Baseline Biological Survey Report

for the

Sage Hill Preserve

County of San Diego

Prepared for

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List of Acronyms

Cal-IPC	California Invasive Plant Council
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CNPS	California Native Plant Society
DPR	County of San Diego Department of Parks and Recreation
MSCP	North County Multiple Species Conservation Program
USDA	United States Department of Agriculture

Executive Summary

AECOM conducted baseline biological surveys of the County of San Diego's Sage Hill Preserve (Preserve). This effort was undertaken to provide biological data, information, and analysis to the San Diego County Department of Parks and Recreation (DPR) to aid their development of a Resource Management Plan with Area Specific Management Directives for the Preserve. To evaluate the Preserve's biological resources, AECOM performed the following studies: a) vegetation mapping; b) sensitive plant surveys; c) invasive plant surveys; d) butterfly surveys; e) amphibian surveys; f) reptile pit traps and surveys; g) avian point counts; h) nocturnal bird surveys; i) acoustic surveys and roost surveys for bats; j) small mammal trapping, and k) camera survey stations for medium and large mammals.

This report describes all survey methodologies, data collected, and analyses performed during the survey, which occurred from February through December, 2009. The report also includes management recommendations based on the survey results. These recommendations cover management and monitoring of sensitive plant and animal species, including species covered by the North County Multiple Species Conservation Program (North County MSCP). It also includes recommendations for management and monitoring of vegetation communities, control of invasive non-native plant species, and other recommendations to ameliorate illegal collection of animal species from the Preserve.

The Preserve covers approximately 231.5[1] acres of native and non-native habitats, including Diegan coastal sage scrub, southern maritime chaparral, coastal sage-chaparral scrub, coastal and valley freshwater marsh, southern oak riparian forest, non-native grassland, disturbed habitat, and tamarisk scrub. All of the Preserve is within the proposed North County MSCP preserve system.

The 2009 surveys documented 8 vegetation types and 239 species within the Preserve. The species detected included 146 plant species (of which 97 were native), wildlife surveys detected 13 butterfly species, 4 amphibian species (including one non-native), 8 reptile species, 48 bird species (including one non-native), and 20 mammal species (including one non-native). Of these species, there are 11 special-status species of which six are North County MSCP-covered species (2 plants and 4 animals).

[1] The assessor's parcel data list the Preserve to be 235 acres; however, calculations generated from the GIS data show the Preserve as 231.5 acres. Therefore, this report references the property as 231.5 acres.

1.0 Introduction

1.1 Purpose of the Report

This report documents the baseline biological data collected by AECOM for the County of San Diego's Sage Hills Preserve (Preserve). The Preserve is managed by the County of San Diego Department of Parks and Recreation (DPR). Biological data were collected on behalf of DPR in 2009 to establish baseline habitat and species data. The data and survey results will be used to direct future Preserve monitoring and management, and to develop a Resource Management Plan (RMP) including Area Specific Management Directives (ASMDs).

1.2 MSCP Context

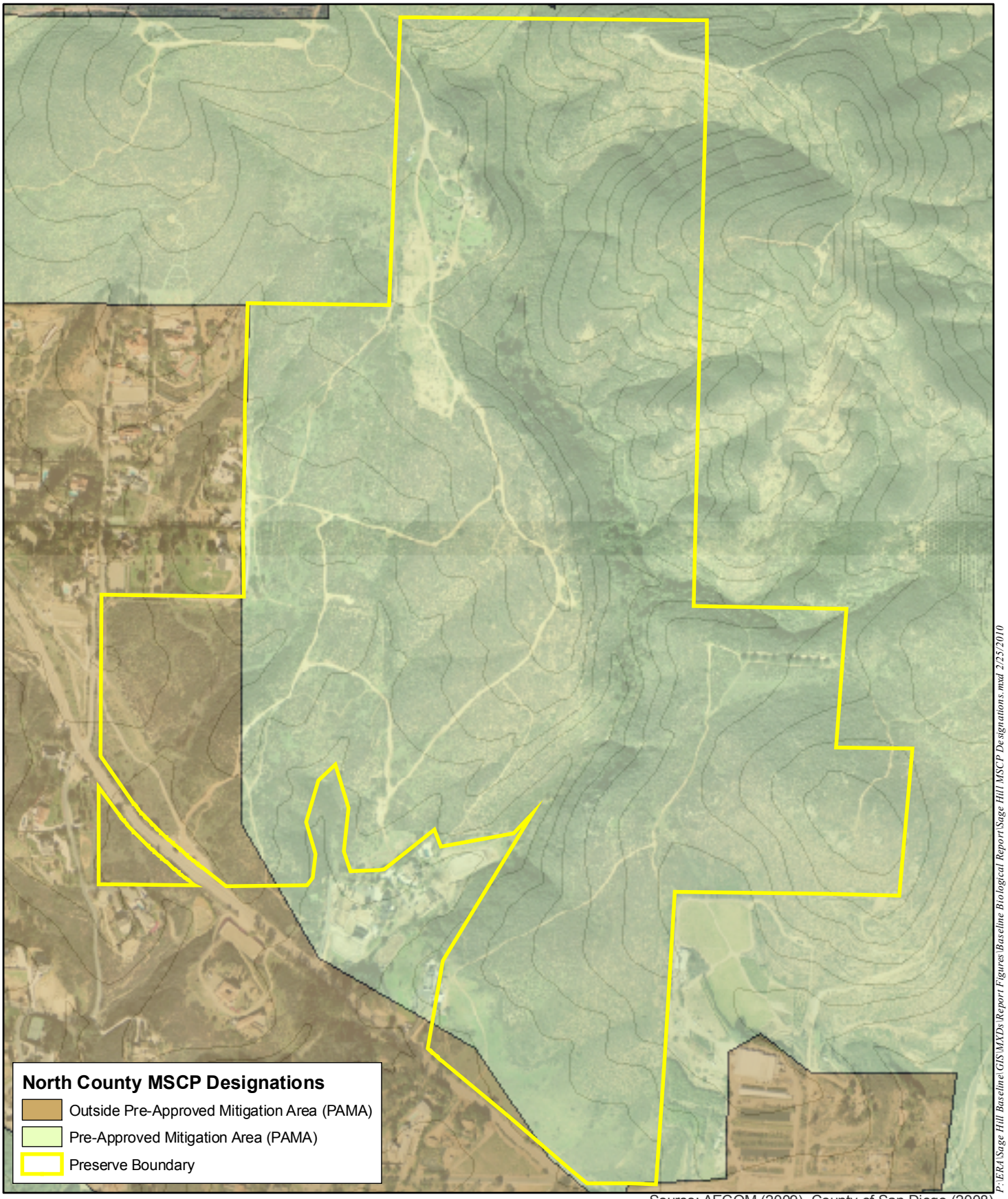
The Preserve is included in the proposed North County Multiple Species Conservation Program (North County MSCP) preserve system and consists of valuable native habitats containing sensitive species, as well as areas that have been marginally impacted by human activities, such as unofficial trail systems, foundations of former buildings, former agricultural fields, and recreational use (Figure 1). The County of San Diego acquired the Sage Hill Preserve in February 23, 2009.

It should be noted that the North County MSCP has not been approved by the resource agencies (California Department of Fish and Game and U.S. Fish and Wildlife Service) and is currently in draft form. A key feature of the North County MSCP is the focus of proposed conservation areas that are identified in the plan as pre-approved mitigation areas (PAMA). As proposed 80% of the natural habitats within the North County MSCP planning area are proposed for conservation. Within the PAMAs, the plan identifies planning segments including core areas, special areas, and linkages between core areas.

2.0 Study Area Description

2.1 Project Location

The 231.5-acre Preserve is located in the Elfin Forest community of unincorporated San Diego County, California, between Fortuna del Norte and Carib Drive on the west, Questhaven Road on the north, Aguilera Lane on the east and Elfin Forest Road on the south (Figures 2, 3). The Preserve is mapped in the Rancho Santa Fe USGS 7.5 minute quadrangle map at Township 12 South, Range 3 West, Section 34. The Preserve consists of assessor's parcel numbers 679-060-0400, 679-060-0600, 679-060-0700, 679-080-1000, 679-080-1100, 679-100-0100, 679-100-0200, 679-100-0300, 679-100-0400, and 679-100-0600. It is bordered by private property on all sides, and these parcels include single-family residences, agricultural land, and undeveloped parcels. Open space is located to the northeast of the Preserve. Primary and vehicular access to the Preserve is through an unofficial dirt parking lot on Elfin Forest Road on the southern edge of the Preserve. Secondary access is through a gate on Elfin Forest Road east of the parking lot, and through a gate on Questhaven Road on the northern side of the Preserve.



P:\ERA\Sage Hill Baseline GIS\MXDs Report Figures\Baseline Biological Report\Sage Hill MSCP Designations.mxd 2/25/2010

Source: AECOM (2009), County of San Diego (2008)

1 inch = 600 feet

0 150 300 600 Feet

Sage Hill Preserve MSCP Designations

AECOM

Figure 1



1 inch = 5 miles

Miles

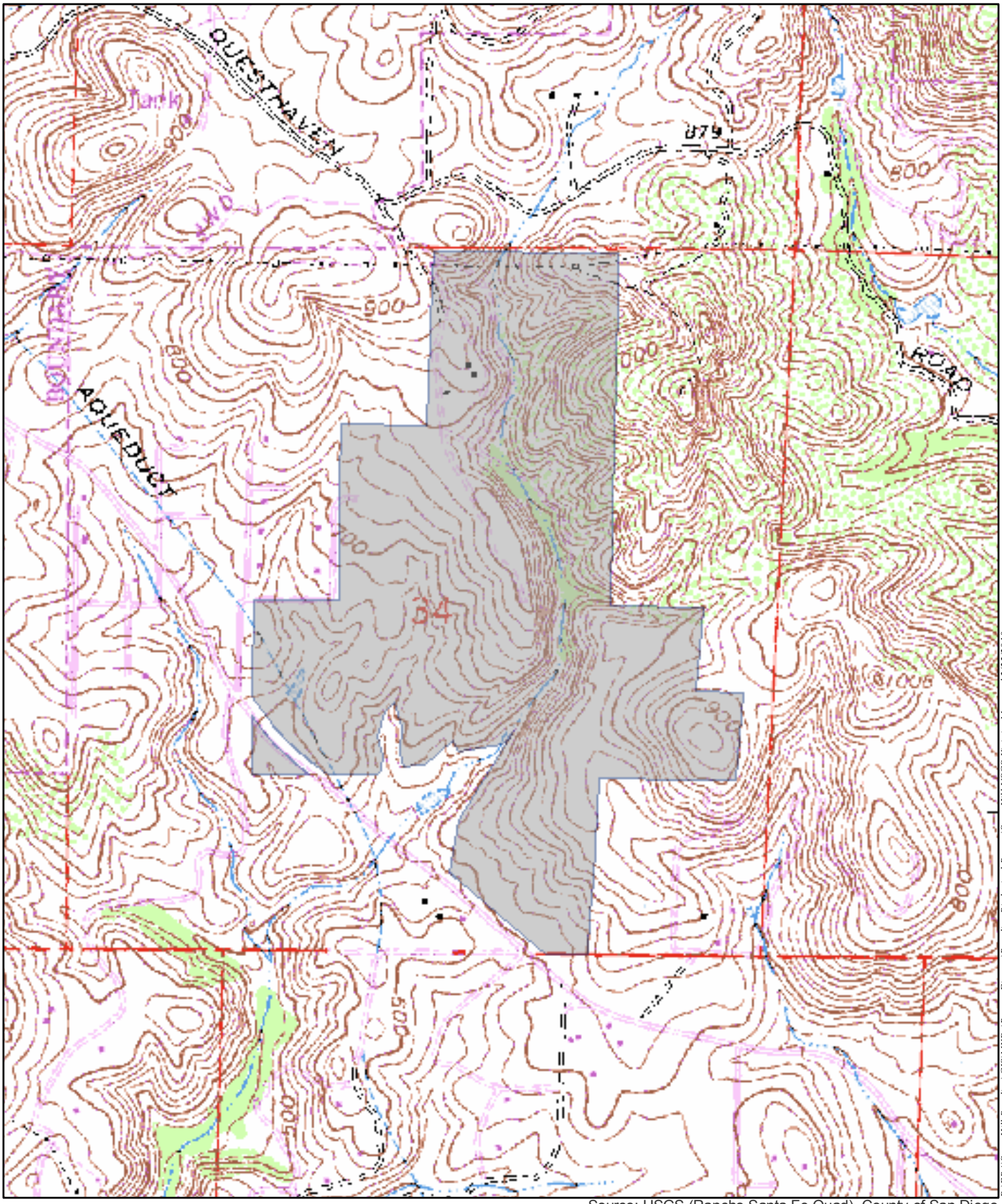
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Sage Hill Preserve Regional Map

AECOM

Figure 2



Source: USGS (Rancho Santa Fe Quad), County of San Diego

1 inch = 1,000 feet

0 250 500 1,000 Feet

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Sage Hill Preserve USGS Vicinity Map

AECOM

Figure 3

2.2 Geographic Setting

The Preserve is located in the Peninsular Geomorphic Range, in the coastal foothills of western San Diego County, approximately 7.4 miles east of the Pacific Ocean. The Preserve's terrain contains primarily moderate to steep slopes with some flat terrain along the top of the ridgelines. The elevation change is approximately 400 feet, ranging from 590 feet above mean sea level (MSL) near the southern edge of the Preserve to 990 feet above MSL on the eastern edge (Figure 3). A canyon with a small, unnamed perennial stream bisects the Preserve from north to south (Figure 3).

2.3 Geology and Soils

Preserve geology was mapped in the Oceanside 30' X 60' quadrangle (Kennedy and Tan, 2005). The Preserve is underlain by Cretaceous volcanic and metavolcanic rocks, including granite, granodiorite and unidentified hard metavolanic rocks (Bowman 1973). The Preserve also contains areas of granitic alluvium eroded from these rocks.

The Preserve contains seven mappable soil phases in five soil series (Figure 4). Soils were mapped using data from the web soil survey (NRCS 2009); and soil series and phase descriptions are taken from Bowman (1973).

Cieneba Series: Cieneba rocky coarse sandy loam, 9 to 30 percent slopes, eroded (CmE2)

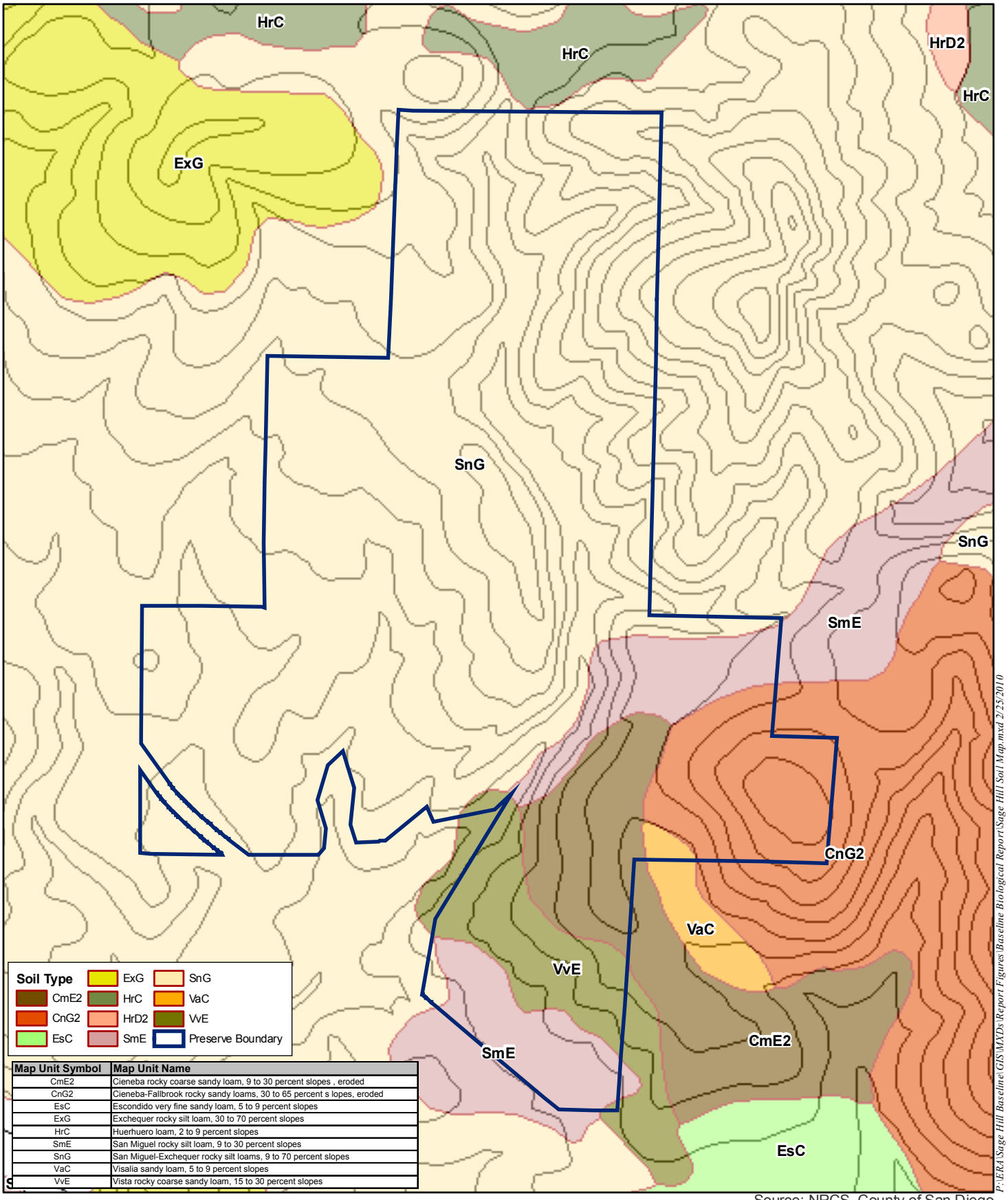
This soil is a coarse sandy loam, 5 to 15 inches deep over hard granodiorite. The slope is rolling to hilly, and 10 to 30 percent is covered by rock outcrops and very large granodioritic boulders. Available water holding capacity is 1 inch to 1.5 inches. Included in mapping are small areas of Vista rocky coarse sandy loam and Las Posas rocky sandy loam.

Cieneba Series: Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded (CnG2)

This complex is about 50 percent Cieneba coarse sandy loam and 40 percent Fallbrook sandy loam. The remainder is covered by rock outcrops and large boulders. Included in the mapping are small areas of Vista rocky coarse sandy loam. The Cieneba portion is coarse sandy loam 5 to 15 inches deep. The soil is moderately rapidly permeable, excessively drained, and has 1 inch to 1.5 inches of water available. Fertility is low. Fallbrook sandy loam is 20 to 34 inches deep. The soil is slowly to moderately permeable, well drained, and has 3 to 5 inches of water available. Fertility is medium in this soil. For both soils, runoff is rapid to very rapid and the erosion hazard is high to very high. Sheet and gully erosion are moderate.

San Miguel Series: San Miguel rocky silt loam, 9 to 30 percent slopes (SmE)

This soil is a well-drained silt loam 15 to 34 inches thick, derived from hard metavolcanic rock, and rocks cover approximately 10 percent of the surface. Fertility is very low. Permeability is slow, and available water holding capacity is 2.5 to 3 inches, although some moisture is available from the clay subsoil. Runoff is medium to rapid, and erosion hazard is moderate to high. This soil mapping unit includes small areas of Escondido soils, Exchequer soils, and Friant soils, as well as small areas were the slope is up to 50 percent.



Map Unit Symbol	Map Unit Name
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent s lopes, eroded
EsC	Escondido very fine sandy loam, 5 to 9 percent slopes
ExG	Exchequer rocky silt loam, 30 to 70 percent slopes
HrC	Huerhuero loam, 2 to 9 percent slopes
SmE	San Miguel rocky silt loam, 9 to 30 percent slopes
SnG	San Miguel-Exchequer rocky silt loams, 9 to 70 percent slopes
VaC	Visalia sandy loam, 5 to 9 percent slopes
VvE	Vista rocky coarse sandy loam, 15 to 30 percent slopes

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Source: NRCS, County of San Diego

1 inch = 700 feet

0 175 350 700 Feet

Sage Hill Preserve Soil Map

AECOM

Figure 4

San Miguel Series: San Miguel-Exchequer rocky silt loams, 9 to 70 percent slopes (SnG)

This complex occurs on mountainous uplands, at elevations of 400 to 3,300 feet. It is about 50 percent San Miguel silt loam and 40 percent Exchequer silt loam, and the rest is covered by rock outcroppings. Included in mapping were small areas of Escondido soils and Friant soils. The San Miguel soil has a rooting depth is 18 to 23 inches, and fertility is very low. The soil is slowly permeable and has 2.5 to 3 inches of water holding capacity. The Exchequer soil has a rooting depth is 8 to 17 inches, and fertility is very low. The soil is moderately permeable and has 1 to 2 inches of water available. For both soils drainage is good, runoff is medium to rapid, and the erosion hazard is moderate to very high.

