Trail Nature Preserve (Fr. Faria, 2015). Mission archives note that Father Junipero Serra's 13th Station of the Cross along the route between the Mission and the Presidio occurred near the 11th Avenue Trailhead to the Preserve (Fr. Faria, 2015).

The area that comprises the Mission Trail Nature Preserve was acquired by the City of Carmel-by-the-Sea in the 1970's, approximately 200 years after the Mission was established by Father Serra. The goal of the land acquisition was the preservation of the greenbelt and habitat area conserved in the park area. A Master Plan for the Mission Trail Nature Preserve was adopted by the City of Carmel in the mid-1990's to establish long-term management goals for the parkland. Guidelines were designed to safeguard the natural and cultural values of the nature preserve. The Preserve Master Plan (1996) is a site-specific component of the City's General Plan and Local Coastal Program-Land Use Plan (2002), which was developed in compliance with provisions outlined in the 1976 California Coastal Act. The Mission Trail Nature Preserve Master Plan serves to guide the City in its decision-making process concerning management of the parkland. The Master Plan outlines goals and objectives consistent with the City's LCP/LUP.

The 1996 Mission Trail Nature Preserve Master Plan is a concise and prescient document, with objectives and recommendations that remain contemporary today. Habitat management, public use, infrastructure, improvements, parking, access, and equipment are addressed in the Master Plan. Within each section, goals are established, objectives are identified, and supporting policies are forwarded.

The Mission Trail Natural Preserve Master Plan stresses that,

Active management is essential if resource values of this habitat are to be protected and preserved (page 3).

This Report is divided into two parts: Part One is a Baseline Biological Assessment that describes habitat, biotic species and environmental conditions characterizing the Mission Trail Nature Preserve property, and Part Two outlines programmatic management recommendations for enhancing the natural resources and biodiversity of the Preserve. The baseline biological documentation is provided to support planning and implementation of projects which will actively manage and enhance natural resources, as outlined in the Preserve Master Plan. Recommendations for removal of invasive plants, trail rehabilitation, parking, rare plant conservation and general habitat management are included in the report. An implementation strategy and work plan are suggested in order to fulfill Master Plan guidelines. Priorities and projects for specific management zones are listed and timelines are suggested. The report also includes general habitat management recommendations for the Flanders Mansion inholding and

the Lester Rowntree Native Plant Garden, however the focus of the assessment and management recommendations are on the open space park lands of the Preserve, rather than the improved grounds.

The Biological Assessment relies on field work completed between May and August 2015. Supporting background information was obtained from a number of previously written documents, including the *Mission Trail Nature Preserve Master Plan* (1996), the *Final Results of the Environmentally Sensitive Habitat Area Study* prepared by consultants Jones and Stokes of Sacramento, CA (July 6, 1995), the *Recirculated Draft Environmental Impact Report for the Sale of the Flanders Mansion Property* written by consultants with Denise Duffy and Associates (January 2009), and the Friends of Mission Trail Nature Preserve “Bluebook” of proposed enhancement projects (October 2013). The 1995 Jones and Stokes study was commissioned as part of Carmel’s LCP/LUP compliance report and the City’s General Plan.

The Baseline Biological Assessment is not a comprehensive survey of the entire Mission Trail Nature Preserve property, but rather a study designed to evaluate representative biological features and overall environmental conditions, pursuant to the implementation of the Master Plan. The Baseline Biological Assessment provides information for the prioritization of management tasks designed to protect and enhance significant habitat areas and associated special status species. The Assessment also outlines program-level protocols for resource management, including weed eradication and revegetation. In accordance with City practices, more detailed, systematic surveys may be needed in advance of some of the proposed projects in order to assess changing conditions and determine the presence/absence of elements potentially affected by improvements.

The Baseline Biological Assessment will serve as the foundation document for a Coastal Development Permit application submitted to the Carmel Planning Commission for the implementation of projects proposed that have the potential for substantial alteration of existing development within the “Environmentally Sensitive Habitat Area” (ESHA).

The City’s Municipal Code Section 17.20.220, Environmentally Sensitive Habitats, describes the need for a Coastal Development Permit for projects that substantially alter existing development within the ESHA. However, even if a project is a “development” within the ESHA, paragraph C of CMC 17.20.210 allows for exemption from ESHA permitting requirements if the “development” is exempt under CMC 17.52.100 (Development Excluded From Coastal Development Permit Requirements). The Municipal Code does not specify what “development” actually means, and whether removal of weeds, invasive trees and other habitat management projects fall into this category, or under the “improvements” categories described in the language of CMC 17.52.100. The City’s Municipal Code also does not provide metrics to determine what constitutes, “substantial alteration of existing development” (CMC 20.220.B).

Under the auspices of the Carmel Municipal Code, a Coastal Development Permit may be needed for the following proposed management projects in the Mission Trail Nature Preserve:

- " Invasive species removal in the Riparian and Wetland areas.
- " Erosion control work in any portion of the stream or riparian corridor.

- " Construction of a wet-season boardwalk link between trails in the riparian corridor.
- " Removal of large trees.
- " New trails.

Other potential Mission Trail Nature Preserve management projects outlined in the Preserve Master Plan are assimilated in the City of Carmel’s certified Local Coastal Program, Land Use Plan, which incorporated the Preserve Master Plan as a supporting document to govern management of the nature park.

In the event the use of herbicides is considered for invasive species removal and control in either the Riparian or Wetland natural communities at the Mission Trail Nature Preserve, a variance will be required from the section Carmel’s Municipal Code that specifies such chemicals are prohibited within 100 feet of Riparian habitat, Section 17.20.220.E.6.

Management recommendations are proposed in Part Two of this report for a long-term, multi-year program to reclaim the Mission Trail Nature Preserve from invasive species and restore the biological integrity of the resource-rich natural communities protected in the parkland.



2. FIELD SURVEY METHODS

Local maps, literature references, Internet-based searches and consultations with knowledgeable individuals were used during the preparation of the Baseline Biological Assessment. In addition, information pertinent to the project was provided by the Carmel City Forester and the Friends of Mission Trail Nature Preserve, a cooperating association recognized by the City and operating as an independent 501(c)3, non-profit organization.

Floristic field survey methods utilized in the Baseline Biological Assessment conform to protocols outlined by the California Department of Fish and Game (November 2009). The purpose of the statewide survey protocols is to facilitate a comprehensive, consistent and systematic approach for the identification of plants, natural communities and special status elements in project areas. The goal is to produce reliable information and to maximize the potential for locating special status species and communities.

Field assessment for this project focused on the following objectives:

- Identify and map natural communities
- Identify and map significant infestations of invasive weeds
- Locate and map special status plants and wildlife species
- Note significant cultural features

Botanical and habitat surveys were conducted between May and August 2015. Botanical surveys around and through natural communities were conducted on foot and boundaries of habitat areas were mapped using Global Positioning System (GPS) instrumentation available on the Avenza mobile phone application. The data collected were graphically compiled by Turf Image, Carmel, CA. GPS was used to geo-reference botanical, wildlife and cultural features on the site.

The spring and summer biological reconnaissance survey featured in this Biological Assessment documents what was apparent, or could be inferred during the survey time, with supplemental botanical data provided by referenced reports and data sets. In a few instances, plant species identification was performed using "forensic" botany techniques that depend on general morphological characteristics and dry plant material to aid in making a taxonomic determination. Where a positive identification could not be made, the plant taxon was simply identified to genus, if possible. All species noted in the plant list for the Preserve were observed by the author of this report.

To identify known element occurrences of special status habitats, plants and wildlife species, a records search was initiated with the California Department of Fish and Wildlife – California Natural Diversity Data Base (CNDDDB). CNDDDB data for the vicinity of the Mission Trail Nature Preserve were prepared by Fish and Wildlife staff on July 17, 2015, with "Full Condensed Report" and "Spotted Owl" computer print-outs. The CNDDDB vellum map overlay for the Monterey USGS 7.5' quadrangle was prepared by CDFW staff on July 22, 2015.

The California Department of Fish and Wildlife (CDFW) RareFind and BIOS data base and List of Special Animals (2008) were also reviewed online for sensitive plant and wildlife species in the Carmel area. CNDDDB mapping and database information display specific records and element occurrences for several sensitive or special status species on the Preserve and numerous element occurrences are documented in similar habitat areas in the general vicinity of the Preserve property. The California Native Plant Society web-based "Inventory of Rare and Endangered Vascular Plant Species" was also consulted to identify occurrences of special status plants in the general Carmel region.

Based on the presence of Monterey Pine Forest, Coastal Prairie, Riparian and Wetland vegetation types on the Mission Trail Nature Preserve, appropriate habitat on the Preserve was specially reviewed for the following special status species, which have a high potential to occur:

- " Monterey Dusky-footed Woodrat
- " American Badger
- " California Tiger Salamander
- " California Red-legged Frog
- " Coast Horned Lizard
- " Southwestern Pond Turtle
- " Raptors
- " Burrowing Owl
- " Yellow Warbler
- " Tri-colored Blackbird
- " Monarch Butterfly
- " Smith's Blue Butterfly
- " Yadon's rein-orchid, *Piperia yadonii*
- " Hickman's onion, *Allium hickmanii*
- " Eastwood's goldenbush, *Ericameria fasciculata*
- " Hooker's manzanita, *Arctostaphylos hookeri*
- " Sandmat manzanita, *Arctostaphylos pumila*
- " Santa Lucia bush-mallow, *Malacothamnus palmeri* var. *palmeri*
- " Jolon clarkia, *Clarkia jolonensis*
- " Kellogg's Horkelia, *Horkelia cuneata* ssp. *sericea*
- " Marsh microseris, *Microseris paludosa*

During field surveys, several special status plants and animals were documented on the subject property and potential habitat was inspected that is appropriate for additional sensitive species of concern, including the federally endangered Smith's Blue Butterfly (*Euphilotes enoptes smithi*). Please refer to Table 1, for the list of Special Status Plants and Wildlife, and the results of field survey to document presence/absence of species of concern on the Preserve.

Lists of plant and wildlife species observed, or potentially occurring on the subject property are included in Appendix A (plants), Appendix B (Beidleman, birds observed), Appendix C (potential birds), Appendix D (observed and potential mammals), and Appendix E (observed and potential reptiles and amphibians). Common names for plant and wildlife species observed on the Preserve are noted with scientific names when they are first mentioned in the text of the report, and generally only common names are used thereafter. Scientific nomenclature for plants described in this report follows protocols used in Baldwin, et al. (2012).

TABLE 1

FEDERAL, STATE AND CALIFORNIA NATIVE PLANT SOCIETY STATUS FOR
SIGNIFICANT PLANTS AND WILDLIFE
IN THE VICINITY OF MISSION TRAIL NATURE PRESERVE, CARMEL, CA

Scientific Name	Common Name	Federal	State	CNPS	Habitat	Found/Not Found
PLANTS						
<i>Allium hickmanii</i>	Hickman's onion			1B.2	CP	FOUND
<i>Arctostaphylos hookeri</i>	Hooker's manzanita			1B.2	MC	FOUND in Garden
<i>Arctostaphylos pumila</i>	sandmat manzanita			1B.2	MC	NOT FOUND
<i>Castilleja latifolia</i>	Monterey Indian paintbrush			4.3	CBS, Dune	NOT FOUND
<i>Cirsium occidentale</i> var. <i>compactum</i>	Compact cobwebby thistle			1B.2	CS, CP	NOT FOUND
<i>Clarkia jolonensis</i>	Jolon clarkia			1B.2	CS, CP, G	NOT FOUND
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i>	Seaside bird's beak		E	1B.1	C, MC, CS, OW	NOT FOUND
<i>Delphinium hutchinsoniae</i>	Hutchinson's larkspur			1B.2	C, CP, CS	NOT FOUND
<i>Encameria fasciculata</i>	Eastwood's goldenbush			1B.2	MC	NOT FOUND
<i>Enogonum nortonii</i>	Pinnacles buckwheat			1B.3	C, G, MC	NOT FOUND
<i>Fritillaria liliacea</i>	fragrant fritillary			1B.2	CP, RF	NOT FOUND
<i>Horkelia cuneata</i> var. <i>sericea</i>	Kellogg's horkelia			1B.1	MC	NOT FOUND
<i>Lasthenia conjugens</i>	Contra Costa goldfields		E	1B.1	CP	NOT FOUND
<i>Lomatium parvifolium</i>	small-leaved lomatium			4.2	MC, MPF	NOT FOUND
<i>Malacothamnus palmeri</i> var. <i>palmeri</i>	Carmel Valley bush-mallow			1B.2	C, CS	NOT FOUND
<i>Microseris paludosa</i>	marsh microseris			1B.2	CP	NOT FOUND
<i>Pinus radiata</i>	Monterey pine			1B.1	MPF	FOUND
<i>Piperia michaeli</i>	Michael's rein-orchid			4.2	MC, CS	NOT FOUND
<i>Piperia yadonii</i>	Yadon's rein orchid		E	1B.1	MC, MPF	FOUND
<i>Plagiobothrys uncinatus</i>	hooked popcom flower			1B.2	CP	NOT FOUND
<i>Potentilla hickmanii</i>	Hickman's cinquefoil		E	1B.1	MPF, Wetland	NOT FOUND
<i>Rosa pinetorum</i>	pine rose			1B.2	MC, MPF	NOT FOUND
<i>Sanicula maritima</i>	adobe sanicle		R	1B.1	CP, CS	NOT FOUND
<i>Sidalcea malachroides</i>	maple-leaved checkerbloom			4.2	RF, MEF	NOT FOUND
<i>Tortula californica</i>	California screw moss			1B.2	G, CS,	NOT FOUND
<i>Trifolium buckwestiorum</i>	Santa Cruz clover			1B.1	CP, MEF	NOT FOUND
<i>Trifolium polyodon</i>	Pacific Grove clover		R	1B.1	CP, MEF, Wetland/Riparian	NOT FOUND
<i>Trifolium trichocalyx</i>	Monterey clover		E	E	1B.1 CCP	NOT FOUND

ANIMALS

Reptiles/Fish/Amphibians

<i>Ambystoma californiense</i>	California Tiger Salamander	T	T	ponds, grasslands	NOT FOUND
<i>Anniella pulchra pulchra</i>	California Legless Lizard		SC	sandy soil	NOT FOUND
<i>Emys marmorata</i>	Western Pond Turtle	SC	CP,SC	rivers, ponds	NOT FOUND
<i>Phrynosoma coronatum frontale</i>	California Horned Lizard	SC	CP,SC	G,C,CS,MC	NOT FOUND
<i>Rana draytonii</i>	California Red-legged Frog		T	rivers, ponds	NOT FOUND
<i>Taricha torosa torosa</i>	Coast Range Newt		SC	creeks with pools, ponds	NOT FOUND
<i>Thamnophis hammondi</i>	Two-striped Garter Snake	FSS	SC	riparian	NOT FOUND

Mammals

<i>Lasiurus cinereus</i>	Hoary Bat			trees, mosaic habitats	NOT FOUND
<i>Neotoma fuscipes luciana</i>	Monterey Dusky-footed Woodrat	SC	SC	CS,OW, riparian,MEF	FOUND
<i>Taxidea taxus</i>	American Badger		SC	G, CP	NOT FOUND

Birds

<i>Agelaius tricolor</i>	Tricolored Blackbird		SC	riparian	NOT FOUND
<i>Athene cunicularia</i>	Burrowing Owl		SC	CP, CS	NOT FOUND
<i>Cypseloides niger</i>	Black swift		SC	cliffs	NOT FOUND
<i>Dendrocica petechia</i>	Yellow Warbler		SC	riparian	POTENTIAL
<i>Falco mexicanus</i>	Prairie Falcon		SC	G,OW,CP, CS, MC	POTENTIAL
<i>Falco peregrinus anatum</i>	Peregrine Falcon		E	cliffs, bridges	NOT FOUND

Invertebrates

<i>Coelus globosus</i>	Globose Dune Beetle		SC	dunes	NOT FOUND
<i>Danaus plexippus</i>	Monarch Butterfly winter roost		SC	euc., pine, RW groves	OBSERVED IN PAST
<i>Euphilotes enoptes smithi</i>	Smith's Blue Butterfly	E		CS	NOT FOUND

Abbreviations for Status Codes

- E = Endangered
- T = Threatened
- R = Rare
- SC = Species of Special Concern, * indicates potential status change
- CP = Protected under California Code of Regulations
- FP = Protected under California Fish and Game Codes
- FSS = Forest Service Sensitive Species
- 1B = Plants rare, threatened or endangered in California and elsewhere
- 1B.1 = Seriously endangered in California
- 1B.2 = Fairly endangered in California
- 1B.3 = Not very endangered in California
- 4 = Plants of limited distribution in California - A Watch List
- 4.2 = Fairly Endangered in California
- 4.3 = Not very endangered in California

Habitat Abbreviations:

- C = Chaparral
- G = Foothill and Valley Grassland
- OW = Oak Woodland
- CP = Coastal Prairie
- CS = Coastal Scrub
- MC = Maritime Chaparral
- MPF = Monterey Pine Forest
- RW = Redwood Forest
- MEF = Mixed Evergreen Forest
- CCP = Closed Cone Pine Forest
- CBS = Coastal Bluff Scrub

3. PROPERTY DESCRIPTION and EXISTING CONDITIONS

3.1. LOCATION AND GEOGRAPHIC SETTING

3.1.1. Location

The Mission Trail Nature Preserve is located near the southeastern edge of Carmel-by-the-Sea in coastal Monterey County. The southern border of the Preserve borders Rio Road across from the Carmel Mission approximately 0.25 miles north of the Carmel River. The northern tip of the parkland extends into the wooded neighborhoods of Carmel near the Highway 1 corridor. The narrow, linear property is composed of four irregularly-shaped Assessor's Parcels situated within the City Limits and almost entirely surrounded by improved residential properties. One of the parcels in the Preserve is occupied by the Flanders Mansion, an impressive structure completed in 1925 and currently vacant. The Lester Rowntree Native Plant Garden occupies a portion of the northern parcel adjacent to the Flanders Mansion. The northeastern boundary of the Preserve abuts rural residential parcels in unincorporated lands of Monterey County. Map 2 is a baseline map of the Preserve.

The Preserve is accessed from four signed trailheads, which are located at Rio Road on the south, Martin Road on the east, 11th Avenue on the west and at the junction of Mountain View Avenue and Forest Road on the north. The Preserve can also be accessed at the Flanders Mansion driveway and entry to the Lester Rowntree Native Plant Garden, 25800 Hatton Road. The Hatton Road entrance offers the only paved vehicular approach into the Preserve, however gated, unpaved vehicular access is also provided from entry points at Rio Road, Martin Road and 11th Avenue. Map 2 is the Baseline Preserve Map depicting trails, important place names and trailheads. Map 3 outlines the four Assessor's Parcels that form the Preserve and depicts the location of the Lester Rowntree Native Plant Garden.

Portions of the internal road network in the Preserve correspond with improved utility easements maintained by the Carmel Area Wastewater District, which has underground pipes and access manholes located at ground level along several trails. Pacific Gas and Electric holds a 10-foot wide easement under the electric lines found near the Willow Trail and the western property boundary. Although no recorded easements in the Preserve exist for PG&E, the utility has the right to maintain a pathway under any other electrical lines within the property (for example, to the meter serving the well in the center of the Preserve). A California-American Water main-line, as well as other utilities span the canyon at the upper reach of the Preserve near the Mountain View/Forest trailhead. The stream canyon is spanned by a wooden pedestrian bridge at this site. There is an internal system of signed roads and trails in the Preserve, as well as numerous neighborhood footpaths that enter the parkland from adjoining private homes and streets.

The central feature in the Mission Trail Nature Preserve is an unnamed canyon, which is flanked by gently sloping marine terraces that indicate a history of sea level fluctuation over long periods of time. The canyon mouth is a broad swale truncated by the elevated roadbed of Rio Road. The canyon narrows to the north, with an increasingly steep gradient upstream. The unnamed canyon supports a small stream and portions of the bottomlands are vegetated with high quality Riparian and Wetland habitat. The stream appears to be perennial in the upper reaches of the Preserve and becomes intermittent as it percolates into alluvium in the central area of the property. The

Baseline Preserve Map

Legend

-  Entrance
-  Hiking Trail
-  Service Road
-  Stream
-  5 Foot Contour
-  Preserve Boundary

1 inch = 350 feet

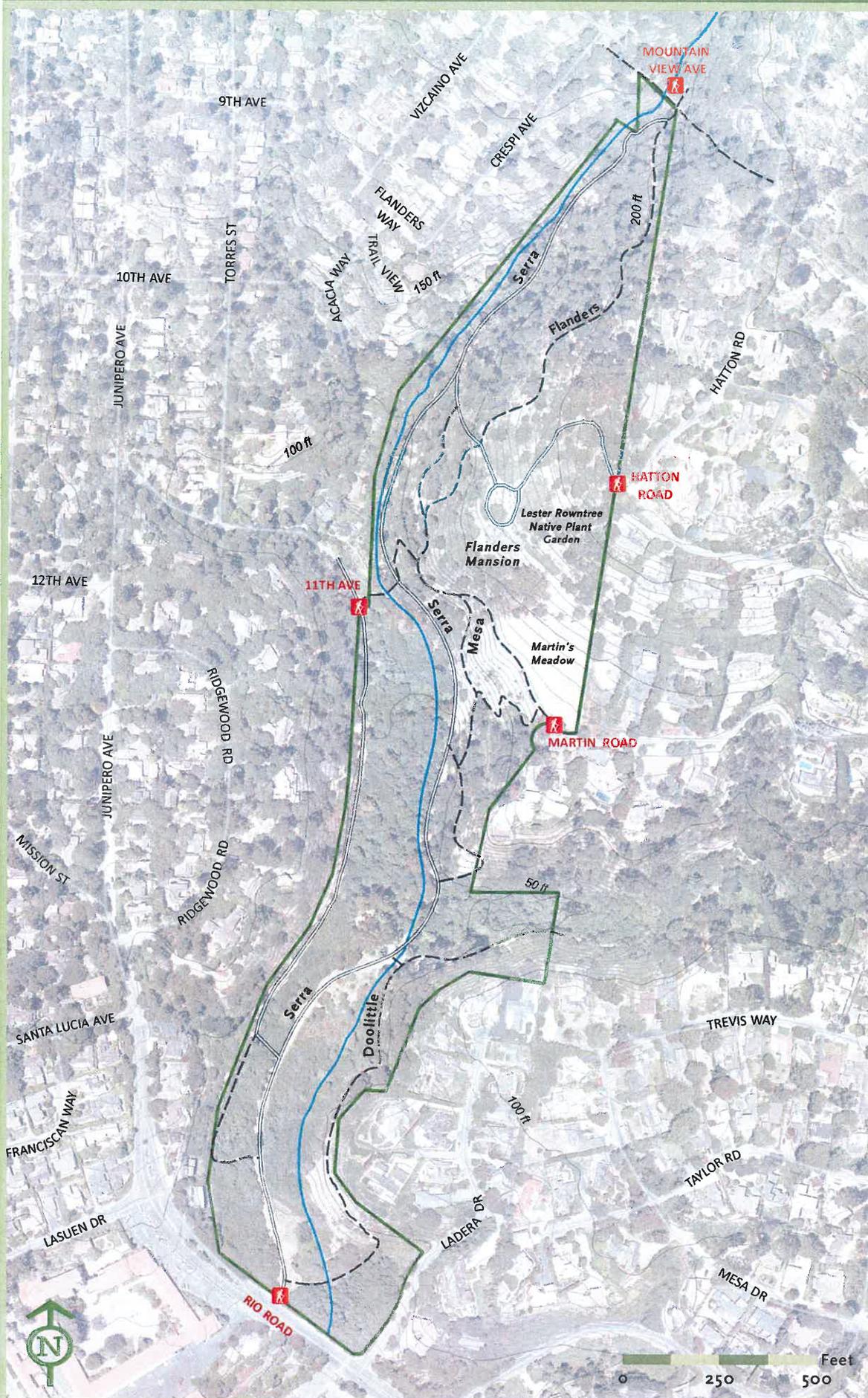


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Assessor's
Parcels

Legend

-  009-341-001
-  009-341-008
-  010-061-006
-  010-061-007
-  Native Plant Garden
-  APN



1 inch = 350 feet



Nicole Nedeff
Consulting Ecologist

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August 2015

primary drainage is intersected by several small, seasonal creeks and one larger drainage located on the southeastern side of the property. The combined drainages comprise the farthest downstream tributary of the Carmel River before the river enters the lagoon at the Carmel River State Beach. Elevations in the Preserve range from a low of approximately 30 feet at the Rio Road entrance, to 215 feet near Hatton Road and the entrance to the Lester Rowntree Native Plant Garden.

3.1.2. Climate

The Central Coast of California experiences a Mediterranean type climate, with cool, rainy winters and warm, dry summers. The City of Carmel-by-the-Sea averages about 15 inches of annual precipitation as rain that usually falls between mid-October and the end of April. In general, during the warmer months of the year, the coastal area of Carmel and low-lying inland regions are bathed in predictable, marine-driven advection fog that typically dissipates by mid-day. Occasionally, the marine layer persists for several days at a time and the area experiences heavy condensation and fog drip.

The moderating influence of the marine layer creates environmental conditions that support habitats requiring more moisture than generally falls as precipitation during winter months. On the Mission Trail Nature Preserve, the Monterey Pine Forest and Coastal Prairie natural communities are sustained in-part by the supplemental moisture and cool conditions provided by predictable coastal fogs during summer months, whereas the Riparian and Wetland communities are dependent on consistently high groundwater levels occurring in the canyon bottomlands and near the stream “outfall” at Rio Road.