Visalia Series: Visalia sandy loam, 5 to 9 percent slopes (VaC)

This fertile soil is a sandy loam that can be up to 60 inches deep. It is derived from granitic alluvium, and occurs on low slopes, where runoff is slow and erosion hazard is slight. Permeability is moderately rapid, and the available water holding capacity is 8 to 9.5 inches. Included in this soil in mapping are small areas of Greenfield soils, Placentia soils, Ramona soils, and Tujunga soils.

Vista Series: Vista rocky coarse sandy loam, 15 to 30 percent slopes (VvE)

This soil is sandy loam that is 20 to 34 inches deep over weathered granodiorite or quartz diorite. It occurs on moderately steep slopes, with 10-20 percent covered with rock outcrops and large boulders. The available water holding capacity is 2 to 4.5 inches. Runoff is medium to rapid, and erosion hazard is moderate to high. Included in mapping are small areas of Fallbrook soils and Cieneba soils.

2.4 Climate

San Diego County has a Mediterranean climate, with cool wet winters and warm, dry summers. To provide more detail, temperature and precipitation data were taken from the California Irrigation Management Irrigation System (CIMIS 2009) weather station in Escondido, approximately 12 miles east of the Preserve (33.08^{o}N, 116.98^{o}W, 390' elevation). The data were averaged by month across 10 years (July 1999-July 2009) to determine the monthly mean temperature, the mean minimum temperature, and the mean maximum temperature, as well as mean monthly precipitation (Table 1). Overall, December is the coldest month and August is the hottest, while June is the driest and February is the wettest month, on average (Table 1).

Table 1
Mean Monthly Temperatures and Precipitation, July 1999-July 2009

Month	Mean Monthly Temperatures Mean (Min to Max)(^{o}F)	Mean Monthly Total Precipitation (in)
January	51.8^{o} (36.4^{o} to 68.9^{o})	1.18"
February	52.4^{o} (39.0^{o} to 66.7^{o})	2.52"
March	55.1^{o} (41.7^{o} to 69.8^{o})	1.08"
April	57.7^{o} (44.2^{o} to 71.8^{o})	0.82"
May	62.8^{o} (50.1^{o} to 76.9^{o})	0.19"
June	66.5^{o} (53.5^{o} to 81.4^{o})	0.01"
July	70.9^{o} (57.2^{o} to 86.7^{o})	0.03"

Table 1
Mean Monthly Temperatures and Precipitation, July 1999-July 2009

Month	Mean Monthly Temperatures Mean (Min to Max)(^{o}F)	Mean Monthly Total Precipitation (in)
August	71.2^{o} (57.2^{o} to 87.7^{o})	0.10”
September	68.0^{o} (53.4^{o} to 85.7^{o})	0.03”
October	62.7^{o} (48.0^{o} to 79.8^{o})	0.71”
November	56.5^{o} (41.1^{o} to 73.9^{o})	0.65”
December	51.2^{o} (36.1^{o} to 68.4^{o})	0.86”

2.5 Hydrology

The Preserve is within the Escondido Creek Watershed, which is part of the Carlsbad Hydrologic Unit (CWN, 2009). An unnamed tributary of Escondido Creek bisects the Preserve north to south (Figure 5). The tributary is mapped as an intermittent blue-line stream. In 2009, it flowed throughout the year.

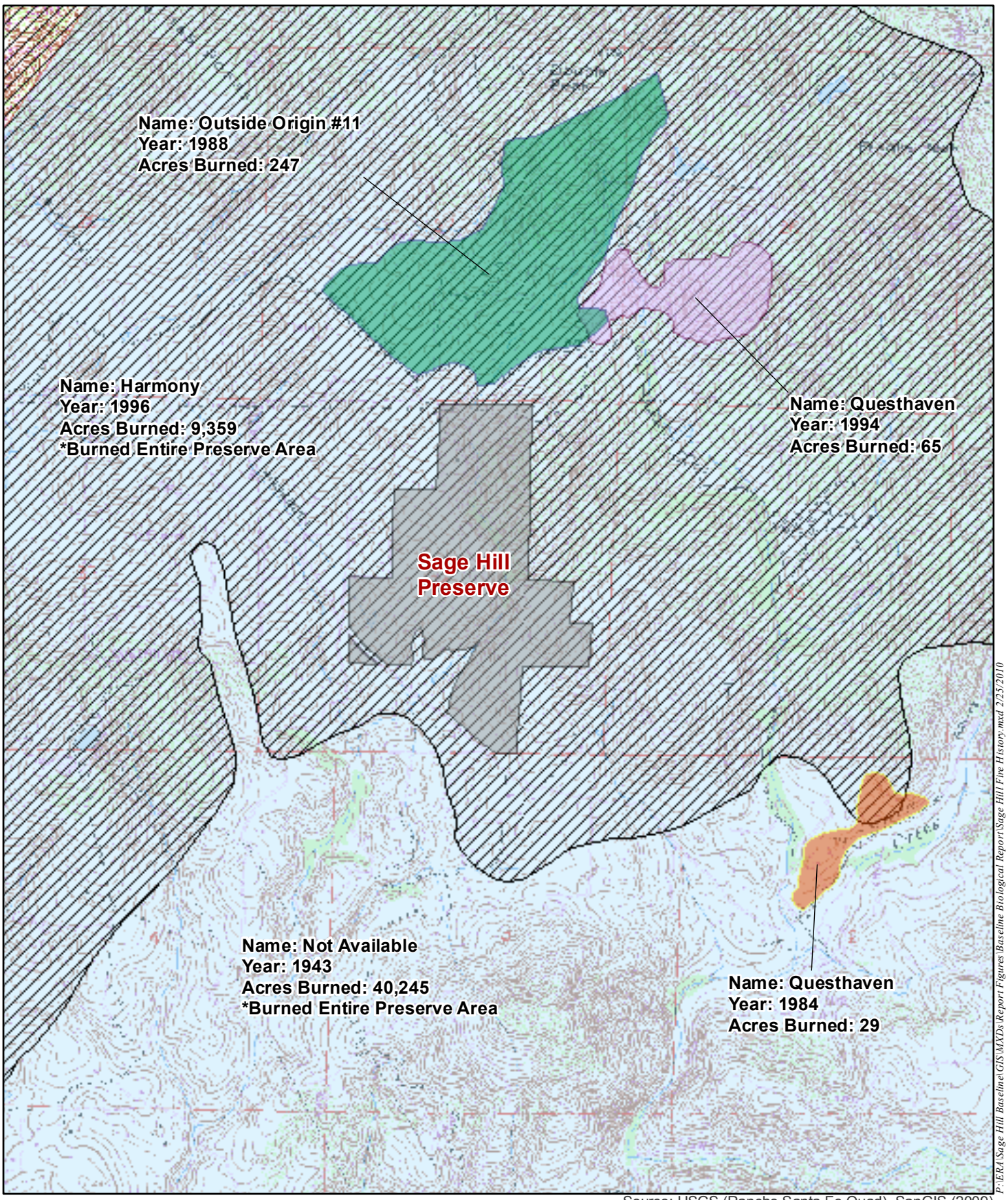
2.6 Fire History

Wildfire is a natural phenomenon in southern California. Although it is common to speak of fire cycles, the evidence suggests that historically, chaparral and coastal sage scrub (common on the Preserve) faced rare, massive fires that happened once per century or less frequently (Keeley and Davis 2007, Rundel 2007). Many native plant species are adapted to particular fire regimes, and these adaptations are based on the minimum fire return intervals that species can tolerate and still complete their life cycles (Keeley and Davis 2007, Rundel 2007). Research suggests that too-frequent fires (<30 year return interval) will eliminate many chaparral species from a landscape, and fire return intervals of <10 years can cause type conversion of chaparral and coastal sage scrub into non-native grasslands, as only a few native species can tolerate being burned that frequently (Keeley and Davis 2007, Rundel 2007). Unfortunately, a majority (99 percent) of recent fires in San Diego County were caused by humans, and exacerbated by drought and invasions of non-native annual plants. In many areas of San Diego County, fires have recurred frequently enough to cause type conversion.

The Preserve burned entirely in 1943 and 1996 (SanGIS 2009) (Figure 5). While fires occurred nearby in 1988 and 1994, they did not enter the Preserve. Based on the continued dominance of chaparral and coastal sage scrub in the Preserve’s vegetation, the Preserve’s native species can tolerate fires that return every 53 years.

2.7 Trails

The Preserve currently contains approximately five and one half miles of un-official trails that traverse a large portion of the Preserve (Figure 6). These existing un-official trails include both dirt roads and single-track footpaths which run through the following habitats: non-native grassland, Diegan coastal sage scrub, southern maritime chaparral, coastal sage-chaparral scrub, coastal and valley freshwater marsh, and southern coast live oak riparian forest. Access to the Preserve occurs from several un-official trail heads located on the southern edge, along Elfin Forest Road; and the northern edge, at Questhaven Road. A small dirt lot located at the southern border of the Preserve along Elfin Forest Road is being utilized as an un-official parking area. The un-official trails are being used by hikers, mountain bikers, and equestrians.



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Source: USGS (Rancho Santa Fe Quad), SanGIS (2009)

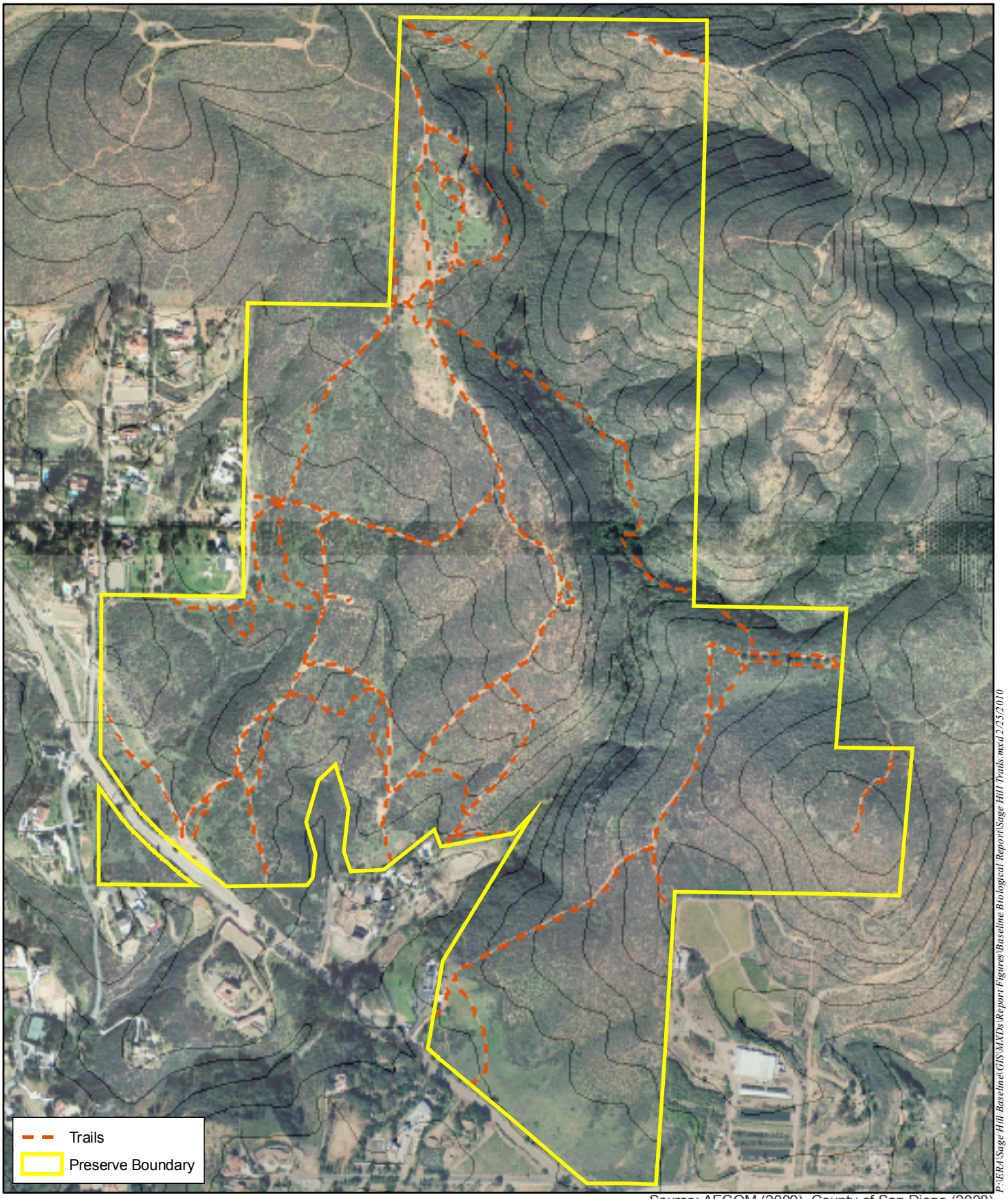
1 inch = 2,000 feet

0 500 1,000 2,000 Feet

Sage Hill Preserve Fire History

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Figure 5



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Source: AECOM (2009), County of San Diego (2008)

1 inch = 600 feet

0 150 300 600 Feet

Existing Trails Within the Sage Hill Preserve

AECOM

Figure 6

3.0 Methods

AECOM biologists surveyed the Preserve for 34 days, surveying vegetation communities, plants, invertebrates, amphibians, reptiles, and mammals (Figure 7).

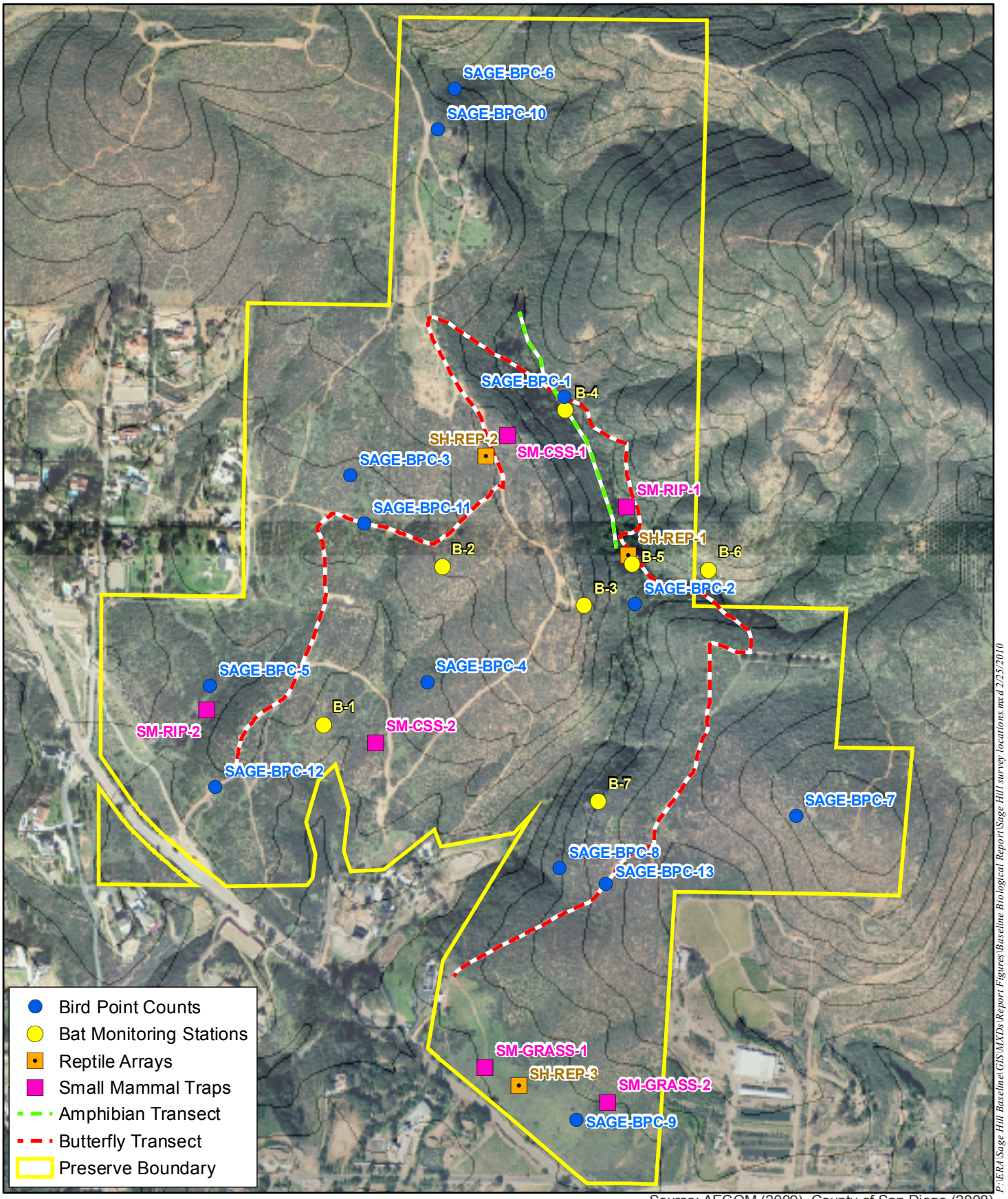
3.1 Vegetation Communities and Habitats

The purpose of these surveys was to map the vegetation of the Preserve into communities in accordance with the Holland Code (Holland, 1986) as modified by Oberbauer and others (County of San Diego 2008, Oberbauer 2005, Oberbauer et al. 2008). All existing un-official trails were also included on the map.

Prior to field work, aerial imagery of the site was obtained from ESRI as a collection of 2008 images, and combined in a mosaic with one foot resolution. Using this imagery, the preliminary vegetation polygons were delineated based on visual differences in vegetation cover and signature. The minimum mapping unit was 0.5 acres. The map was created in ArcGIS 9.2 and was taken into the field.

AECOM biologists visited the Preserve for two days (May 7 and 8, 2009) to determine the composition of the vegetation polygons, and to adjust the boundaries as needed. Following an abbreviated version of the California Native Plant Society (CNPS) rapid assessment protocol (CNPS 2007), each polygon was first assessed to determine if the vegetation was sufficiently homogenous to be considered a single vegetation type. If not, areas that were different were separated into their own polygons. Conversely, adjacent polygons that had the same type of vegetation were merged. Within each polygon, the dominant and common species were determined, and cover was estimated into cover classes by visual assessment (CNPS 2007). Special features, such as rock outcroppings and ponds, were mapped in the field at a 0.1 acre minimum mapping unit. Unknown plant species were collected as needed in a minimally destructive way following California Department of Fish and Game collecting guidelines (CDFG 2000), and identified to species in the office.

Using the field data, the vegetation of each polygon was classified using the Holland Code (1986) as modified by Oberbauer (2005) and the County of San Diego (2008) and existing un-official roads and trails were mapped as disturbed habitat. Data for each polygon will be submitted to DPR. The area of each vegetation community on the Preserve was determined through simple addition of polygon areas. Additionally, the cover for each species in each vegetation type was estimated across the entire area of each vegetation type, using an algorithm (Appendix A).



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Source: AECOM (2009), County of San Diego (2008)

1 inch = 600 feet

0 150 300 600 Feet

Sage Hill Preserve Survey Locations

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Figure 7

3.2 Plants

3.2.1 Floristics Surveys

Sensitive Plant Surveys

The purpose of this work was to discover, describe, and map the sensitive plant species of the Preserve. This effort was performed concurrently with vegetation mapping and with invasive plant surveys.