3.1.3. Geology and Soils

Geologic maps of this portion of Monterey County depict a series of wave-cut marine terraces and ancient river floodplains in the vicinity of the Mission Trail Nature Preserve (Wagner, 2002). The stream drainages through Mission Trail Nature Preserve have carved through the succession of dune and sediment-covered terraces into the underlying granodiorite bedrock, as well as an area of sandstone at Martin’s Meadow which is probably related to the interbedded sands and shales of the Monterey Formation. The terrace features are veneered primarily with marine sediments and ancient sand dune features, as well as river (fluvial) deposits from the late Pleistocene Epoch. Areas of river cobble and fluvial sediment are notable on adjoining private properties on the south-eastern side of the Preserve.

It is interesting to note that the soils map available in the *Soil Survey of Monterey County* prepared by T.D. Cook and the U.S.D.A. Soil Conservation Service (1978) and the general surface geology/soils map available from the USGS (Map 4) differ considerably from the site-specific soils map (Map 5) prepared by Jones and Stokes consultants, who were hired to analyze habitat in Mission Trail Nature Preserve twenty years ago (1995). The Jones and Stokes team included a soil scientist, who completed detailed mapping and described soil sequences in the Mission Trail Nature Preserve that do not entirely correlate with the generalized soil maps published by the Soil Conservation Service.

Soils, combined with variations in topography and moisture availability, create microclimate conditions which influence plant species composition and structure in the vegetation communities on the Mission Trail Nature Preserve. In general, soils on the property are highly

erosive and poorly drained. According to the Jones and Stokes work, the unnamed canyon bottom in the Mission Trail Nature Preserve is composed of recent alluvial deposits with inclusions of Elder and Alviso soils. The Elder soil type consists of moderately well-drained alluvium derived from granitic and sedimentary rocks, while Alviso soils are very poorly drained, silty clay loams. The accumulation of Alviso fine, clayey sediments in the canyon bottom contributes to the development of the Riparian and Wetland habitat types characterizing the broad, flat downstream reaches of the Preserve, particularly the Wetland Meadow areas in the downstream portion of the canyon.

According to Jones and Stokes, the Martin Meadow grasslands are underlain by soils that best fit the Haire series. Haire soils develop on uplands generally underlain by granodiorite or arkosic sandstone, which is lithified sand derived originally from granitic rock. These shallow soils have very slow permeability and occur over a dense claypan at Martin's Meadow. The consultants speculated that the claypan under the native perennial grasslands at Martin's Meadow may be a component of veneer sandstone of the Monterey Formation, which is mapped by the USGS under the Flanders Mansion and Rowntree Garden, but not the Martin's Meadow parcel. At Martin's Meadow, poor drainage and high water-tables perched over the lens of clay in the hardpan contribute to the presence of spreading rush (*Juncus patens*), a wetland indicator plant found at the margins of the native perennial grassland.

One small area of Oceano soil was mapped by the Jones and Stokes consultant team at the northern tip of the Preserve. The nutrient-poor, shallow Oceano soils are derived from ancient eolian, wind-blown sands on old stabilized dunes at relatively high elevations. Mature Monterey Pine Forest habitat has developed on the ancient sands that persist in Oceano soils that occur over the underlying marine terrace. The soils are moderately weathered loamy sands, with organic material on the surface and occasional thin lenses of clay in the sub-soil.

The majority of Mission Trail Nature Preserve supports soils in the Sheridan Series and Cieneba Series, both of which are upland soil types derived from granitic and/or sedimentary bedrock on steep slopes. Sheridan and Cieneba soils are generally shallow, well-drained and have high rates of run-off. The upland Sheridan and Cieneba soils in the Mission Trail Nature Preserve support Monterey Pine Forest mixed with co-dominant stands of Coast Live Oak.

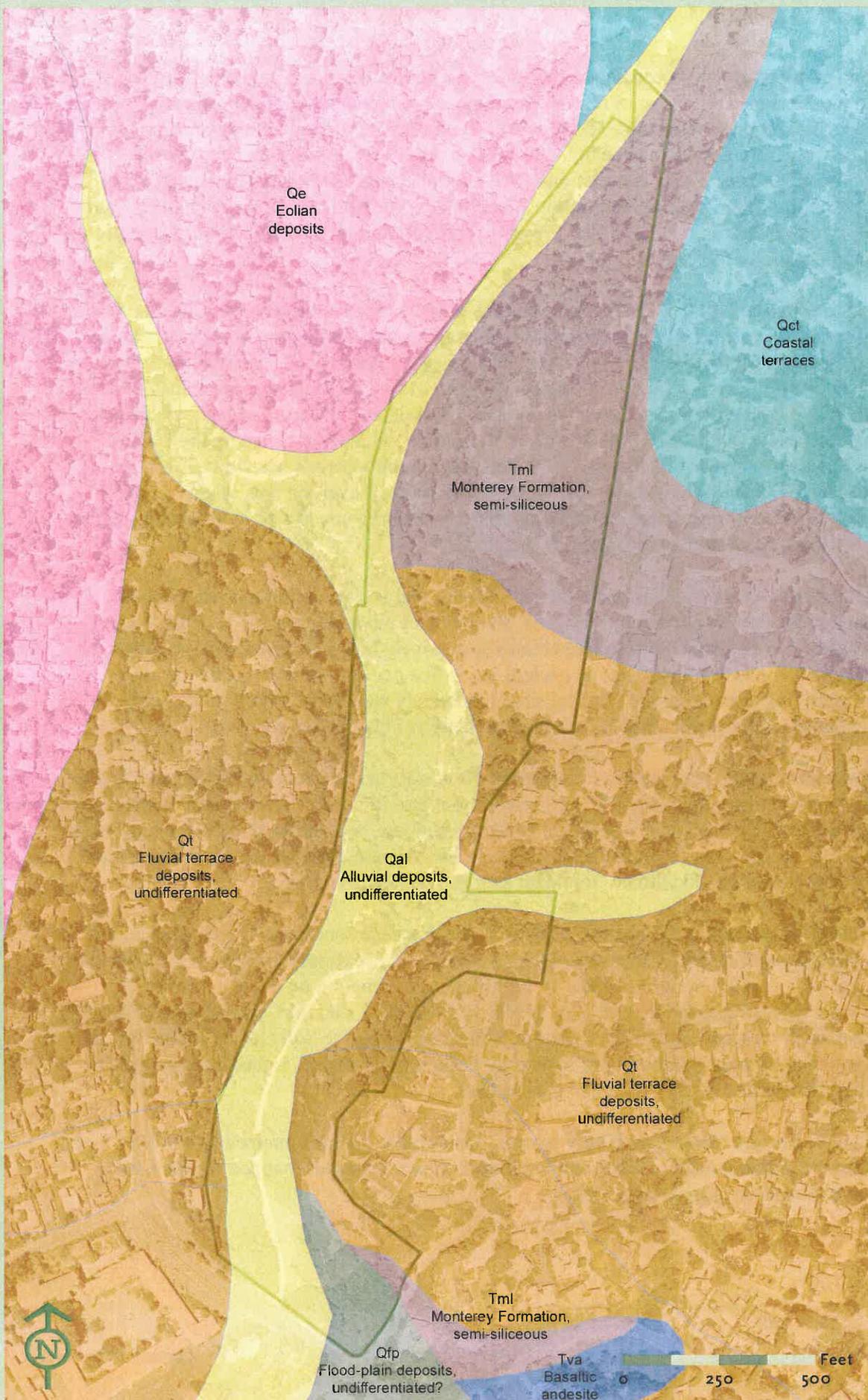
The 1978 Soil Conservation Service (SCS) map differs from the Jones and Stokes work in that the SCS includes well-drained Elder alluvial soils over the entire canyon bottom in the Preserve, Santa Lucia soils derived from hard shale in the Monterey Formation on the canyon sides, Chamise soils derived from shaly alluvium at Martin's Meadow, and thin, sand-derived Elkhorn soils on the north-western edge of the Preserve. Soil mapping by the Soil Conservation Service suggests more significant weathering of Monterey Formation materials, rather than the granitic pedo-genesis forwarded by the Jones and Stokes team.

Map 4 depicts Surface Geology and very general geomorphic features mapped by the USGS and available in the public domain on the Internet. Map 5 shows soil types mapped for the City in 1995 by consultants with Jones and Stokes.

Surface Geology

Legend

-  Qal
-  Qct
-  Qe
-  Qfp
-  Qt
-  Tml
-  Tva
-  Preserve Boundary



1 inch = 350 feet

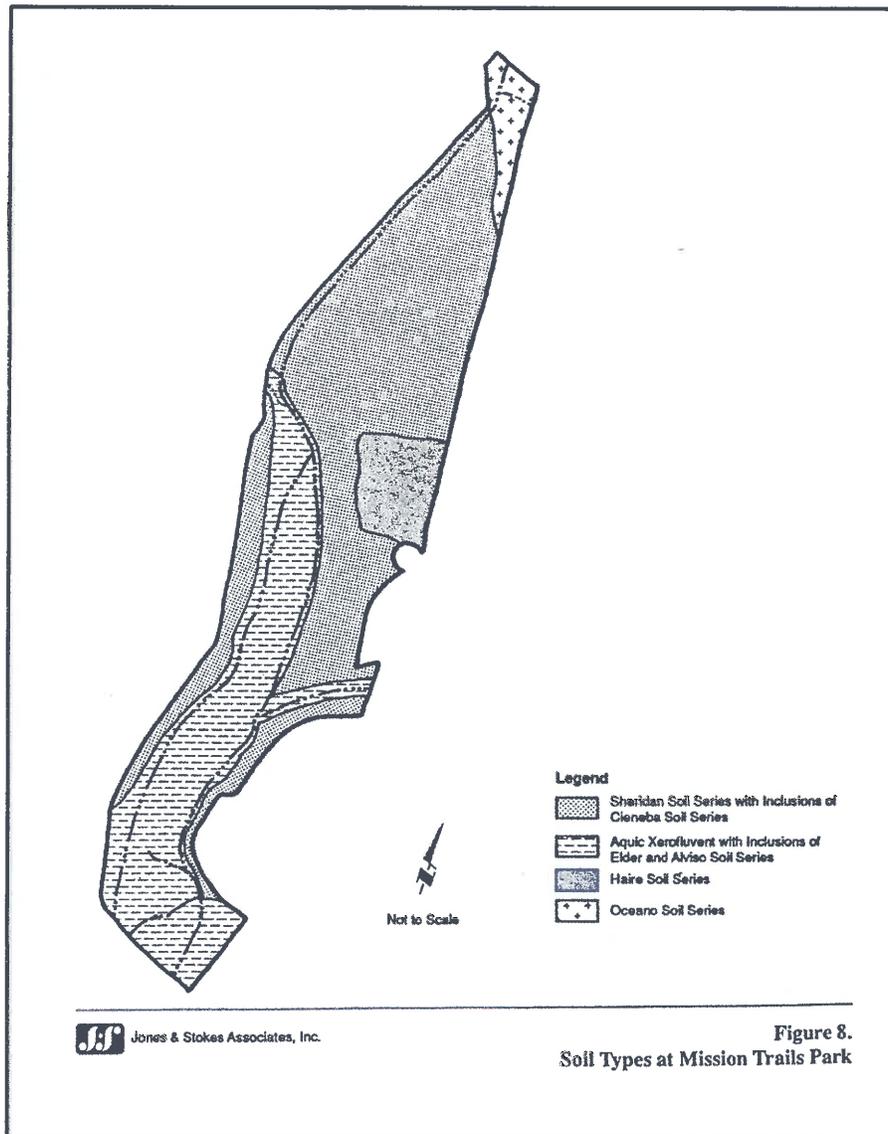


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Consulting Ecologist

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Map 5 – Soil types according to Jones and Stokes (1995).

3.2 LAND USE

The Mission Trail Nature Preserve today is sandwiched between developed residential lands to the west, east and north, and the Carmel Mission complex and recreational fields to the south across Rio Road. The passive recreational parkland is extremely popular with hikers and dog-walkers and the roads and pathways are regularly used by visitors to the Carmel Mission eager for a quiet nature walk. Bicyclists use the improved service roads in the Preserve to connect

Carmel neighborhoods with shopping districts and transportation routes that bypass the busy Coast Highway. Bicycles should be discouraged from using hiking trails.

The historic property that comprises the Preserve was once an important agricultural and livestock grazing area associated with the Carmel Mission. Grazing persisted in the lower reaches of the Preserve until the early 1970's. Historical research and an analysis of historical ecology was not a component of the Biological Assessment, however it is important to note that the canyon has experienced many decades of human use and associated landscape change. Nothing remains of the Native American encampments or Mission agricultural endeavors in the Mission Trail canyon today. Even the historic name for the canyon has been lost and contemporary maps display no name for the creek that courses through the Preserve.



Figure 3 – Carmel Mission grounds looking across what is today Rio Road and the lower reaches of the Mission Trail Nature Preserve, “About 1903” (Internet photograph).

Historic images available on the Internet depict the abandoned Carmel Mission in the late 1800's and early 1900's in fields of what are likely mixed native perennial and non-native annual grasslands. Scant Riparian and Wetland habitat is visible in the area where the Mission Trail Nature Preserve is situated and few trees are seen in the early photographs. It is likely that the engineered construction of the elevated and compacted roadbed for Rio Road altered the groundwater hydrology of the once-grassy swale in the area of the contemporary Preserve, which today is densely vegetated with moisture-dependent Riparian and Wetland natural communities. Downstream surface and groundwater movement through the Mission Trail canyon has been altered by Rio Road, which impounds both surface and subsurface flow before shunting water through a culvert downstream to the Carmel River. Fine soils have accumulated upstream of Rio

Road on the lower floodplain of the Preserve and the altered hydrological conditions have created a zone of constant soil saturation and corresponding phreatophytic vegetation.

The nature of cultural disturbance in the area has changed over time with the advent of rural residential development. Livestock grazed the canyon bottom until the City took ownership of the property in the early 1970's and in the absence of disturbance, the vegetation has gradually transformed into the wet meadow and willow-dominated habitat characterizing the bottomlands today. The historic images of the Mission environs also depict few trees in the matrix of grasses. Many of the mature Coast live oaks (*Quercus agrifolia*) and Monterey pines (*Pinus radiata*) found on the Preserve today may post-date the era when wood-fired cooking, crafts and heating denuded much of the landscape of woody vegetation.

No surface evidence of potentially significant cultural resources was observed during survey work for the Baseline Biological Assessment.

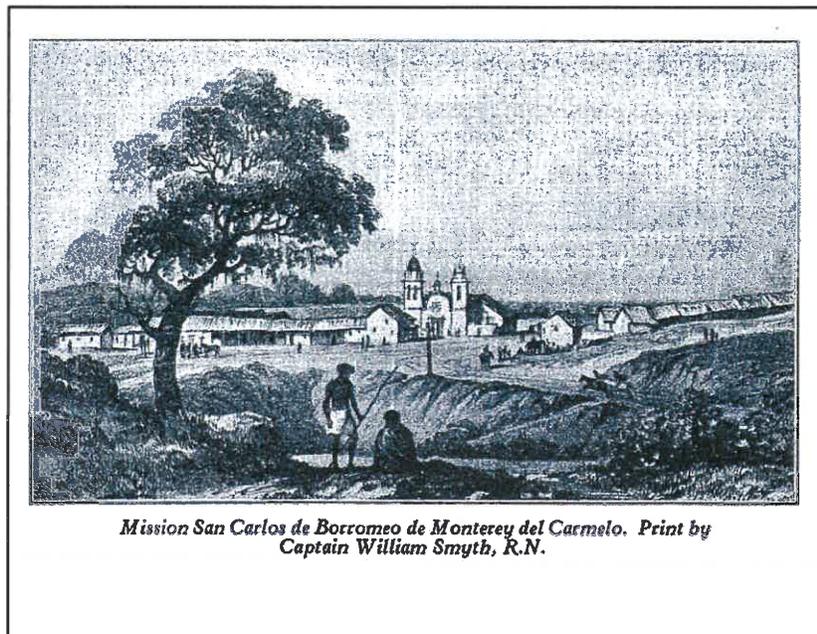


Figure 4 – Artist's rendering looking across what appears to be the mouth of the unnamed canyon where Mission Trail Nature Preserve is located today (Internet photograph, date unknown).

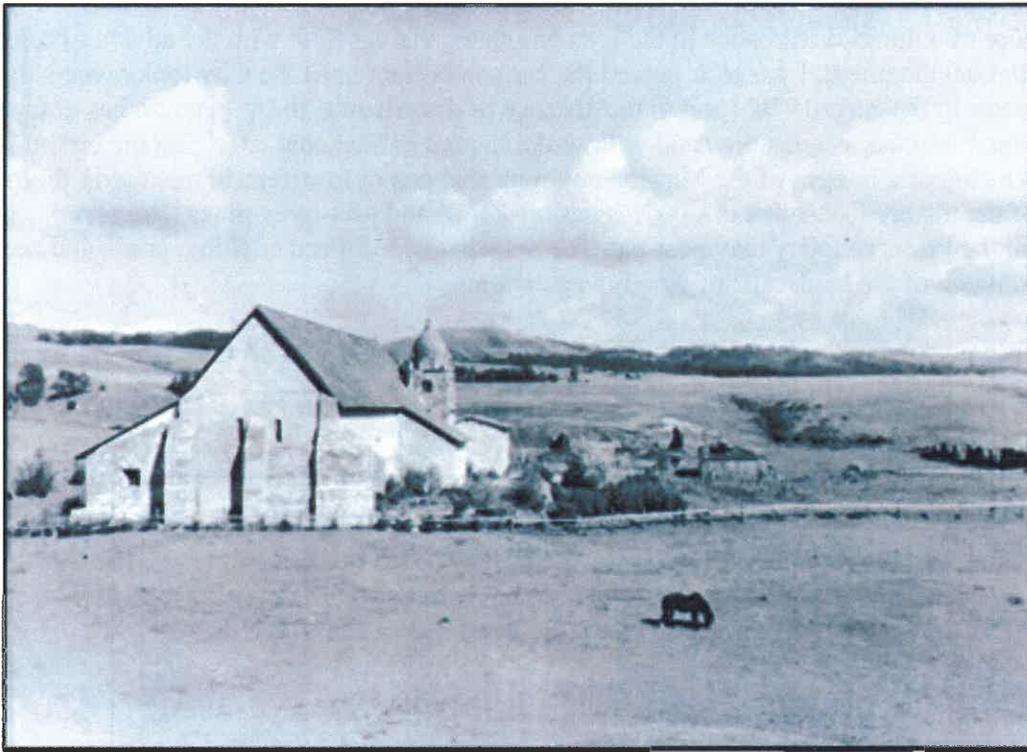


Figure 5 – Looking northward towards Martin’s Meadow and the current site of the Flanders Mansion from behind the Carmel Mission Basilica. Note the grassy landscape and the bluff area with structures and adobe ruins in the lower reaches of what is today the Mission Trail Nature Preserve (Internet photograph, date unknown).

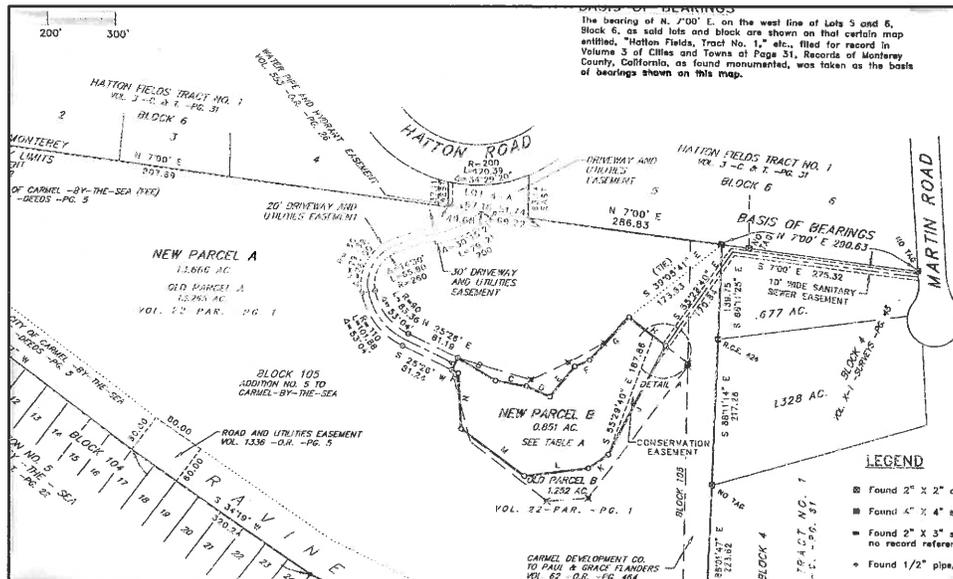


Figure 6 – Lower Mission Trail Nature Preserve area in the late 1920’s, (Friends of Mission Trail Nature Preserve, unpublished manuscript).

3.3 ZONING

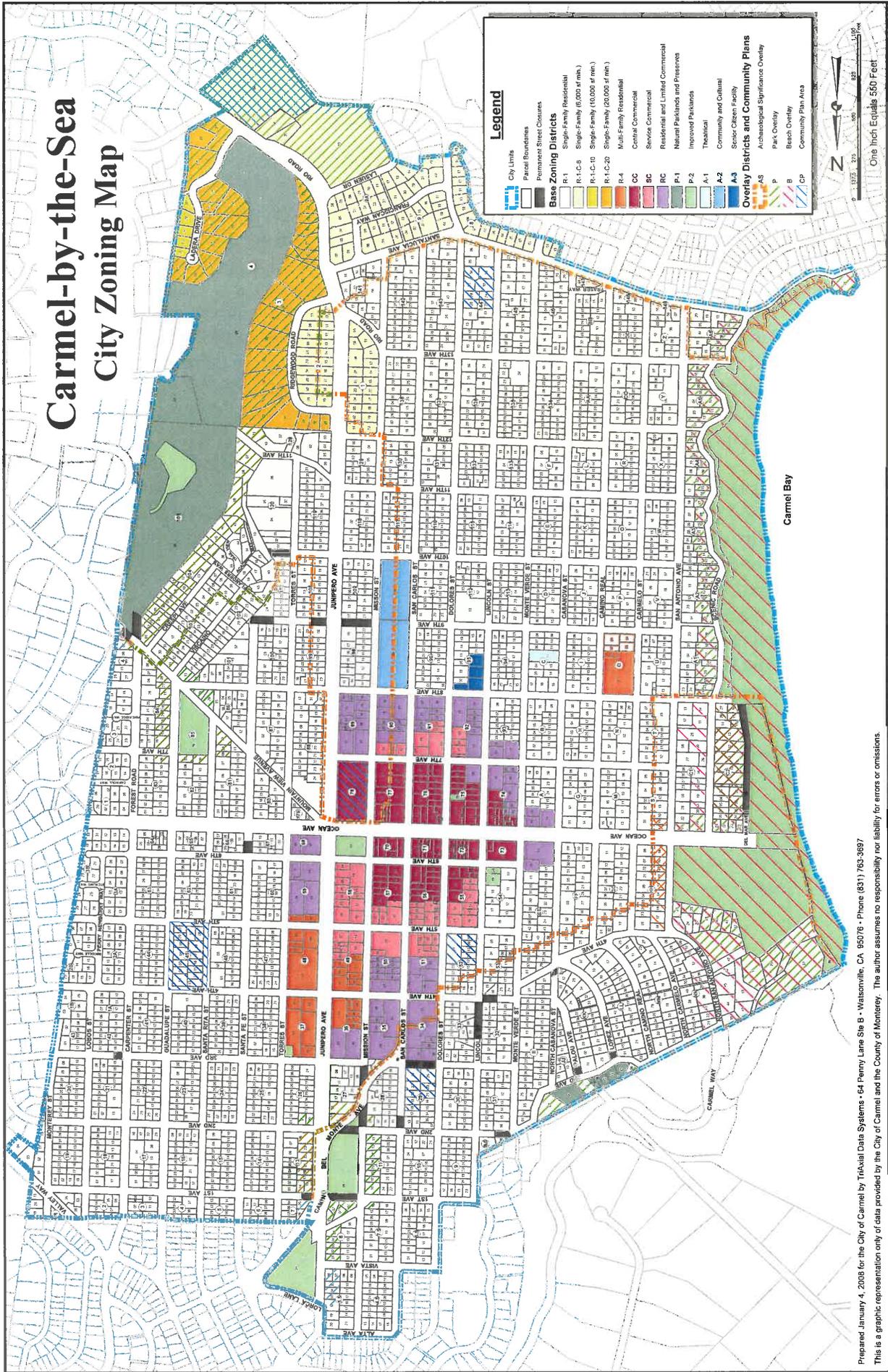
Three of the four Assessor's Parcels in the Mission Trail Nature Preserve are within the Carmel City "Natural Parklands and Preserves" Zoning District (P-1), while the Flanders Mansion parcel is covered by an "Improved Parklands" designation (P-2). Map 7 displays City zoning overlays. The "Natural Parklands and Preserves" Zoning District (P-1) guides the management of publicly owned park and beach areas for the benefit and enjoyment of present and future generations. The Zoning specifications are designed to prevent conflicting, or discordant use of the parklands and preserves and protect the City's natural open spaces from inappropriate development. The Improved Parklands zoning district (P-2) conserves recreation opportunities and associated facilities, with permitted uses similar to the P-1 district, but including the infrastructure devoted to public recreation, public use, government and non-profit buildings. The P-2 zoning applies to properties that are considered parks, but are not entirely in a natural state, for example the Flanders Mansion parcel.