For purposes of this report, a plant species is considered sensitive if it is: (1) listed or proposed for listing as threatened or endangered by state or federal agencies; (2) in the California Native Plant Society's California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2009), on one of five lists: 1A (presumed extinct in California), 1B (considered endangered throughout its range), 2 (considered endangered in California but more common elsewhere) of the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2009); 3 (more information about the plant's distribution and rarity needed) or 4 (plants of limited distribution) (CNPS 2009); (3) considered rare, endangered, or threatened by the State of California (California Department of Fish and Game 2009a); or (4) included on one of San Diego County's four Sensitive Plant lists: A, B, C, or D, which largely follow the definitions for CNPS lists 1b-4 above.

Prior to conducting the field survey, sensitive plant species that would potentially be present on the Preserve and surrounding areas were identified using the California Natural Diversity Data Base (CNDDB) (CDFG 2009), and the Inventory of Rare and Endangered Plants on the CNPS website (CNPS 2009). A CNDDB database search was conducted, encompassing a 10-mile radius around the Preserve and a nine-quadrangle search was conducted in the CNPS database around the U.S. Geological Survey quadrangle in which the Preserve is located. Additionally, the County of San Diego Sensitive Plant List was consulted (County of San Diego, 2009)

AECOM biologists visited the Preserve on May 7 and 8, 2009, and again on June 17 and 18, 2009. These efforts focused on locating and mapping sensitive plant species, and compiling a floral inventory of the Preserve. Isolated individuals and clumps of sensitive species were mapped using Trimble® GeoXH™ handheld GPS unit with sub-meter accuracy (Trimble Inc. Sunnyvale, CA). The distribution of sensitive plants that were dominants or subdominants in the vegetation was mapped into polygons as part of the vegetation mapping effort. Unknown plant species were collected as needed in a minimally destructive way following California Department of Fish and Game collecting guidelines, (CDFG 2000). These were identified to species in the office.

Plants were identified to the species level from photographs and specimens and a floral inventory was compiled (Appendix A). Nomenclature follows Calflora (2009) and identification was conducted using the *Jepson Manual* (Hickman, 1993) supplemented by Lightner (2006), and Calflora (2009). Family names follow the current Angiosperm Phylogen Group II system for flowering plants, as systematics has advanced substantially since the *Jepson Manual's* publication in 1993 (Stevens 2009). Appendix B provides a list of all species encountered and includes references to the families found in the *Jepson Manual* (Hickman, 1993) where changes have occurred.

Sensitive plant species were found as scattered individuals, in patches, and as dominants of the southern maritime chaparral. Scattered individuals and patches were mapped as points using a GPS. The vegetation dominated by a sensitive species (*Ceanothus verrucosus*) was mapped at a 0.5 acre scale, following the vegetation mapping protocol (see Section 3.1).

Invasive Plant Species

The purpose of this survey was to map the invasive, non-native plant species located on the Preserve. This effort was performed concurrently with vegetation mapping and with sensitive plant surveys.

Non-native species vary in their invasive potential (CAL-IPC 2006), and also in their range at the Preserve. Forty-two non-native species were detected during the surveys, including at least 32 that have some invasive potential according to the California Invasive Plant Council (CAL-IPC). As can be seen on the vegetation map, 16.7 percent of the Preserve is dominated by non-native plant species.

Because of these complexities, determining the mapping strategy was a major part of the work. It had to accurately portray the non-native invasive plants on the site, in a way that showed both widespread and rare species, and emphasized the species that can be readily controlled. Invasive species were mapped on two scales. Where they were rare or localized, their location is mapped as points, as described below. Where they are widely spread in the vegetation, the polygons in which they occur are described, with a minimum mapping unit of 0.1 acres.

AECOM biologists visited the Preserve on May 7 and 8, 2009 to map the distribution of non-native plant species as part of the vegetation mapping effort (Section 3.1.1). In every polygon mapped, the most common non-native species were noted, even if they were a negligible part of the vegetation. Moreover, the overall distribution of non-natives within the vegetation was described for each polygon. Finally, isolated individuals and clumps of invasive non-natives were mapped using a handheld GPS unit with sub-meter accuracy (Trimble Inc. Sunnyvale, CA). Unknown plant species were collected as needed in a minimally destructive way following California Department of Fish and Game collecting guidelines (CDFG 2000). These were identified to species in the office.

Plants were identified to the species level from photographs and specimens and a floral inventory was compiled (Appendix B). Nomenclature follows Calflora (2009) and identification was conducted using the Jepson Manual (Hickman, 1993) supplemented by Walker et al (2003), Lightner (2006), and Calflora (2009).

To determine the legal status and characteristics of each non-native species, three sources were consulted: the United States Department of Agriculture (USDA) Federal Noxious Weed List (USDA 2006); the California Department of Food and Agriculture's (CDFA) ratings of noxious weed species (CDFA 2003); and CAL-IPC (CAL-IPC 2006). Data from these sources were compiled and used to determine the mapping process. Invasive plants were identified as those that appeared on noxious weed lists and those that had high ratings from CAL-IPC (Appendix C). Additionally, non-native plants that were found to be reproducing on the Preserve are identified as invasive, even if they are not considered invasive by the above resources.

The invasive, non-native plant information is shown in two parts, two maps and an associated table. The first map shows the vegetation mapping polygons, as an adjunct to the table. The table shows data for each species, along with the habitats and polygons in which it was found.

The second map shows locations of the "top ten" invasive species, which are discussed in the text.

3.3 Wildlife

3.3.1 Invertebrates

AECOM evaluated the Preserve for its potential to support the federally endangered and North County MSCP covered Quino checkerspot butterfly species (*Euphydryas editha quino*) and Hermes copper butterfly (*Lycaena hermes*), a federal species of special concern. A general butterfly survey was also performed on the Preserve and documentation of butterfly species that were found incidentally during other surveys. Protocol surveys were not performed for Quino checkerspot butterfly. There was no previous record of either species from the Preserve. The closest Quino checkerspot location is 27 miles from the Preserve in Jamul, and the closest known Hermes copper location is in La Mesa, approximately 18 miles from the Preserve. In both cases, this distance is far beyond the known dispersal distance for these two species.

AECOM conducted a preliminary site reconnaissance visit on March 6, 2009 and a designated butterfly survey on June 19, 2009. During the reconnaissance, all species (animals, plants, butterflies, etc.) seen were recorded The designated butterfly survey had to be conducted when air temperatures were between 70^{o}F and 90^{o}F, when wind were speeds less than 7 mph, and skies were clear to partially cloudy, ideally in May or early June. However May and early June were unseasonably cool with high cloud cover, and June 19 was the first day that met survey conditions. During May and early June, informal butterfly observations were recorded during bird surveys.

The June 19 survey was conducted between 11:00 a.m. and 1:35 p.m. along a transect which included all major habitats onsite including coastal sage scrub, chaparral, oak wood and freshwater marsh (Figure 7). Temperatures ranged from 70^{o}F to 75^{o}F. The sky was clear to 10 percent cloud cover, and wind speeds averaged between 1 to 3 miles per hour. Weather conditions were not recorded during the March 6, 2009 site reconnaissance visit. In addition, potential hill topping locations were visited as well. Additional time was spent in areas of high butterfly diversity and nectar resources. All species of butterfly were counted, recorded, and mapped to document the habitat where the observation occurred. All scientific names follow Heath (2004).

The Preserve was also generally evaluated for potentially suitable habitat for the Quino checkerspot butterfly and Hermes Copper. Primarily, this involved searching for suitable food plants during reconnaissance and plant surveys. Quino checkerspot larvae eat a variety of plants, primarily dot-seed plantain (*Plantago erecta*). Female quino checkerspot butterflies have also been observed depositing eggs on woolly plantain (*Plantago patagonia*), white snapdragon (*Antirrhinum coulterianum*), and thread-leaved bird's beak (*Cordylanthus rigidus*) (USFWS 2002). It is possible that members of the figwort group, including purple owl's clover (*Castilleja exserta*), are also used (Mattoni et al. 1997). Hermes copper larvae feed exclusively on spiny redberry (*Rhamnus crocea*), and the adults feed on nectar from California buckwheat (*Eriogonum fasciculatum*).

3.3.2 Herpetofauna

Amphibians

AECOM sampled amphibians on the Preserve in two ways. First, two AECOM biologists (Ms. Julie Hickman and Mr. Russ Smith), surveyed the Preserve on the evenings of June 4, 2009 and June 24, 2009, between 8:00 pm and 10:30 pm (Table 2). The observers followed a set route (Figure 7), and wore headlamps, to aid in spotting species. Amphibian species were identified both visually and through call identification. Additionally, curators at the three major California museums (San Diego Natural History Museum, Los Angeles Natural History Museum, and California Academy of Science) were contacted to determine whether they had specimens from the San Marcos area, as these species have the potential to occur within the Preserve.

Reptiles

AECOM sampled reptiles using a three-pronged approach. First, three pitfall trap arrays were installed in the area. Second, the Preserve was searched along a major trail through all vegetation types, to look for reptiles and reptiles were noted when found on other surveys. Finally, curators at the three major California Museums (San Diego Natural History Museum, Los Angeles Natural History Museum, and California Academy of Science) were contacted to determine what species had been collected in the San Marcos region. Reptile field surveys were scheduled between April and June, based on information from a 16 year-long census of snakes in San Diego County (1997).

Trap arrays based on a standard USGS design (Fisher et al., 2008) were used to trap and sample reptiles in three vegetation types (non-native grassland, oak woodland and coastal sage scrub) on the Preserve. The arrays were used because it has the least amount of observer bias and generally yield substantial data on the diversity or relative abundance in the trap area. Each array consisted of three 15-meter long drift fences joined into a “Y” shape. Seven traps were installed in each area. A pitfall trap was placed at the center of each arm, a snake funnel trap was installed at the end of each arm of the Y, and a pitfall trap was placed at the junction of the three fences. The pitfall traps consisted of 5-gallon plastic buckets buried up to the lip in the ground, with a cover suspended over the top of the trap to shade any animals trapped. The drift fence directed animals into the bucket. The snake funnel traps consisted of wire mesh with a small opening that directed animals into the funnel. The opening was small enough that once inside, animals could not relocate the opening and escape. Each funnel trap was shaded to prevent exposure to sunlight and/or precipitation.

Three trap arrays were installed: one in the riparian area (SH-REP 1, Figure 7), one in the coastal sage scrub (SH-REP-2, Figure 7), and one in the grassland (SH-REP-3, Figure 7). Traps were opened and sampled on four consecutive days. AECOM biologists (Ms. Julie Hickman, Ms. Kristen Turner, and Mr. Russ Smith) conducted the surveys from June 29, 2009 through July 2, 2009 and from July 13, 2009 through July 16, 2009 (Table 2). All animals caught in the traps were processed and released. The array number, trap number, species identification, age, sex and reproductive status (if possible) were recorded for all captured animals. Weather data was collected at each trap array when the traps were opened and when the traps were checked.

Two biologists (Ms. Hickman and Mr. Smith) surveyed the Preserve trails concurrently with sampling the pitfall trap arrays, following the route established for the butterfly surveys that also

provided access to each of the reptile arrays (Figure 7). The surveyors walked the route, identifying species visually. The species found are noted below.

3.3.3 Birds

The bird point count survey methodology was designed to maximize the number of bird species detected within the Preserve by surveying the full range of habitats present onsite. This section describes the point counts and point placement as well as the general point count survey schedule, data collection methodologies, and results.

Each bird point is defined by a center location (point) and an associated 50-meter radial circle around that point (Figure 8). For simplicity, the entire circular area is referred to as the point in this report. Points were placed so that there was a distance of at least 200 meters between points in order to maintain spatial independence thus avoiding double counting. In addition, the center of the point was located at least 50 meters away from the edge of the Preserve boundary so that the entire point count survey area was located completely within the Preserve.

Following the vegetation survey described in Section 3.1, points were placed in an attempt to survey the full range of habitat types. The number of survey points per habitat type is proportional to the percent cover of each habitat type while maintaining a geographical distribution throughout the Preserve (Figure 7). A total of 13 bird points were established, of which nine were surveyed diurnally and seven were surveyed nocturnally; three points were surveyed both nocturnally and diurnally. Diurnal surveys were conducted May 28, June 17, and July 8, 2009. Nocturnal surveys were conducted on June 10, 2009, June 25, 2009, and July 20, 2009. Most points were placed adjacent to trails but were kept far enough away to maximize vegetation coverage within the survey area. Nocturnal points, however, were placed directly on trails due to the difficulty of maneuvering at night through the dense vegetation and steep terrain found in the Preserve. In order to make comparisons, the four points identified exclusively for nocturnal surveys are in close proximity to a diurnal counterpart. They were simply moved to the closest trail while maintaining spatial independence from adjacent nocturnal points.

Diurnal surveys were conducted within the 50-meter radial point using the area search methodology. This methodology involves a 10-minute point count survey, during which the surveyors were allowed to move freely throughout the point to investigate sightings or calls, and to record all bird species seen and/or heard within the point. At the beginning and end of each bird point count survey, surveyors collected site condition data, which included the time, temperature, wind speed, percent cloud cover, and precipitation. In addition, surveyors recorded the date, point identification, surveyor names, and any changes to vegetation communities since the previous visit. Time, temperature, wind, and precipitation restrictions were established to ensure that surveys were conducted under appropriate survey conditions. Diurnal point count surveys were conducted between sunrise and 12:00 pm and nocturnal surveys were started after sunset. Temperatures were at least 45 degrees Fahrenheit but not greater than 95 degrees Fahrenheit, with winds less than 15 miles per hour. No surveys were permitted to begin outside of these survey constraints or when there was precipitation, and surveys were to be discontinued if weather conditions became unsuitable during surveys. For each observation of a bird within the point, surveyors recorded the species name, the number of individuals observed, and the vegetation polygon it occupied at the time of detection. Bird species identified outside the point count locations were considered incidental observations and were recorded as points in a separate database used to supplement the species list for the Preserve.

Figure 8. Standard Bird Point Count Survey Area and Spacing

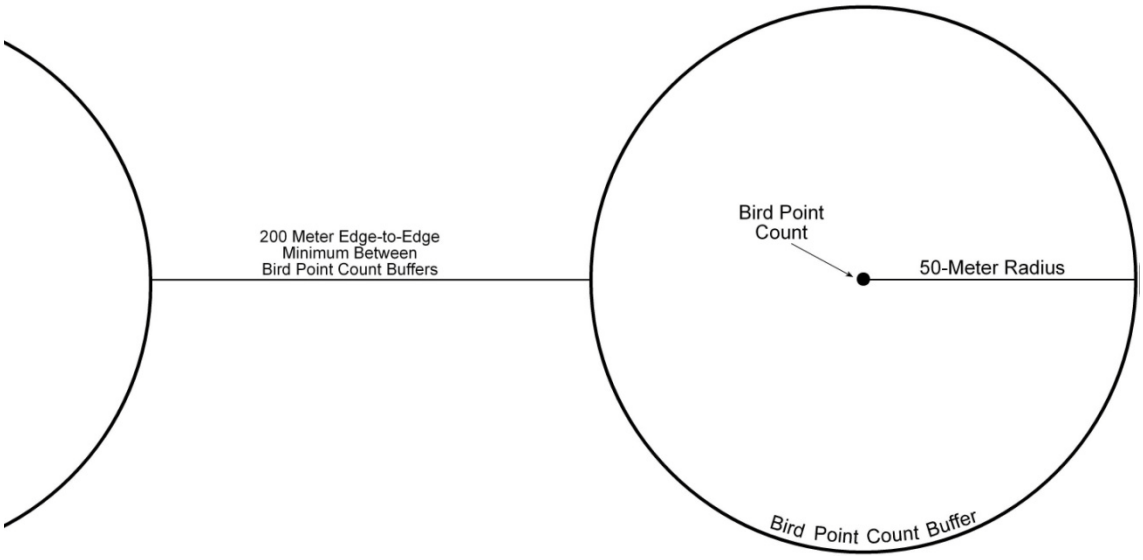


Table 2
Bird Survey Conditions

Date	Time	Temperature	Wind Speed	Cloud Cover	Survey Type
5/28/2009	6:14AM – 10:24AM	60-65°F	0-5 mph	80-100%	Diurnal
6/10/2009	8:02PM – 10:00PM	61-66°F	1-3 mph	80-100%	Nocturnal
6/17/2009	6:03AM – 9:56AM	67-72 °F	0-5 mph	80-100%	Diurnal
6/25/2009	8:32PM – 10:10PM	63-67°F	0-5 mph	80-100%	Nocturnal
7/8/2009	6:16AM – 10:21AM	64-77°F	0-5 mph	0-100%	Diurnal
7/20/2009	8:20PM – 9:48PM	73-75°F	0-3 mph	0-20%	Nocturnal

Nocturnal surveys followed the same general protocol as the diurnal survey methodology however each survey lasted for only five minutes and a spot light was used to detect and identify potential species.

3.3.4 Mammals

Small Mammal Trapping

Small mammal surveys were conducted using Sherman Traps. The traps were placed in three arrays, each in a different vegetation type (coastal sage scrub, non-native grassland, and oak riparian forest), to obtain a representative sample of the small mammals in the Preserve (Figure 7).

Each trap array consisted of fifty traps placed in a 5 X 10 trap grid, with 10 meter spacing between traps. Traps were opened and baited with rolled oats each evening and checked at first light each morning. The traps were opened during the evening to target nocturnal animals and to prevent animal mortality during the high summer temperatures. Grid number, species identification, age, sex, and reproductive status were recorded for all captured animals. Each animal was marked with a temporary red stripe to determine recapture rates. Weather conditions were recorded at the time of trap opening and trap check.

Two rounds of surveys were conducted by AECOM biologists (Ms. Julie Hickman and Ms. Kristen Turner) and a permitted surveyor (Mr. Art Davenport), who was the primary animal handler for all traps. The first round of sampling included June 29, 2009 through July 2, 2009; the second round included July 13, 2009 through July 16, 2009. In each survey round, all three trap arrays were sampled nightly.

Medium and Large Mammals

Surveys for medium and large mammals were conducted in conjunction with other surveys that were conducted between February and October. Track and other animal sign were recorded, in addition to direct species observations. Mammal cameras were not installed because other expensive equipment had already been stolen during the course of bat surveys.

3.3.5 Bats

Surveys for bats on the Preserve were conducted by Dr. Matt Rahn (Rahn Conservation Consulting, Inc). The surveys focused on foraging and roosting bats, using a combination of passive monitoring using AnaBat® systems and walking surveys. Initial property surveys, habitat assessments, and field reconnaissance occurred on June 11, 2009.

AnaBat® passive monitoring systems were temporarily installed in seven locations (Table 3). Five systems were installed in areas adjacent to areas of high bat activity that were identified during the field reconnaissance, and two systems were installed at potential roosting habitat locations along rocky slopes and cliff faces. The systems were hidden within the surrounding vegetation, with only a small portion of the microphone visible. The systems passively recorded the echolocation calls of bats within the vicinity of the microphone every night for seven consecutive nights over two rounds of surveys (June 19-25, 2009; August 20-26, 2009).

Table 3
Location of Short-Term Bat Monitoring Stations

Site	Latitude	Longitude	Elevation	Habitat Type
1	33° 05’ 09.92”	-117° 10’ 58.86”	190m	Coastal Sage Scrub
2	33° 05’ 17.08”	-117° 10’ 52.59”	220m	Coastal Sage Scrub
3	33° 05’ 15.39”	-117° 10’ 45.00”	227m	Cliff Roost
4	33° 05’ 24.17”	-117° 10’ 46.10”	216m	Marsh
5	33° 05’ 17.30”	-117° 10’ 42.48”	208m	Oak Woodland/Riparian
6	33° 05’ 17.02”	-117° 10’ 38.36”	231m	Coastal Sage Scrub
7	33° 05’ 06.59”	-117° 10’ 44.14”	222m	Cliff Roost

In addition, walking surveys were conducted on June 19 and August 20, 2009, in areas of high quality foraging habitat along the drainage surrounded by southern coast live oak riparian forest. Surveys began at the start of the route adjacent to Elfin Forest Road. Each circuit of the entire survey location took approximately 45 minutes and was conducted three times each evening, beginning at dusk, with approximately 1.5 hours between each survey circuit. Walking surveys identified areas of significant bat activity, species present, and potential roost use. A mobile AnaBat® detector was used, paired with a pocket-PC, to visually confirm the calls in the field. A thermal imaging camera was also used to survey areas of significant bat activity and potential roost sites, to estimate relative abundance.

4.0 Results and Discussion

AECOM biologists surveyed the Preserve for 34 days, surveying vegetation communities, plants, invertebrates, amphibians, reptiles, and mammals (Figure 7). The time and personnel dedicated to each survey are listed below (Table 4).

Table 4
Summary of Survey Efforts

Date	Personnel	Survey(s) performed
March 6, 2009	Mr. Tito Marchant, Ms. Julie Simonsen-Marchant, Dr. Frank Landis, Mr. Michael Perretti, Mr. Jason Erlich	Initial reconnaissance
May 7-8, 2009	Dr. Frank Landis, Mr. Robert Hobbs	Vegetation, sensitive plants, invasive plants
May 28, 2009	Mr. Patrick Del Pizzo, Ms. Julie Simonsen-Marchant	Diurnal birds, Large mammals
June 4, 2009	Ms. Julie Hickman, Mr. Russ Smith	Amphibians,
June 10, 2009	Mr. Patrick Del Pizzo, Ms. Joelle Fournier	Nocturnal birds
June 17, 2009	Mr. Patrick Del Pizzo	Diurnal birds
June 17-18, 2009	Dr. Frank Landis	Vegetation, sensitive plants, invasive plants
June 19, 2009	Ms. Julie Simonsen-Marchant	Invertebrates, Large mammals
June 19-25, 2009	Dr. Matthew Rahn	Bats
June 24, 2009	Ms. Julie Hickman, Mr. Russ Smith	Amphibians, Large mammals
June 25, 2009	Mr. Patrick Del Pizzo, Mr. Clayton Kraft	Nocturnal Birds
June 29-July 2, 2009	Ms. Julie Hickman, Mr. Russ Smith, Mr. Art Davenport	Reptiles, small mammals
July 8, 2009	Mr. Patrick Del Pizzo	Diurnal Birds
July 13-16, 2009	Ms. Kristen Turner, Mr. Russ Smith, Mr. Art Davenport	Reptiles, small mammals
July 20, 2009	Mr. Clayton Kraft, Ms. Joelle Fournier	Nocturnal Birds
August 20-26, 2009	Dr. Matthew Rahn	Bats

4.1 Vegetation Communities/Habitat

The vegetation on the Preserve is dominated by two vegetation communities: Diegan coastal sage scrub, and southern maritime chaparral (Table 5). The remainder is composed of six other vegetation types, including freshwater marsh, coastal sage-chaparral scrub, and southern coast live oak riparian forest. Non-native species dominate non-native grassland, which occurs primarily as fuel modification zones along the outer edges of the Preserve, disturbed habitat, which includes the existing dirt roads and trails and an old agricultural area, and a tamarisk thicket ("tamarisk scrub") (Table 5). Each vegetation type is mapped (Figure 9) and described below.

Table 5
Vegetation Types and Overall Acreage

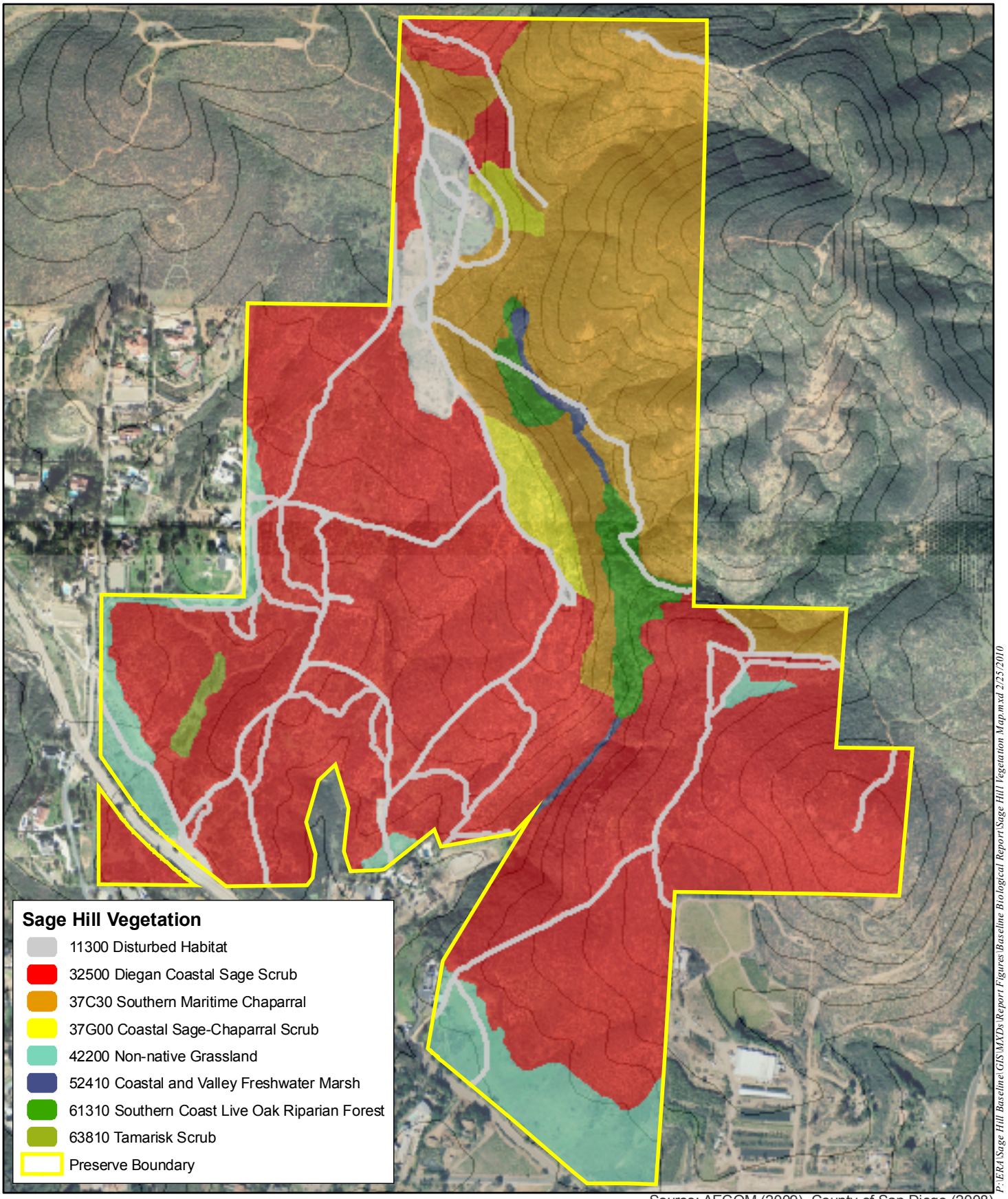
Vegetation Type	Holland Code	Acres
Diegan Coastal Sage Scrub	32500	138.5
Southern Maritime Chaparral	37C30	53.6
Coastal sage-Chaparral Scrub	37G00	4.6
Coastal and Valley Freshwater Marsh	52410	1.2
Southern Coast Live Oak Riparian Forest	61310	5.5
Non-Native grassland	42200	14.7
Disturbed Habitat	11300	12.6
Tamarisk Scrub	63810	0.9
Total		231.5

Diegan Coastal Sage Scrub (Holland Code 32500)

Diegan coastal sage scrub is a vegetation type dominated by native drought-deciduous shrubs that are most physiologically active in the early spring (Holland 1986). The approximately 138.5 acres of coastal sage scrub in the Preserve occurs through the middle of the Preserve, running from the northwest to southeast edge (Table 5, Figure 9). This vegetation type is mostly dominated by black sage (*Salvia mellifera*), which comprises 25 to 50 percent of the vegetative cover (Appendix A). Other common native shrubs include coastal sagebrush (*Artemisia californica*), which dominates the 2.5 acre patch of coastal sage scrub upslope from the dirt parking area, and laurel sumac (*Malosma laurina*), California buckwheat (*Eriogonum fasciculatum*), and wart-stemmed ceanothus (*Ceanothus verrucosus*) (Appendix A). Non-native grasses, most commonly red brome (*Bromus madritensis* ssp. *rubens*), occur at low density in gaps in the coastal sage scrub. This is also the most diverse vegetation type on the Preserve, with over 38 plant species (Appendix A).

Southern Maritime Chaparral (Holland Code 37C30)

Southern maritime chaparral is considered a “sensitive habitat land” under the County of San Diego’s Resource Protection Ordinance (County of San Diego, 2008). This vegetation type is restricted to the coastal areas of San Diego County, and is dominated by woody sclerophyllous shrubs. The approximately 53.6 acres of southern maritime chaparral found within the Preserve occurs in the northeastern portion of the Preserve (Figure 9). This vegetation is dominated overwhelmingly by uniform, probably even-aged stands of wart-stemmed ceanothus (Appendix A). Black sage is common in gaps in the ceanothus. A number of other shrubs are present as scattered individuals, including Torrey scrub oak (*Quercus* X *acutidens*), coastal sagebrush, laurel sumac, California buckwheat, coast live oak (*Quercus agrifolia*), spiny redberry (*Rhamnus crocea*), and chamise (*Adenostoma fasciculatum*) (Appendix A). The special-status summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*) also occurs in this habitat. Non-native grasses, including red brome and soft brome (*Bromus hordeaceus*), occur along trails through this vegetation type. Over 24 plant species were detected in this vegetation community (Appendix A).



P:\ERA\Sage Hill Baseline GIS\MXDs Report Figures\Baseline Biological Report\Sage Hill Vegetation Map.mxd 2/25/2010

Source: AECOM (2009), County of San Diego (2008)

1 inch = 600 feet

0 150 300 600 Feet

Sage Hill Preserve Vegetation Map

AECOM

Figure 9

Coastal Sage-Chaparral Scrub (Holland Code 37G00)

On the border between the Diegan sage scrub and the southern maritime chaparral are a few vegetation patches where wart-stemmed ceanothus has invaded the coastal sage scrub, resulting in approximately 4.5 acres of coastal sage-chaparral scrub (Table 5). Black sage dominates this vegetation, forming 25 to 50 percent of the vegetative cover (Appendix A). Wart-stemmed ceanothus forms roughly one-third of the cover, and other common species include coastal sagebrush and laurel sumac. Red brome occurs at low density in open areas and along paths. Six other plant species were seen as scattered individuals and patches in this vegetation community (Appendix A).

Coastal and Valley Freshwater Marsh (Holland Code 52410)

Small freshwater wetlands occur along parts of the creek and pond in the center of the Preserve, along the un-named creek between the oak stands, and along the stream south of the oaks, for roughly 1.23 acres in total (Table 5, Figure 9). As the wetland is dominated by herbaceous plants, it is categorized as a marsh. The dominant species is San Diego sedge (*Carex spissa*), which comprises 25 to 50 percent the vegetative cover, with arroyo willow (*Salix lasiolepis*) as a subdominant at 15 to 25% cover, and a local dominant in patches (Appendix A). Other species include laurel sumac, water cress (*Rorippa nasturtium-aquaticum*), cattail (*Typha latifolia*), mule fat (*Baccharis salicifolia*), and common California bulrush (*Scirpus californicus*). The special-status Palmer's sagewort (*Artemisia palmeri*) also grows in this habitat. Curly dock (*Rumex crispus*) and spearmint (*Mentha spicata*) are the most common non-natives in this vegetation community, which contains six other plant species (Appendix A).

Southern Coast Live Oak Riparian Forest (Holland Code 61310)

Coast live oak trees dominate the area immediately west and upslope from the un-named creek and marsh, and also cover parts of the creek (Figure 9). Collectively, they form about 5.5 acres of southern coast live oak riparian forest (Table 5). Although the oaks are the structural dominant, they form 50 to 75 percent of the vegetative cover, and poison oak (*Toxicodendron diversilobum*) is more common in terms of cover because it dominates the understory and fills in gaps (Appendix A). Arroyo willows (*Salix lasiolepis*) are present as scattered individuals, as are a number of other shrubs, including wart-stemmed ceanothus, laurel sumac, toyon (*Heteromeles arbutifolia*), Mexican elderberry (*Sambucus mexicana*), lemonadeberry (*Rhus integrifolia*), honeysuckle (*Lonicera subspicata* var. *denudata*) and fuchsia-flowered gooseberry (*Ribes speciosum*). Over 19 plant species were found in this vegetation, including 15 native species. Non-natives include pampas grass (*Cortaderia selloana*), red brome, fennel (*Foeniculum vulgare*) and smilo grass (*Piptatherum miliaceum*) (Appendix A).

Non-Native Grassland (Holland Code 42200)

Open fields dominated by non-native grasses and herbs cover approximately 14.7 acres of the Preserve (Table 5). Primarily, they are fuel modification zones cleared adjacent to residences along the southern and western boundaries of the Preserve, with all plants growing at low density (Figure 9). There is a small area of grassland in the eastern extension of the Preserve, in an area modified by human activity (Figure 9). Non-native grasses such as red brome and wild oats (*Avena* spp.) are the dominant plant in most of the patches, but the largest patch is an open area dominated by filaree at low density (*Erodium cicutarium*) (Appendix A). These areas contain scattered coastal sage scrub species, the most common of which coastal sagebrush,

laurel sumac, and California buckwheat (Appendix A). The fields also contain native wildflowers, including fascicled tarplant (*Deinanda fasciculate*), San Diego morning glory (*Calystegia macrostegia*), California poppy (*Eschscholzia californica*), and blue-eyed grass (*Sisyrinchium bellum*) (Appendix A). A wide variety of non-native plants also occur as scattered individuals and as small patches (Appendix A).

Disturbed Habitat (Holland Code 11300)

There are two distinct types of disturbed habitat. First, on the northwest side of the Preserve, an area of approximately 12.6 acres was historically used for agriculture and horticulture (Figure 9). Currently, this disturbed area is dominated by non-native species, including stands of crown daisy (*Chrysanthemum coronarium*) that cover approximately one-third of the area, black mustard, and a stand of blue gum (*Eucalyptus globulus*) (Appendix A). A number of other non-natives are found in this area, including ornamentals such as agaves (*Agave americana*) and non-native pines. There are also some native species, including wart-stemmed ceanothus, toyon, and laurel sumac growing along the edge of this vegetation type (Appendix A). Second, existing roads and trails were mapped as disturbed habitat. These paths were largely bare ground, but were fringed by non-native annual grasses such as red brome, and a variety of mostly non-native annual species (Appendix A).

Tamarisk Scrub (Holland Code 63810)

A stand of tamarisk (*Tamarix ramosissima*) dominates the bottom of a drainage on the southwestern side of the Preserve (Figure 9). The area of approximately 0.9 acres has three zones, with the southern half covered by a dense stand of tamarisk, the middle by a substantially smaller stand of Italian thistle (*Carduus pycnocephalus*) and crown daisy, and northern portion by a small stand of arroyo willow (*Salix lasiolepis*) (Appendix A). Other non-native species occur as individuals and scattered clumps around the edges.

4.2 Plants

4.2.1 Sensitive Plant Species

Three sensitive species were found at the Preserve: summer holly, wart-stemmed ceanothus, and Palmer's sagewort (Figure 10). Summer holly and wart-stemmed ceanothus are both North County MSCP covered species.

Summer holly (*Comarostaphylis diversifolia ssp. diversifolia*)

CNPS list 1B; County of San Diego List A; North County MSCP Covered Species

Summer holly is a chaparral shrub that occurs along the coast in scattered pockets from San Diego up to Santa Barbara (Calflora 2009). A close relative of manzanitas (*Arctostaphylos*), summer holly has fleshy, animal dispersed fruits, and a woody lignotuber from which it can potentially regenerate if the top is destroyed by fire or frost. There is no evidence that its seeds germinate in response to fire (Keeley 1987). Like other obligate resprouters (plants that resprout after fire, but whose seeds are not germinated by fire), it probably needs long fire-free intervals (30-50 years) to successfully reproduce (Keeley and Davis 2007). In the Preserve, 11 individuals were found near the top of the mountain in the north eastern corner, and more are

located in the chaparral to the east of the Preserve boundary. All of the summer holly in the Preserve is 1 to 2 m tall, and they are growing in southern maritime chaparral. Individuals found are mapped as points in Figure 10.

Wart-stemmed ceanothus (*Ceanothus verrucosus*)

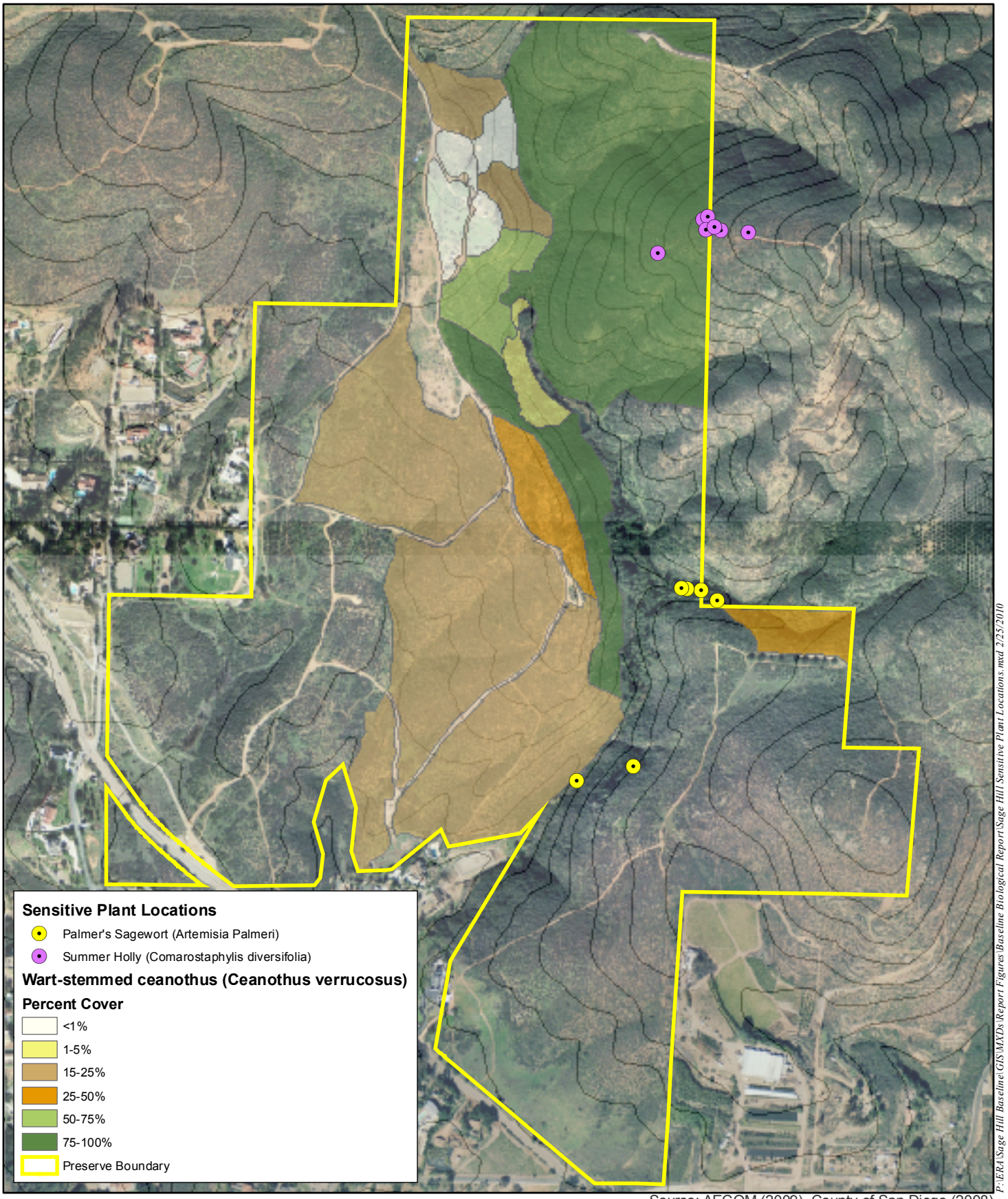
CNPS list 2; San Diego County List B; North County MSCP Covered Species

Wart-stemmed ceanothus grows to roughly 3 meters in height and is locally common within its limited range, which is San Diego County (west of Interstate15), northern Baja California, and Cedros Island, Baja California, at altitudes less than 1,000 feet (Fross and Wilken 2006, Lightner 2006). This ceanothus is an obligate resprouter, meaning that adults die during fires, and the next generation sprouts from seeds whose germination is stimulated by the fire (Fross and Wilken 2006, Keeley 1987). This species dominates the southern maritime chaparral in the Preserve. Additionally, it is a codominant in the coastal sage-chaparral scrub, and scattered individuals are found in the coastal sage scrub and even on the borders of the disturbed habitat. The distribution of this species is mapped in polygons in Figure 10.