The entire Preserve is included in an "Archeological Significance Overlay", and the three undeveloped P-1 parcels are considered "Environmentally Significant Habitat Area" (ESHA) by the Carmel City General Plan and Local Coastal Program-Land Use Plan. The ESHA designation for the three undeveloped parcels reflects the presence of special status plants, animals and natural communities. Technically, the Flanders parcel is considered "ESHA Buffer", although there are no physical barriers or boundaries between the Improved Parkland of the Mansion inholding and the surrounding Natural Parkland. The Lester Rowntree Native Plant Garden is not included in the ESHA lands. It is a landscaped and maintained garden area that is encircled by a low, split stake fence. A portion of the Preserve is also included in a Coastal Appeal Jurisdiction zone.



Map 6 – Portion of the January 2014 unrecorded plat for the newly surveyed Flanders Mansion parcel (Neill Engineers).

Carmel-by-the-Sea City Zoning Map



Legend

- City Limits
- Parcel Boundaries
- Remainder Street Closures

Base Zoning Districts

- R-1 Single-Family Residential (6,000 sf min.)
- R-1-C-6 Single-Family (10,000 sf min.)
- R-1-C-10 Single-Family (10,000 sf min.)
- R-1-C-20 Single-Family (20,000 sf min.)
- R-4 Multi-Family Residential
- CC Centre Commercial
- SC Service Commercial
- RC Residential and Limited Commercial
- P-1 Natural Parklands and Preserves
- P-2 Improved Parklands
- A-1 Theatrical
- A-2 Community and Cultural
- A-3 Senior Citizens Facility

Overlay Districts and Community Plans

- AS Architectural Significance Overlay
- P Park Overlay
- B Beach Overlay
- CP Community Plan Area

Prepared January 4, 2008 for the City of Carmel by Tibetal Data Systems - 64 Penny Lane Ste B - Watsonville, CA 95076 - Phone (831) 763-3697
 This is a graphic representation only of data provided by the City of Carmel and the County of Monterey. The author assumes no responsibility nor liability for errors or omissions.

The City's General Plan incorporates the management policies and recommendations for the Preserve's P-1 lands presented in the 1996 Mission Trail Nature Preserve Master Plan, which is integrated into the Carmel City General Plan (Appendix H of the City's General Plan).

Of note is that the 1.252-acre Flanders Mansion Assessor's Parcel (APN 010-061-007) was resurveyed in January 2014, however the new parcel dimensions and the proposed lot line adjustment with the surrounding parkland parcel (APN 010-061-008) have not yet been recorded with the City or County Assessor. The City Community Planning and Building Department is working on completing a Lot Line Adjustment application. The newly surveyed Flanders Mansion parcel is 0.851 acres, which is slightly smaller than the original 1.252-acre lot. The newly configured inholding will be encumbered by a small, triangular Conservation Easement along the southern boundary (Map 6).

4. EASEMENTS AND INFRASTRUCTURE

Though largely undeveloped, the Mission Trail Nature Preserve has anthropogenic, or human-created elements that influence the land and how the property is managed. There are roads, trails, benches, bridges, utility lines and other features that are integral components of the Preserve. In addition, the Flanders Mansion inholding and Lester Rowntree Native Plant Garden are considered part of the Preserve property, and although they are technically not part of this Baseline Biological Assessment, each of these special use areas incorporates management activities that have bearing on the long-term disposition of the overall Preserve. Currently, the Flanders Mansion and surrounding improved grounds are lightly maintained by the City, whereas the Rowntree Garden is sustained by a group of dedicated volunteers who receive some financial assistance from the City for landscape improvements. The City has been engaged in a review of options for the administration and use of the Mansion inholding and lease, or sale scenarios are being considered.

All the trailheads to the Preserve have associated gated entries with pedestrian passageways, except at Mountain View/Forest, which has no vehicular access or gate. The gated trailheads provide vehicular access to the internal network of roadways and utility easements that service the Preserve and the California-American (Cal-Am), Pacific Gas & Electric (PG&E) and Carmel Area Wastewater District (CAWD) infrastructure. The Hatton and Martin Road entry points provide vehicular access to the Flanders Mansion and the Lester Rowntree Native Plant Garden.

The CAWD easements through the Preserve are mowed annually and regularly maintained for access to manholes over the sewer network. PG&E was not able to specify a maintenance schedule for the Preserve, however the utility regularly inspects overhead electric powerlines and maintains a 10-foot wide easement under the lines that connect utility poles along the western edge of the property. The PG&E utility easement is recorded on the adjoining private properties, however access is provided through the Mission Trail Nature Preserve on the Willow Trail. PG&E trims trees below and around its overhead lines and asserts the right to trim below all electric lines, even if no recorded easement is in place (Kuhn, 2015).

The small, unnamed stream that courses through the Preserve serves an urban watershed over 300 acres in size and conveys stormwater runoff from Carmel and unincorporated County lands to the Carmel River. Canyon drainage is variable and subject to surge in episodic events during storms. Stormwater transported through the canyon during heavy downpours has resulted in substantial erosional incidents that have incised the channel, caved-in banks and rerouted the streambed. Gabion baskets filled with rock have been installed in a number of locations in the upper reaches of the canyon, and cobbles and riprap have been placed directly into the streambed in an attempt to reduce water velocity and erosion potential. A small culvert along the Serra Trail near Rio Road conveys surface flow under the roadway and into the primary channel before the stream is directed under Rio Road towards the Carmel River. The Preserve watershed and small tributary drainages (sub-watersheds) are shown on Map 8.

The Preserve improvements maintained by the City include a number of small, wooden pedestrian bridges and two concrete fords that cross the stream drainage in the central portion of the property. A City-owned well is situated in the central area of the Preserve, with a large water storage tank and a PG&E electric meter nearby. The water from the well has not been treated in the past for domestic or municipal use, and the well is currently not operational. At some point in the past, the well served some municipal uses. The only other water source observed in the Preserve that was not associated with either the Rowntree Garden or the grounds around the Flanders Mansion was a hosebib west of the Flanders Mansion driveway.

Internal service roads appropriate for maintenance vehicles include the Willow Trail and the Serra Trail, as well as the paved driveway to the Flanders Mansion and the dirt two-track between the terminus of Martin Road and the south-eastern area of the Rowntree Garden. The roadbed of the lower Serra Trail is made of compacted decomposed granite, while the upper portion of the Serra Trail and the Willow Trail are heavily mulched with native chipped material that is spread over the roadbed after trees are cut for removal. The road connection between the Flanders Mansion and the Serra Trail is also chipped and passable by vehicles, however all the other internal pedestrian trails are characterized by dirt pathways.

Wooden benches are situated along the roads and pathways, with a larger collection of benches in the central portion of the Preserve where a grove of planted coast redwood trees (*Sequoia sempervirens*) is dedicated to former Carmel Mayor Barney Laiolo (benches, bridges and other improvements are shown on Map 14, Trail Management Recommendations).

Included on Map 9, Conservation and Utility Easements, are three Assessor's Parcels that are encumbered by Conservation Easements, which limit potential development on these properties. Two of the parcels on the western edge of the Preserve are privately owned, with Conservation Easements held by the Big Sur Land Trust. The Land Trust owns in fee the parcel immediately adjacent to the 11th Avenue entrance.

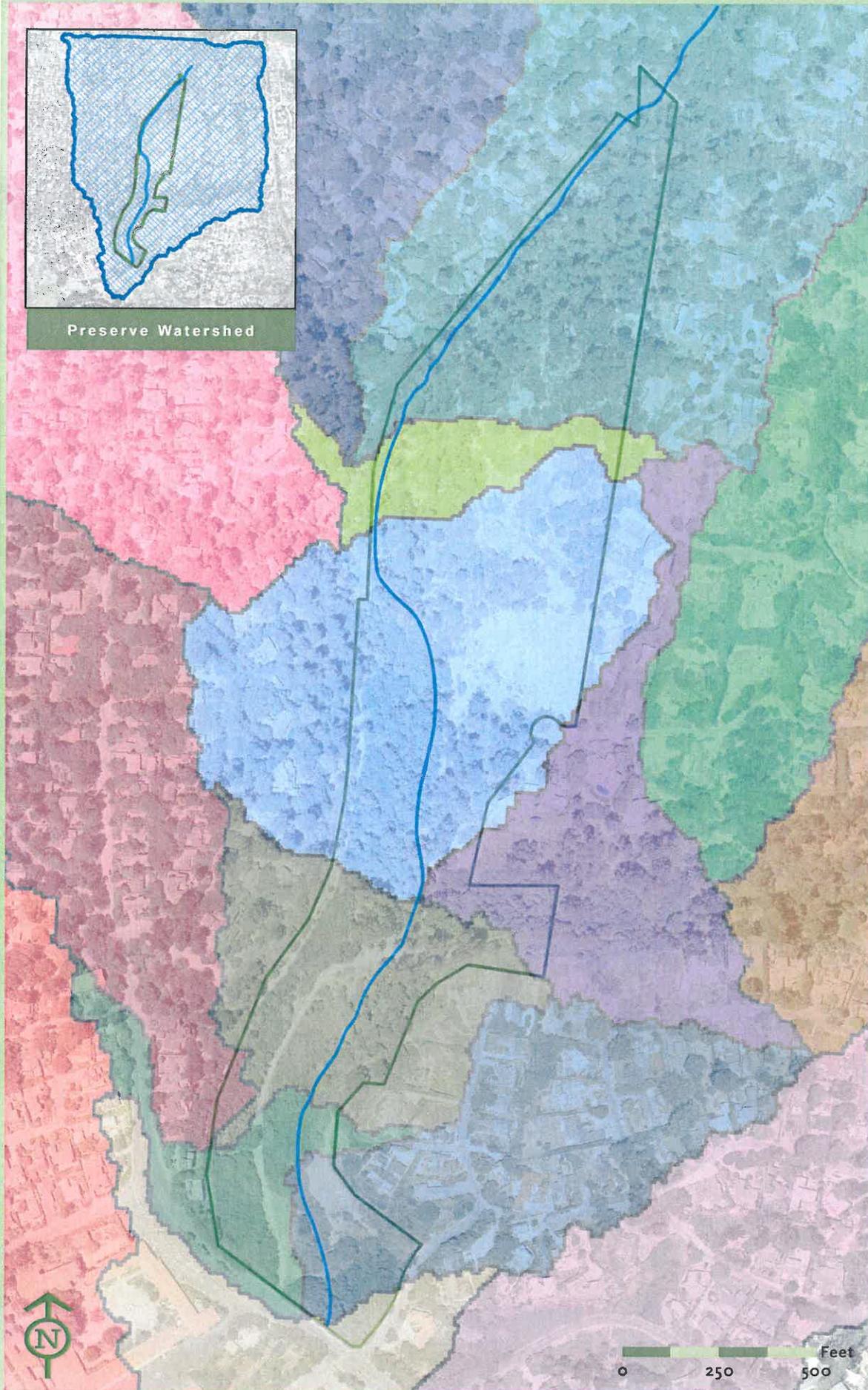
Tributary Drainages

Legend

-  Stream
-  Preserve Boundary



Preserve Watershed



1 inch = 350 feet

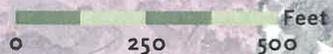


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Conservation and Utility Easements

Legend

-  Culvert
-  Power Pole
-  Tank
-  Water Spigot
-  Well
-  Fire Hydrants
-  Flushing Inlet
-  Manhole
-  CalAm Water Mains
-  CAWD Sewer Line
-  Private Sewer Line
-  Hiking Trail
-  Service Road
-  BSLT Easements
-  Preserve Boundary

Pacific Gas & Electric claims no easements within the Preserve.

1 inch = 350 feet

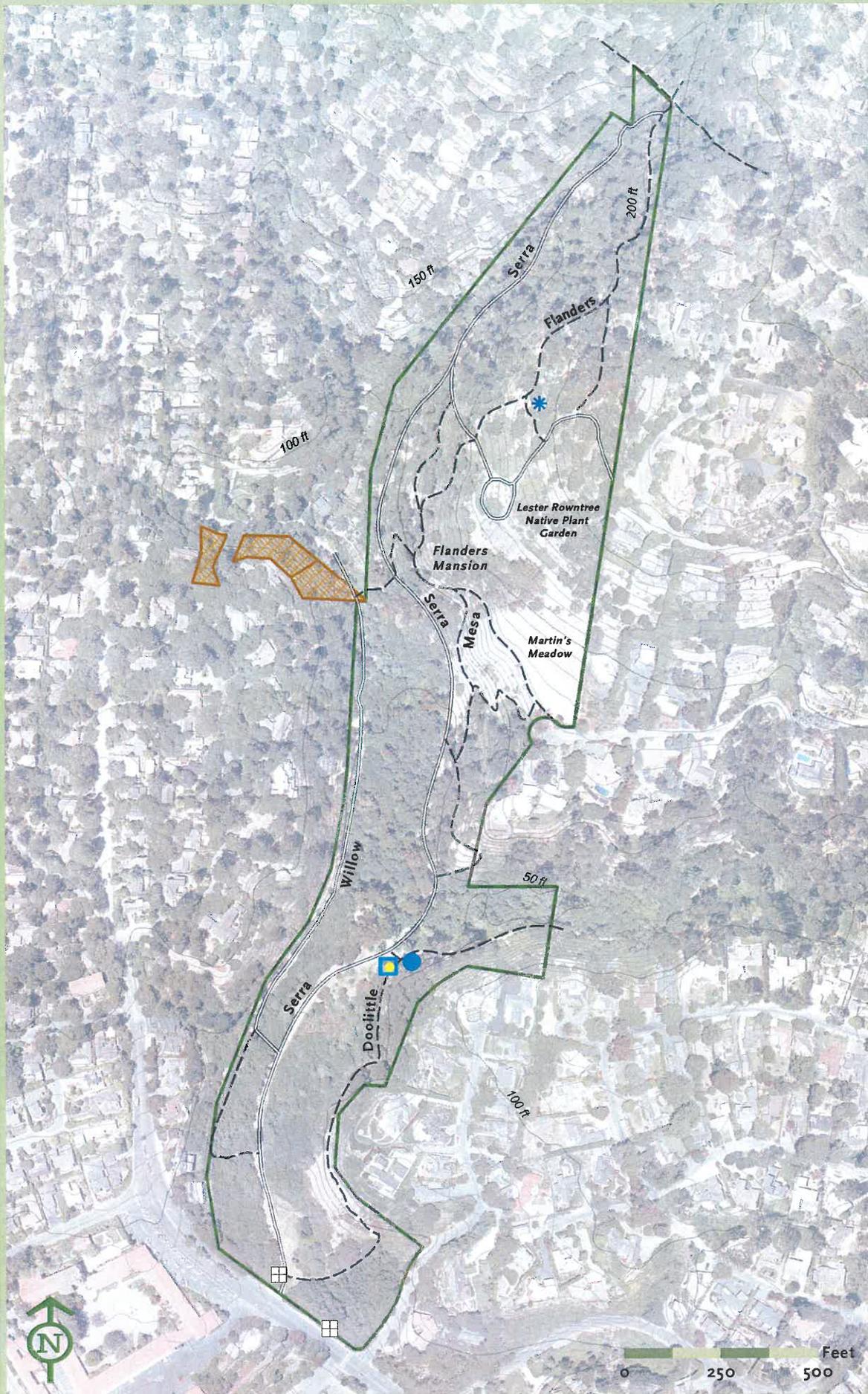


Nicole Nedeff
Consulting Ecologist

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August 2015



5. BIOLOGICAL CONDITIONS

The vegetation found on the Mission Trail Nature Preserve is a patchwork mosaic of different habitat types that reflect edaphic (soil) differences, variations in terrain, land use history, and microclimate conditions. The undeveloped portions of the Preserve are considered Environmentally Sensitive Habitat Area (ESHA), however the entire Preserve (the Flanders parcel and the Lester Rowntree Native Plant Garden) contain special status species and rare natural communities.

Biological assessments have been prepared for the Mission Trail Nature Preserve in the past, including an *Environmentally Sensitive Habitat Area Study* (1995) by consultants Jones and Stokes Associates, Inc., and a *Biotic Survey for the Doolittle Trail Footbridge Project* by consultant Jean Ferreira (2009). Environmental review of the proposed sale of the Flanders Mansion parcel includes biological information in the *Recirculated Draft Environmental Impact Report for the Sale of the Flanders Mansion Property* written by consultants with Denise Duffy and Associates (January 2009).

5.1. NATURAL COMMUNITIES

The following vegetation descriptions cover the general habitat types found at the Mission Trail Nature Preserve. Names for communities of plants correspond to groupings of indicator species that typically occur together in a similar environmental context. Vegetation provides habitat for wildlife species, as well as for individual plants - collectively, vegetation, soil and associated wildlife comprise natural communities. Natural Communities of the Mission Trail Nature Preserve are shown on Map 10.

The California Department of Fish and Wildlife (CDFW) has developed a number of classification systems over the past several decades that describe vegetation in either quantitative, or qualitative terms. The descriptive names used in the Baseline Biological Assessment correspond to the standardized, hierarchical naming protocols developed by Robert Holland and expanded by Fish and Wildlife staff (CDFW 2010). These vegetation types are also described in Sawyer, et al., (2009).

The vegetation descriptions used in this report have a numeric code that corresponds to the CDFW classification system. A star symbol (*) is used by the Department to designate a high priority, rare ecosystem in the statewide hierarchical system. Numeric codes follow protocols in the CNDDDB 2010 list of natural communities prepared for the State of California by the Department of Fish and Wildlife, Natural Heritage Division.

The Mission Trail Nature Preserve supports examples of the following vegetation in natural communities of plants and wildlife:

5.1.1. Central Lucian Coastal Scrub

This natural community is distinguished by woody shrubs that often have pungent leaves and intricate flowers. Coastal Scrub habitat typically occurs along the immediate coastline on hill slopes and terraces, but can extend far inland to areas that experience regular marine-influenced fog or winds. Coastal Scrub occurs in small, discontinuous patches in the Mission Trail Nature

Preserve, most notably on the eastern boundary of the property in ecotone areas between other habitat types. The sparse appearance of this summer-deciduous natural community is characteristic on exposed, south and west-facing hillsides with shallow, nutrient-poor soils.

Occasionally referred to as "soft chaparral" because of the flexible stems and foliage of the shrub cover, Coastal Scrub on the Mission Trail Nature Preserve is mostly characterized by coyotebrush (*Baccharis pilularis*) and gray-green California sagebrush (*Artemisia californica*), CDFW code 32.060.05. Typical co-dominant species include poison oak (*Toxicodendron diversilobum*), sticky monkey-flower (*Diplacus aurantiacus*) and black sage (*Salvia mellifera*). Twining coast morning glory (*Calystegia macrostegia* ssp. *cyclostegia*) and wild cucumber (*Marah fabacea*) can often be seen draped over the shrub vegetation. Coffeeberry (*Frangula californica*) and aster (*Lesingia* sp.) occur less frequently in the overall matrix of shrubs, however each of these species is dominant or co-dominant in particular areas.

5.1.2. Coastal Prairie

The Mission Trail Nature Preserve supports extremely high quality meadows of rare Coastal Prairie, an herbaceous natural community of grasses and forbs (wildflowers) occasionally referred to as Coastal Terrace Prairie in the botanical literature. Coastal Prairie habitats occur on marine terraces and hill slopes in the coastal zone and it is thought that the natural community is sustained in part by supplemental moisture provided by fog. Coastal Prairie occurs in several discontinuous patches in the eastern portion of the Preserve, with a large prairie still intact between the Flanders Mansion and the cul-de-sac at Martin Road. This area, called Martin's Meadow, supports the last large remaining Coastal Prairie within the City Limits of Carmel and is a remnant of the once expansive meadows that characterized the Hatton Fields neighborhood before the area was developed.

Coastal Prairie vegetation occurs on the gently sloping marine terraces that are veneered with thin, sandy soils and underlain by shallow lenses of clay. Several different bunchgrass species associations within the Coastal Prairie at the Preserve are considered by CNDDDB as "rare and worthy of consideration", particularly the areas supporting California oatgrass (*Danthonia californica*) and our California State Grass, purple needlegrass (*Stipa pulchra*). The Department of Fish and Wildlife codes for these rare grassland types are Purple Needlegrass, CDFW Code *41.150.00, and Danthonia/Oatgrass Prairie, CDFW Code *41.050.00.

The Preserve's Coastal Prairies, both the large tract at Martin's Meadow and the small pocket meadows on the southeast side of the property, are characterized by a high density of the rare native bunchgrasses, as well as a variety of diverse flowering forbs. The Coastal Prairie at Martin's Meadow also supports one of the few remaining populations of the tiny Hickman's onion (*Allium hickmanii*), a small native onion considered rare, threatened or endangered in the state by the California Native Plant Society. Seasonal wildflowers found in Coastal Prairie areas include diminutive dwarf brodiaea (*Brodiaea terrestris*), yellow mariposa lily (*Calochortus luteus*), and the hairy gumplant (*Grindelia hirsutula* var. *maritima*) a perennial sub-shrub. The presence of flowering forbs that sprout from bulbs or corms (*Brodiaea*, *Calochortus*, *Dichelostemma*, *Sisyrinchium*, *Triteleia*), indicate that the meadow's shallow soil horizons have not been altered by deep tilling or agricultural practices.

Coastal Prairie on the Preserve also supports notable patches of western ryegrass (*Elymus glaucus*) and the creeping, rhizomatous leafy bent-grass (*Agrostis pallens*), which seems to occupy open areas in some of the more sloped, shaded terrain with deeper organic layers of duff or leaf litter.

The Coastal Prairie on the Mission Trail Nature Preserve has numerous associated plant species that occur as co-dominants in various locations. Non-native rattlesnake grass (*Briza maxima*), wild oats (*Avena fatua*), English plantain (*Plantago lanceolata*), curly dock (*Rumex crispus*) and mustard (*Brassica nigra*) are found in patches, as are native croton (*Croton californicus*), coyote thistle (*Eryngium armatum*) and pretty face (*Triteleia ixioides*). The margins around some portions of the Prairie habitat at Martin's Meadow also host spreading rush (*Juncus patens*), a wetland indicator species that has colonized Prairie edges where the underlying soil hardpan is exposed. Groundwater perched over the hard clay lens seeps to the surface at down-slope locations where spreading rush can be sustained. Although soils where the rush occurs are not saturated throughout the year, moisture levels remain high enough for long enough periods of time to promote the wetland indicator plants. These are not true "Wetlands" with characteristic soils and hydrology, however areas supporting spreading rush around the perimeter of the Coastal Prairie should be noted and potential disturbances minimized.

Plant ecologists have come to understand that Coastal Prairie ecosystems in California co-evolved through time with occasional disturbance provided by fire and grazing animals (Ford and Hayes, 2007). Every summer, the City of Carmel mows the Coastal Prairie at Martin's Meadow to reduce fire hazard for adjoining residential neighborhoods. Mowing actually mimics the disturbance the native grasses received from grazing animals and the contemporary maintenance practice has actually served to promote the vitality of the grassland ecosystem. However, annual mowing before the maturing of spring wildflower seeds and flowering of summer season forb species may have actually limited the distribution of some of the wildflowers that normally would occur in the matrix of the perennial bunchgrasses, particularly native tarweeds and milkweeds that flower in late summer and early fall. Mowing has likely benefitted the overall disturbance ecology of the Coastal Prairie habitat at Martin's Meadow by reducing dry residual grass "thatch" and removing encroaching shrubs, however the timing and periodicity of mowing should be reviewed and perhaps adjusted to promote the flowering forbs, as well as the native grasses.

5.1.3. Annual Grassland

Although the marine terrace at Martin's Meadow and other Coastal Prairie patches on the Mission Trail Nature Preserve Ranch are mantled with high concentrations of native perennial bunchgrasses, there are also areas of non-native annual grassland and weedy vegetation found in association with the prairie habitat. Overgrazing, concentration of livestock and some forms of human activity can promote the ascendancy of weedy annual grasses, which thrive on disturbance. Disturbed grassland areas are characterized by wild oats (*Avena fatua*) and ripgut brome (*Bromus diandrus*), and occasionally poison hemlock (*Conium maculatum*) and various thistles (*Carduus pycnocephalus*, *Cirsium vulgare*). The dominance of annual grasses is patchy throughout Coastal Prairie areas, although they regularly and predictably occur in association with Coastal Prairie species.

5.1.4. Riparian

Streamside habitats are particularly valuable for a wide variety of native wildlife species that utilize the densely vegetated riparian corridor for cover, nesting, foraging and movement. Found in both dense and discontinuous thickets along the unnamed drainage on the Mission Trail Nature Preserve, Riparian habitat on the property is best classified as Central Coast Arroyo Willow Riparian, with CDFW Code *61.201.01. This vegetation type is identified as a rare natural community by the CDFW. The willow-dominated Riparian habitat is marked by dense thickets of tall arroyo willow (*Salix lasiolepis*), which generally grows where watertable levels remain high enough throughout the year to provide moisture in the root zone for these phreatophytic plants. The largest willow thicket occurs immediately upstream of Rio Road, where the dense overstory canopy shades a thick and tangled understory of creek dogwood (*Cornus sericea*), California blackberry (*Rubus ursinus*), mugwort (*Artemisia douglasiana*) and numerous moisture-dependent sedges and rushes. Central Coast Arroyo Willow Riparian habitat becomes discontinuous in the narrow, upper reaches of the drainage, where willow thickets occur sporadically with chain fern (*Woodwardia fimbriata*) and occasional upland shrubs.

Black cottonwood (*Populus trichocarpa*), sycamore (*Platanus racemosa*) and coast redwood (*Sequoia sempervirens*) grow with the arroyo willow in the riparian corridor, along with an occasional red alder (*Alnus rubra*) and elderberry (*Sambucus nigra* ssp. *caerula*). The dense riparian habitat harbors numerous stick nests of the endemic Monterey Dusky-footed Woodrat (*Neotoma macrotis luciana*). The California Department of Fish and Wildlife considers the Monterey Dusky-footed Woodrat a Species of Special Concern because it appears to be a locally endemic sub-species of the otherwise common native rodent.