Palmer's sagewort (*Artemisia palmeri*),

CNPS list 4; San Diego County List D

Palmer's sagewort is a biennial or perennial plant from a woody base that grows up to 3 meters tall (Hickman 1993, Lightner, 2006). This member of the sagebrush genus is confined to San Diego County and adjacent Baja California, and it is mostly found in coastal ravines, especially where there is fog drip or other moisture available. There are no data on Palmer's Sagewort response to fire, but if the plant responds like the related California sagebrush (*Artemisia californica*), a fraction of the plants may regrow after fire, and seeds will germinate, but fires at less than 10 year intervals would eliminate the plant (Hauser, 2006). In the Preserve, this species is found most commonly along the un-named creek south of the oak riparian forest, within roughly 20 feet of the water. It is also found on the rock face east of the stream, particularly at the bottom of the face and along the northern edge. Additional plants grow along the trail that runs uphill and east of the oak riparian forest. Its distribution within the Preserve is mapped as points in Figure 10.



P:\ERA\Sage Hill Baseline GIS\MXDs Report Figures\Baseline Biological Report\Sage Hill Sensitive Plant Locations.mxd 2/25/2010

Source: AECOM (2009), County of San Diego (2008)

1 inch = 600 feet

0 150 300 600 Feet

Sage Hill Preserve Sensitive Plant Locations

AECOM

Figure 10

4.2.2 Special-Status Plant Species with High Potential to Occur

A number of other sensitive species have high potential to be present on the Preserve based on habitat preference, elevations and/or soils. The list presetneted below is based on data from CNPS, CNDDB and the San Diego Natural History Museum Plant Atlas (Table 6).

Table 6
Sensitive Plant Species with a High Potential to Occur

Species		Status F/S/CNPS/ County/MSCP	Habitat
Common Name	**Scientific Name**		
Ashy spike-moss	*Selaginella cinerascens*	-/4.1/D	undisturbed coastal sage scrub
Southwestern spiny rush	*Juncus acutus* var. *leopoldii*	-/4.2/D	marshes, seeps and riparian areas
Catalina mariposa lily	*Calochortus catalinae*	-/4.2/D	coastal grasslands, cismontane woodland, coastal sage scrub, chaparral
Cooper's rein orchid	*Piperia cooperi*	-/4.2/D	chaparral, woodland, grassland, elev. 15-1585m
Encinitas baccharis	*Baccharis vanessae*	FT/CE /1B.1/A NCMSCP	coastal mixed chaparral, central coast & foothills
Graceful tarplant	*Holocarpha virgata* ssp. *elongata*	-/4.2/D	coastal mesas and foothills
San Diego marsh-elder	*Iva hayesiana*	-/2.2/B	south coastal arroyos and ravines
Golden-rayed pentachaeta	*Pentachaeta aurea*	-/4.2/D	woodlands, lower conifer forests, coastal sage scrub, grasslands
Rayless ragwort	*Senecio aphanactis*	-/2.2/B	coastal scrub, chaparral, woodlands, alkaline
Robinson pepper-grass	*Lepidium virginicum* var. *robinsonii*	-/1B.2/A	coastal sage scrub and grassy areas
Seaside calandrinia	*Calandrinia maritima*	-/4.2/D	coastal bluff scrub, coastal sage scrub, grassland, sandy areas

Federal and State Listing Status		
FE Federal Endangered FT Federal Threatened FSC Federal Species of Concern	CFP California Fully Protected Species CE California Endangered CT California Threatened	CSC California Species of Special Concern CR California Rare CSP California Specially Protected

Sensitive Plant (CNPS and County of San Diego)	CNPS	County
Considered rare, thereatened, or endangered in California and elsewhere.	1B	A
Considered rare, threatened, or endangered in CA, but more common elsewhere.	2	B
Plants which need more information.	3	C
Limited distribution-a watch list	4	D

NCMSCP North County MSCP Covered Species

4.2.3 Invasive Plant Species

Forty non-native species were identified on the Preserve (Figure 11, 12). Of these, four (onionweed, artichoke thistle, Italian thistle, and fountain grass) are defined as noxious weeds by either the United States Department of Agriculture (USDA) or California Department of Food and Agriculture (CDFA). Five other species (tamarisk, pampas grass, red brome, hottentot fig, and fennel) are rated as high by CAL-IPC. The other species are rated as moderate or limited, although they do substantially impact the Preserve in some cases (Appendix C).

Of the species listed, eleven deserve special mention:

- Onionweed (*Asphodelus fistulosus*) is a noxious weed on the CDFA quarantine list. This species also has a moderate ranking by Cal-IPC. It occurs in several patches in the disturbed area of former agriculture and on the edge of the adjacent chaparral (Figure 12). It also occurs as scattered individuals along trails in polygons. Finally, a few plants were discovered in small openings high on the mountain. These plants were uprooted, but more may be present. All patches are small and could be readily controlled.

- Artichoke thistle or cardoon (*Cynara cardunculus*) is a CDFA list B noxious weed. This species also has a moderate ranking by Cal-IPC. It occurs along the road in non-native grassland and could be readily controlled.

- Italian thistle (*Carduus pycnocephalus*) is a CDFA list C noxious weed. This species also has a moderate ranking by Cal-IPC. It occurs on the margin of the west side of the preserve, primarily in the tamarisk patch and the grassland upslope for a total of 0.19 acre onsite (Figure 12). Control of all the patches would be straightforward, although it might take some time to get the seed bank removed.

- Fountain grass (*Pennisetum setaceum*) is a CDFA quarantine and list C noxious weed. This species also has a moderate ranking by Cal-IPC. It occurs in patches along the road, in grasslands adjacent to the road, and on the edge of the disturbed areas for a total of 1.76 acres onsite (Figure 12). It can be controlled in all areas.

- Tamarisk (*Tamarix ramosissima*) is a high rated, highly invasive non-native (CAL-IPC 2006). It occurs in the southern half of polygon 60 and accounts for 0.34 acres (Figures 11 and 12). However, the tamarisk scrub patch does have a native arroyo willow stand on the north end, so removal of the tamarisk and other invasive non-natives would allow the arroyo willows to dominate the area. The patch is small enough that it could be cleared by a crew.

- Pampas grass (*Cortaderia selloana*) is a high rated, highly invasive non-native (CAL-IPC 2006). Several individuals occur around the oak trees and along the un-named creek, in a wet area in coastal sage scrub in the northwestern area of the Preserve, and in the disturbed areas (Figure 12). These individuals could be removed.

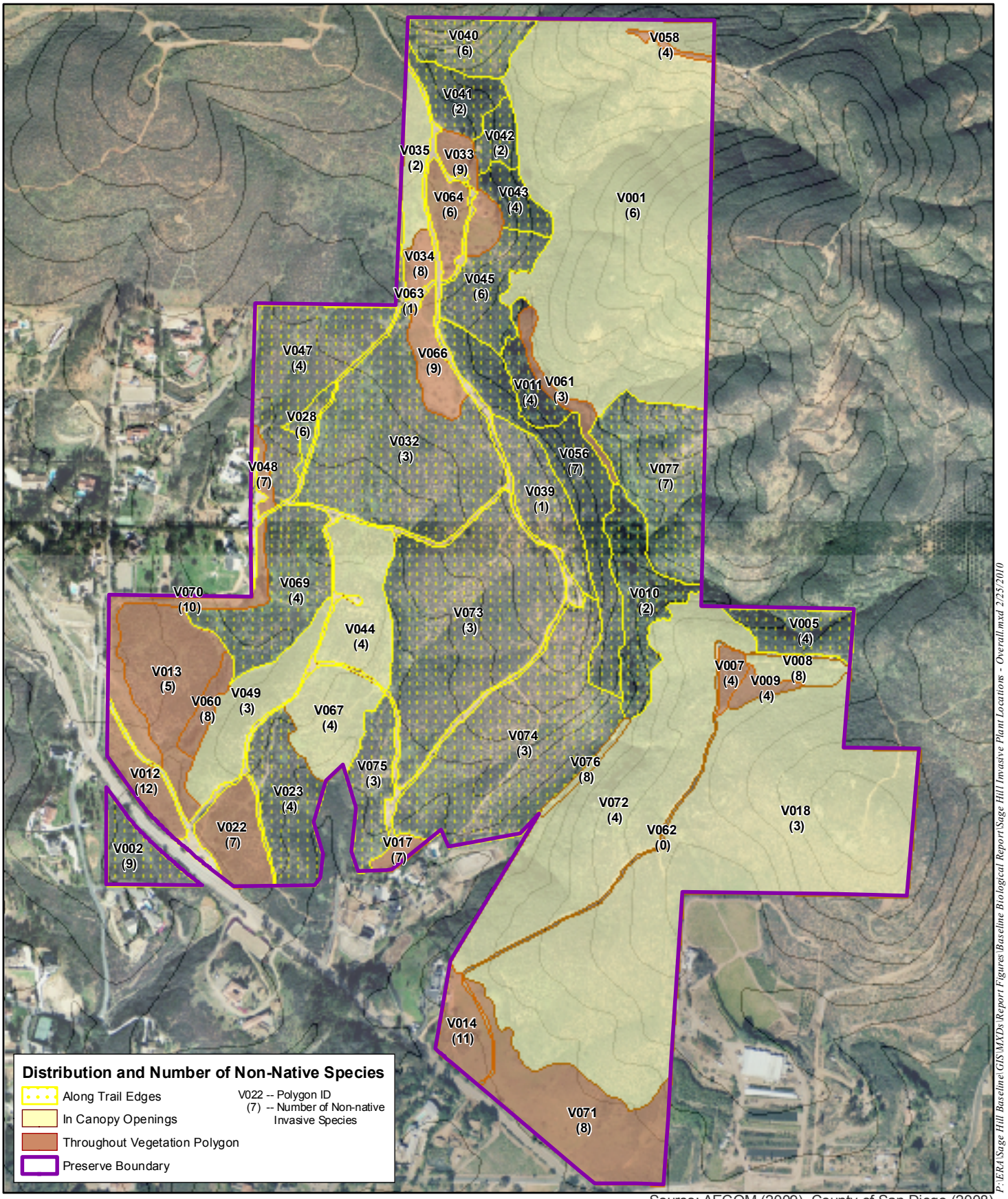
- Hottentot fig (*Carpobrotus edulis*) is a high rated invasive non-native (CAL-IPC 2006). Currently, there is one small patch on the Preserve near the private residence adjacent to the southern area of the Preserve (Figure 12). This patch could be readily removed.

- Mexican fan palm (*Washingtonia robusta*) is a moderate rated invasive non-native that is the subject of an alert by CAL-IPC (2006). There are two small individuals on the Preserve: one a seedling along Elfin Forest Road, the other a two meter tall sapling in the disturbed habitat at the north end of the Preserve previously used as a nursery (Figure 12). Both are recommended for removal to prevent the plants from establishing in the Preserve.

- Tree-of-Heaven (*Ailanthus altissima*) is a moderately rated invasive non-native (CAL-IPC 2006). Three individuals have been detected at the Preserve in the un-named creek watershed (Figure 12). Their removal would prevent an infestation from occurring.

- Crown daisy (*Chrysanthemum coronarium, Glebionis coronarium*) is a moderately rated invasive non-native (CAL-IPC 2006) that dominated patches of the Preserve and other areas of San Diego County. At the Preserve, it occurs in the tamarisk patch and dominates parts of the disturbed habitat in the area previous used as a nursery (Figure 11). Both infestations can be controlled or removed.

- Tasmanian blue gum (*Eucalyptus globulus*) is a moderately rated invasive non-native (CAL-IPC 2006) that occurs in polygons around the disturbed habitat in the area previous used as a nursery, in the non-native grasslands near Elfin Forest Road, and in coastal sage scrub near both areas for a total of approximately 0.29 acres (Figure 11).



Source: AECOM (2009), County of San Diego (2008)

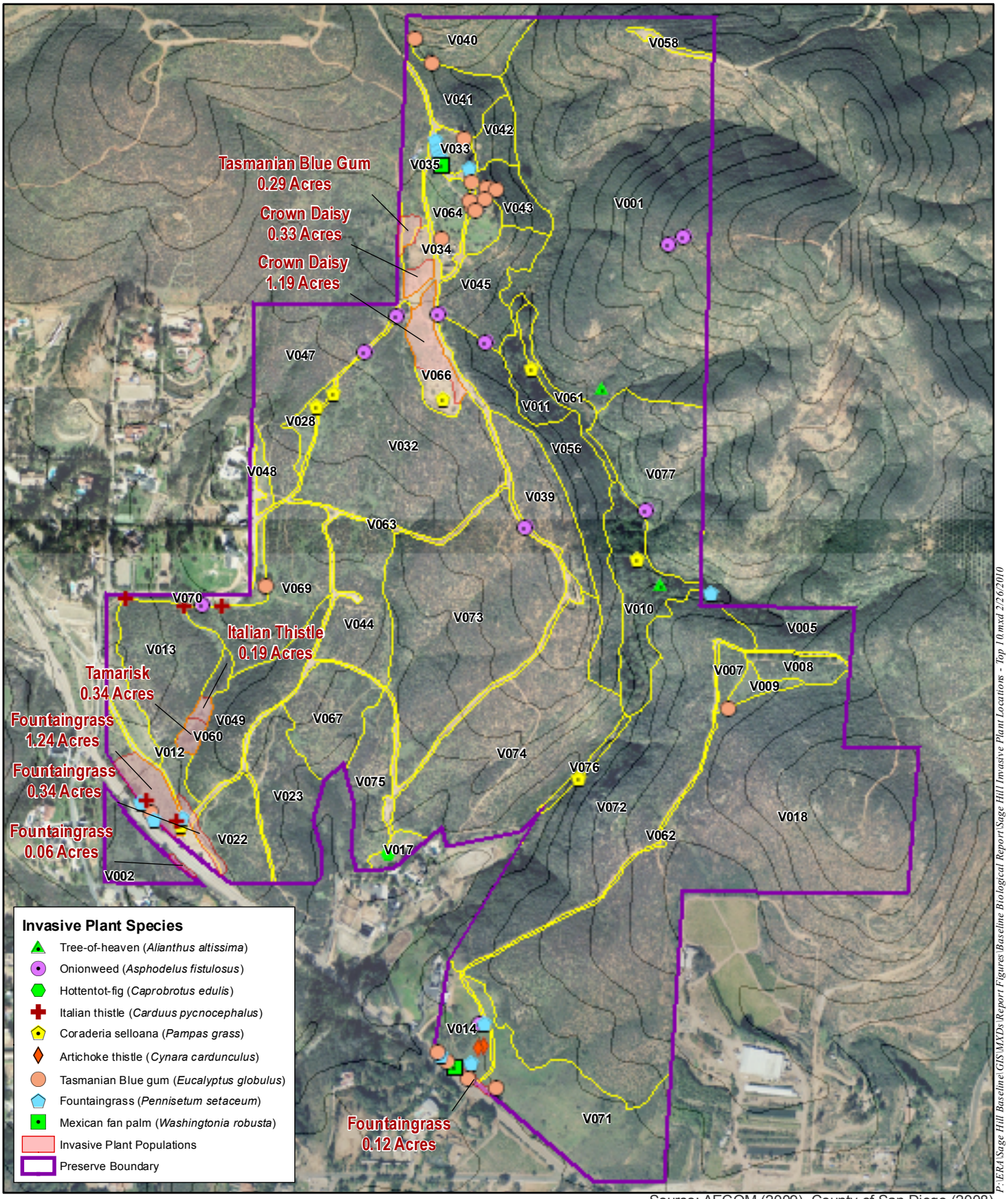
1 inch = 600 feet

0 150 300 600 Feet

Sage Hill Preserve Invasive Non-native Plant Species Locations

AECOM

Figure 11



P:\ERA\Sage Hill Baseline GIS\MXDs Report Figures\Baseline Biological Report\Sage Hill Invasive Plant Locations - Top 10.mxd 2/26/2010

Source: AECOM (2009), County of San Diego (2008)

1 inch = 600 feet

0 150 300 600 Feet

Sage Hill Preserve Target Invasive Non-native Plant Species Locations

AECOM

Figure 12

4.3 Wildlife

During the course of the biological surveys 93 wildlife species were observed, including 11 special status species of which six are North County MSCP-covered species. This section summarizes the wildlife survey results. The sensitive wildlife species observations are also included in Figure 13.

4.3.1 Invertebrates

Butterflies

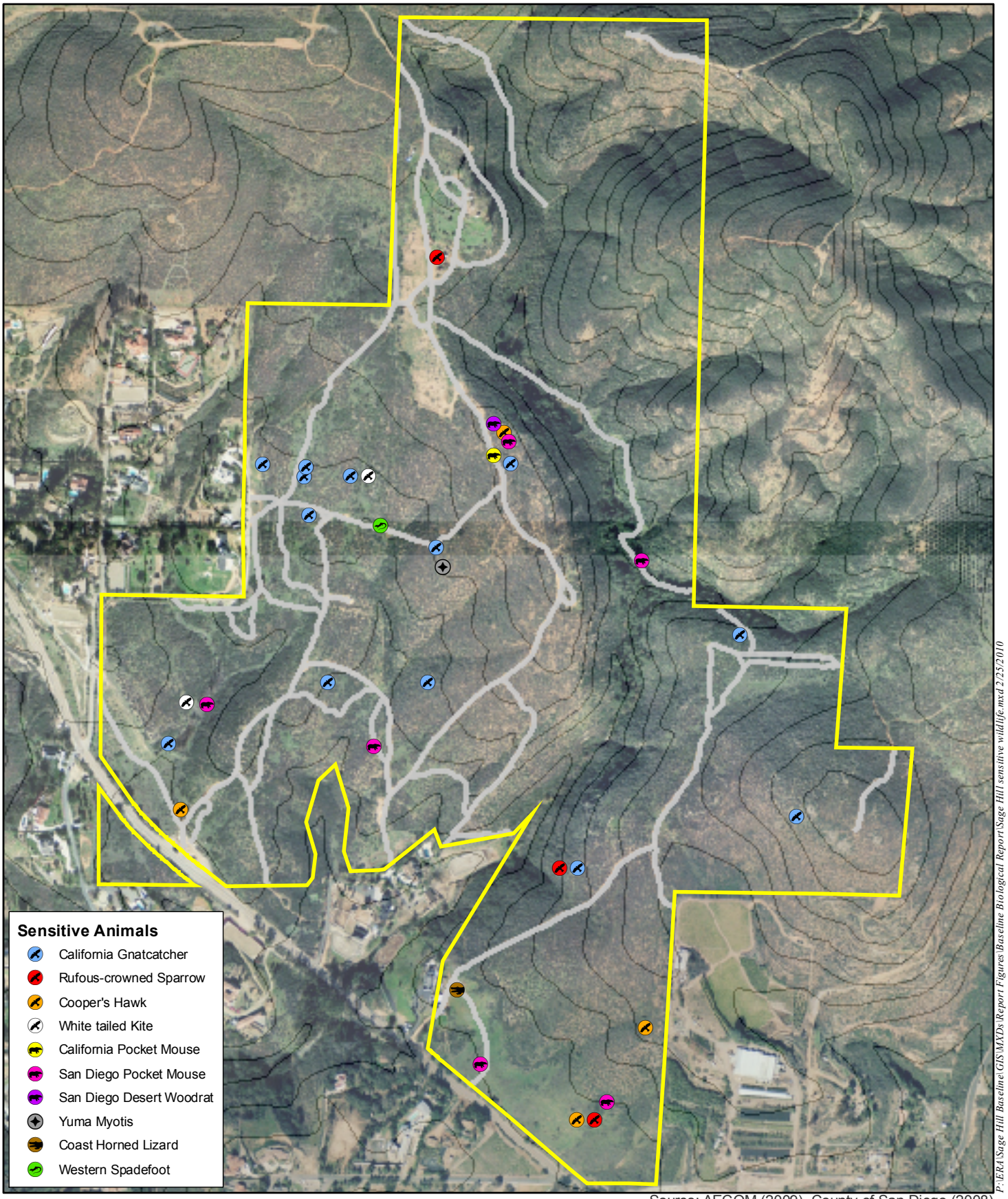
In total, 13 common butterfly species were recorded with a total of 40 individual observations (Table 7). Of these, eight species were observed during the reconnaissance visit, and eight species were observed during the butterfly survey (Table 7). During June the primary nectar source for butterflies was California buckwheat (*Eriogonum fasciculatum*). Acmon butterfly was the most observed butterfly during this time of year, likely due to its preference for buckwheat as a nectar source. Minimal butterfly activity was observed during bird surveys that were conducted between May and early June.

No Quino checkerspot, Hermes copper, or other sensitive butterfly species were detected in the Preserve. Limited potential habitat for Quino checkerspot and Hermes copper is found onsite. Limited patches of dot-seed plantain were observed within coastal sage scrub in the southern portion of the Preserve on primarily west facing slopes. The patches occurred in areas with cryptogamic crusts, which included the occasional purple owl's clover. Spiny redberry occurs in a small patch in the northeast portion of the Preserve on predominantly north facing slope, and the patch extends off-site to the north-east. California buckwheat, a potential nectar source for both butterfly species, is common through much of the area, including adjacent to the spiny redberry.

Table 7
Butterfly Species Survey Results

Species		Habitat Observed	Number of Observations	
Common Name	**Scientific Name**		**3/6/2009**	**6/19/2009**
Acmon blue	*Plebejus acmon*	CSS		12
Behr's metalmark	*Apodemia mormo virgulti*	CSS	1	2
Buckeye	*Junonia coenia*	CSS		2
Cabbage white	*Pieris rapae*	Oak		1
California dogface	*Colias eurydice*	Oak	2	
California ringlet	*Coenonympha tullia california*	grass		2
Checkered/Common White	*Pontia protodice*	grass, disturbed	1	2
Funeral duskywing	*Erynnis funeralis*	CSS, disturbed	2	2
Painted lady	*Vanessa* sp.	CSS	2	
Pygmy blue	*Brephidium exile*	CSS	2	
Sara Orange tip	*Anthocharis sara*	CSS, Oak	5	
Southern blue	*Glaucophsyche lygdamus australis*	CSS	1	
Western tiger swallowtail	*Papilio rutulus*	Oak		1
Total			**16**	**24**

CSS=Diegan coastal sage scrub; grass = non-native grassland; Oak=oak woodland; disturbed= disturbed habitat



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Source: AECOM (2009), County of San Diego (2008)

1 inch = 600 feet

0 150 300 600 Feet

Sage Hill Preserve Sensitive Wildlife

AECOM

Figure 13

4.3.2 Herpetofauna

Amphibians

Four species were observed in the Preserve, of which one, western spadefoot toad, is a State species of special concern (Table 8).

Table 8
Amphibians Survey Results

Species		Status (F/S/County/MSCP)	Location/Habitat Observed
Common Name	**Scientific Name**		
Bullfrog	*Rana catesbeiana*		oak woodland drainage
Pacific treefrog	*Hyla regilla*		oak woodland drainage
Western spadefoot toad	*Spea hammondii*	-/CSC/2/NCMSCP	coastal sage scrub
California toad	*Bufo boreas halophilus*		oak woodland drainage
Federal and State Listing Status			
FE Federal Endangered FT Federal Threatened FSC Federal Species of Concern	CFP California Fully Protected Species CE California Endangered CT California Threatened	CSC California Species of Special Concern CR California Rare CSP California Specially Protected	
Sensitive Animals (County of San Diego)			
1-Animals of high sensitivity (listed or specific natural history requirements) 2-Animals decling, but not in immediate threat of extinction or extirpation. NCMSCP North County MSCP Covered Species			

Although they were not found during surveys or as specimens, both the ensatina (*Ensatina eschocholtzii*) and the arboreal salamander (*Aneides lugubris*) may live on the Preserve. Both salamanders are active during the first winter rains, and would not have been found during the surveys. The bullfrog was the only non-native species observed.

Reptiles

Eight species of reptiles were detected on the Preserve. Five species were caught in the pit-fall trap arrays, and three more were observed incidentally during the survey effort (Table 9). The only North County MSCP covered species observed is the San Diego horned lizard (*Phrynosoma coronatum).*

Table 9
Reptile Survey Results

Common Name	Scientific Name	Status (F/S/County/MSCP)	Location/Habitat Observed
California kingsnake	*Lampropeltis getula californiae*		NNG
Coastal Western Whiptail	*Cnemidophorus tigris stejengeri*	FSC/-/2/-	oak woodland drainage, CSS
Coast horned lizard*	*Phrynosoma coronatum*	FSC/CSC/2/ NCMSCP	NNG
Night snake*	*Hypsiglena torquata*		NNG
Southern alligator lizard	*Elgaria multicarinata webbii*		oak woodland drainage,
Southern pacific * rattlesnake	*Crotalus oreganus helleri*		CSS
Western fence lizard	*Sceloporus occidentalis*		oak woodland drainage,
Western skink	*Eumeces skiltonianus*		NNG
Federal and State Listing Status			
FE Federal Endangered FT Federal Threatened FSC Federal Species of Concern	CFP California Fully Protected Species CE California Endangered CT California Threatened	CSC California Species of Special Concern CR California Rare CSP California Specially Protected	
Sensitive Animals (County of San Diego)			
1-Animals of high sensitivity (listed or specific natural history requirements) 2-Animals decling, but not in immediate threat of extinction or extirpation. NCMSCP North County MSCP Covered Species			
CSS-coastal sage scrub NNG-native native grassland * Species only observed incidentally outside of the survey grids.			

4.3.3 Birds

Forty-eight bird species were detected within the Preserve, of which 41 (85 percent) were detected during point count surveys (Tables 10 and 11).

Diurnal Survey Results

Two special-status species were observed during diurnal point count surveys, coastal California gnatcatcher (*Polioptila californica*) and rufous-crowned sparrow (*Aimophila ruficeps*) . These two species are also considered North County MSCP covered species. Coastal California gnatcatchers were detected during each of the three diurnal point count surveys, as well as during multiple other surveys, with up to six territories observed including three potential pairs (Figure 13). One potential pair was observed actively calling to each other in Diegan coastal sage scrub around survey point 3. Two other pairs were detected in Diegan coastal sage scrub and mixed coastal sage and chaparral scrub along the tributary adjacent to survey points 1 and 2. Single individuals were observed multiple times calling from Diegan coastal sage scrub at survey point 7. Individuals were detected in Diegan coastal sage scrub at points 4 and 8 as well. Multiple individuals were detected in the vicinity of all of these points throughout the course of this project. An individual was also detected in Diegan coastal sage scrub at the edge of tamarisk scrub near survey point 5. Coastal California gnatcatchers appear to be concentrated on the western side of the tributary where the slope is more moderate (< 15%).

Rufous-crowned sparrows were observed multiple times with one individual observed vocalizing in Diegan coastal sage scrub at survey point 8, and a family group with four fledges observed in the southern non-native grassland around point 9. This species was also observed incidentally at the north end of the preserve in non-native grassland south of point 6.

The brown-headed cowbird was the only non-native invasive bird species observed.

Table 10
Bird Survey Results
Sensitive Species Observed

Common Name	Scientific Name	Status (F/S/County /MSCP)	Location/Habitat Observed
Coastal California Gnatcatcher	*Polioptila californica*	FT/CSC/1/ NCMSCP	CSS
Rufous-crowned Sparrow	*Aimophila ruficeps*	FSC/CSC/1/ NCMSCP	CSS
Cooper's hawk	*Accipiter cooperii*	-/CSC/1/-	CSS and Tamarisk, near Elfin Forest Rd.
White-tailed Kite	*Elanus leucurus majusculus*	-/CFP/1/-	CSS, in southern portion of Preserve
Federal and State Listing Status			
FE Federal Endangered FT Federal Threatened FSC Fderal Species of Concern	CFP California Fully Protected Species CE California Endangered CT California Threatened	CSC California Species of Special Concern CR California Rare CSP California Specially Protected	
Sensitive Animals (County of San Diego)			
1-Animals of high sensitivity (listed or specific natural history requirements) 2-Animals decling, but not in immediate threat of extinction or extirpation. NCMSCP North County MSCP Covered Species			

Several raptor and owl species were observed including the white-tailed kite, Cooper's hawk, western screech owl and a great horned owl. A white-tailed kite was observed foraging over Diegan coastal sage scrub and tamarisk scrub and willow. A single Cooper's hawk was observed multiple times in Diegan coastal sage scrub along Elfin Forest Road on the south and west side of the Preserve. Three adults were also observed in a possible territory dispute over the non-native grassland. A potentially nesting adult red-tailed hawk was observed several times in southern coast live oak. This may have been the source of fledges observed just outside of the preserve in the residential area just northeast of Elfin Forest Road. The single record of a western screech owl refers to the remains of a depredated individual discovered in riparian forest. Lastly, a great horned owl was observed in southern coast live oak in the vicinity of this kill.

Coastal sage scrub was the dominant vegetation type within the Preserve, covering 61 percent of the total acreage. Not surprisingly, it also had the highest species richness with 27 species detected. Coastal sage scrub was the next most common type covering 23.5 percent of the preserve with a species richness of 17 species. Southern coast live oak riparian habitat made up only 2.4 percent of the Preserve but also accounted for 17 different species. Freshwater marsh made up just 0.6 percent of the Preserve and tamarisk scrub made up just 0.4 percent but these vegetation types were occupied by 15 and 14 species respectively. Non-native grassland covered 6.5 percent of the Preserve with a species richness of 10.

Table 11
Birds Point Count Survey Results

Species		BPC-1	BPC-2	BPC-3	BPC-4	BPC-5	BPC-6	BPC-7	BPC-8	BPC-9	BPC-10	BPC-11	BPC-12	BPC-13	Incidental
Common Name	**Scientific Name**														
Acorn Woodpecker	*Melanerpes formicivorus*														D
American Coot	*Fulica americana*	D													
American Crow	*Corvus brachyrhynchos*			D	D	D									
Anna's Hummingbird	*Calypte anna*	D		D	D	D	D	D							
Ash-throated Flycatcher	*Myiarchus cinerascens*														
Belted Kingfisher	*Ceryle alcyon*					D									
Bewick's Wren	*Thryomanes bewickii*	D	D	D	D	D	D	D							
Black-chinned Hummingbird	*Archilochus alexandri*						D								
Black-headed Grosbeak	*Pheucticus melanocephalus*														D
Black Phoebe	*Sayornis nigricans*					D									
Blue-gray Gnatcatcher	*Polioptila caerulea*	D													
Brown-headed Cowbird	*Molothrus ater*	D													
Bushtit	*Psaltriparus minimus*	D		D		D	D								
California Gnatcatcher	*Polioptila californica*			D	D			D	D						
California Quail	*Callipepla californica*	D		D	D		D	D							
California Thrasher	*Toxostoma redivivum*	D				D									D
California Towhee	*Pipilo crissalis*	D	D	D	D	D	D	D	D	D			N		D
Cassin's Kingbird	*Tyrannus vociferans*			D		D									
Cliff Swallow	*Petrochelidon pyrrhonota*	D		D	D		D	D	D	D					
Common Barn Owl	*Tyto alba*												N		
Common Poorwill	*Phalaenoptilus nuttallii*										N				N
Common Raven	*Corvus corax*		D												
Common Yellowthroat	*Geothlypis trichas*	D	D	D		D	D		D						
Cooper's hawk	*Accipiter cooperii*									D			N		D
Great Horned Owl	*Bubo virginianus*														D

Table 11
Birds Point Count Survey Results

Species		BPC-1	BPC-2	BPC-3	BPC-4	BPC-5	BPC-6	BPC-7	BPC-8	BPC-9	BPC-10	BPC-11	BPC-12	BPC-13	Incidental
Common Name	**Scientific Name**														
Green Heron	*Butorides striatus*	D													
Hooded Oriole	*Icterus cucullatus*														D
House Finch	*Carpodacus mexicanus*			D	D		D		D	D					D
House Wren	*Troglodytes aedon*	D	D			D									
Lesser Goldfinch	*Carduelis psaltria*	D		D	D	D		D	D	D					
Mourning Dove	*Zenaida macroura*	D	D			D	D								
Northern Mockingbird	*Mimus polyglottos*			D	D	D				D					
Nuttall's Woodpecker	*Picoides nuttallii*	D	D				D								
Oak Titmouse	*Baeolophus inornatus*	D													
Phainopepla	*Phainopepla nitens*							D							
Red-shouldered hawk	*Buteo lineatus*									D					D
Red-tailed Hawk	*Buteo jamaicensis*	D	D	D				D	D						D
Red-winged Blackbird	*Agelaius phoeniceus*					D									
Rufous-crowned Sparrow	*Aimophila ruficeps*								D	D					D
Song Sparrow	*Melospiza melodia*	D	D	D	D	D			D						
Spotted Towhee	*Pipilo maculatus*	D	D	D	D	D	D	D	D	D			N		
Western Bluebird	*Sialia mexicana*														D
Western Flycatcher	*Empidonax difficilis*	D	D												
Western Screech Owl	*Megascops kennecotti*														D
Western Scrub-jay	*Aphelocoma californica*	D		D	D	D	D		D						
Western Tanager	*Piranga ludoviciana*			D											
White-tailed Kite	*Elanus leucurus majusculus*			D											D
Wrentit	*Chamaea fasciata*	D	D	D	D	D	D	D	D	D					

D=Diurnal N=Nocturnal

California towhees, spotted towhees, and wrentits were detected at every survey point regardless of habitat type. Additionally, lesser goldfinches and cliff swallows were found at every survey point located entirely in coastal sage scrub. A spotted towhee fledge and three hooded oriole fledges were observed on 5/28/2009.

Nocturnal Survey Results

Nocturnal surveys resulted in sightings of five species. No species were detected after 9:00PM. Common poorwill were detected in coastal sage scrub throughout the Preserve but only in the first hour after sunset. A pair of common barn owls was detected just after dusk foraging over disturbed coastal sage scrub at the southwest corner of the Preserve near the dirt parking area along Elfin Forest Road. A Cooper's hawk was detected in Diegan coastal sage scrub near survey point 12. Other species detected during nocturnal surveys include California towhee and spotted towhee, both observed just after dusk.

4.3.4 Mammals

Small Mammal Trapping

Eleven mammal species were detected during the small mammal survey (Table 12). Of these, three are California species of special concern: the Dulzura pocket mouse (*Chaetodipus californicus femoralis*), the northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), and the San Diego desert woodrat (*Neotoma lepida intermedia*). In addition to the eleven species trapped, three other species were observed separately. Burrows of Botta's pocket gopher (*Thomomys bottae*) were observed in the non-native grassland, and meadow vole (*Microtus californicus sanctidiegi*) was observed in the riparian area. One Crawford's desert shrew (*Notiosorex crawfordi*) was observed in the pit-fall trap array.

The trapping results provided good information on the distribution of small mammals in the Preserve. The San Diego pocket mouse was found in every array, while cactus mouse (*Peromyscus eremicus fraterculus*), California pocket mouse, deer mouse (*Peromyscus maniculatus gamelii*), and western harvest mouse (*Reithrodontomys megalotis longicaudis*) were all trapped in the three habitat types sampled (Table 12). Pacific kangaroo rat (*Dipodomys simulans*) was found in coastal sage scrub and non-native grassland, whereas the dusky footed woodrat (*Neotoma macrotis macrotis*) and California mouse (*Peromyscus californicus insignis*) were detected in coastal sage scrub and oak riparian arrays. The least prevalent species were the desert woodrat, which was found in the coastal sage scrub array, and the non-native black rat (*Rattus rattus*), which was detected in the oak riparian array. None of these species are of sensitive status.

Table 12
Small Mammal Trapping Results

Species		Status (F/S/ County /MSCP)	Trapping Grid					
Common Name	Scientific Name		CSS-1	CSS-2	GRASS-1	GRASS-2	RIP-1	RIP-2
Black rat*	*Rattus rattus*						4	
Cactus mouse	*Peromyscus eremicus fraterculus*		13	9		4		13
California mouse	*Peromyscus californicus insignis*		8				33	
California pocket mouse	*Chaetodipus californicus*		6		2		4	
California vole	*Microtus californicus*						4	7
Deer mouse	*Peromyscus maniculatus gamelii*		3	11		4		19
San Diego Desert woodrat	*Neotoma lepida intermedia*	FSC/CSC/2/-	7					
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	FSC/CSC/2/-	3	16		4		
Dusky footed woodrat	*Neotoma macrotis macrotis*		4	5			2	12
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	FSC/CSC/2/-	17	23	3	26	5	14
Western harvest mouse	*Reithrodontomys megalotis longicaudis*			2	3	3	3	3

Federal and State Listing Status

FE Federal Endangered FT Federal Threatened FSC Fderal Species of Concern	CFP California Fully Protected Species CE California Endangered CT California Threatened	CSC California Species of Special Concern CR California Rare CSP California Specially Protected

Sensitive Animals (County of San Diego)

1-Animals of high sensitivity (listed or specific natural history requirements)
2-Animals decling, but not in immediate threat of extinction or extirpation.

* Non-native Species

CSS-coastal sage scrub
GRASS-non-native grassland
RIP-Riparian habitat

Medium and Large Mammals

Sign of several medium and large mammals were observed during the course of the survey effort including coyote (*Canis latrans*), mule deer (*Odocoileus hemionus*), brush rabbit (*Sylvilagus bachmani*), and bobcat (*Felis rufus*). Coyote were repeatedly observed using the ridgeline trail that begins at the eastern-most Elfin Forest Road access point, including an observation of an adult with a single young. Coyote scat was also observed throughout the oak woodland trail that runs along the drainage and the trail that follows the ridge east of the historic nursery location that leads to the far eastern knoll (Figure 6). Mule deer scat was also observed throughout the Preserve. Several observations of multiple individuals were recorded from the

oak woodland along the drainages. Upon encountering these individuals they moved to the northeastern portion of the Preserve and out to the adjacent open space. Bobcat sign was recorded through observations of the dead kill and characteristic piling of the prey entrails at the eastern viewpoint (Figure 6).

In addition, opossum (*Didelphis virginiana*), stripped skunk (*Mephitis mephitis*), and raccoon (*Procyon lotor*) are likely to occur but were not directly observed. Special-status species mountain lion (*Felis concolor*) is expected to utilize the Preserve because of it connectivity to the open space to the east.

Bats

A total of six species were identified within the Preserve. Utilizing the passive monitoring systems, the most common species detected included western pipistrelle (*Pipistrellus hesperus*), followed by the big brown bat (*Eptesicus fuscus*) and California myotis (*Myotis californicus*). The Mexican free-tailed bat (*Tadarida brasiliensis*), Yuma myotis (*Myotis yumanensis)*, and western mastiff bat (*Eumops perotis*) were infrequently recorded. A summary of the survey results are provided in Table 13.

Table 13
Bat Survey Results

Species		Status	Survey Type	Location/Habitat
Common Name	**Scientific Name**			
Big Brown Bat	*Eptesicus fuscus*		MS, WS	CSS, Marsh, Oak/Riparian
California Myotis	*Myotis californicus*		MS, WS	CSS, Cliff, Riparian
Yuma Myotis	*Myotis yumanensis*	FSC/CSC/2/-	MS	Riparian
Western Pipistrelle	*Pipistrellus hesperus*		MS, WS	CSS, Marsh, Oak/Riparian
Mexican Free-tailed Bat	*Tadarida brasiliensis*		MS, WS	CSS, Marsh
Western Mastiff Bat	*Eumops perotis*		MS, WS	CSS
Federal and State Listing Status				
FE Federal Endangered FT Federal Threatened FSC Fderal Species of Concern		CFP California Fully Protected Species CE California Endangered CT California Threatened		CSC California Species of Special Concern CR California Rare CSP California Specially Protected
Sensitive Animals (County of San Diego)				
1-Animals of high sensitivity (listed or specific natural history requirements) 2-Animals decling, but not in immediate threat of extinction or extirpation.				
MS: Monitoring station, WS: Walking survey				
* Non-native Species				
CSS-coastal sage scrub GRASS-non-native grassland RIP-Riparian habitat				

Only five species of bats were recorded during the walking surveys, which roughly followed the butterfly walking transect (Figure 7). Majority of the bats recorded during the walking surveys were near the riparian corridor (95%). The habitat on the western portion of the walking route provided limited use for the bats. Similar patterns were observed in the passive monitoring stations. The most commonly recorded species during the walking surveys were the western pipistrelle, big brown bat, and California myotis. The Mexican free-tailed and western mastiff

bats were infrequently recorded. Unlike the passive monitoring systems, no Yuma myotis were recorded during the walking surveys.