Coast redwood (*Sequoia sempervirens*) was planted in the Preserve between the 1950's and 1980's, although the species is not native to this portion of the Central Coast. Redwoods have altered the forest ecology of the Riparian corridor to some degree and have changed both the canopy and understory structure. Many of the planted redwoods have died or are exhibiting signs of stress, despite being in moist soil bottomlands along the canyon drainage. Sycamores may also have been introduced to the riparian corridor, as this species generally occurs on higher floodplain terraces where the trees experience less frequent flood inundation and drier soils. Although not native to the Mission Trail Nature Preserve, coast redwood is not an invasive species and has not expanded its range on the property.

The rich Riparian habitat in the Mission Trail Nature Preserve has been severely compromised by a huge number of invasive, non-native species, most notably black acacia (*Acacia melanoxylon*) and blue gum eucalyptus (*Eucalyptus globulus*). Vast areas of Riparian habitat within the Preserve have been colonized by weedy invasive plants, which totally dominate the native species plant palette in much of the central, riparian portion of the property. In addition to the massive infestations of non-native and highly invasive eucalyptus and acacia, both Cape ivy (*Delairea odorata*) and English ivy (*Hedera helix*), as well as passion vine (*Passiflora* sp.) and aggressive Himalayan blackberry (*Rubus discolor*) have overtaken huge areas of the native habitat. Localized occurrences of non-native white poplar (*Populus alba*) also exist along with numerous, evergreen pittosporum shrubs (*Pittosporum* sp.) and ornamental plums (*Prunus* sp.), which have invaded from adjoining gardens and from the grounds of the Flanders Mansion. These considerable weed infestations have completely altered the native species composition and

ecology of the natural Riparian habitat in the Mission Trail Nature Preserve, to the detriment of native plants and wildlife. The presence of non-native trees, shrubs and vines in the riparian corridor and along the drainages in the Preserve has also changed natural hydrological processes and threatened the stability of channel geometry and adjoining streambanks.

Invasive weed removal and control will be key long-term maintenance goals for the management of habitat and drainage in the riparian corridor of the Mission Trail Nature Preserve. Management recommendations are outlined in Section 7 of this report.

5.1.5. Wetland

Wetland habitats are varied and complex on the Mission Trail Nature Preserve. Wetland habitats are defined by the presence of indicator plant species, evidence of saturated soils, and hydrological conditions that inundate the habitat area for certain periods of time. Wetland conditions, with indicator plant species and year-round moist soils, occur upstream of Rio Road and along the bottomlands in the southern half of the Preserve. Wetland soils support herbaceous vegetation composed of grasses, sedges and rushes, as well as the Riparian habitat dominated by arroyo willow. Wetland Meadow vegetation generally does not have a thick canopy of riparian trees, although lush sedge and rush-dominated Wetland vegetation with thick stands of Santa Barbara sedge (*Carex barbarae*, CDFW code *45.142.00) occurs in the shaded understory below willows, cottonwoods and the ubiquitous non-native trees.

Sedges (*Carex barbarae*, *Cyperus squarrosus*, *C. esculentus* and *Scirpus microcarpus*) and rushes (*Juncus patens*, *J. effusus*, and *J. xiphiodes*) occur upstream of Rio Road and along the Wetland margins of the Serra Trail roadway. Sedges and rushes grow in association with Pacific silver-weed (*Potentilla anserine* ssp. *pacifica*), creeping wild rye (*Elymus triticoides*) and California barley (*Hordeum brachyantherum*). The Serra Trail roadway is composed of compacted fill material, which creates long, narrow, linear drainage areas next to the less permeable and elevated roadbed. The shallow, grassy channels between the roadbed and the primary stream channel convey surface water during rain events and collect fine soils that retain moisture and maintain wetland growing conditions through the year. Near Rio Road and also in the flat bottomland area of the Preserve downstream of the Redwood Grove dedicated to former Carmel mayor Barney Laiolo, lush Wetland Meadow features have formed with a variety of sedges, rushes and moisture-dependent grass species. These areas have also been compromised by invasive ivy species, non-native grasses like Bermuda, Kikuyu and panic veldt grass (*Cynodon dactylon*, *Pennisetum clandestinum*, *Ehrharta erecta*), as well as large infestations of non-native annual nasturtium (*Trapaecolum magus*), curly dock (*Rumex crispus*) and poison hemlock (*Conium maculatum*).

5.1.6. Monterey Pine Forest

Native groves of Monterey Pine Forest habitat are considered Special Status Plant Communities by the CDFW and Environmentally Sensitive Habitat Areas (ESHA) by the California Coastal Commission and the City of Carmel. The CDFW numeric code for Monterey Pine Forest habitat is *87.110.00 (*Pinus radiata*, Monterey Pine Forest, Alliance), with a sub-category describing pine forest habitat and co-dominant coast live oak and poison oak, *87.110.04 (*Pinus radiata* – *Quercus agrifolia*/*Toxicodendron diversilobum*). The California Native Plant Society lists native Monterey pine (*Pinus radiata*) as Rank 1B - rare, threatened or endangered in California.

Native stands of Monterey Pine Forest habitat are restricted to just three locations along the central coast of California and small groves on two Mexican islands. Native Monterey Pine Forest is dependent on the predictable summer moisture provided by the cool marine layer, which can augment annual precipitation with fog drip by as much as half an inch per week during foggy summer months. The Monterey Pine Forest natural communities in Carmel and on the Monterey Peninsula support more than a dozen special status plants and animals, some of which are found nowhere else in the world.

Pine groves on the Mission Trail Nature Preserve occur in areas with granitic and shale bedrock overlain by marine sediments and ancient dune sands. The forests often include co-dominant coast live oak (*Quercus agrifolia*) and toyon (*Heteromeles arbutifolia*). Toyon is found in the Preserve in notable stands of extremely large specimens, particularly north of the Rowntree Garden and below the eucalyptus stand near the Flanders Mansion. Understory plant composition and density varies throughout the Monterey Pine Forest, with poison oak (*Toxicodendron diversilobum*), creeping snowberry (*Symphoricarpos mollis*), sticky monkey flower (*Diplacus aurantiacus*), coffeeberry (*Frangula californica*) and areas of native blackberry vines (*Rubus ursinus*). Occasional California rose (*Rosa californica*) and pink-flowering currant (*Ribes sanguineum*) occur in scattered locations throughout the pine forest community. Both Cape ivy and English ivy cover large areas in the understory of Monterey Pine Forest habitat and the invasive species have often climbed up into the canopy of the native trees forming dense mats and lianas of non-native vegetation that create hazardous ladder fuels when dry.

Two open areas surrounded by Monterey Pine Forest habitat support populations of the federally endangered Yadon's rein-orchid (*Piperia yadonii*). This extremely rare species is only found in association with Monterey Pine Forest and Maritime Chaparral habitats around the Monterey Peninsula. The interesting orchid plant displays a cryptic, irregular flowering cycle, with only a small percentage of the perennial plants in a population sending up leaves and flowering stalks each year. The strap-shaped leaves appear in early winter and eventually wither and die back as the flowering stalk appears. The spike supporting small, intricate orchid flowers matures in early summer. At the Mission Trail Nature Preserve, one small area of open pine habitat carpeted with dry needles supported only 4 individual *Piperia* plants, while another area nearby hosted over 125 flowering plants (plants were counted during the third week of June). This federally endangered plant deserves special protection at the Mission Trail Nature Preserve and recommendations for habitat enhancement are discussed further in following sections of the report.

The CNDDDB also has a record of a Monarch Butterfly (*Danaus plexippus*) winter roosting area in what is most likely Monterey Pine Forest habitat within the Lester Rowntree Native Plant Garden. Winter roosting sites for this increasingly rare butterfly species are uncommon and noteworthy for their importance to the long-term survival of the species, particularly during the grueling, long-distance migration undertaken by this fragile insect.

5.1.7. Coast Live Oak Woodland

Coast live oak (*Quercus agrifolia*) frequently occurs as a co-dominant in Monterey Pine Forest habitat, however concentrations of this iconic tree were mapped as Coast Live Oak Woodland habitat at the Mission Trail Nature Preserve when pines dropped out of the vegetation matrix, CDFW code 71.060.02. Small groves of coast live oak with diverse understories of poison oak,

toyon, coffeeberry, sticky monkey flower and wood mint (*Stachys bullata*) were noted on the eastern side of the Preserve and below the Flanders Mansion.

5.1.8. Summary

The Mission Trail Nature Preserve supports tremendous biodiversity in only 34 acres; the proximity of different plant communities, topography, soils and moisture regimes has produced a habitat mosaic rich in plants and wildlife, despite the abundance of non-native, weedy invasive species. Habitats vary in structure, from the grasses and forbs of the Wetlands and Coastal Prairie to the stately pines and oaks in the Monterey Pine Forest and Riparian communities. The plant list (Appendix A) compiled for the Preserve includes over 90 native species of trees, shrubs, forbs, ferns, grasses and grass-like plants, which is a large number of native taxa for such a small area surrounded by developed residential properties. Map 10 depicts the Natural Communities on the Preserve.

The Preserve also includes at least 56 species of birds, as recorded by naturalists Dr. Richard and Linda Beidleman between 1992 and 1995. As Dr. Beidleman observed, “Few urban parks and indeed natural areas in the country possess the diversity of birdlife to be encountered here, even during the winter months.” Dr. Beidleman goes on to note that, “Mission Trail Park is a phenomenally productive wildlife area, despite its being completely surrounded by urban development,” (Beidleman, 1995). Dr. Beidleman’s list of birds observed is included as Appendix B.

The Preserve hosts several special status species, Monterey Dusky-footed Woodrat, Monarch Butterfly, Yadon’s rein-orchid and Hickman’s onion, as well as high quality examples of rare Monterey Pine Forest, Coastal Prairie, Riparian and Wetland Meadow habitats. These are discussed in detail in the following section.

Natural Communities

Legend

- Hiking Trail
- Service Road
- Native Plant Garder
- Coastal Prairie
- Coastal Scrub
- Oak Woodland
- Pine Forest
- Riparian
- Wet Meadow
- Preserve Boundary

1 inch = 350 feet

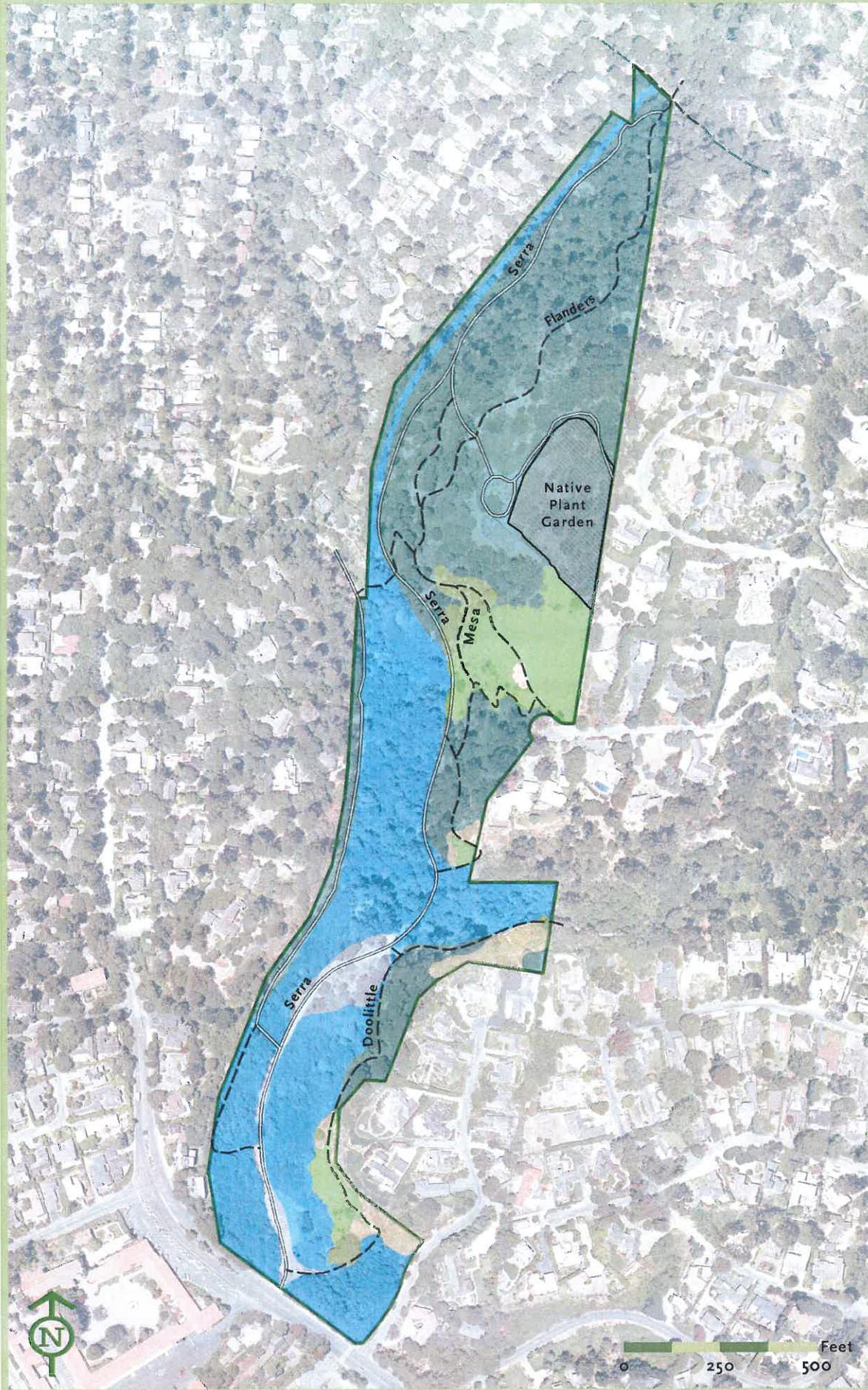


Nicole Nedeff
Consulting Ecologist

TURF Image
GEOSPATIAL CONSULTING



August 2015



6. SPECIAL STATUS NATURAL COMMUNITIES, PLANTS and ANIMALS

Special status natural communities, plants and animals include habitats and species that have been identified as being biologically rare or noteworthy and thus, deserving of special protection under federal, state or local laws and policies.

The California Department of Fish and Wildlife supports the operation of the California Natural Diversity Data Base (CNDDDB), which is a massive digital store-house of up-to-date information on the state’s unique biota. The CNDDDB has on-line maps and data for special status communities and species. This service is available by subscription, or individual maps and reports can be purchased from the Department for a fee of \$60.00 per United States Geological Survey quadrangle (USGS). For purposes of this Baseline Biological Assessment, both the digital CNDDDB RareFind records, as well as the USGS map overlay and corresponding reports were consulted.

Figure 7 is a computer screen shot of the CDFW-CNDDDB map covering the area of Carmel where the Mission Trail Nature Preserve is located. The Preserve is subtly mapped in green, with the red circle indicating the general location of a Monarch Butterfly wintering roost in the northern portion of the Preserve. Smaller, solid green circles indicate populations of Hickman’s onion and Yadon’s rein-orchid. Other element records in the greater Carmel vicinity are named on the CNDDDB map, however location information is far more general and specific sites are only identified and described in the text reports that accompany the mapping data. The record for Hooker’s manzanita (*Arctostaphylos hookeri* ssp. *hookeri*) is for a plant that is situated on the edge of the Lester Rowntree Native Plant garden and is likely a planted specimen.

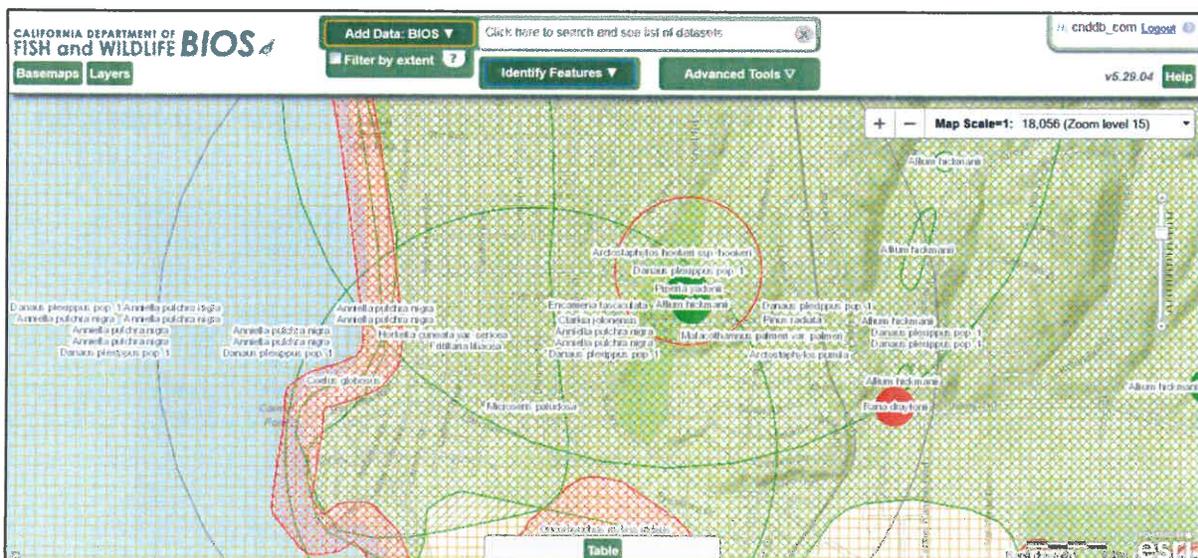


Figure 7 – Portion of the CNDDDB web-based database.

Table 1, previously referenced in Section 2, lists the special status natural communities and plant and animal species that are either present, or may occur on the Mission Trail Nature Preserve. These species have either been identified on the Preserve, or are found in similar habitats in the surrounding region and have the potential of occurring on the property. All species listed on Table 1 were considered during the field survey work on the Mission Trail Nature Preserve conducted for this Baseline Biological Assessment.

Yadon's rein-orchid was observed during field survey in June 2015, and although Hickman's onion was not seen during the extremely dry Spring 2015 survey for this Biological Assessment, the species has been previously documented on the Preserve in Martin's Meadow. Potential habitat may be present for the other plant species listed on Table 1, but none were seen during field survey for this project and no previous records exist to suggest their presence on the parkland property.

Based on the data and mapping provided by CNDDDB, potential habitat exists on the Preserve for the following wildlife species: Monterey Dusky-footed Woodrat, American Badger, California Tiger Salamander, California Red-legged Frog, Southwestern Pond Turtle, Coast Horned Lizard and Monarch Butterfly. Numerous stick nests potentially occupied by Monterey Dusky-footed Woodrats were observed during field work and CNDDDB includes an element occurrence for overwintering Monarch Butterflies in and around the Lester Rowntree Native Plant Garden. No American Badger dens were observed in and around appropriate Coastal Prairie habitat and no special status reptiles or amphibians, or breeding habitat for these species, was seen in potential habitat areas on the Preserve.

Foraging and nesting habitat is present on the Preserve to potentially support Yellow Warbler and Tricolored Blackbird in Riparian and Wetland Meadow habitats, although neither of these birds was observed by Dr. Richard and Linda Beidleman between 1992 and 1995. During the 2015 survey period for this report, a number of raptor species, including White-tailed Kite, Red-shouldered Hawk, Red-tailed Hawk and American Kestrel were positively identified flying over the Mission Trail Nature Preserve on several occasions. No raptor nests were observed, however potential raptor nesting habitat exists in large Monterey pine, Monterey cypress and eucalyptus trees around the Preserve and on adjoining private properties.



Figure 8 – Yellow Warbler (Photograph by the Audubon Society, Internet source).



Figure 9 – Tricolored Blackbird (Internet photograph).

CNDDDB records and CDFW lists include the following rare natural communities found on the Preserve and all were confirmed during field survey: Monterey Pine Forest, Coastal Prairie, Central Coast Arroyo Willow Riparian, Wetland Meadow.

6.1. SPECIAL STATUS PLANTS OBSERVED

6.1.1. Yadon's rein-orchid

Yadon's rein-orchid (*Piperia yadonii*), Federally endangered, CNPS Rank 1B. This fragile, perennial orchid was observed on the Preserve at the peak of the flowering period during the third week of June 2015. Two populations were identified – the smaller population included only 4 plants, while the larger grouping included approximately 125 individuals in flower. The orchids were seen in small, sunny openings in the canopy of Monterey Pine Forest where needle duff had accumulated, but understory plants did not provide competition or cover. Both groupings of orchids were readily seen from the paved driveway to the Flanders Mansion in locations where stray dogs and hikers cutting through the forest could potentially impact the plants.

Yadon's rein-orchid is a cryptic bloomer, with only a percentage of viable plants sending out leaves and flowers each year. The timing and environmental triggers for flowering are not understood. Plants send out small, strap-shaped leaves in the winter (late January-February), which eventually wither and dry as the flower spike emerges. The flowering stalks elongate through the spring, with small orchid-shaped flowers typically opening in mid-June. The flower spikes are like candy to deer and blooming *Piperia* is often decimated by herbivory.

6.1.2. Hickman's onion

Hickman's onion (*Allium hickmanii*), CNPS Rank 1B2. This small, cream and pinkish-colored native onion is generally less than 15 cm in height and is easily overlooked when growing in a matrix of grasses and other forbs. It was not observed during 2015 late spring-early summer field survey on the Mission Trail Nature Preserve, however a large population is documented in Martin's Meadow and more than 1,000 plants were counted during a casual survey several years ago (Stevens, 2015). Plants generally bloom between April and May and are confined to open coastal habitats in and around the Monterey Peninsula, northern San Luis Obispo County, and in Prairie habitat on marine terraces in Big Sur.

No other species included in the CNDDDB lists of special status plants were observed in the Preserve, or the general vicinity, besides Monterey pines. All other CNDDDB species potentially occurring on the property are readily identifiable and can typically be found in Maritime Chaparral, Monterey Pine Forest, Coastal Prairie, Coastal Scrub and Coast Live Oak Woodland natural communities around the Monterey region.



Figure 10 – Yadon’s rein-orchid
(Photograph by Nikki Nedeff).



Figure 11 – Hickman’s onion
(Photograph by Dr. Rod Yeager).

6.2. SPECIAL STATUS ANIMALS OBSERVED and RECORDED

6.2.1. Monterey Dusky-footed Woodrat

Monterey Dusky-footed Woodrat (*Neotoma fuscipes luciana*, aka *N. macrotis luciana*) was the only special status mammal observed on the Mission Trail Nature Preserve during biotic survey for this Biological Assessment. This nocturnal rodent is considered a Species of Concern by both the federal Fish and Wildlife Service and the California Department of Fish and Wildlife. The population of the native rat is distributed between the Monterey region and Point Conception in woodland, forest, scrub and chaparral habitat types. Woodrats are identified by the presence of their large, mounded nests built out of downed wood and fresh twigs. Occupied nests are “sharper” in shape, with fresh woody material placed at the apex of the stick pile.

Numerous nests were observed in the Preserve, primarily in the tangled understory of Riparian habitat in the southern half of the property, but also in Monterey Pine Forest and Coast Live Oak Woodland communities. The 1995 Jones and Stokes survey identified two concentrations of woodrat nests in riparian vegetation in the Preserve and 2009 mapping by Jean Ferreira documented 42 different nests just in the southern third of the property. During the 2015 survey, numerous active stick nests were identified and no doubt there are many more, as the rats prefer inaccessible sites protected by the safety offered by dense, thorny branches and poison oak.



Figure 12 – Monterey Dusky-footed Woodrat, (Photograph by inaturalist).



Figure 13 – Monarch Butterflies roosting in eucalyptus (Photograph by www.learner.org).

6.2.2. Monarch Butterfly

Monarch Butterfly (*Danaus plexippus*) is considered a Species of Concern by the CDFW and records documenting overwintering roost sites are noted in the CNDDDB. The CNDDDB documents a “very minor” winter roosting area on the eastern side of the Preserve in the Lester Rowntree Native Plant Garden, as observed and reported in 1989 by lepidopterist Dr. Walter Sakai. The record was updated in January 1996 and reported as Occurrence Number 83 (CNDDDB, 2015). The CNDDDB records state that approximately 20 butterflies were seen roosting in the Monterey Pine Forest, however there is no indication whether the butterflies were actually in Monterey pines or a different species of tree. There are eucalyptus around the margin of the Rowntree Garden, and coast live oaks and a variety of other trees are planted in the garden setting. Monarchs were not observed during the 2015 biotic survey for this Biological Assessment since the survey period was too late in the season to make observations of potential winter-roosting butterflies.

Typically, Monarchs utilize Monterey pine, eucalyptus and occasionally other large trees during the winter months when they roost between migration pulses. Monarchs gather in the Monterey region starting in late October and typically leave the area by the beginning of March. Roost trees are chosen that protect the fragile insects from prevailing winds and roosting sites are generally near water and nectar sources. The butterflies seek out groves of trees where temperatures remain relatively stable between night and day, and where shade is available to protect them from intense sun. Map 11 depicts the known locations of Monterey Dusky-footed Woodrat, Yadon’s piperia, Hickman’s onion, and potential winter roosting habitat for Monarch Butterfly.

6.2.3. Other Special Status Species

Other special status animals with the potential to occur on the Mission Trail Nature Preserve include the species noted on Table 1. These can be found in Maritime Chaparral, Monterey Pine Forest, Coastal Prairie, Coastal Scrub, Riparian, Wetland and Coast Live Oak Woodland natural communities around the Monterey region. None of these special reptiles, fish, amphibians, mammals, birds or invertebrates were observed on the Preserve.