4.3.5 Special-Status Wildlife Observed

Eleven species with federal, state and/or local status were observed within the Preserve, including four North County MSCP covered species. Species descriptions for special-status wildlife are described below.

Western Spadefoot (*Spea hammondii*)

State Species of Special Concern; San Diego County Group 2, North County MSCP Covered Species

Western spadefoot ranges from central northern California through the Coast Ranges from San Francisco and south into Baja California, Mexico, at elevations from sea level to 4,500 feet (Stebbins 1985; Zeiner et al. 1988). Habitat for the western spadefoot includes lowlands, washes, floodplains of rivers, alluvial fans, alkali flats, temporary ponds, and vernal pools. Although this species is generally found in areas of open vegetation with sandy or gravelly soil (Stebbins 1985), it has been observed in vernal pools containing clay soils on Otay Mesa. Surface activity can occur from October through April depending on rainfall, and oviposition occurs between late February and May (Jennings and Hayes 1994). The western spadefoot diet consists of crickets, butterflies, ants, flies, and earthworms (Morey and Gullin, as cited in Jennings and Hayes 1994). Decline in western spadefoot populations is primarily due to habitat loss and fragmentation and possibly pesticide use. The western spadefoot was observed in coastal sage scrub in the western portion of the Preserve.

Coast Horned Lizard (*Phrynosoma coronatum)*

State Species of Special Concern; San Diego County Group 2; North County MSCP Covered Species

Coast horned lizard ranges from coastal southern California to the desert foothills and into Baja California. In San Diego County, it has a wide range but spotty distribution. It is often associated with coastal sage scrub, especially areas of level to gently sloping ground, with well-drained loose or sandy soil, but can also be found in annual grasslands, chaparral, oak woodland, riparian woodland, and coniferous forest between 30 and 7,030 feet (Mills 1991; Jennings and Hayes 1994). This animal usually avoids dense vegetation, preferring 20 to 40 percent bare ground in its habitat. Where it can be found, the coast horned lizard can be locally abundant, with densities near 20 adults per acre. Adults are active from late March to late August; young are active from August to November or December. They are largely dependent upon native harvester ants (*Pogonomyrmex* sp.) for food. Populations along the coast and inland have been severely reduced by loss of habitat. The coast horned lizard was observed in the nonnative grassland along Elfin Forest Road, immediately north of the eastern access point.

Coastal Western Whiptail (*Cnemidophorus tigris multiscutatus*)

Federal Species of Concern; San Diego County Group 2

This large whiptail lizard is found west of the coastal ranges in Southern California and Baja California. It is often associated with dense vegetation such as chaparral and sage scrub especially in and around sandy washes and streambeds (Stebbins 2003). It is active from spring to late fall. Peak activity typically occurs in the morning, as temperatures begin to rise, or later in the day if the weather is cool. Breeding generally occurs between May and August. The primary threat to this species is the reduction of habitat within its range. The coastal western whiptail was found in reptile arrays in both coastal sage scrub , in the western portion of the Preserve, and in riparian habitat along the drainage.

Coastal California gnatcatcher (*Polioptila californica californica*)

Federally Threatened, State Species of Special Concern, San Diego County Group 1, North County MSCP Covered Species

The coastal California gnatcatcher is a nonmigratory, resident species found on the coastal slopes of southern California, ranging from Ventura County southward through Los Angeles, Orange, Riverside, and San Diego Counties into Baja California, Mexico (Atwood and Bontrager 2001). Coastal California gnatcatchers typically occur in or near sage scrub habitat, although chaparral, grassland, and riparian woodland habitats are used where they occur adjacent to sage scrub. Breeding occurs from February through August, and nests are constructed most often in California sagebrush. The coastal California gnatcatcher diet consists mainly of sessile small arthropods, such as leafhoppers, spiders, beetles, and true bugs (Atwood and Bontrager 2001). The primary cause of decline in the coastal California gnatcatcher is due to habitat loss and degradation.

Coastal California gnatcatchers were detected during each of the three diurnal point count surveys, as well as during multiple other surveys, with up to six territories observed including 3 potential pairs (Figure 12). One potential pair was observed actively calling to each other in Diegan coastal sage scrub around survey point 3. Two other pairs were detected in Diegan coastal sage scrub and mixed coastal sage and chaparral scrub along the tributary adjacent to survey points 1 and 2. Single individuals were observed multiple times calling from Diegan coastal sage scrub at survey point 7. Individuals were detected in Diegan coastal sage scrub at points 4 and 8 as well. Multiple individuals were detected in the vicinity of all of these points throughout the course of this project. An individual was also detected in Diegan coastal sage scrub at the edge of tamarisk scrub near survey point 5. Coastal California gnatcatchers appear to be concentrated on the western side of the tributary where the slope is more moderate (< 15%).

Rufous-crowned sparrow (*Aimophila ruficeps canescens*)

Federal Species of Special Concern, State Species of Special Concern, San Diego County Group 1, North County MSCP Covered Species

This subspecies of rufous-crowned sparrow is a San Diego County resident and ranges throughout southern California from Los Angeles County to Baja California, Mexico (Collins 1999). Southern California rufous-crowned sparrows are found in chaparral and coastal sage scrub habitats and occasionally in grasslands adjacent to these habitats. The species exhibits a strong preference for moderate to steep, dry, rocky slopes interspersed with grasses and rock outcrops (Unitt 1984; Collins 1999). Breeding occurs from March through June and pair bonds are formed that may last year-round (Collins 1999). Their diet consists primarily of seeds, stems, and shoots and extends to insects during spring and summer months (Wolf 1977).

Urbanization, range restrictions, and loss of habitat have decreased the amount of suitable habitat for southern California rufous-crowned sparrows.

Rufous-crowned sparrows were observed multiple times with one individual observed vocalizing in Diegan coastal sage scrub at survey point 8, and a family group with four fledges observed in the southern non-native grassland around point 9. This species was also observed incidentally at the north end of the preserve in non-native grassland south of point 6.

Cooper's Hawk (*Accipiter cooperii*)

State Species of Concern and San Diego County Group 1

Cooper's Hawk is wholly endemic to North America, but widespread, with both migratory and resident populations ranging from southern Canada, continent-wide to southern Mexico. The California population is resident but numbers in winter increase as the population is augmented by migrants from the North (Curtis et. al. 2006; Unitt 2004). Currently this species can be found breeding throughout the state in appropriate habits, generally below 6000 feet excluding deserts where it is an uncommon in winter visitor and transient only, save a few oasis where it may still breed (Garrett and Dunn 1981). They catch small birds, especially young during nesting season, and small mammals; also takes reptiles and amphibians. Hunts in broken woodland and habitat edges; catches prey in air, on ground, and in vegetation. Often dashes suddenly from perch in dense cover and pursues prey in air through branches. Sometimes runs prey down in dense thickets. Uses cover to hide, attack, and approach prey; also soars and makes low, gliding search flights.

Cooper's Hawk nest in deciduous trees in crotches 3-23 m (10-80 ft), but usually 6-15 m (20-50 ft), above the ground. Also nests in conifers on horizontal branches, in the main crotch, often just below the lowest live limbs. Nest is a stick platform lined with bark. Usually nests in second-growth conifer stands, or in deciduous riparian areas, usually near streams. The Cooper's Hawk was listed in 1978 as a species of concern on the basis of population declines due to shooting, destruction of riparian woodland, and pesticide contamination (Remsen 1978); but recent studies suggest that populations have recovered in many areas (Curtis et. al. 2006; Unitt 2004). Its shift to the use of more urban areas was likely a major factor leading to population increases (Unitt 2004). However, with the colonization of urban habits also comes an increased incidence of collision with windows and disease (Curtis 2006; Unitt 2004). A single Cooper's hawk was observed multiple times in Diegan coastal sage scrub along Elfin Forest Road on the south and west side of the Preserve.

White-tailed Kite (*Elanus leucurus*)

CDFG fully protected species and a San Diego County Group 1

White-tailed Kite is a common to uncommon, yearlong resident in coastal and valley lowlands; rarely found away from agricultural areas. Habitat for white-tailed kite includes herbaceous and open stages of most habitats found mostly in cismontane California. They use trees with dense canopies for cover. They also roost in saltgrass and Bermudagrass. They have had extended range and increased numbers in recent decades. They prey mostly on voles and other small, diurnal mammals, occasionally on birds, insects, reptiles, and amphibians. They forage in undisturbed, open grasslands, meadows, farmlands and emergent wetlands. Soars, glides, and hovers less than 30 m (100 ft) above ground in search of prey. Slowly descends vertically upon prey with wings held high, and legs extended; rarely dives into tall cover (Thompson 1975).

They make nests of loosely piled sticks and twigs and lined with grass, straw, or rootlets. Nest placed near top of dense oak, willow, or other tree stand; usually 6-20 m (20-100 ft) above ground (Dixon et al. 1957). Previous population declines have been attributed to shooting, habitat loss, and poisoning of small rodents (Dunk 1995; Unitt 2004). In the past three decades this species has dramatically expanded in numbers and range in the western U.S (Dunk 1995; Patten et. al. 2003). A white-tailed kite was observed foraging over Diegan coastal sage scrub and tamarisk scrub and willow.

Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*)

Federal Species of Concern; State Species of Special Concern; San Diego County Group 2

The Northwestern San Diego pocket mouse ranges from Los Angeles County and extreme southern San Bernardino County, southward into west-central Baja California, Mexico (Hall 1981). In San Diego County, northwestern San Diego pocket mouse is known from Del Mar, Dulzura, Jacumba, Lake Hodges, Pala, San Diego, and San Marcos (Bond 1977). Habitat for this subspecies is most often sparse or disturbed coastal sage scrub or grasslands with sandy soils. Breeding occurs from March to May; giving birth to a litter averaging four young (Zeiner et al. 1990). Their diet consists of seeds from forbs, shrubs, and grasses (Brylski 1983). Threats to northwestern San Diego pocket mouse are most likely due to development, resulting in loss of habitat. A total of 88 individuals were recorded in all habitats sampled, with the highest observations occurring in coastal sage scrub and nonnative grassland.

Dulzura California pocket mouse (*Chaetodipus californicus femoralis*)

Federal Species of Concern; State Species of Special Concern; San Diego County Group 2

Dulzura (California) pocket mouse ranges throughout most of San Diego County into northern Baja California, Mexico. It is generally found on chaparral-covered slopes. Breeding occurs from March to July, giving birth between two and seven young with an average of four (Zeiner et al. 1990). Their diet consists of seeds, insects, and sometimes green leaves (Phillips et. al. 2004). Dulzura pocket mouse is threatened by habitat loss due to urbanization and agricultural land uses. A total of 23 individuals were recorded; 19 were in the coastal sage scrub grids in the west and central portion of the Preserve and 4 were recorded in the nonnative grassland grid near Elfin Forest Road.

San Diego Desert Woodrat (*Neotoma lepida intermedia*)

Federal Species of Concern; State Species of Special Concern; San Diego County Group 2

The San Diego desert woodrat occurs in coastal California from San Luis Obispo south through the Transverse and Peninsular Ranges into Baja California. They commonly inhabit Joshua tree woodlands, pinyon-juniper woodlands, mixed chaparral, sagebrush, and desert habitats (Zeiner and others 1990). They are primarily herbivorous and rely on a continuous supply of green vegetation for food and water (Thompson 1982). They do not appear to be highly selective in the type of vegetation they eat, but may be particular about the parts of each plant species they consume. In general, desert woodrats breed from late October or November through April, and females can produce up to four litters of two to four young each year (Bleich and Schwartz 1975). The gestation period is 30–36 days (Zeiner and others 1990). Seven individuals were found in a small mammal trapping grid in coastal sage scrub in the western portion of the Preserve.

Yuma myotis (*Myotis yumanensis*)

Federal Species of Concern; State Species of Special Concern; San Diego County Group 2

Yuma myotis ranges from British Columbia, the western United States, and south into Mexico (Batcon 2007). Habitat for the Yuma myotis typically includes open forests and woodlands with water sources, but will utilize desert riparian areas along the Colorado River Valley (Zeiner et al. 1990). They roost in buildings, caves, crevices, mines, and have been known to use bridges and abandoned swallow nests. Maternity colonies are large, typically thousands of females with young born in May and June. Their diet consists of insects such as moths, midges, flies, termites, ants, hoppers, and caddisflies (Zeiner et al. 1990). The main threat to the Yuma myotis is human disturbance to maternity roosts (Schmidley 1991). Yuma myotis was observed during a walking survey through the riparian drainage within the Preserve.

4.3.6 Special-Status Wildlife with a High Potential to Occur

The following federal, state or locally sensitive species have a high potential to occur on the Preserve.

Orange-throated whiptail (*Cnemidophorus hypecythrus*)

Federal Species of Concern; State Species of Special Concern; San Diego County Group 1; North County MSCP Covered Species

This subspecies is restricted to the extreme southwest of California and northwest of Baja California Norte, Mexico (Stebbins 2003). In California, it is found on the west side of the Peninsular Ranges between sea level and 3,000 feet, in Los Angeles, San Bernardino, Orange, Riverside and San Diego counties (Zeiner et al 1988). It appears to prefer sage scrub that covers about 50 percent of the ground without dense grasses in between, but it also inhabits dense to extremely open stands of sage as well as chamise chaparral and floodplain areas. A limiting factor to the species' range is the availability of its primary food item, the termite *Reticulitermes hesperus.* The principal threat to this species is loss of open sage scrub, its preferred habitat. It is still locally common in many areas where it remains.

Coast patch-nosed snake (*Salvadora hexalepis virgultea*)

Federal Species of Concern; State Species of Special Concern; San Diego County Group 2

The distribution of the coast patch-nosed snake includes the coastal slope of southern California and northern Baja California (Stebbins 2003). The coast patch-nosed snake is found in a variety of habitats from sea level to 7000 feet including coastal sage scrub, chaparral, riparian, grasslands, and agricultural fields (Zeiner et al. 1988). The patch-nosed snake is rarely encountered, but one was sighted in Del Mar. This species feeds primarily on the whiptail lizards which are very common at the Preserve. Its activity patterns are diurnal and it is active most of the year in Southern California. It prefers open habitats with friable or sandy soils, burrowing rodents for food, and enough cover to escape predation. This uncommon snake is threatened by intensive agricultural practices and urbanization of its habitat.

Coastal rosy boa (*Charina trivirgata roseofusca*)

Federal Species of Concern; San Diego County Group 2

Coastal rosy boa is widely, but sparsely, distributed throughout desert and chaparral habitats in southern California (Zeiner et al 1988). This subspecies is widespread throughout western San Diego County west of the coast ranges. It occurs in dry rocky brushlands and arid habitats, usually near intermittent streams, but does not require permanent water. It is secretive and chiefly nocturnal and best surveyed for at night. It is declining as a result of habitat alteration and collection for the pet trade. Habitat requirements include vegetation or rock outcrops for shelter and small mammals or birds for prey.

Silvery legless lizard (*Anniella pulchra pulchra*)

Federal Species of Concern; State Species of Special Concern; San Diego County Group 2

The range of the silvery legless lizard extends west of the Sierra Nevada from San Francisco to Baja California Norte, Mexico, from sea level to 6400 feet (Stebbins 2003). In San Diego County this subspecies is widespread throughout the lower elevations between the coastline and the western border of Anza Borrego Desert (SDHS 1980). Habitat requirements are loose soil for burrowing (sand, loam, or leaf mold), moisture, warmth, and plant cover. This species is found where suitable soils occur in a number of vegetation communities including sparse vegetation of coastal dunes, chaparral, pine-oak woodland, and streamside growth of sycamores, cottonwoods, or oaks. These lizards burrow in the loose soil of the washes, dunes, and loose alluvium, often near intermittent and permanent streams and can sometimes be found in association with plant roots.

Red diamond rattlesnake (*Crotalius rubber*)

Federal Species of Concern; State Species of Special Concern; San Diego County Group 1; North County MSCP Covered Species

This subspecies is restricted to southern California and Baja California from Morongo Pass to the tip of the Baja Peninsula, with the majority of it's California range in San Diego County. It occurs there from sea level to 3,000 feet (Stebbins 2003). Habitat preferences include dense vegetation in rocky areas with a supply of burrowing rodents for prey. Prey include rabbits, lizards, birds, and other snakes (Stebbins 2003). It is often found in chaparral, coastal sage scrub, along creek banks, and in rock outcrops or piles of debris. It is generally active from mid-spring to mid-fall. It has a limited range that is threatened by urban development and agriculture. Red diamond rattlesnake is poisonous and is often killed or removed from habitat adjacent to residential areas.

Cooper's hawk (*Accipiter cooperi*)

State Species of Special Concern; San Diego County Group 1

The Cooper's hawk is a relatively small bird of prey with short wings adapted for flight in dense woods where it peruses smaller birds on which it primarily feeds. Though previously associated

only with semi-dense woodlands, Cooper's Hawks, since the 1980's and probably as a result of society's shift in attitude towards birds of prey, have proven remarkably adaptable to urban landscapes; as Unitt (2004) notes, they are at least as numerous in urban habitats as in natural ones. This species wholly endemic to North America, but widespread, with both migratory and resident populations ranging from southern Canada, continent-wide to southern Mexico. The California population is resident but numbers in winter increase as the population is augmented by migrants from the North (Unitt 2004). Currently this species can be found breeding throughout the state in appropriate habits, generally below 6000 feet excluding deserts where it is an uncommon in winter visitor and transient only, save a few oasis where it may still breed (Garrett and Dunn 1981).

Sharp-shinned hawk (*Accipiter striatus*)

State Species of Special Concern; San Diego County Group 1

Adapted to hunting on the wing in moderately dense vegetation, this small raptor preys on small passerines almost exclusively and is rarely encountered away from large trees or brushy boarders of agricultural fields and canals. This forest specialist has both resident and migratory populations across North America and south to n. Argentina (Blidstein and Meyer 2000). In the western U.S. this species breeds mainly in Canada as well as a few northern states but migrates south in winter. Though this species nests in small numbers in northern California the majority of occurrences in the state are of winter visitors which are fairly common throughout much of the state from mid-September to mid-April (Small 1994). In San Diego county it is listed as an uncommon winter visitor (Unitt 2004). Adapted to hunting on the wing in moderately dense vegetation, this species preys on small birds almost exclusively and is rarely encountered away from large trees or brushy boarders of agricultural fields and canals. The Sharp-shinned Hawk's small breeding population makes it vulnerable to impact, which and is the reason for its special status (Remsen 1978).

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)

Federal Species of Concern; State Species of Special Concern; San Diego County Group 1; North County MSCP Covered Species

This subspecies ranges from near Mt. Pinos (at the Kern-Ventura County line), southward and west of the Peninsular Range into Baja California (Hall 1981). They can be found throughout southern California, with the exception of the high-altitude mountains. San Diego black-tailed jackrabbit occupy open or semi-open habitats, such as coastal sage scrub and open chaparral areas. Forested and thick chaparral regions are not suitable (Bond 1977). San Diego black-tailed jackrabbit breeds throughout the year, with the greatest number of births occurring from April through May. This jackrabbit is strictly herbivorous, preferring habitat with ample forage such as grasses and forbs. Threats to San Diego black-tailed jackrabbit are due to a decline in suitable habitat as a result of urban development.

Mountain lion (*Felis concolor*)

California Specially Protected; San Diego County Group 2; North County MSCP Covered Species

The mountain lion occurs within a broad range of habitats in southern California including coastal sage scrub, chaparral, oak woodland and riparian habitat. Breeding for mountain lions occur year-round (Shivarajo and Dewey 2003, Wilson and Ruff 1999). The main prey item for mountain lion is deer; however, they will feed upon other mountain lions, raccoons, skunks, coyotes, and bobcats (Wilson and Ruff 1999). Threats to this subspecies are due to human interactions such as, hunting and habitat destruction.

4.3.7 Nonnative Wildlife Species

Three nonnative wildlife species were observed within the Preserve: the bullfrog, black rat and brownheaded cowbird. Several bullfrogs were heard near the pond within the riparian cooridor and the black rat was caught in the riparian cooridor as well. Brown-headed cowbirds were observed on one occasion during a bird point count in coastal sage scrub in the western portion of the Preserve.