6.3. SPECIAL STATUS NATURAL COMMUNITIES

Habitat types considered uncommon or important for legally protected plants and animals are safeguarded under federal, state and local laws. Wetlands, riparian corridors, areas of high biological diversity, unusual or restricted vegetation types, and areas supporting legally protected species are considered special status habitats. These habitats are noted on the Department of Fish and Wildlife's California Natural Diversity Data Base (CNDDB) "Natural Communities List" (2010). These habitat types are also considered by the California Coastal Commission as constituting Environmentally Sensitive Habitat Areas (ESHA) in the California Coastal Zone.

The CDFW – CNDDB includes Monterey Pine Forest habitat in their mapping data and areas of high quality forest area included as discrete mapping units on the state maps. The CDFW also includes Coastal Prairie and Wetland types on its list of special plant communities, however these vegetation types are not mapped. Each of these special natural communities occurs on the Mission Trail Nature Preserve and all examples offer high quality natural resource values.

6.4. SUMMARY and REGULATORY FRAMEWORK – PLANTS & ANIMALS

Species formally listed, or proposed for listing as endangered or threatened, or are candidates for such listing under either the federal Endangered Species Act or the California Endangered Species Act, are given legal protection by federal or state laws.

When species are not "listed" by the federal or state government, the plants and animals included on special status species inventories by the California Department of Fish and Wildlife, the federal Fish and Wildlife Service, Monterey County policies, City of Carmel-by-the-Sea ordinances, and under the federal Migratory Bird Act as either Species of Special Concern or Fully Protected Species, are given protection against potential impacts and habitat loss by the California Environmental Quality Act (CEQA).

CEQA provides management consideration for all special status species and rare natural communities, even though these biological elements are not legally protected by either the federal or state endangered species laws. The Species of Special Concern are classified as those fish, mammals, amphibians, reptiles and invertebrates that may face extirpation if current population trends continue. These species have no legal status, however the Department of Fish and Wildlife requires that they be analyzed during review of proposed development project impacts. Efforts must be incorporated into development proposals to conserve declining populations and avoid the need to list them as endangered or threatened in the future. CEQA also recognizes plants listed by the California Native Plant Society (CNPS) as Rank 1B (plants rare, threatened or endangered in California) as special status species. The CNPS website states that, "Plants with a California Rare Plant Rank of 1B are rare throughout their range with the majority of them endemic to California. Most of the plants that are ranked 1B have declined significantly over the last century. California Rare Plant Rank 1B plants constitute the majority of taxa in the CNPS Inventory, with more than 1,000 plants assigned to this category of rarity. All of the plants constituting California Rare Plant Rank 1B meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Secs. 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Wildlife Code, and are eligible for state listing. It

is mandatory that they be fully considered during preparation of environmental documents relating to CEQA.

The special status and federal or state “listed” plant and animals on the Mission Trail Nature Preserve include:

- √ Monterey Dusky-footed Woodrat
- √ Monarch Butterfly winter roost
- √ Yadon’s rein-orchid
- √ Hickman’s onion

Several different species of raptor were seen flying over the Preserve, however none were observed either roosting, nesting or foraging on the property. No bats were observed on the property either, however no focused surveys were conducted for any of the special status species that might occur. Potential habitat exists on the Mission Trail Nature Preserve for both of these groups of special status species.

Conservation of all of these biotic elements is essential on the Mission Trail Nature Preserve and management of habitats that support these elements should be directed towards enhancing their environment for the long-term sustainability of their populations.

6.5. SUMMARY and REGULATORY FRAMEWORK – NATURAL COMMUNITIES

Development policies and regulations specific to the City of Carmel-by-the-Sea are outlined in the City’s Coast Land Use Plan (LUP)-Local Coastal Program (LCP), which was adopted by the Carmel City Council in June 2003. Mission Trail Nature Preserve was identified by the City as Environmentally Sensitive Habitat Area (ESHA), as defined by the California Coastal Commission.

The Coastal Act language pertaining to ESHA is very broad. It defines ESHA in Section 30107.5, which states that ESHA is:

Any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.

Historically, the California Coastal Commission has considered these specific habitats in the Preserve as potential ESHA:

- Riparian - Central Coast Arroyo Willow Riparian
- Wetland - Wetland Meadow
- Coastal Prairie
- Redwood Forest - Riparian
- Monterey Pine Forest
- Any habitat area supporting a Special Status wildlife species

- Any habitat area supporting a CNPS Rank 1B plant

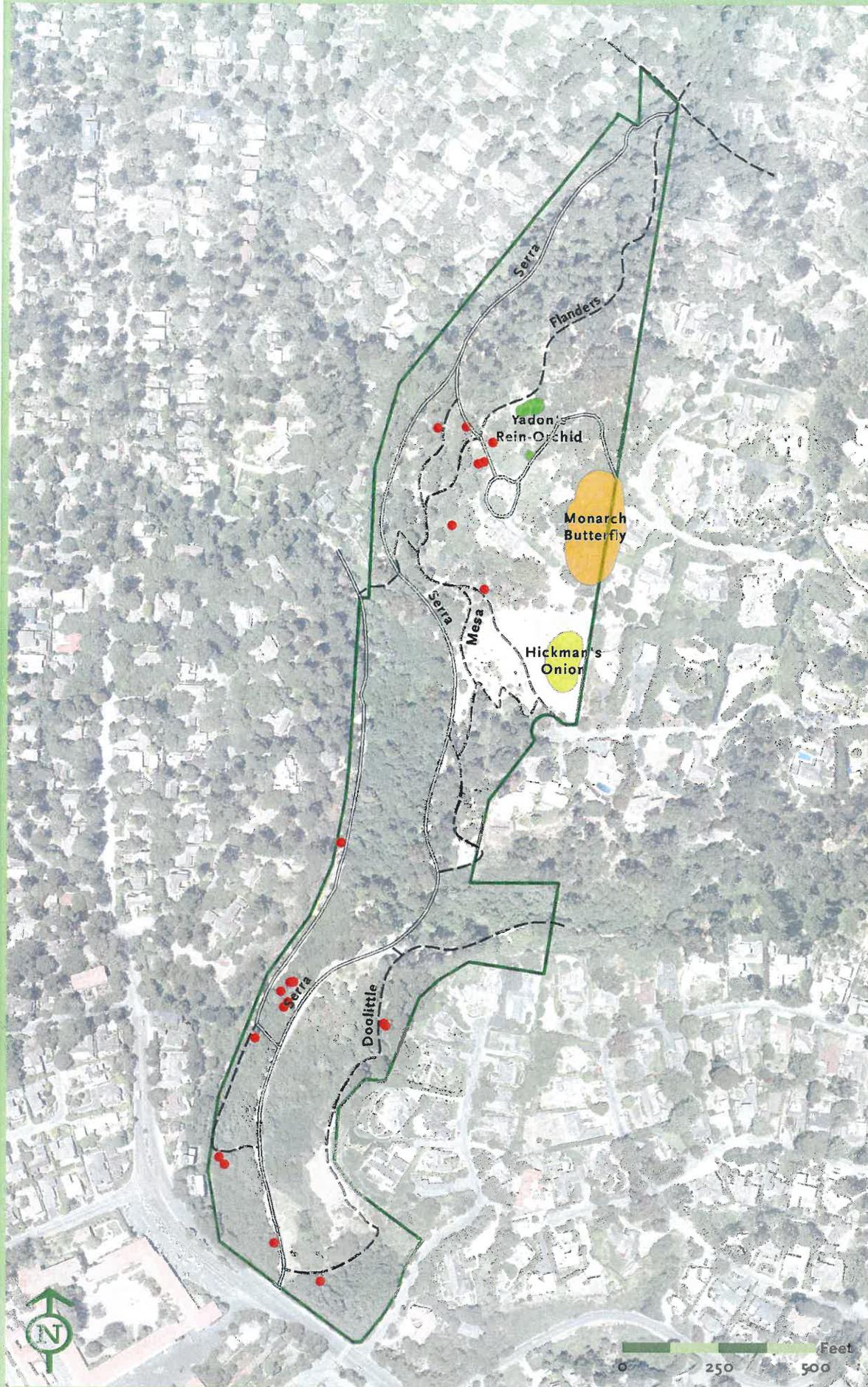
It is incumbent that the City of Carmel-by-the-Sea conserves and enhances the coastal ESHA habitats on the Mission Trail Nature Preserve. Essentially the entire property is one sort of rare natural community, or another, and City parkland management practices have allowed significant portions of the Preserve to deteriorate. Natural resource values and commensurate habitat for special status species are being lost.

Map 11 shows the populations of Yadon's rein-orchid and Hickman's onion on the Preserve, with a large oval representing potential habitat for winter roosting Monarch Butterflies. No specific CNDDDB location information is provided describing the exact location of roosting butterflies, other than the easterly side of the Lester Rowntree Native Plant Garden. Map 11 also shows the locations of Monterey Dusky-footed Woodrat stick nests. Although the distribution of stick nests seems robust for such a small geographic area, far more nests were mapped by consultant Jean Ferreira in 2009, particularly in the lower third of the Preserve. These shy creatures prefer dense and tangled understory habitat, which makes their nests difficult to document.

Special Status Species

Legend

- Hiking Trail
- ~ Service Road
- Woodrat Nest
- Hickman's Onion
- Monarch Butterfly
- Yadon's Rein-Orchid
- ▭ Preserve Boundary



1 inch = 350 feet



Nicole Nedeff
Consulting Ecologist

TURF Image
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August 2015

7. PART 2 - HABITAT MANAGEMENT RECOMMENDATIONS AND SUGGESTED PROJECTS

7.1. INTRODUCTION

The following section of the report recommends a number of enhancement and restoration efforts that will improve the biological integrity of habitats on the Mission Trail Nature Preserve. Suggested habitat management projects and corresponding Best Management Practices (BMP's) are programmatic in nature for the scope of this report. Although the Preserve Master Plan was adopted by the City Council and incorporated into the City's Local Coastal Program, Land Use Plan over a decade ago, several of the recommended habitat enhancement projects may be subject to general permitting under the Coastal Development Permit (CDP) process. The purpose of a programmatic Coastal Development Permit, or the purpose of individual project Permits, will be to implement a variety of projects that support the goals of the Mission Trail Nature Preserve Master Plan.

A Coastal Development Permit issued by the City, and depending on location, subject to appeal before the California Coastal Commission, is required for proposed projects that substantially alter existing development. Existing development is not defined in the City's Municipal Code pertaining to ESHA (17.20.220), however restoration work in an ESHA generally requires a CDP. As such, a CDP is an anticipated prerequisite for a program of specific projects that involve the removal of invasive species, including large sentinel trees of eucalyptus and acacia.

Because the Preserve's Master Plan was adopted by the City Council and incorporated into the City's General Plan and LCP/LUP, it is anticipated that the programmatic enhancement projects recommended in the City's adopted 1996 Master Plan are consistent with the City's LCP, however a CDP would still be required.

The Baseline Biological Assessment serves as the foundation document for permitting and environmental review for projects that may substantially alter the localized environment during project implementation. These types of projects include:

- " Invasive species removal in the Riparian and Wetland areas.
- " Erosion control work in any portion of the stream or riparian corridor.
- " Construction of a wet-season boardwalk link between trails in the riparian corridor.
- " Removal of large trees.
- " New trails.
- " Other projects designed to improve the biological integrity of Preserve habitats, pursuant to the Mission Trail Preserve Master Plan.

Fundamental goals of the Mission Trail Nature Preserve Master Plan specify that the following be achieved:

- Preserve the forested, tranquil atmosphere of the property.
- Protect, maintain and enhance the rare coastal habitats and associated plants and animals.
- Preserve the natural drainage and enhance wetlands.
- Provide reasonable low-impact uses for the enjoyment of the natural surroundings and plant and wildlife inhabitants.
- Maintain the Lester Rowntree Native Plant Garden within the Preserve as an area where the public can view and study native California plants and trees. The goal is that the knowledge gained will lead to an expanded use of California native plants in private landscapes.
- Maintain the Preserve using great care to avoid the degradation of resources.

To implement the goals above, suggested resource management and habitat enhancement projects on the Mission Trail Nature Preserve are divided into several categories:

- Weed Management
- Trail Maintenance
- Parking
- Rare Plant Conservation
- Management of the Lester Rowntree Native Plant Garden and Flanders Mansion parcel
- Stream Channel Stabilization
- General Property Management

Each of these general categories is fundamental for managing the Mission Trail Nature Preserve as the 1996 Master Plan intended – as a nature preserve providing passive recreational and educational opportunities to the public. Each of these categories is also vital for achieving the goals of the Master Plan. In order to protect all resource values within the Preserve, active, long-term habitat management must integrate weed control, trail maintenance, parking strategies, rare plant conservation, Rowntree Garden and Flanders Mansion upkeep, stream stabilization and general good property management practices. Resource management categories and potential projects are described below, with specific recommendations and BMP's for active management outlined in a general work plan (Table 3) that addresses priority projects and invasive species removal.



Figure 14 – The entire frame of this photograph is covered with invasive weeds that have overrun Arroyo Willow Riparian habitat. Himalayan blackberry, Cape ivy, English ivy and nasturtium vines blanket acacia and eucalyptus trees to create a noxious natural community dominated by non-native plants (July 2015).

7.2. WEED MANAGEMENT

“Invasive plants displace native plants and wildlife, increase wildfire and flood danger, consume valuable water, degrade recreational opportunities, and destroy productive range and timber lands.”

From the Home web page of the California Invasive Plant Council, Cal-IPC

7.2.1. Background Information

A “weed” describes a plant considered undesirable in a certain context and usually growing where it is not wanted. Many weeds in the Central California coastal area evolved in Mediterranean climatic regions elsewhere in the world and were introduced to California accidentally, or by escaping into wild lands from garden plantings. Most non-native weed species considered problematic in Central California have found appropriate habitat where they can grow and reproduce aggressively in the absence of co-evolved predators or natural controls. Many weeds have become naturalized, meaning they are generally expanding their distributional range and reproducing on their own without cultivation. Weeds growing and expanding their distribution throughout the Mission Trail Nature Preserve - invasive weeds - are a primary threat to the biodiversity of this natural resource-rich parkland. Invasive weeds have the propensity to choke out native plants and animals and dramatically alter habitat function as they continually expand their distribution and modify their environment.

In order to maintain the ecological integrity and biodiversity of the Mission Trail Nature Preserve, the removal of non-native, invasive plant species is of paramount importance. Weed infestation, particularly in the biologically significant Riparian and Wetland natural communities, has resulted in changed drainage patterns and vegetation monocultures of noxious plants that eliminate recruitment opportunities for native species. The conversion of Riparian and Wetland habitat has significantly degraded conditions for wildlife. The influx and proliferation of weeds in the Preserve has progressed unchecked for many years and weed control will likely be a multi-year, on-going, labor-intensive and expensive effort involving tree, shrub and herbaceous plant removal. Weed removal will expose soil in some areas of the Preserve that will require erosion control, revegetation with native plants and regular monitoring to identify and address continuing management needs.

In many cases on the Mission Trail Nature Preserve, total eradication of undesirable plants will not be feasible. Control of seed sources on neighboring properties, restriction of weed distribution vectors, or effective treatment methods may be impossible to implement. Complete eradication of undesirable species on the Mission Trail Nature Preserve may be accomplished for some weed species over a number of years, but in other cases containment or gradual reduction in vigor and areal extent are more realistic property management goals. Weed management will reduce fuel hazards, improve native habitat function, stabilize streambanks, contribute to watershed values and improve water quality, particularly for the downstream reaches of the Carmel River and Lagoon.

7.2.2. Target Species for Treatment

Table 2 lists the most prevalent and invasive, non-native weed species on the Mission Trail Nature Preserve and prioritizes their removal. These invasive plants have dramatically altered the composition of native vegetation communities and wildlife habitat in the Preserve and have the capacity to continually expand their dominance of the native vegetation conserved on the property.

The * symbol notes weed species considered particularly problematic in the Central Coastal region; the X symbol marks species considered Noxious Weeds in the State of California; the √ symbol indicates plants included on the list of Federal Noxious Weeds (invasive.org). Very specific treatment recommendations and guidelines for herbicide application are included for most of the Mission Trail Nature Preserve target species on the California Invasive Plant Council website <http://www.cal-ipc.org/> (see references).

TABLE 2 – PROMINENT INVASIVE PLANTS

REMOVAL PRIORITY	TREES	SHRUBS	FORBS, VINES & GRASSES	HABITAT
HIGH	Acacia X Eucalyptus X Mayten	Pittosporum X Cotoneaster X Pyracantha X French broom *X	Cape ivy *X English ivy X Periwinkle X Passion vine X Fennel X Himalayan blackberry X Jubata grass *X Harding grass X	Riparian corridor Wetland Monterey Pine Forest Oak Woodland
MODERATE	Italian stone pine X White poplar X Ornamental plum X	Pride-of-Madeira X Myoporum X	Three-cornered onion Crocoshmia X Helliborine X Cheeseweed Nasturtium Bermuda buttercup X Wild radish X Mustard X Poison hemlock *X Bermuda grass *XV Kikuyu grass *XV Panic veldt grass *XV Velvet grass X Thistles *X Curly dock X	Riparian corridor Wetland Monterey Pine Forest Oak Woodland Coastal Scrub
LOW		Fuchsia	Agapanthus Century plant Mare's tail X Philodendron Calla lily X Iceplant *X Salsify X Succulents Yucca	Riparian corridor Wetland Monterey Pine Forest Oak Woodland Coastal Scrub Coastal Prairie Annual Grassland

7.2.3. Potential Treatment Methods

There are many potential techniques for managing invasive weed species on the Mission Trail Nature Preserve, but all fall into four basic categories: mechanical, biological, chemical and burning. One single technique, or a combination of techniques, may be appropriate for consideration depending on the target species and specific site conditions.

Mechanical Treatment Options:

- " Removal of plant by roots (hand pulling, grubbing with shovels or similar hand tools)
- " Removal of flowers before seed set
- " Girdling by damaging cambium, resulting in mortality
- " Mowing (weed whacking, power mowing, flail mowing with tractor-mounted blades)

- " Mastication (grinding biomass with specialized equipment)
- " Tilling or cultivation (with hand tools, rototiller or plough)
- " Solarization (black plastic covering, which heat soils, eliminates sun & reduces growth)
- " Heavy mulching (using sterile, weed-free native leaf litter or commercial materials)

Biological Treatments:

- " Grazing (most practical in large infestation areas, must be carefully controlled)
- " Use of other plants to shade or out-compete weeds
- " Introduction of weed pathogens or predators (not feasible)

Chemical:

" Application of a variety of herbicides can be a practical treatment method and foliar spray of both broad-leaf and general herbicides is considered an appropriate tool for invasive species management, in many cases. Herbicide-based weed management can be cost effective and less labor-intensive, particularly when used in combination with other weed control methods. Herbicide use is generally not a preferred option for treatment of invasive species in Carmel (Branson, 2015) and herbicide use within 100-feet of Riparian habitat is prohibited in the Carmel Municipal Code, however chemical treatments have been used successfully over targeted areas on the Preserve in the past. Specific herbicide brand names and solution mixtures can be researched fully on several websites posted by organizations that focus on weed management and control issues (see references section). All chemical treatments should be used cautiously and only as directed by guidelines on product labels. Some herbicides may require special certification before use.

Burning:

- " Prescribed fire (not practical)
- " Green Flaming, also called Weed Blanching - individual plants are heat treated with a small propane torch to induce wilting and damage to plant tissue. This technique is very labor intensive and works best as a follow-up treatment to eradicate newly sprouted seedlings.

7.2.4. Invasive Species Management

Active invasive species management generally requires the development of a program to plan, budget and schedule both routine weed control and removal of more substantial infestations. Diligent long-term monitoring, prompt action to address new sprouts or regrowth, and routine follow-up treatment will be key to the success of weed management efforts at the Mission Trail Nature Preserve. Outreach to the public and to neighbors in adjacent parcels may be needed to educate park visitors and adjoining residents about the City's efforts to control invasive weeds that have detrimental impacts to the Preserve and the wildlife it hosts.

Repeated treatment (hand-pulling or spraying, for example) through the growing season, or attentive removal of seedlings and resprouted biomass on a regular schedule is generally required for most weedy invasive plants. Revegetation, seeding, or lightly mulching disturbed soil with native leaf litter is recommended after weed treatment in order to reduce erosion and prevent the exposure of fresh seedling establishment areas that could support new crops of invasives. The

scope of potential revegetation activities depends on the site, the amount of soil disturbance and the season of treatment. Revegetation will involve determining the areal extent of the weed treatment zone and arranging for native plant propagules to be collected and grown for eventual out-planting in the restoration zone. Suggestions for stabilizing weed treatment sites after invasive species removal are included in the general discussion of General Property Management and post treatment activities.

An integrated invasive plant management strategy is most effective when all weed treatment options are considered for the control and eradication of undesirable plants. In some cases, initial treatment with hand-pulling should be followed up with herbicide application or Green Flaming (weed blanching) of young plants and resprouts. Green Flaming may be useful in the damp Riparian and Wetland zones as a replacement for mechanical or chemical methods.

Weed management efforts are most effective when treatment areas are regularly monitored and treatments adjusted when needed. Bi-annual monitoring inspections by the City Forester, or a qualified Biologist will augment routine assessments conducted by Public Works staff.

Map 12 displays infestations of invasive trees, shrubs, grasses, vines and ivy, cactus and forbs. Map 12 includes so many different species of weeds that a more detailed poster-size graphic is included as a separate addendum to this report. Map 13 "Habitat Management Zones" depicts general geographic areas where weed management and other recommended projects are prioritized for action. The prioritization strategy for the Habitat Management Zones suggests that efforts be focused first on outer areas of the Preserve, where weed infestations are less severe and native habitat recovery is likely to be relatively rapid. The internal network of roads and pathways creates internal boundaries and containment lines for controlling weed infestation and delimiting work areas. Containment of weedy infestations in the central, northern and eastern portions of the Preserve should be a management goal while treatment of outlying areas is concurrently pursued.

The greatest infestation of weeds and the most dramatic habitat degradation in the Mission Trail Nature Preserve occurs in the Arroyo Willow Riparian area in the central portion of the parkland. Riparian vegetation provides the greatest habitat values for bird, mammal and herp species and this natural community is in great jeopardy of being converted to a weed monoculture on the Preserve. Eucalyptus and highly invasive acacia trees are scattered in groves throughout the Riparian corridor, which is choked with English ivy, Cape ivy, passion vine, periwinkle, nasturtium and a variety of invasive shrubs, particularly pittosporum.

Both eucalyptus and acacia are represented by enormous individual trees, as well as numerous smaller trees and saplings. Removal of eucalyptus, acacia and other woody species will require boom trucks and ground crews with trucks to remove slash. If stumps can not be ground up on site, then careful herbicide application over the recently cut stumps may be effective at controlling resprouting. Evidence of previous efforts to remove acacia trees on the Preserve can be seen. Unfortunately, in the absence of routine monitoring and continued weed control, most trees have regrown vigorously from the side of cut stumps. Herbicides appropriate for use in Riparian and Wetland habitats are commercially available and recommendations for application

in these sensitive environments are detailed in specific species treatment protocols available on the California Invasive Plant Council (CalIPC) website, <http://www.cal-ipc.org/>.

Weed work in the central area of the Preserve along the Riparian corridor and in Wetland habitat may require a California Department of Fish and Wildlife “Streambed Alteration Agreement” to cover the removal of non-native species from the stream channel and bottomlands. It is recommended that conversion from the weed-dominated vegetation to native willow and cottonwood riparian habitat progress from upstream to downstream areas in the central portion of the Preserve, with the caveat that the Arroyo Willow Riparian habitat in the lower third of the Preserve be managed aggressively in the initial stages of project implementation. The lower third of the Preserve is relatively weed-free at this time and initial “immediate action” weed removal efforts in this zone will aid in the curtailing weedy growth before it becomes more problematic. In addition, it is recommended that the Wetland Meadow near Rio Road and along the Serra Trail be treated as a very high priority and invasive Bermuda and Kikuyu grasses replaced with native sedges and grasses.

The removal of noxious weeds from the central and northern Riparian areas of the Preserve will likely require planning for a multi-year project involving crews that coordinate tree, shrub and ivy removal, with follow-up revegetation. It is suggested that contact with the local California Department of Fish and Wildlife representatives be initiated to determine whether a Streambed Alteration Agreement will be required for aggressive weed and tree removal work in the Riparian zone, as the permitting process can take several months to complete. Prior to commencing tree and weed removal in the riparian corridor, a focused survey for nests supporting Monterey Dusky-footed Woodrats may need to be undertaken to identify active nest sites. Trapping and relocating woodrats may need to occur in the event nests will be damaged by weed removal work. Tree removal in any area of the Preserve should commence after riparian bird species and raptors have fledged from any nest sites, which is generally by early summer.

Public Works staff can determine whether all noxious trees will be removed from the Weed Management Zones during the duration of work in each area, or whether just smaller trees are eradicated at first, leaving larger individuals on-site. It is recommended that all acacia and woody shrubs be completely removed during focused eradication efforts. However, there may be some benefit to removing small and mid-sized eucalyptus during an initial wave of clearing and leaving the largest specimens intact. Large, “sentinel” eucalyptus may be utilized by owls and raptors, as well as by Monarch Butterflies for winter roosting in the lower (southern) area of the Lester Rowntree Native Plant Garden. That said, diligent survey and prompt action to remove eucalyptus seedlings will be required in perpetuity if the largest eucalyptus are retained. Repeated ground disturbance and revegetation will be required if trees are not removed all at once from a site. Decisions to remove just the small and mid-size eucalyptus may be made on a case-by-case basis, depending on the level of disturbance (and follow-up revegetation) required when trees are felled and whether the larger eucalyptus in a stand provide some natural or cultural benefit.



Figure 15 – Black acacia



Figure 16 - Eucalyptus



Figure 17 - Pittosporum

Although removal of weed trees and woody shrubs will be challenging, it is by no means as complicated as the removal of English and Cape ivy from the Preserve. Vines of English ivy can be lifted from the soil by hand and stringy lianas climbing into trees can be cut at ground level. Open, cut stems of English ivy should be painted carefully with herbicide to reduce the potential for resprouting. Cape ivy, on the other-hand, is a fragile, easily broken, vining plant that has the ability to sprout from any small plant fragment that contains a leaf node. All Cape ivy biomass carefully removed from the Preserve will have to be bagged and disposed of in a local landfill, as even small stolon fragments that have dried in the sun for 10 weeks have the ability to resprout and produce new plants. The fragile stems and leaves of Cape ivy also contain a milky sap, which is laced with alkaloids that have been proven to be toxic to spiders, mammals, fish and other aquatic species when plant materials are soaking in water (Cal-IPC). Removal of Cape ivy will be extremely labor intensive in the field and will result in large areas of completely barren ground that will require revegetation with willow cuttings and plugs of other native streamside plants to gradually restore riparian habitat function. Without the removal of invasive trees and vines from the riparian corridor, this wildlife-rich habitat will eventually be lost at the Mission Trail Nature Preserve and the stream will continue to flow in an altered hydrological environment through toxic plants.

Cape ivy removal generally requires removing all ivy biomass, as well as much of the underlying vegetation, since any stem, stolon or rhizome fragment has the potential to resprout. Other areas of the Preserve that support extensive infestations of English ivy, passion flower and periwinkle will be somewhat less challenging for weed removal and control.



Figure 18 – Cape ivy.



Figure 19 – Himalayan blackberry.



Figure 20 – English ivy.

7.2.5. Summary

- Identify and program the level of personnel and financial resources to address weed management.
- Initiate process for CDFW Streambed Alteration Agreement covering weed removal and restoration activities.
- Work from areas of lowest concentration to areas of greatest infestation throughout the property – use suggestions for Immediate Action vs. Long-Term Action in Habitat Management Zones (Map 13).
- Use trails and roads as containment lines within Habitat Management Zones.
- Remove all weed biomass that has resprouting or seeding potential and dispose in appropriate landfill.
- Incorporate light mulching and/or revegetation with native species when ground is disturbed.
- Adjust the work plan each season, based on review of conditions at the Preserve.
- Enlist volunteers.
- Engage adjacent homeowners to reduce invasive species landscaping.
- Routinely monitor and repeat treatment when weeds resprout .
- Investigate options to repurpose eucalyptus trunks.
- Consider a pilot project to test Green Flaming (blanching) of Cape ivy and other weeds.

Invasive Species Infestations

Legend

- Grasses
- Vines & Ivy
- Misc. Forbs & Cactus
- Shrubs
- Trees
- Preserve Boundary

1 inch = 350 feet

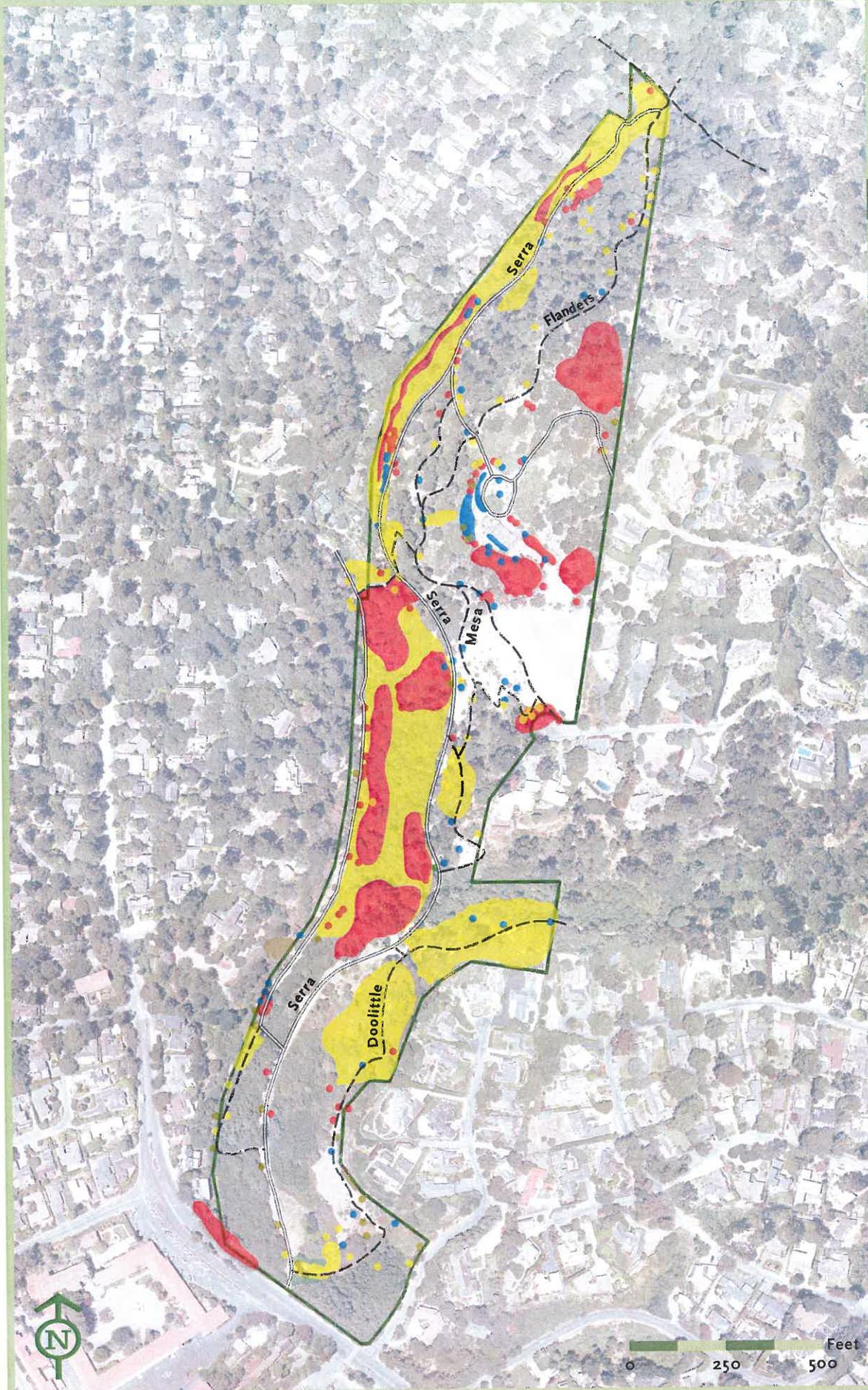


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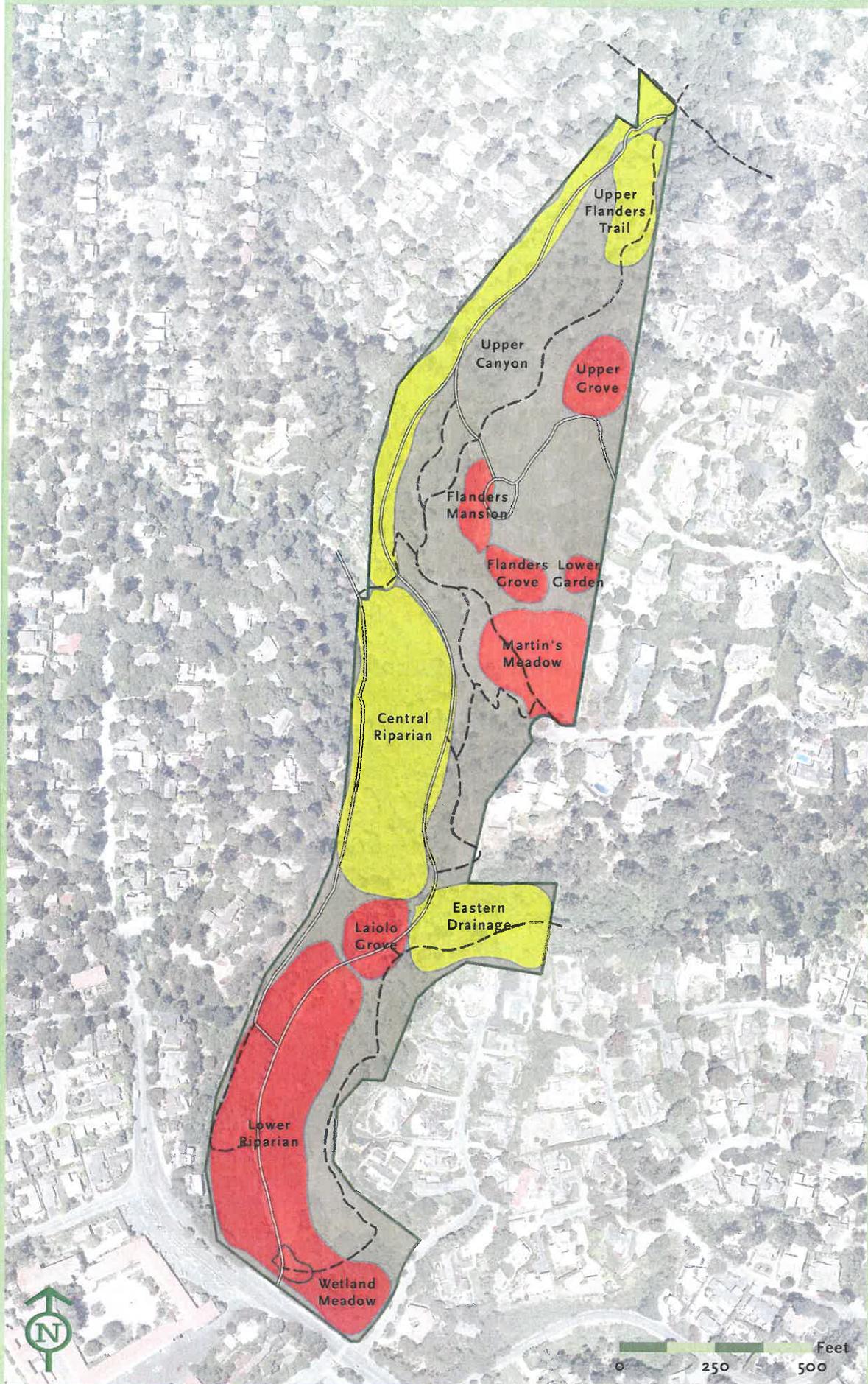
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Habitat Management Zones

Legend

-  Immediate Action
-  Long-Term Action
-  Routine Action
-  Preserve Boundary



1 inch = 350 feet



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7.3. TRAIL MAINTENANCE:

The Mission Trail Nature Preserve and the Lester Rowntree Native Plant Garden are popular destinations for local residents and visitors to the Carmel area. Regular groups of walkers hike in the Preserve on a daily basis to exercise dogs and enjoy the tranquility of the parkland, and the Rowntree Garden is often visited by school groups and people interested in both native plants and the Garden's namesake, intrepid botanist Lester Rowntree. There are over 3 miles of trails in the Mission Trail Nature Preserve, and all are open to the general public for passive recreational use. Roadways that provide access for service vehicles are also open to bicycles for off-street routes between neighborhoods of Carmel. Trailheads leading to internal roads and footpaths offer connections between downtown and the Carmel Mission and provide a passive outdoor recreational, as well as an educational experience for the public.

Trail maintenance has been undertaken by volunteers in the Friends of Mission Trail Nature Preserve group, however the network of footpaths would benefit from a comprehensive trail maintenance program. Many sections of the trail system are in need of remedial erosion control and realignment to stabilize the trail tread. Trail erosion, as well as the use of casual pathways through habitat areas threaten habitat areas and the special status plants on the Preserve. Vulnerable habitat in all natural communities should be protected from damage by rerouting footpaths where appropriate, installing steps on steep paths, and inspecting and replacing trail railings where they control hikers from cutting switchbacks. Trail maintenance will enhance natural resources in the Preserve and contribute to a safe and pleasurable visitor experience.

A component of trail maintenance is the upkeep of utility easements undertaken by the Carmel Area Wastewater District (CAWD) and Pacific Gas and Electric (PG&E). CAWD has several sewer lines in the Preserve: one is a short spur from the Martin Road cul-de-sac to the northern edge of Martin's Meadow and another traverses through the easterly drainage and along the eastern side of the Preserve. A primary line extends adjacent to the western border of the Preserve along the Willow Trail. Manholes at ground level mark the location of the CAWD easements, which are maintained by CAWD staff or contractors so that utility vehicles have access to the manholes. The CAWD easement along the eastern edge of Martin's Meadow does not extend all the way to the Flanders Mansion, as CAWD staff only service the sewer line from the manhole at the northern edge of the meadow to Martin Road (Lauer, 2015).

PG&E technically does not hold utility easements over any portion of the Mission Trail Preserve (Kuhn, 2015). The electric company maintains power poles and lines along the western margin of the Preserve using the Willow Trail for access, since the electrical lines follow the property boundary between the Preserve and adjoining private homes. Vegetation is pruned under the electrical lines along the Willow trail for fire safety and clearance. PG&E also has a dead-end spur line to the electric meter near the City's well in the central portion of the Preserve. Although there is no recorded easement for the poles or line to the well, PG&E owns the meter and claims the right to trim vegetation in a 10-foot wide corridor under all electric lines. If PG&E were to exercise this right under the lines to the electric meter near the well, significant vegetation damage to Monterey Pine Forest and coast live oak habitat may occur, particularly if City staff is not consulted prior to major efforts. In addition, a Coastal Development Permit and/or other permits may be required for such work.

Easements through the Mission Trail Nature Preserve are vital for servicing utility networks, however easement maintenance by agencies and their contractors creates the potential for weed materials to be spread inadvertently to other portions of the Preserve and adjacent private property. Clearing and maintenance along easements should conform to Best Management Practices and weed materials, particularly Cape and English ivy, should be removed from the Preserve and disposed of appropriately. Map 9 previously noted in the report depicts sewer and water lines through the Preserve and in the general environs.

Map 14 displays areas of the Preserve's internal trail network that could benefit from trail maintenance activities. Informal "use" trails and unnecessary trails through important habitat areas are proposed for removal. The extension of the Flanders Trail immediately below the Flanders Mansion could be eliminated, as it is extremely steep and the trail bed is badly eroded. This portion of the Flanders Trail can be bypassed by utilizing the parallel connecting trail due west and a little downhill. Additional signage may be appropriate to direct hikers to the correct path when the steep section of the Flanders Trail is decommissioned.

Several small "use" trails that are not formally incorporated into the Preserve's trail network can be eliminated and habitat restored to reduce foot traffic through sensitive Monterey Pine Forest, particularly near the populations of the federally endangered Yadon's rein-orchid. A new connecting trail (potential route not shown on Map 14) between a proposed alternate parking area above the Flanders Mansion and the Flanders Trail could be aligned concurrently with the development of alternate parking near the Rowntree Native Plant Garden.

Trail realignment could be considered in the Martin's Meadow Coastal Prairie to connect and unify the fragmented habitat areas currently bisected by the dirt two-track that links Martin Road with the Flanders Mansion. Rerouting and restoring the current roadway would enhance the Coastal Prairie habitat where the special status Hickman's onion occurs and connect areas of fragmented prairie vegetation. The route could be moved slightly to the east so that it follows the CAWD easement along the fence bordering the Preserve's boundary. Establishing a trail or roadway wide enough to accommodate the CAWD light utility vehicle would also provide a fire break adjacent to the Preserve border. Moving the trailhead slightly to the east at the Martin's Road cul-de-sac could be accommodated with relatively little disturbance to existing habitat, which also includes rushes that indicate seasonally elevated water tables. This potential trail realignment was discussed informally in the field with a representative of CAWD, who explained that his agency only needed to get their maintenance "mule" along the existing easement to the manhole near the edge of Martin's Meadow.

As in the case of the PG&E and CAWD easements, the routine maintenance of easements by other agencies or contractors should be coordinated with the Carmel Public Works Department so that weed management objectives and Best Management Practices are observed at all times. Invasive weed biomass should be removed from the Preserve.

The spreading of native chipped material inside the Preserve has been a routine maintenance practice, as wood chips help control dust during dry months and reduce erosion on roads and trails when conditions are wet. It is suggested that the spreading of native chipped material

should not add excessive depth to the already thick layer covering some portions of the vehicular access routes in order to maintain access to manholes where sewer lines are located. Native chipped material should not be broadcast into natural habitat areas, particularly along trails or roads, unless deemed appropriate by the City Forester. Broadcasting of chipped material into inappropriate native habitat may damage existing vegetation, reduced recruitment of native plants and potentially alter soil properties.

7.3.1. Summary

- Implement a comprehensive trail maintenance program, with clearing and erosion control.
- Decommission unnecessary trails and informal paths, and restore.
- Work with CAWD and PG&E to coordinate easement maintenance and proper disposal of biomass removed.
- Reroute roadway through Martin's Meadow to CAWD easement along fenceline.
- Remove steep connector trail below Flanders Mansion and install new signage.
- Identify trail rails for replacement and maintain consistent design.
- Consider realignment of Doolittle Trail at lower concrete crossing to facilitate wet season access.
- Consider alignment of future possible trail connecting parking areas near the Lester Rowntree Native Plant Garden with the Mesa Trail, in the event the Flanders Mansion is sold or leased.

Trail Management Recommendations

Legend

- Bench
- Bridge
- ▣ Concrete Crossing
- ▣ Culvert
- Gate
- ◆ Rail
- ~ Proposed Trail
- Remove Trail
- Repair Trail
- Repair Railings
- ~ Hiking Trail
- ~ Service Road
- ~ Stream
- ▣ Preserve Boundary

1 inch = 350 feet

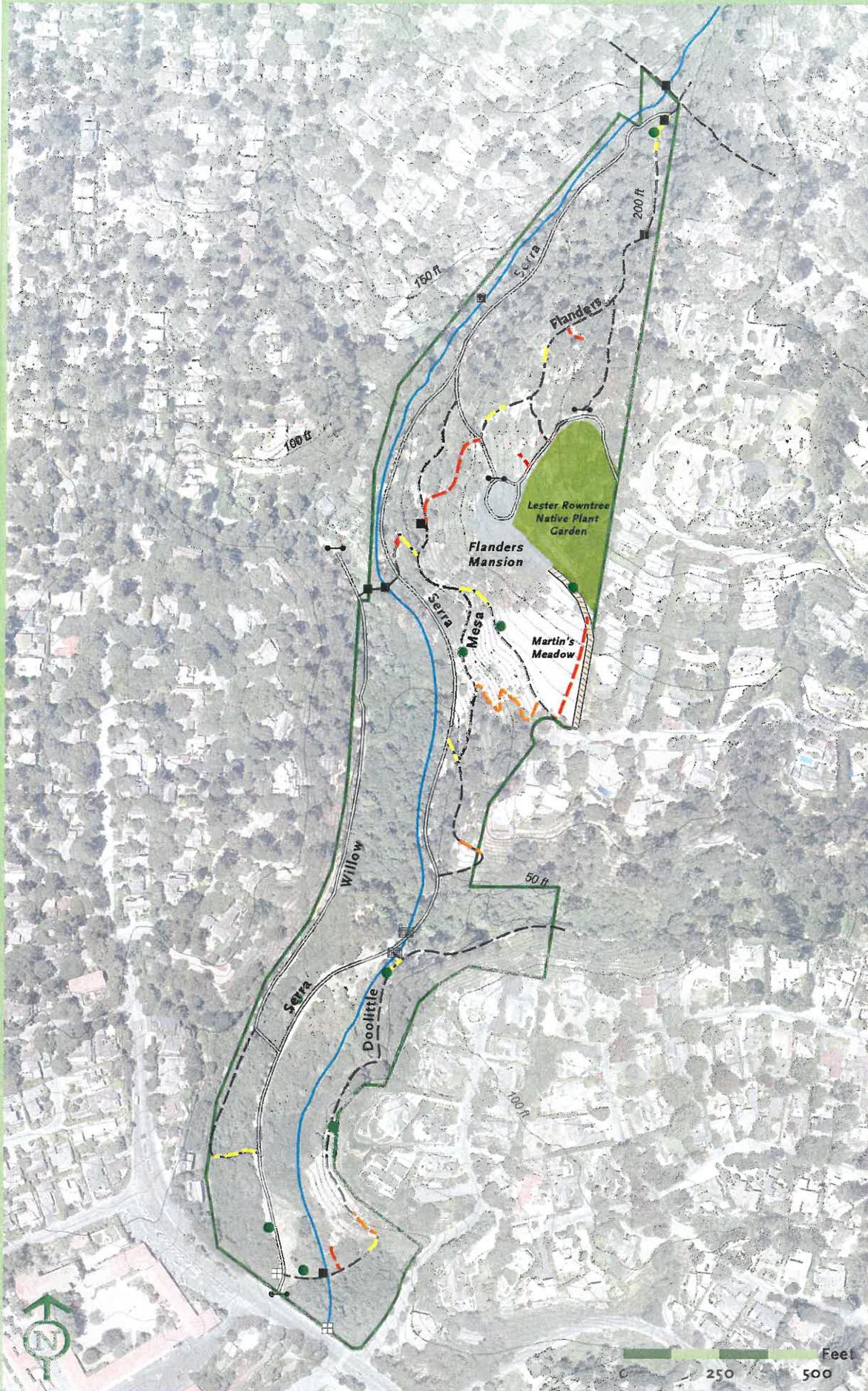


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7.4. PARKING STRATEGIES

A component of the various improvements on the Mission Trail Nature Preserve includes the development of safe parking for Preserve visitors. Several alternate parking opportunities can be implemented that offer benefits to natural habitat, as well as enhancement of visitor experience.

As noted above, the development of alternate parking near the northern entrance to the Lester Rowntree Native Plant Garden will facilitate access for visitors to the garden and provide spaces for vehicles currently parking in the driveway at the Flanders Mansion. The grove of eucalyptus and small acacia immediately north of the Rowntree Garden occurs in a relatively level area that could be developed into a small parking lot, once all the invasive trees are removed. There are actually two options for parking areas at this site: one is behind a chain gate relatively close to the neighboring residential home east of the Preserve, and the other is in a disturbed area immediately west and slightly lower in elevation. Both locations will be disturbed during the removal of non-native trees, however the potential parking area behind the chain gate is closer to the neighboring house and will be more visible when invasive eucalyptus are removed. When invasive eucalyptus and acacia are removed from this area, it is recommended that native Monterey pine saplings be appropriately placed to add screening between the proposed alternate parking area and the adjoining private residence.

Parking improvements could also be considered at the southern trailhead into the Preserve along Rio Road. Visitors currently leave vehicles along the Rio Road right-of-way, or at the Carmel Mission across the street. The right-of-way has been blocked by encroaching vegetation, which diminishes line-of-sight views and constrains space. As a component of vegetation management on the Preserve, it is recommended that willow branches be trimmed back from the road shoulder. The hedge row of planted Monterey cypress could also be removed from the edge of Rio Road. The cypress limbs grow out into the street and roots pose a liability to the road bed. The embankment below the road bed could be planted with low-growing native vegetation that will provide native habitat for wildlife and provide views of the Mission Trail canyon, while increasing parking space, as well as safety for vehicles along Rio Road.

7.4.1. Summary

- Develop alternate parking area north of Rowntree Garden and plant native Monterey pines to screen neighboring home from new parking area.
- Connect alternate parking area and upper Flanders Trail with a new path.
- Consider opportunities to improve parking along Rio Road.

7.5. RARE PLANT CONSERVATION

Natural vegetation has been altered in the Carmel region with rural residential development and few areas within the City Limits currently provide physical and biological features capable of sustaining large tracts of native habitat. The Mission Trail Nature Preserve hosts remnant, high quality examples of rare natural communities and the attendant special status plants and wildlife species associated with these unique coastal environments. Weed control, trail maintenance and other habitat management activities will enhance not only Yadon's rein-orchid, Hickman's onion

and Monterey Dusky-footed Woodrat populations, but also habitat opportunities for other plants and wildlife that could potentially utilize the Preserve for foraging, nesting or migration corridors.

The small populations of federally endangered Yadon's rein-orchid are potentially threatened by accidental damage when park visitors and dogs cut through Monterey Pine Forest habitat areas to access trails. Inadvertent trampling could be prevented by installing low fences along the Flanders Mansion driveway that will direct Preserve visitors to the formal trail network.

As discussed above, rerouting the trail through Coastal Prairie habitat in Martin's Meadow will join fragmented habitat areas and make use of an existing utility easement already in place. The current trail alignment should be revegetated with a mix of native grass and forb seeds obtained from the adjoining meadow. Before broadcast seeding, the trail tread should be lightly scored to break up compacted soil without disturbing soil horizons or the underlying clay hardpan essential to the Coastal Prairie growing environment. The revegetation area should be lightly mulched with native chipped material to retain moisture and discourage seed predation by birds. The area will require occasional weed management and possibly signage to explain habitat enhancement efforts and the trail realignment.

In addition, the mowing schedule currently in place for the Coastal Prairie at Martin's Meadow should be adjusted to delay mowing until late-season forbs have completed their blooming cycle and set seed. A delay in the mowing schedule will benefit late season flowering forbs and possibly encourage the recruitment of native milkweed (*Asclepias* spp.), which is a late summer flowering plant that provides a vital host supporting Monarch Butterflies. No milkweed plants were observed at the Mission Trail Nature Preserve during early August 2015 when plants were maturing and setting seed in other nearby areas. Martin's Meadow was mowed by Carmel staff in late June 2015. Mowing definitely has encouraged the native grasses preserved on the Meadow by removing thatch and simulating the disturbance regime these species require, however mowing every other year, or every few years, and delaying mowing until late summer should allow for the maturation of plant species that currently have their seed-set curtailed. Fire danger will be ameliorated to some degree by rerouting the current trail through the meadow to the CAWD easement along the property line, where a fire break can easily be maintained without damaging Coastal Prairie habitat.

Monterey Pine Forest habitat in the Preserve includes stands of high quality forest vegetation that has been compromised by invasive weedy vines and non-native shrubs. Removal of weedy invasives should be a top priority in Pine Forest areas as a routine management action. If seedling recruitment appears to be lagging in forest habitat, the propagation and out-planting of native pines is recommended. Supplemental planting will likely be required in all areas of the Preserve where invasive ivy, periwinkle, acacia, eucalyptus and pittosporum are removed. A small nursery of native seedlings for restoration planting could possibly be maintained at the Rowntree Native Plant Garden.

7.5.1. Summary

- Implement a long-term weed management program throughout the Preserve to benefit native habitat areas and populations of special status species.
- Reroute trail through Martin's Meadow to CAWD easement along fenceline and develop revegetation plan for abandoned route.
- Construct low fence along Flanders Mansion driveway to protect Yadon's rein-orchid.
- Consider mowing the Coastal Prairie every other year, or every few years to promote late-season forbs.
- Survey eucalyptus and Monterey pine groves near Hatton Road and in the Lester Rowntree Native Plant Garden for overwintering roosts of Monarch Butterflies.
- Survey for Monterey Dusky-footed Woodrat nests and develop protocol for protecting rats when weed control work impacts nests.
- Develop nursery for propagation of native restoration plants

7.6. LESTER ROWNTREE NATIVE PLANT GARDEN and FLANDERS MANSION

The Lester Rowntree Native Plant Garden is located at 25800 Hatton Drive on a 1-acre sloping hillside adjacent to the Flanders Mansion. The garden hosts numerous representative examples of the diverse flora of California, however the lack of regular maintenance has resulted in poorly kept facilities, plant mortality and the influx of tree seedlings that threaten to shade the garden area and turn it into a thicket of coast live oaks and Monterey pine. Comprehensive weeding, including removal of many invading native oak and Monterey pine seedlings (leaving strategic replacement trees), and focused attention on the maintenance of the garden area will greatly benefit the appearance and viability of this important educational and plant conservation facility.

The Lester Rowntree Native Plant Garden was formerly maintained by the Lester Rowntree Native Plant Garden Committee, an official support group of the City. The Committee Board of Directors asked the Friends of Mission Trail Nature Preserve to assume responsibility for Garden upkeep and the Friends group, and occasionally members of the local California Native Plant Society (CNPS), have stepped up to assist with Garden maintenance activities. CNPS considers the Native Plant Garden as an "affiliate" of their organization. The Garden would benefit from more regular and routine weeding, plant replacement and facilities management.

The garden area is an education and conservation asset that could greatly enhance the visitor experience and provide information about the benefits of landscaping with representative examples of California's native flora. Benches and the seating area at the southern edge of the Garden could be enhanced for visitors to enjoy the sweeping views of Point Lobos and the Carmel Mission across the last remaining Coastal Prairie in the city.

Although the Flanders Mansion parcel and the Native Plant Garden were not part of the scope of the Baseline Biological Assessment project, it is recommended that the control of invasive weeds around the Flanders Mansion be incorporated into the long-term habitat enhancement goals for the entire Mission Trail Nature Preserve. The Flanders Mansion grounds host numerous non-native, invasive plants that have become distributed off the landscaped grounds and into the adjoining parklands, thus contributing to the problem with weedy species overtaking the Mission

Trail Nature Preserve. The removal of key non-native plants from the Mansion parcel will facilitate the weed management activities throughout the Preserve. Most notably, removal of pittosporum, cotoneaster, periwinkle, eucalyptus and acacia from the Mansion grounds will help reduce the seed source for some of the Preserve's most problematic invasive species. Numerous Monterey cypress are also growing on the Mansion grounds, and although these trees are native to the Monterey Peninsula region, they are not native to the Mission Trail Nature Preserve. Monterey cypress have the propensity to become weedy and a determination should be made by the City Forester as to whether these trees should be removed as a component of a comprehensive weed management plan for the Preserve.

7.6.1. Summary

- Selectively remove coast live oak and Monterey pine seedlings from Lester Rowntree Native Plant Garden.
- Support regular weeding and garden maintenance.
- Survey large pines and eucalyptus for winter roosting Monarch Butterflies to establish presence/absence.
- Remove weedy invasive plants from the Mansion grounds.
- Remove invasive trees from lower margin of garden area and expand native plantings in transitional area at edge of Martin's Meadow
- Define trail from Flanders Mansion to new Martin's Meadow access and enhance seating area at southern edge of Garden.
- If Mansion parcel is sold or leased, align and construct new trail that connects driveway with Mesa Trail.

7.7. STREAM CHANNEL STABILIZATION

Stabilizing the longitudinal profile of the Mission Trail Nature Preserve stream and revegetating steep banks vulnerable to erosion will aid in enhancing Riparian and Wetland habitats on the Preserve. Any work in the stream channel or riparian corridor, including the removal of invasive weedy species, will likely require a Coastal Development Permit. Weed removal work may also require a Streambed Alteration Agreement prepared by the California Department of Fish and Wildlife. Channel stabilization with native riparian and wetland species will protect property and improve water quality by reducing erosion and associated sediment loads transported through the canyon into the Carmel River, Lagoon and Carmel Bay. The removal of Cape ivy and subsequent revegetation of native Riparian and Wetland habitat will ultimately improve environmental conditions and water quality for all aquatic species affected by urban runoff through the Preserve.

It is recommended that a hydrological/geomorphic analysis be outsourced to a hydrological consulting firm to identify erosional hazards and propose corrective action to remediate the incised channel bed. Eroded stream banks, particularly in the northern portion of the Preserve, need to be addressed and a bio-hydrological erosion control strategy developed.

7.7.1. Summary

- Hire hydrological/geomorphic consultant to assess channel stability and suggest management options.
- Implement a long-term weed management program throughout the Riparian corridor to promote natural channel and habitat function.

7.8. GENERAL PROPERTY MANAGEMENT

The following suggested projects and protocols promote the overall biological integrity of the Mission Trail Nature Preserve:

- Eliminate broadcast chipping of biomass into habitat areas already mulched with native leaf litter.
- Remove dead redwoods, downed Monterey pine and oak limbs, pruned material and weed biomass to reduce fire danger and eliminate weed seed sources. Repurpose trunks, if feasible.
- Continue to enlist community groups, such as the Friends of Mission Trail nature Preserve, to revisit areas where French broom (*genista*) and other weeds have been removed in order to address sprouts.
- Continue to engage with community groups, such as MEarth and Carmel Unified School District, for resources management assistance provided by school groups.
- Stabilize all weed treatment sites with native vegetation, or lightly mulch with native leaf litter.
- Maintain consistent design for signage, low fencing, trail steps and rails.
- Address drainage off Rio Road into Preserve at entry gate and direct towards Wetland Meadow area to reduce ponding at entry.
- Consider constructing an elevated boardwalk across Wetland area where the lower Willow Trail crosses under the canopy of Riparian habitat and connects with the Serra Trail to provide a wet season linkage between trails and reduce impacts to sensitive Wetland and Riparian habitat.
- Engage in a public information campaign to educate Preserve neighbors and visitors about the crippling impact of invasive species on natural habitats and wildlife. Note that Carmel Municipal Code Section 17.20.220.E.2 (ESHA, General Development Standards – Vegetation Removal) states that, “Existing, nonnative invasive vegetation growing on private property located in the ESAH or within 30 feet of the ESHA shall be removed as part of the landscaping plan unless the decision-making body determines (a) that vegetation removal would cause unwarranted damage to ESHA resources, or (b) that the difficulty of removing the invasive plants would be an excessive burden given the scope and nature of the approved development.”
- Coordinate labor crew needs with the organizations like the Gabilan Conservation Crew to augment Public Works staffing, when appropriate.

Table 3 presents suggestions for specific projects implemented in Habitat Management Zones (map 13) throughout the Mission Trail Nature Preserve. The Habitat Management Zones were identified based on similarity of underlying habitat parameters and degree of invasive weed infestation. Each Habitat Management Zone is prioritized for Immediate, Long-Term or Routine action. Immediate Action is recommended within 3 years in Habitat Management Zones to control the spread of invasives and contain future infestations. Immediate Action will result in speedy, positive results that will benefit the biological integrity of the overall Preserve. The areas proposed for Long-Term Action will require coordination of staff resources, revegetation

planning and possibly permitting before implementation. These Habitat Management Zones are the most severely overrun with weedy invasives and eradication efforts should be initiated within 5 years. Routine Action involving on-going weed eradication, primarily along trails, should be incorporated into regular maintenance activities and scheduled as a component of day-to-day Preserve management throughout the entire property.

8. CONCLUDING REMARKS

The Baseline Biological Assessment is designed to describe biotic resources at the Mission Trail Nature Preserve and provide supporting material in the event the Carmel Public Works Department intends to carry out maintenance activities in the Preserve. The Biological Assessment provides background information to support any necessary permitting and/or environmental review. Certain activities for work in the Environmentally Sensitive Habitat Area (ESHA) would require a Coastal Development Permit (CDP) and perhaps other permits. All proposed future projects, whether they are conceptual in nature or specifically described in this document, are related to the implementation of the Mission Trail Nature Preserve Master Plan.

The following tasks were included in the Scope of Work for the Baseline Biological Assessment:

- Ecological and mapping services to complete a Biological Assessment pursuant to the implementation of the 1996 Mission Trail Nature Preserve Master Plan.
- Describe and map natural communities, significant ecological features, areas of invasive tree cover, areas of invasive plant cover, populations of special status species, and relevant infrastructure.
- Evaluate potential environmental impacts associated with the implementation of the Master Plan and propose activities to avoid, or minimize those impacts, including restoration, if needed.
- Develop a strategy and work plan to implement Master Plan projects.
- Include suggestions for additional potential work, for example stream channel stabilization, trail realignment, etc.

The general habitat management categories, suggested projects and Habitat Management Zones described in the report have been prepared as recommendations to the City of Carmel-by-the-Sea in order to achieve the goals set forth in the Master Plan. City staff did not specify precise or detailed Preserve Master Plan projects in the Scope of Work for the Baseline Biological Assessment, and thus the suggested Best Management Practices and mitigations are programmatic in nature. Many of the suggested projects forwarded in the report are also included in the “Bluebook” assembled by the Friends of Mission Trail Nature Preserve.

TABLE 3 - PRIORITY PROJECTS AND INVASIVE SPECIES WORK PLAN

Immediate Action = Complete within 3 years

Long-term Action = Initiate within 5 years

Routine Action = Areas where ongoing, continuous action occurs as part of regular maintenance

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
WETLAND MEADOW – IMMEDIATE ACTION						
* Significant ground-disturbing work to be covered by Coastal Development Permit						
Remove Cape ivy, English ivy, hemlock, wild radish, curly dock, Himalayan blackberry, Crocosmia, Echium and other weedy forbs	Total eradication of limited infestations.	Hand pull, or grub out. Cut English ivy vines in trees at ground level and spot-treat stems with herbicide. Consider green flaming or foliar chemical application in spring. Bag and dispose of biomass.	Minimal, localized ground disturbance.	Immediately treat new shoots with herbicide or hand pull or grub. Bag for disposal. On-going monitoring and treatment will be required.	Minimize ground disturbance – if needed, cover treated area with native chips or duff. Allow native species to revegetate naturally.	Reduction in extent and containment of ivy; eradication of invasive forbs in 3 years.
* Misc. invasive grasses in matrix of Wetland indicators (Bermuda and Kikuyu, in particular)	Total eradication	Hand pull or grub out	Ground disturbance with barren areas	Hand pull or grub. On-going monitoring and treatment will likely be required.	Allow native grasses to cover site and revegetate large barren areas with plugs of Santa Barbara sedge and creeping wild ryegrass. Control sediment during revegetation process with silt fencing around work site.	Eradication of velvet grass in 3 years and continuing reduction of cover of Bermuda & Kikuyu over time
Trim willow branches creeping into Wetland Meadow near Rio Road without disturbing root crowns	Remove tree cover over Wetland Meadow	Prune branches	Willow cover removed	Seasonal trimming		On-going pruning will be required.
Cypress hedge along Rio Road	Improve shoulder parking	Remove trees and grind stumps	Tree cover removed		Revegetate embankment with native plants.	Remove hedge

Build-up roadbed at Rio entry	Improve drainage and street runoff into Wetland Meadow	Installation of appropriate road material	Temporary sedimentation potential	Monitor performance during rain events	Temporary fiber wattles around construction site	Reduction of ponding at trailhead
Remove dead redwoods	Reduce fire hazard, enhance Wetlands	Removal of dead wood at ground level	Temporary localized disturbance	Monitor areas with increased sunlight and remove invasives that recruit	Plant arroyo willow cuttings, if appropriate.	On-going removal if trees continue to die
* Wet-season boardwalk link	Reduce impacts to Wetland vegetation	Construct elevated boardwalk connecting Willow and Serra trails. Use non-toxic materials.	Temporary ground disturbance during construction, installation of boardwalk and pilings.	Monitor for stability during rain events, remove debris if material catches on boardwalk.	Revegetate all disturbed ground with native Wetland species and propagules collected on-site.	Reduction in foot traffic and trampling in Wetland area.

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
LOWER RIPARIAN – IMMEDIATE ACTION						
Remove Cape ivy, English ivy, weedy forbs, periwinkle, white poplars, acacia, cactus, succulents, Pittosporum, Himalayan blackberry and other invasive plants	Total eradication of limited infestations before they become out of control.	Hand pull, grub or chainsaw; cut English ivy vines in trees at ground level and spot treat stems with herbicide. Consider green flaming or foliar chemical application in spring. Bag and dispose of biomass. Fell trees and spot treat stumps with herbicide.	Minimal, localized ground disturbance.	Immediately treat new tree shoots with herbicide; hand pull and bag vines and sprouts of other forbs for disposal. On-going monitoring and treatment will be required.	Cover treated area with native chips or duff and allow native species to revegetate naturally. Consider spreading native grass seed along western margin of Willow Trail. Plant arroyo willow cuttings where canopy is broken by tree removal. Plant plugs of Santa Barbara sedge.	Eradication of trees, reduction in extent and containment of ivy, eradication of invasive forbs in 3 years.
Remove dead redwoods	Reduce fuel loads and fire hazard, enhance Riparian habitat	Removal of dead wood at ground level	Temporary localized disturbance, potential for increased light	Monitor areas with increased sunlight and remove invasives that recruit	Plant arroyo willow cuttings, if appropriate.	On-going removal if trees continue to die
Remove invasive from Wetland areas bordering Serra Trail	Total eradication	Hand pull or grub out	Minimal disturbance	Hand pull or grub out as new plants appear	Allow native Wetland species to recruit	Eradication in 3 years

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
MARTIN'S MEADOW AND TRAILHEAD – IMMEDIATE ACTION						
* Significant ground-disturbing work to be covered by Coastal Development Permit						
Remove ivy, eucalyptus, acacia and cypress from cul-de-sac area on Martin Road. Remove cotoneaster and ivy on trail below.	Eradication of invasive plants, revegetation with native species.	Remove trees entirely, grind stumps or apply spot treatment of herbicide; hand pull ivy and remove biomass.	Temporary ground disturbance	On-going monitoring to hand pull or grub ivy and address sprouting stumps	Revegetate tree removal area with coast live oaks or toyon. Cover bare ground with native duff or light mulch of chipped biomass. Avoid disturbing clay soil lens where rushes are located	Eradication of invasives in 3 years, with containment of ivy along trail below cul-de-sac.
* Realign trail across meadow	Merge fragmented prairie habitat and utilize existing CAWD easement. Remove trail through Prairie.	Rebuild fence and change access location; lightly score existing trail and reseed.	Temporary ground disturbance along old trail	Remove any invasives that colonize old trailbed	Revegetate with native grass seed collected on-site and lightly mulch with weed-free hatch or native chipped material. Avoid removing rushes, to the extent possible. Maintain CAWD easement as firebreak, as well as access to Mansion.	Growth of Coastal Prairie species, with less than 30% cover of non-native barnyard weeds.
Change mowing strategy	Promote late-season forbs	Mowing later in the summer or early fall every few years	Enhancement of late-season seed production and diversity	Regular monitoring to assess species diversity with and without regular mowing	Monitor and evaluate changed conditions, adjust mowing schedule if appropriate. Note influx of Coastal Scrub shrubs and remove if necessary to maintain Prairie habitat.	Increased cover of late-season flowering forbs after 3 years.

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
LAILOLO GROVE – IMMEDIATE ACTION						
* Significant ground-disturbing work to be covered by Coastal Development Permit						
	Obtain CDFW Streambed Alteration Agreement for work in riparian corridor					
Remove dead redwoods	Reduce fire hazard, enhance Riparian habitat	Removal of dead wood at ground level	Temporary localized disturbance, increased light	Monitor areas with increased sunlight; remove invasives.	Plant cuttings of black cottonwood to maintain canopy.	On-going removal if redwood trees continue to die
* Realign creek crossing to Doolittle Trail	Reduce damage to stream banks	Remove concrete step structure and widen trail on eastern bank, or construct bridge downstream	Temporary localized disturbance	Revegetate disturbed ground, or lightly mulch with native duff or chipped materials	Monitor new trail access for signs of erosion and correct, if needed	Reduced damage to stream bank an easier access to trail.
Remove Cape ivy, English ivy, annual nasturtium, invasive grasses	Control of invasive plants and revegetation with native species	Hand pull or grub and bag all biomass. Remove vines of nasturtium before seed sets. Consider green flamingo or foliar chemical application on ivy species	Ground disturbance with barren areas.	Immediately treat new shoots with herbicide or hand pull and bag for disposal.	Revegetate with plugs of Santa Barbara sedge, creeping wild rye or native blackberry	Reduction in extent and containment of ivy, eradication of nasturtium in 3 years. Increased cover of native Wetland vegetation.
* Remove large eucalyptus and acacia and consider removing cypress. Remove invasive periwinkle. Remove ivy.	Eradication of invasive plants, revegetation with native species	Fell trees and either grind or spot treat stumps with herbicide, grub out acacia seedlings. Hand pull periwinkle	Temporary ground disturbance, increased light	Monitor areas with increased sunlight and remove invasives that recruit by hand pulling or foliar herbicide application	Revegetate tree area with arroyo willow and black cottonwood seedlings. Install plugs of Santa Barbara sedge and wild blackberry. Lightly mulch exposed soils with native chipped material	Eradication of invasive trees and periwinkle in 3 years, with containment of ivy
Address need and safety of well and rusted water tank	Secure well-head. Remove tank	Remove tank and revegetate pad.	Exposed ground below tank.	Revegetate with native species.	Revegetation of exposed site	Restoration of tank site

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
FLANDERS GROVE – IMMEDIATE ACTION						
* Significant ground-disturbing work to be covered by Coastal Development Permit						
* Remove invasive eucalyptus, acacia, shrubs, including hedge of cypress, and weedy vines	Restoration of native habitat	Logging of trees; eradication of shrubs by grubbing and spot treatment of all cut stumps	Temporary localized ground disturbance, increased light to forest floor	Monitoring of stumps for resprouting and follow-up herbicide treatment, if necessary	Minimize damage from equipment used during logging, revegetate with toyon, other native shrubs, coast live oak and Monterey pine. Cover exposed ground with native duff or chip materials.	Eradication of non-native trees and shrubs in 3 years. Containment of invasive vines. Ongoing maintenance will be required.
Scout new potential trail alignment if/when alternate parking is developed and Mansion is sold or leased.		Locate potential trail to avoid removal of native vegetation	* New trail construction will impact localized area.			
LOWER GARDEN – IMMEDIATE ACTION						
* Significant ground-disturbing work to be covered by Coastal Development Permit						
* Remove invasive eucalyptus, acacia, shrubs	Restoration of native habitat	Logging of trees; eradication of shrubs by grubbing. Spot treatment of all cut stumps with herbicide	Temporary localized ground disturbance, increased light to forest floor. Survey to identify whether trees are utilized by Monarchs for winter roosting	Monitoring of stumps for resprouting and follow-up herbicide treatment, if necessary	Minimize damage from equipment used during logging, revegetate with toyon, other native shrubs and Monterey pine. Cover exposed ground with native duff or chipped materials. Survey in winter for butterflies.	Eradication of non-native trees and shrubs in 3 years. Containment of invasive vines. Ongoing maintenance will be required.
Expand garden area southwards into transitional zone at top of Martin's Meadow.	Address open transitional area and revegetate. Enhance seating area	Revegetate with native species appropriate for transitional habitat. Level sloped ground for flat trail and seating area.	Potential erosion from soil leveling or placement of imported material to enhance seating and create level trail bed.	Monitor, maintain weeding program and garden maintenance	Utilize native species appropriate for garden and natural environment. Contain newly leveled soil area with vegetation and fiber wattle.	Reduction of open, unvegetated area. Enhancement of seating area and views of Meadow and Mission
Formalize trail to Martin Road trailhead	Identify trail route	Create pathway between Mansion and CAWD easement	Temporary, minimal disturbance	Monitor for erosion, trail avoidance and mitigate if needed	Establish new trail tread with hand tools	Utilization of new trail alignment

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
UPPER GROVE – IMMEDIATE ACTION						
* Significant ground-disturbing work to be covered by Coastal Development Permit						
* Remove invasive eucalyptus, acacia, shrubs	Restoration of native habitat	Logging of trees; eradication of shrubs by grubbing. Spot treatment of all cut stumps with herbicide	Temporary localized ground disturbance, increased light to forest floor. Survey to identify whether trees are utilized by Monarchs for winter roosting	Monitoring of stumps for resprouting and follow-up herbicide treatment, if necessary	Minimize damage from equipment used during logging, revegetate with toyon, other native shrubs and Monterey pine. Cover exposed ground with native duff or chipped materials. Survey in winter for roosting Monarch Butterflies.	Eradication of non-native trees and shrubs in 3 years. Containment of invasive vines. Ongoing maintenance will be required.
Identify and construct alternate parking area	Creation of alternate parking area near Garden entrance	Utilize flat area as far west of adjacent residence. Construct after removal of invasive trees	Ground leveling, vegetation removal, altered drainage	Monitor recruitment of invasive seedlings. Address potential erosion from drainage off impervious surface.	Pave or chip seal to reduce soil erosion and transport. Encircle work area with fiber wattle. Screen neighboring residence by planting Monterey pine and coast live oaks, with toyon for sub-canopy screening.	Development of parking to replace sites at Flanders Mansion
Remove informal use trails	Reduce habitat fragmentation	Use hand tools to replace native duff and leaf litter. Consider signage directing walkers to alternate trails	Temporary alteration of soil environment	Monitor and replace native duff if walkers continue to bypass formal trail network	Use hand tools and minimize soil disturbance	Reduction of off-trail walking and habitat fragmentation
* Identify new trail route connecting new parking area with formal trail network	Reduce habitat fragmentation by directing visitors to formal trail network	Employ minimal ground disturbance and align to avoid removal of native vegetation	Localized soil disturbance, potential for erosion	Monitor for erosion and mitigate if needed	Establish new trail tread with hand tools. Avoid disturbing roots of adjacent plants	Utilization of new trail alignment

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
FLANDERS MANSION – IMMEDIATE ACTION						
Remove invasive, non-native plants from grounds and garden areas	Reduction of seed sources for Preserve	Log larger trees, grub shrubs and paint all cut stumps with herbicide. Hand pull or consider foliar application of herbicide on vines.	Removal of horticultural plantings will disturb soil and eliminate landscaping	Monitor for resprouting weedy plants and hand pull or spot treat.	Revegetate with native plants in garden settings and restore transitional areas at edge of natural Preserve habitat. Place chipped material over exposed soils to reduce erosion and mulch native plantings	Eradication of weeds in 3 years and restoration of natural habitat. Containment of invasive plants.

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
EASTERN DRAINAGE – LONG-TERM ACTION						
* Significant ground-disturbing work to be covered by Coastal Development Permit						
Obtain CDFW Streambed Alteration Agreement for work in riparian corridor						
* Remove Cape ivy, English ivy, annual nasturtium, invasive grasses, passion vine, periwinkle, Himalayan blackberry. Remove Pittosporum and all invasive shrubs.	Restore native riparian habitat. Eradication or control of invasive plants and revegetation with native species	Hand pull or grub and bag all biomass. Remove vines of nasturtium before seed sets. Consider green flamingo or foliar chemical application on ivy and passion vine	Temporary, significant ground disturbance with barren areas.	Immediately treat new shoots with herbicide or hand pull and bag for disposal.	Revegetate with plugs of Santa Barbara sedge, creeping wild rye or native blackberry. Install cuttings of arroyo willow and black cottonwood. Mulch exposed soils.	Reduction in extent and containment of vines in 5-10 years. Eradication of shrubs in 5-10 years. Increased cover of native Wetland and Riparian vegetation.
* Remove large eucalyptus and acacia and consider removing cypress.	Restore native Riparian habitat. Eradication of invasive plants, revegetation with native species	Fell trees and either grind or spot treat stumps with herbicide, grub out acacia seedlings.	Temporary significant ground disturbance with barren areas, increased light	Monitor areas with increased sunlight and remove invasives that recruit by hand pulling or foliar herbicide application	Revegetate tree area with arroyo willow and black cottonwood seedlings. Install plugs of Santa Barbara sedge and wild blackberry. Lightly mulch exposed soils with native chipped material	Eradication of invasive trees in 5-10 years
Work with CAWD staff and contractors to identify partnership opportunities to reduce invasive species along utility easement	Reduction of invasive species and restoration of native habitat					

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
CENTRAL RIPARIAN – LONG-TERM ACTION						
* Significant ground-disturbing work to be covered by Coastal Development Permit						
Obtain CDFW Streambed Alteration Agreement for work in riparian corridor						
Remove dead redwoods	Reduce fuel loads and fire hazard, enhance Riparian habitat	Removal of dead wood at ground level	Temporary localized disturbance, potential for increased light	Monitor areas with increased sunlight and remove invasives that recruit	Plant cuttings of black cottonwood to maintain canopy.	On-going removal if redwood trees continue to die
* Remove Cape ivy, English ivy, annual nasturtium, invasive grasses, passion vine, periwinkle, Himalayan blackberry. Remove Pittosporum and all invasive shrubs.	Restore native Riparian and Wetland habitat Eradication or control of invasive plants and revegetation with native species	Hand pull or grub and bag all biomass. Remove vines of nasturtium before seed sets. Consider green flamingo or foliar chemical application on ivy and passion vine	Temporary, significant ground disturbance with barren areas.	Immediately treat new shoots with herbicide or hand pull and bag for disposal.	Revegetate with plugs of Santa Barbara sedge, creeping wild rye or native blackberry. Install cuttings of arroyo willow and black cottonwood. Mulch exposed soils.	Reduction in extent and containment of vines in 5-10 years. Eradication of shrubs in 5-10 years. Increased cover of native Wetland and Riparian vegetation.
* Remove large eucalyptus and acacia and consider removing cypress.	Restore native riparian habitat. Eradication of invasive plants, revegetation with native species	Fell trees and either grind or spot treat stumps with herbicide, grub out acacia seedlings.	Temporary significant ground disturbance with barren areas, increased light	Monitor areas with increased sunlight and remove invasives that recruit by hand pulling or foliar herbicide application	Revegetate tree area with arroyo willow and black cottonwood seedlings. Install plugs of Santa Barbara sedge and wild blackberry. Lightly mulch exposed soils with native chipped material	Eradication of invasive trees in 5-10 years
UPPER FLANDERS TRAIL – LONG-TERM ACTION						
Remove German and Cape ivy infestations along trail and from adjacent Monterey Pine Forest habitat areas	Restore native understory in Monterey Pine Forest	Hand pull or grub, consider foliar application of herbicide	Temporary ground disturbance	Monitoring and continual removal of sprouts	Cover exposed soil areas with native duff or chipped material. Revegetate larger areas with Monterey pine seedlings and native understory species	Containment of ivy infestation in 5-10 years. On-going weed control will be required.

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
UPPER CANYON – LONG-TERM ACTION						
* Significant ground-disturbing work to be covered by Coastal Development Permit						
Retain hydrological – geomorphic consultant to evaluate drainage and channel stability, and propose options to reduce stream bank failure and channel incision	Clear direction on causes of channel instability and remedial action to address on-going erosion.	Bio-mechanical erosion control utilizing native riparian vegetation. Consider potential uses of repurposed eucalyptus trunks for channel structures.				
Obtain CDFW Streambed Alteration Agreement for work in riparian corridor.						
* Remove Cape ivy, English ivy, annual nasturtium, invasive grasses, passion vine, periwinkle, Himalayan blackberry. Remove Pittosporum and all invasive shrubs.	Restore native Riparian habitat in canyon corridor. Eradication or control of invasive plants and revegetation with native species	Hand pull or grub and bag all biomass. Remove vines of nasturtium before seed sets. Consider green flaming or foliar chemical application on ivy and passion vine	Temporary, significant ground disturbance with barren areas.	Immediately treat new shoots with herbicide or hand pull and bag for disposal.	Revegetate with plugs of Santa Barbara sedge, creeping wild rye or native blackberry. Install cuttings of arroyo willow and black cottonwood. Mulch exposed soils.	Reduction in extent and containment of vines in 5-10 years. Eradication of shrubs in 5-10 years. Increased cover of native Wetland and Riparian vegetation.
* Remove large eucalyptus and acacia	Restore native Riparian habitat. Eradication of invasive plants, revegetation with native species	Fell trees and either grind or spot treat stumps with herbicide, grub out acacia seedlings.	Temporary significant ground disturbance with barren areas, increased light	Monitor areas with increased sunlight and remove invasives that recruit by hand pulling or foliar herbicide application	Revegetate tree area with arroyo willow and black cottonwood seedlings. Install plugs of Santa Barbara sedge and wild blackberry. Lightly mulch exposed soils with native chipped material	Eradication of invasive trees in 5-10 years

HABITAT MANAGEMENT ZONE, PRIORITY & PROJECTS	GOAL	PREFERRED TREATMENT	POTENTIAL IMPACTS TO HABITAT	FOLLOW-UP TREATMENT	BEST MANAGEMENT PRACTICES – Always Remove Biomass	SUCCESS CRITERIA
ROUTINE MAINTENANCE ACTION						
Remove German and Cape ivy infestations, as well as all other invasive tree, shrub and forb species along internal trails and from adjacent natural habitat	Restore native understory in Monterey Pine Forest and Oak Woodland. Revegetate Coastal Scrub areas	Hand pull or grub, consider foliar application of herbicide	Temporary ground disturbance	Monitoring and regular removal of sprouts	Cover exposed soil areas with native duff or chipped material. Revegetate with appropriate native species	Containment of ivy infestation in 5-10 years. Eradication of misc. shrubs and forbs. On-going weed control will be required.
Monitor trails for erosion, damaged water bars, bridges and broken tree limbs	Reduction of erosion, trail safety	Use of hand tools		Monitoring and regular maintenance	Address as needed	Safe and stable trails, well-maintained infrastructure
Collaborate with CAWD, PG&E and other easement holders to address weed management issues	Coordination of vegetation management					
Collaborate with Friends group to address weed control and other Preserve management opportunities.	Coordination of vegetation and general Preserve management					
Collaborate with MEarth, local schools and other partners for assistance with weed control, revegetation and general Preserve management issues	Coordination of vegetation and general Preserve management.					
Manage and enhance Lester Rowntree Native Plant Garden	Sustainable, well-maintained native plant garden. Educational opportunity and potential plant conservation benefits	Hand pull or grub oak and pine seedlings. Remove all invasive non-native species	Regular monitoring as part of overall Preserve management	Utilize native chipped materials and native leaf litter. Remove dried or dead plant materials. Replace native specimens, as needed		Sustainable, well-maintained garden

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APPENDICES

APPENDIX A

Mission Trail Nature Preserve Plants Observed

TREES:

Acacia dealbata, * silver wattle
Acacia melanoxylon, * black acacia
Acer macrophyllum, big-leaved maple
Aesculus californica, buckeye
Alnus rubra, red alder
Cupressus macrocarpa, Monterey cypress
Eucalyptus globulus, * blue gum
Maytenus boaria, * mayten tree
Quercus agrifolia, coast live oak
Pinus pinea, * Italian stone pine
Pinus radiata, Monterey pine
Platanus racemosa, sycamore (planted)
Populus alba, * white poplar
Populus trichocarpa, black cottonwood
Prunus virginiana var. *demissa*, Western chokecherry
Prunus sp., * ornamental plum
Salix lasiolepis, arroyo willow
Sequoia sempervirens, coast redwood (planted)

SHRUBS:

Acmispon glaber, deerweed
Artemisia californica, coast sagebrush
Baccharis pilularis, coyote brush
Ceanothus thyrsiflorus, blue blossom
Cornus sericea ssp. *occidentalis*, western red dogwood
Cotoneaster franchetii, * orange cotoneaster
Diplacus aurantiacus, sticky monkey flower
Echium candicans, * Pride-of-Madeira
Frangula californica, coffeeberry
Fuchsia sp., * fuchsia
Genista monspessulana, * French broom
Heteromeles arbutifolia, toyon
Myoporum laetum, * myoporum
Pittosporum undulatum, * Victorian box tree
Pyracantha sp. *

Ribes sanguinum var. *glutinosum*, pink-flowering current
Ribes speciosum, fuchsia-flowered gooseberry
Rosa californica, California rose
Rosa gymnocarpa, wood rose
Salvia mellifera, black sage
Sambucus nigra ssp. *caerulea*, blue elderberry
Symphoricarpos mollis, creeping snowberry
Toxicodendron diversilobum, poison oak

FORBS and VINES:

Achillea millefolium, yarrow
Agapanthus africanus, * lily-of-the-Nile
Agave americana, * century plant
Allium hickmanii, Hickman's onion
Allium triquetrum, * three-cornered onion
Anagallis arvensis, * scarlet pimpernel
Artemisia douglasiana, mugwort
Atriplex semibaccata, * Australian saltbush
Baccharis douglasii, Douglas' baccharis
Berula erecta, cut-leaved water parsnip
Brasica nigra, * black mustard
Brodiaea terrestris, dwarf brodiaea
Calochortus albus, fairy lantern
Calochortus luteus, yellow mariposa lily
Calystegia macrostegia ssp. *cyclostegia*, coast morning-glory
Carduus pycnocephalus, * Italian thistle
Carpobrotus chilense, * sea fig ice plant
Carpobrotus edulis, * Hottentot fig ice plant
Chlorogalum pomeridianum, soap plant
Cirsium occidentale, cobweb thistle
Cirsium vulgare, * bull thistle
Claytonia perfoliata, miner's lettuce
Clinopodium douglasii, yerba buena
Conium maculatum, * poison hemlock
Conyza canadensis, * mare's tail
Crocoshmia sp., * orange montretia
Croton californicus, croton
Delaira odorata, * Cape ivy
Dodecatheon clevelandii, shooting star
Epilobium ciliatum, willow-herb
Epipactis helleborine, * broad-leaved helleborine
Erodium cicutarium, * filaree
Eryngium armatum, prickly eryngo, coyote thistle
Eschscholzia californica, California poppy
Filago galica, * narrow-leaved filago

Foeniculum vulgare, * fennel
Fragaria vesca, wood strawberry
Galium aparine, * goose-grass
Galium porigens, climbing bedstraw
Gastridium ventricosum, * nit grass
Geranium dissectum, * cut-leaved geranium
Grindelia hirsutula var. *maritima*, hairy gumplant
Hedera helix, * English ivy
Hirschfeldia incana, * summer mustard
Horkelia californica, California horkelia
Hypochaeris glabra, * smooth cat's ear
Hypochaeris radicata, * hairy cat's ear
Lathyrus vestitus, common Pacific pea
Lonicera hispidula var. *vacillaris*, hairy honeysuckle
Lythrum californica - California loosestrife
Madia gracilis, slender tarweed
Madia madioides, woodland madia
Malva parviflora, * cheeseweed
Marah fabacea, manroot, wild cucumber
Medicago polymorpha, * bur clover
Mentha sp. * mint
Nasturtium officinale, watercress
Opuntia ficus-indica, * mission cactus
Oxalis pes-caprae, * Bermuda buttercup
Pasiflora sp., * orange passion flower
Pasiflora sp., * purple passion flower
Phacelia malvifolia, stinging phacelia
Philodendron sp. * garden philodendron
Picris echoides, * bristly ox-tongue
Piperia yadonii, Yadon's rein-orchid
Plantago coronopus, cut-leaved plantain
Plantago lanceolata, * English plantain
Plantago major, * common plantain
Polygonum lapathifolium, * willow weed
Potentilla anserina ssp. *pacifica*, Pacific silver-weed
Pseudognaphalium luteo-album, * weedy cudweed
Pteridium aquilinum, Western bracken fern
Ramolina sp., lace lichen
Raphanus sativus, * wild radish
Rubus armeniacus, * Himalayan blackberry
Rubus ursinus, California blackberry
Rumex acetosella, * sheep sorrel
Rumex conglomeratus, * clustered dock
Rumex crispus, * curly dock
Sanicula crassicaulis, gambleweed
Satureja douglasii, yerba buena

Silybum marianum, * milk thistle
Sisyrinchium bellum, blue-eyed grass
Solanum douglasii, Douglas' nightshade
Solidago velutina ssp. *californica*, California goldenrod
Sonchus oleraceus, * common sow-thistle
Sonchus asper, * prickly sow-thistle
Stachys bullata, wood mint
Stellaria media, * common chickweed
 Succulents *
Toxicoscordion fremontii, Fremont's star lily
Tragopogon porrifolius, * sasify
Trifolium sp., clover
Triteleia ixioides, pretty face
Tropaeolum majus, * nasturtium
Urtica dioica ssp. *holosericea*, stinging nettle
Vinca major, * periwinkle
Yucca sp. *
Zantedeschia aethiopica, * calla lily

SEDGES, RUSHES and GRASSES

Agrostis pallens, bent grass
Aira caryophyllea, * silver hair grass
Avena fatua, * wild oats
Briza maxima, * rattlesnake grass
Briza minor, * small quaking grass
Bromus diandrus, * ripgut grass
Carex sp., spreading bunch
Carex barbarae, Santa Barbara sedge
Cynodon dactylon, * Bermuda grass
Cyperus esculentus, * yellow nut grass
Cyperus squarrosus, awned cyperus
Danthonia californica, California oat-grass
Elymus condensatus, giant wild rye
Elymus glaucus, western ryegrass
Elymus triticoides, creeping wild rye
Ehrharta erecta, * veldt grass
Festuca myuros, * rat-tail fescue
Holcus lanatus, * velvet grass
Hordeum brachyantherum, California barley
Hordeum murinum ssp. *leporinum*, * barnyard foxtail
Juncus balticus, wire rush
Juncus effusus, common rush
Juncus patens, spreading rush
Juncus xiphioides, iris-leaved rush

Juncus sp., rush
Lolium perene, * perennial ryegrass
Pennisetum clandestinum, * kikuyu grass
Phalaris aquaticus, * Harding grass
Scirpus microcarpus, small-fruited bullrush
Stipa pulchra, purple needlegrass

FERNS:

Dryopteris arguta, wood fern
Pentagramma triangularis, gold-back fern
Polypodium californicum, California polypody
Polystichum munitum, sword fern
Woodwardia fimbriata, chain fern

* plants not native to California

Plant list prepared by Nikki Nedeff, August 2015

APPENDIX B

Winter Bird-Populations, Mission Trail Park, Carmel, CA. 1992-93 and 1994-95
 [Biologists Richard and Linda Beidleman, Pacific Grove, CA. The results were
 published in the Journal of Field Ornithology]

- | | |
|--|--|
| 1. Blackbird, Brewer's | 40. Swift, White-throated |
| 2. Bushtit, Common | 41. Thrush, Hermit |
| 3. Chickadee, Chestnut-backed | 42. Towhee, California |
| 4. Creeper, Brown | 43. Towhee, Rufous-sided |
| 5. Crow, American | 44. Vireo, Hutton's |
| 6. Dove, Mourning | 45. Vulture, Turkey |
| 7. Finch, Cassin's | 46. Warbler, Orange-crowned |
| 8. Finch, House | 47. Warbler, Townsend's |
| 9. Finch, Purple | 48. Warbler, Wilson's |
| 10. Flicker, Northern (Red-shafted) | 49. Warbler, Yellow-rumped
(Audubon/Myrtle) |
| 11. Goldfinch, Lesser | 50. Waxwing, Cedar |
| 12. Gull, California | 51. Woodpecker, Acorn |
| 13. Gull, Western | 52. Woodpecker, Downy |
| 14. Hawk, Cooper's | 53. Woodpecker, Nuttall's |
| 15. Hawk, Red-shouldered | 54. Wren, Bewick's |
| 16. Hawk, Sharp-shinned | 55. Wren, Winter |
| 17. Heron, Great Blue | 56. Wrentit |
| 18. Hummingbird, Allen's | |
| 19. Hummingbird, Anna's | |
| 20. Jay, Scrub | |
| 21. Jay, Steller's | |
| 22. Junco, Dark-eyed (Oregon) | |
| 23. Kestrel, American | |
| 24. Kinglet, Ruby-crowned | |
| 25. Merlin (Pigeon Hawk) | |
| 25. Nuthatch, Pygmy | |
| 26. Nuthatch, White-breasted | |
| 27. Owl, Great-horned | |
| 28. Phoebe, Black | |
| 29. Pigeon, Band-tailed | |
| 30. Pigeon, Rock (= Rock Dove or
Domestic Pigeon) | |
| 31. Quail, California | |
| 32. Robin, American | |
| 33. Siskin, Pine | |
| 34. Sparrow, Fox | |
| 35. Sparrow, Golden-crowned | |
| 36. Sparrow, Lincoln's | |
| 37. Sparrow, Song | |
| 38. Sparrow, White-crowned | |
| 39. Starling, European | |

APPENDIX C

POTENTIAL BIRDS UTILIZING THE MISSION TRAIL NATURE PRESEVE (Additional species not noted by Dr. Richard and Linda Beidleman)		
FAMILY	SCIENTIFIC NAME	COMMON NAME
Accipitridae	<i>Aquila chrysaetos</i>	Golden Eagle
	<i>Buteo jamaicensis</i>	Red-tailed Hawk
	<i>Circus cyaneus</i>	Northern Harrier
	<i>Elanus leucurus</i>	White-tailed Kite
Ardeidae	<i>Nycticorax nycticorax</i>	Black-crowned Night Heron
	<i>Egretta thula</i>	Snowy Egret
	<i>Ardea alba</i>	Great Egret
Caprimulgidae	<i>Phalaenoptilus nuttallii</i>	Common Poorwill
Cardinalidae	<i>Passeriana amoena</i>	Lazuli Bunting
	<i>Pheucticus melanocephalus</i>	Black-headed Grosbeak
Charadriidae	<i>Charadrius vociferus</i>	Killdeer
Corvidae	<i>Corvus corax</i>	Raven
Emberizidae	<i>Passerculus sandwichensis</i>	Savannah Sparrow
Fringillidae	<i>Carduelis lawrencei</i>	Lawrence's Goldfinch
	<i>Carduelis psaltria</i>	Lesser Goldfinch
	<i>Carduelis tristis</i>	American Goldfinch
Hirundinidae	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow
	<i>Hirundo rustica</i>	Barn Swallow
	<i>Tachycineta bicolor</i>	Tree Swallow
	<i>Tachycineta thalassina</i>	Violet-green Swallow
Icteridae	<i>Agelaius phoeniceus</i>	Red-winged Blackbird
	<i>Agelaius tricolor</i>	Tricolored Blackbird
	<i>Icterus bullockii</i>	Bullock's Oriole
	<i>Molothrus ater</i>	Brown-headed Cowbird
	<i>Sturnella neglecta</i>	Western Meadowlark
Laniidae	<i>Lanius ludovicianus</i>	Loggerhead Shrike

Mimidae	Mimus polyglottos Toxostoma redivivum	Northern Mockingbird California Thrasher
Paridae	Baeolophus inornatus	Oak Titmouse
Parulidae	Dendroica petechia Geothlypis trichas	Yellow Warbler Common Yellowthroat
Passeridae	Passer domesticus	House Finch
Picidae	Picoides villosus Sphyrapicus ruber	Hairy Woodpecker Red-breasted Sapsucker
Regulidae	Regulus satrapa	Golden-crowned Kinglet
Sittidae	Sitta canadensis	Red-breasted Nuthatch
Strigidae	Otus kennicottii	Western Screech Owl
Sylviidae	Poliophtila nigriceps Cistothorus palustris	Blue-gray Gnatcatcher Marsh Wren
Trochilidae	Archilochus alexandri	Black-chinned Hummingbird
Troglodytidae	Troglodytes aedon	House Wren
Turdidae	Catharus ustulatus Izoreus naevias Sialia mexicana	Swainsn's Thrush Varied Thrush Western Bluebird
Tyrannidae	Contopus cooperi Contopus sordidulus Sayornis saya Empidonax difficilis	Olive-sided Flycatcher Western Wood Pewee Say's Phoebe Pacific Slope Flycatcher
Tytonidae	Tyto alba	Barn Owl
Vireonidae	Vireo gilvus	Warbling Vireo

APPENDIX D

POTENTIAL MAMMAL SPECIES UTILIZING MISSION TRAIL NATURE PRESERVE		
FAMILY	SPECIES	COMMON NAME
Bassariscidae	<i>Bassariscus astutus</i>	Ringtail
Canidae	<i>Canis latrans</i>	Coyote
	<i>Urocyon cinereoargenteus</i>	Grey Fox
	<i>Vulpes fulva</i>	Red Fox
Cervidae	<i>Odocoileus hemionus</i>	Black-tailed deer
Cricetidae (mice)	<i>Peromyscus miniculatus</i>	Deer Mouse
	<i>Peromyscus californicus</i>	California Mouse
	<i>Peromyscus truei</i>	Pinyon Mouse
	<i>Reithrodontomys megalotis</i>	Western Harvest Mouse
	<i>Microtus californicus</i>	CA Meadow Mouse
	<i>Neotoma fuscipes luciana</i>	Monterey Dusky-footed Woodrat
Didelphiidae	<i>Didelphis virginiana</i>	Opossum
Felidae	<i>Felix concolor</i>	Mountain Lion
	<i>Lynx rufus</i>	Bobcat
Geomyidae	<i>Thomomys bottae</i>	Pocket Gopher
Heteromyidae	<i>Perognathus californicus</i>	California Pocket Mouse
	<i>Dipodops heermanni</i>	Kangaroo Rat
Leporidae	<i>Lepus californicus</i>	Blacktail Jackrabbit
	<i>Sylvilagus audubonii</i>	Audubon's Cottontail Rabbit
	<i>Sylvilagus bachmani</i>	Brush Rabbit
Molossidae	<i>Tadarida brasiliensis</i>	Mexican Freetail Bat
Muridae	<i>Mus musculus</i>	House Mouse
	<i>Ratus norvegicus</i>	Norway Rat
	<i>Ratus rattus</i>	Black Rat

Mustelidae	<i>Mephitis mephitis</i>	Striped Skunk
	<i>Mustela frenata</i>	Longtail Weasel
	<i>Spilogale gracilis</i>	Spotted Skunk
	<i>Taxidea taxus</i>	American Badger
Procyonidae	<i>Procyon lotor</i>	Raccoon
Sciuridae	<i>Spermophilus beecheyi</i>	California Ground Squirrel
	<i>Sciurus griseus nigripes</i>	Western Gray Squirrel
	<i>Sciurus niger</i>	Fox Squirrel
Soricidae	<i>Sorex trowbridgei</i>	Trowbridge Shrew
	<i>Sorex ornatus</i>	Ornate Shrew
Talpidae	<i>Neurotrichus gibbsi</i>	Shrew Mole
	<i>Scapanus latimanus</i>	Broad-handed Mole
Ursidae	<i>Ursus americanus</i>	Black Bear
Vespertilionidae	<i>Myotis lucifungus</i>	Little Brown Myotis
	<i>Myotis yumanensis</i>	Yuma Myotis
	<i>Myotis thysanodes</i>	Fringed Myotis
	<i>Myotis volans</i>	Long-eared Myotis
	<i>Myotis californicus</i>	California Myotis
	<i>Myotis cilolabrum</i>	Small-footed Myotis
	<i>Pipistrellus hesperus</i>	Western Pipistrel
	<i>Antrozous pallidus</i>	Pallid Bat
	<i>Eptesicus fuscus</i>	Big Brown Bat
	<i>Lasionycteris noctivagans</i>	Silver-haired Bat
	<i>Lasiurus cinereus</i>	Hoary Bat
<i>Lasiurus borealis</i>	Western Red Bat	
List from The Monterey Pine Forest Watch. 2011. Stromberg, M. page 147-148, and other sources.		

APPENDIX E

POTENTIAL REPTILES AND AMPHIBIANS UTILIZING THE MISSION TRAIL NATURE PRESEVE		
FAMILY	SCIENTIFIC NAME	COMMON NAME
REPTILES		
Anguidae	<i>Elgaria m. multicarinata</i>	Southern Alligator Lizard
	<i>Elgaria coerulea</i>	Northern Alligator Lizard
Aniellidae	<i>Aniella p. pulchra</i>	California Legless Lizard
Boidae	<i>Charina bottae</i>	Coastal Rubber Boa
Colubridae	<i>Coluber constrictor marmon</i>	Western Yellow-bellied Racer
	<i>Contia tenuis</i>	Sharp-tailed Snake
	<i>Diadophis punctatus vandenberghi</i>	Monterey Ringnecked Snake
	<i>Lapropeltis getulus californiae</i>	California Kingsnake
	<i>Lapropeltis zonata mutifasciata</i>	California Mountain Kingsnake
	<i>Masticophis falagellum</i>	Coach Whipsnake
	<i>Masticophis l. lateralis</i>	Striped Whipsnake
	<i>Pituophis c. catenifer</i>	Pacific Gopher Snake
	<i>Thamnophis atratus</i>	Aquatic Garter Snake
	<i>Thamnophis elegans terrestris</i>	Coast Garter Snake
Pnyrosomatidae	<i>Phrynosoma coronatum</i>	California Horned Lizard
	<i>Sceloporus occidentalis bocourti</i>	Western Fence Lizard
	<i>Uta stasburiana</i>	Common Side-blotched Lizard
Scincidae	<i>Plestiodon s. skiltonianus</i>	Skilton's Skink
Teiidae	<i>Cnemidophorus tigris</i>	Western Whiptail
Viperidae	<i>Crotalus viridis oreganus</i>	Western Rattlesnake
AMPHIBIANS		
Bufo	<i>Bufo boreas</i>	California Toad
Hylidae	<i>Pseudacris regilla</i>	Pacific Chorus Frog

	Plethodontidae	Aneides lugubris	Arboreal Salamander
		Batrachoseps luciae	Santa Lucia Slender Salamander
		Batrachoseps gabilanensis	Gabilan Slender Salamander
		Ensatina e. eschscholtzii	Monterey Salamander
	Ranidae	Rana catesbeiana	American Bullfrog
		Rana draytonii	California Red-legged Frog
	Salamandridae	Taricha t. torosa	Coast Range Newt