4.4 Wildlife Movement

Wildlife migration corridors are essential to maintain populations of healthy and genetically diverse wildlife species. At a minimum, wildlife corridors promote colonization of habitat and genetic variability for both plant and wildlife species by connecting fragments of habitat that are separated by otherwise foreign or inhospitable habitats. Because the isolation of plant and wildlife populations can have many harmful effects and may contribute significantly to local species extinctions, wildlife corridors are important because they help sustain individual species distributions within these habitat fragments.

Wildlife movement corridors can be classified as either regional corridors or local corridors. Regional corridors are defined as those linking two or more large areas of natural open space, and local corridors are defined as those allowing resident animals to access critical resources (i.e., food, cover, and water) in a smaller area that might otherwise be isolated by some form of urban development (i.e., roads, housing tracts, etc.). These habitat linkages provide wildlife a lifeline between “islands” of otherwise isolated habitat and serve as escape routes from danger and avenues to food supplies and mating prospects. Corridors can be narrow (i.e., a culvert) or wider than an eight-lane freeway, or they may be short or extend for miles, perhaps crossing over or under roads.

With respect to regional corridors, the Preserve is bounded by development on the south, west, and northwest, inhibiting wildlife movement and the potential for regional corridors linking those areas. There is limited potential for wildlife use along the unnamed tributary within the Preserve that continues to the west through development. The corridor is small, surrounded by development and likely only provides for local movement. No regionally significant corridors are present on the Preserve however the unnamed tributaries and drainages provide connectivity to Escondido Creek to the east.

However, the Preserve is adjacent to open space to the northeast and there were medium and large animal tracks and scat indicating that the easterly extensions of the oak woodland and the trail that begins from the eastern most access point on Elfin Forest Road are well used by animals moving to and from the Preserve to the adjacent open space. The habitat connectivity between the Preserve and open space provides a broader area for local wildlife corridors for food, cover and water, than the Preserve would provide on its own. There is also some

evidence that animals are moving from the open space to access the water resources on the Preserve.

5.0 Conclusions and Management Recommendations

The following discussion includes a summary of the biological surveys and provides recommendations based on site conditions and the North County MSCP Framework Resource Management Plan (FRMP). This section is structured to be consistent with the presentation of the material in earlier sections of this document. However, it should be noted that the FRMP is structured around plan-wide stewardship and management guidelines, and habitat specific management guidelines that have been incorporated below. The Plan currently does not include species-specific guidelines.

5.1 Vegetation Communities

Eight vegetation communities were mapped in the Preserve, of which five were dominated by native plants and three were dominated by non-native species. No non-vegetated habitats were observed. The County is recommended to maintain an up-to-date vegetation map of the Preserve, to insure that vegetation information stays current and useful for adaptive management decision-making. Mapping efforts should meet both current industry and scientific standards, and meet County management needs. They should also be consistent with regional vegetation monitoring efforts. Mapping and monitoring efforts should also quantify habitat value for sensitive species, as such information becomes available.

As part of managing the Preserve, the County should maintain the acreage of the native communities at least at the current baseline. Moreover, the County should actively manage the Preserve to insure that invasive, non-native species do not spread and thereby degrade the native communities present by reducing native plant diversity and habitat quality for native species. Such management will also affect decisions on trail placement, design, and maintenance, as trails and trail margins are a major route for weeds to become established within the Preserve.

With respect to fuel modification and fire management there are two issues related to vegetation. First, fuel modification zones are sites where invasive, non-native species gain a foothold, and any fuel modification activity should also include weed control activity. Second, as explained below, there is no evidence that any sensitive species in the Preserve would benefit from controlled burns. In addition to the general recommendations described above, the following vegetation community specific recommendations are included based on the guidelines in the Framework Resource Management Plan.

Coastal Sage Scrub, Chapparal and Grassland Habitats

- Fire caused through human ignitiction souces should be controlled through public outreach, maintenance of fuel breaks and enforcement to prevent unnatural fire frequencies.

- Invasive plant species should be monitored and controlled, see Section 5.4 below for locations and recommended treatment methodologies.

Riparian and Marsh Habitats

- Residents in the upper part of the Preserve watershed should be educated about reducing nuisance run-off from their yards and that household chemicals should not be allowed to run-off their yards because of the connectivity to the Preserve and surrounding watershed.

- Invasive plant and animal species should be monitored and controlled if necessary, see Section 5.4 below. Target invasive plant species have been identified for control. Similarly, bullfrog and black rat populations in the riparian cooridor should be monitored to determine if they are having a negative effect on the native community. If negetative effects are demonstrated these species should be eradicated.

5.2 Plants

Three sensitive plant species were found in the Preserve. Wart-stemmed ceanothus is covered by the North County MSCP, but summer holly and Palmer's sagewort are not covered. All three species should be protected by the County. Other sensitive species may occur on the Preserve, particularly fire following species that are currently present only as dormant seeds.

None of the sensitive species are in particular danger from routine human activities in the Preserve. The most sensitive species, summer holly, can best be reached by a trail outside the Preserve limits, and the plants within the Preserve are accessible only by deer trails. While some individuals of Palmer's sagewort occur along a major trail, most of the plants occur in the southern stream channel, and they are difficult to reach. The wart-stemmed ceanothus is the dominant plant in the Preserve's chaparral and present in coastal sage scrub, and it is not under immediate threat.

The species vary in their response to fire. Summer holly can regenerate from the roots, but like all obligate resprouters, it needs a 30 to 50 year or more fire-free interval in which to successfully reproduce (Keeley and Davis, 2007). Wart-stemmed ceanothus is an obligate seeder, and fire improves germination. However, it takes time for plants to mature and to replenish the seed bank after a fire. Based on studies of other ceanothus species and the known fire history of the Preserve, wart-stemmed ceanothus could be sustained if fire returned at an interval of >20 years. Conversely, the population would be threatened by fire return intervals of <10 years (Keeley and Davis, 2007). As there is no data on Palmer's sagewort's response to fire, it has to be assumed that it can be eliminated by frequent fires, similar to California sagebrush.

5.3 Wildlife

5.3.1 Invertebrates

Thirteen butterfly species were detected on the Preserve. No sensitive or MSCP covered butterfly species were observed and the 13 species are common and expected to be observed in the habitats onsite. The Preserve provides very limited habitat for sensitive species evaluated including the Quino checkerspot butterfly and Hermes copper, and given their current distribution they are unlikely to occur. Habitat restoration opportunities within the Preserve should include plant species that are important nectar resources for butterflies including blue

dicks (*Dichelostemma capitatum*), goldfields (*Lasthenia* sp.), and popcorn flower (*Crypthanta* sp.)

5.3.2 Herpetofauna

Amphibians

The Preserve contains at least three native and one non-native species of amphibian. Of these, the western spadefoot toad is a North County MSCP covered species. Monitoring fpr western spadefoot toad should follow the recommendations identified by the final North County MSCP FRMP. The Preserve should be managed to promote the continued existence of all the native species by maintaining habitat and reducing sources of predation. The non-native bullfrog is a predator of some native species, and should be considered for eradication from the pond along the creek.

Reptiles

Eight species of native reptiles were detected in the Preserve, and an additional six may occur. Of these, three are State species of special concern. One, the coast horned lizard (North County MSCP covered species), is known to occur on the Preserve, and two, the coastal rosy boa and the orange-throated whiptail, have a high potential to occur. Monitoring for coast horned lizard should follow the recommendations identified by the final North County MSCP FRMP.

Habitat restoration efforts should inspect plant material imported into the Preserve to avoid new colonization of Argentine ants. Similarly, watering of restoration areas should be through a water truck rather an irrigation system, where leaky pipes create an ideal, moist habitat for Argentine ants.

Additionally, AECOM biologists found twenty-three “snake boards,” plywood sheets and fiberglass roofing panels, placed in vegetation polygon 9 and elsewhere. These boards had been placed in ideal locations to attract snakes to seek cover underneath them, demonstrating that there were amateur herpetologists in the area who were possibly collecting specimens. Even though it is illegal to sell native reptiles and there are legal limits on the number of reptiles an individual may possess, the illegal trade in native reptiles persists. The California kingsnakes found on the Preserve belong to the "striped phase" of the species, which is only found in San Diego County and is desired by collectors. Additionally, the coastal rosy boa is popular as a pet, despite its sensitive status. Because of this, we strongly urge DPR to remove the boards from the Preserve, and to insure that no more are installed. There is no evidence that the boards were installed by the amateur herpetologist who provided the additional information.

5.3.3 Birds

Forty eight bird species were detected within the Preserve, including the coastal California gnatcatcher and rufous-crowned sparrow. Both the coastal California gnatcatcher, a federally threatened species and state species of concern, and rufous-crowned sparrow, a federal and state Species of Concern, are North County MSCP covered species. The Diegan coastal sage scrub onsite currently provides good quality habitat for both species. Invasive non-native plant populations should be controlled so that they do not degrade this habitat and inhibit germination of sage scrub seedlings, as coastal California gnatcatchers prefer habitat with an age-structure.

As indicated both expansion of coastal California gnatcatcher habitat onsite is generally not compatible with the expansion of wart-stemmed ceanothus; however, approximately 6.8 acres of degraded habitat is proposed for Diegan coastal sage scrub restoration in the Vegetation Management Plan being developed for the Preserve. Monitoring of coastal California gnatcatcher and rufous-crowned sparrow should follow the recommendations identified by the final North County MSCP FRMP.

5.3.4 Mammals

Small mammals

No MSCP covered small mammal species were observed; however three California species of special concern were observed including the Dulzura pocket mouse, the northwestern San Diego pocket mouse, and the San Diego desert woodrat. Given the relatively pristine conditions of the Preserve, no specific management recommendations are proposed for these species. No North County MSCP covered small mammal species were observed on the Preserve.

Medium to Large Mammals

Evidence of coyote, bobcat, and mule deer where observed during surveys on the Preserve. The Preserve and adjacent open space provide important resources for large to medium size mammals including food, water, and sufficient acreage to accommodate the larger territory sizes of these species. It is important that the local corridors between the Preserve and adjacent open space are maintained and that unnecessary fences, structures or lighting are not installed in the north and northeast portion of the Preserve. No North County MSCP covered medium to large mammal species were observed on the Preserve.

Bats

Surveys of the cliff roosting sites recorded both the western pipistrelle and California myotis in the area. However, only the pipistrelles were infrequently observed actually using the cliff habitat. The cliff habitat within Preserve does not appear to be the “ideal” geologic formations that typically support significant populations of bat species.

Majority of the bat species are probably roosting outside the property, using the Preserve mainly for foraging and water. Several bats (of the same species recorded at the Preserve) were observed just outside the Preserve, foraging along streetlights and urban boundaries. Majority of the activity on the Preserve was concentrated in the riparian area, and immediately adjacent to these areas in the coastal sage scrub habitat. No bat species were recorded in the disturbed areas.

Several of the documented species on site have been observed roosting in trees (although this was not observed in the Preserve). However, documenting this activity, emergence, or habitat use is difficult and unlikely given the limited scope of these initial surveys. Therefore, the big-brown bat, California myotis, and western pipistrelle could potentially use the oak/riparian area as roosting habitat. No North County MSCP covered bat species were observed on the Preserve.

5.3.5 Wildlife Linkages and Cooridors

The presence of development on the south, west, and northwest of the Preserve inhibit wildlife movement and the potential for regional corridors linking those areas. However, the Preserve is near two MSCP Core areas to the south and east, Elfin Forest and Harmony Grove. Although not a regional cooridor the Preserve contributes to the open space connecting these two larger habitat areas. The habitat connectivity between the Preserve and open space provides a broader area for local wildlife corridors for food, cover and water, than the Preserve would provide on its own.

5.4 Non-Native Invasive Species Removal and Control

5.4.1 Plants

While the Preserve contains over 40 non-native plant species, less than half of these are invasive. Eight of the worst species occur in small patches and could be readily controlled (Table 14). Two more (tamarisk and crown daisy) collectively dominate several acres. They could readily be removed, and the areas restored to native habitat. Several other invasive non-natives, such as red brome, black mustard, and fennel, are well established, and would be difficult to remove from the Preserve. However, most non-natives are present in small numbers and are controllable. Treatment areas and recommended treatment techniques are outlined in the Vegetation Management Plan being developed for the Preserve.

Appendix C lists the non-native invasive plant species, plus their distribution in the vegetation polygons shown in Figure 11 and 12. The polygons are listed by vegetation type, as described in the legend at the bottom of the table. Species were ranked by decreasing ratings, with unrated non-native species listed at the end. The location information was sorted into three categories (throughout, openings, and trail edge) as discussed in methods (section 3.1.3). For example, if a species was found in polygons 1 and 2, which were covered by Diegan coastal sage scrub, and polygon 3, which contained non-native grassland, the table would be shown as "CSS: 1, 2; Grass: 3."

As discussed in the methods (section 3.1.3), two figures were created to show the distribution of non-natives within the Preserve. Figure 11 shows the vegetation polygons, coded to show the number and general location of non-native species in each polygon. Figure 12 shows the locations of the top ten invasive non-natives.

Table 14
Invasive Plant Species Summary

Species		US/CA Weed List	CAL IPC Rating
Common Name	**Scientific Name**		
Onionweed	**Asphodelus fistulosus*	NW, Q	M*
Artichoke thistle	**Cynara cardunculus*	B	M
Italian thistle	**Carduus pycnocephalus*	C	M
Fountain grass	**Pennisetum setaceum*	C, Q	M
Tamarisk	**Tamarix ramosissima*		H
Pampas grass	**Cortaderia selloana*		H
Red brome	*Bromus madritensis* ssp. *rubens*		H

Species		US/CA Weed List	CAL IPC Rating
Common Name	**Scientific Name**		
Hottentot-fig	**Carpobrotus edulis*		H
Fennel	*Foeniculum vulgare*		H
Wild oats	*Avena fatua*		M
Black mustard	*Brassica nigra*		M
Ripgut brome	*Bromus diandrus*		M
Mediterannean mustard	*Hirschfeldia incana*		M
Italian ryegrass	*Lolium multiflorum*		M
Rat-tail fescue	*Vulpia myuros*		M
Tree-of-Heaven	**Ailanthus altissima*		M
Tocalote	*Centaurea melitensis*		M
Crown daisy, =*Glebionis coronariium*	**Chrysanthemum coronarium*		M
Tasmanian blue gum	*Eucalyptus globulus*		M
Tree tobacco	*Nicotiana glauca*		M
Periwinkle	*Vinca major*		M
Mexican fan palm	**Washingtonia robusta*		M*
Soft chess	*Bromus hordeaceus*		L
Smooth cat's ear	*Hypochaeris glabra*		L
Olive	*Olea europaea*		L
Bristly ox-tongue	*Picris echioides*		L
Smilo grass	*Piptatherum miliaceum*		L
Russian thistle	*Salsola tragus*		L
Peruvian pepper tree	*Schinus molle*		L
Filaree	*Erodium cicutarium*		L
Curly dock	*Rumex crispus*		L
Annual beard grass	*Polypogon monspeliensis*		L

Species: * before the species means that the species is discussed further and mapped in Figure 10.

US/CA weed list codes : NW: Federal Noxious Weed (USDA 2006): **Q:** California quarantine list (CDFA 2003): **A:** California list A noxious weed (CDFA 2003): **B:** California list B noxious weed (CDFA 2003): **C:** California list C noxious weed (CDFA 2003)

CAL-IPC Rating (CAL-IPC 2006)

* = Species has "Alert" status with CAL-IPC

H = High. Species causes major biotic and physical impacts, they can spread rapidly, and they are generally widely distributed.

M = Moderate. Species has substantial and apparent biotic and physical impacts, have moderate to high rates of dispersal, and their range varies from limited to widespread.

L = Limited. These species are invasive but either have limited impacts or are insufficiently known to justify a higher rating. They have low to moderate rates of dispersal, and a limited range, but may be locally persistent and problematic.

5.4.2 Wildlife

Bullfrogs, black rats and brown headed cowbird were the only non-native invasive wildlife species detected in the Preserve. Bullfrogs are limited to the pond in the freshwater mars. These individuals should be removed as they eat native amphibians that might otherwise utilize the habitat. Bullfrogs can be captured using a net or by hand and anthetized. Bullfrog eradication will require continued monitoring and removal. Four black rats were found in the oak riparian woodlands. Their numbers, based on trap results are relative low and no targeted removal is recommended at this time although they can prey on other, native animal and plant species. Should nest predation be observed, rat populations should be controlled. Live-traps should be used so that nontarget species are not impacted. Similarly, brown-headed cowbird trapping could be conducted with traps located along the oak woodland drainage. However, low numbers were observed an trapping is not recommended at this time.

5.5 Restoration Opportunities

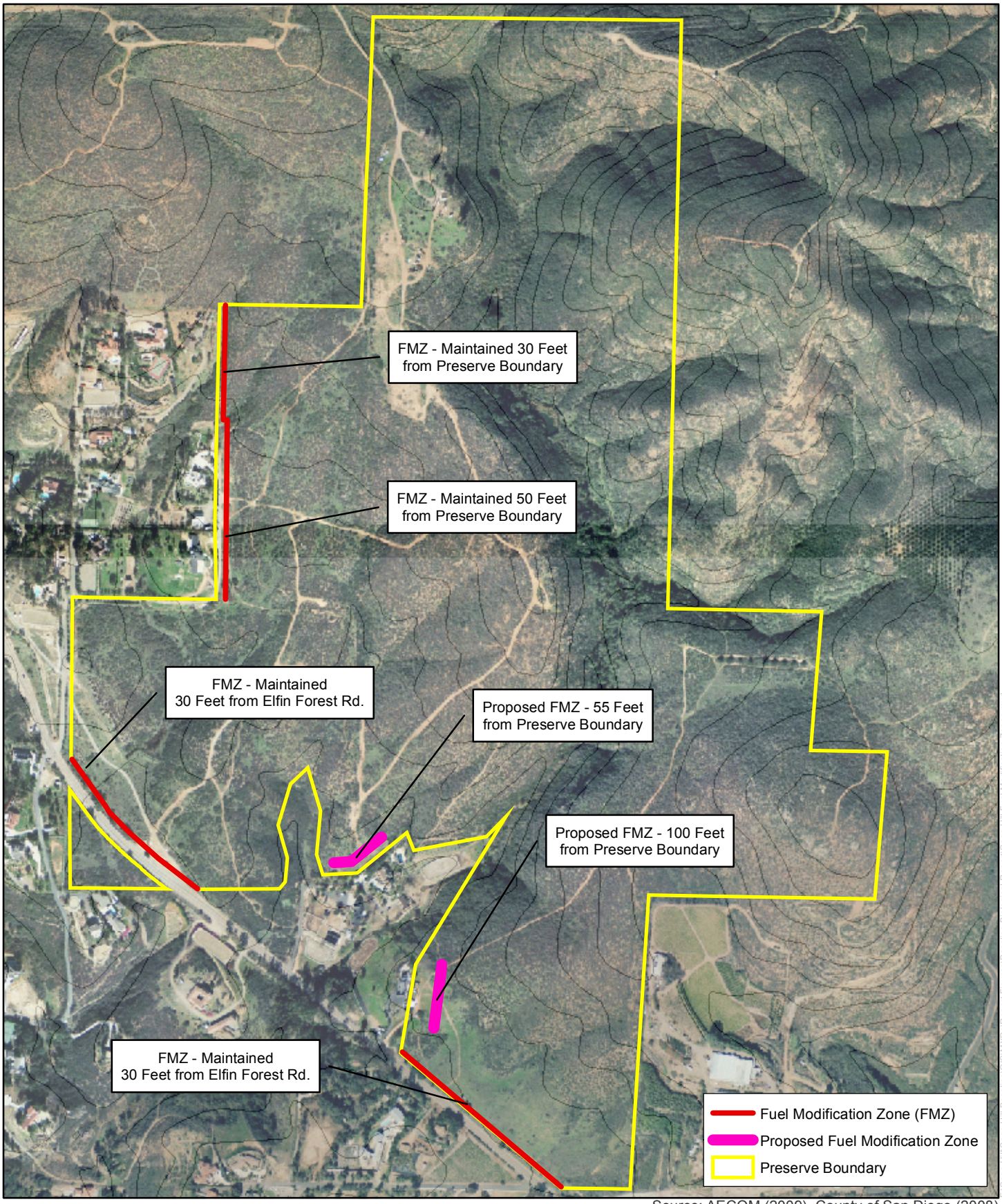
A Vegetation Management Plan is being developed that details proposed restoration opportunities. Of the three vegetation types dominated by invasive non-native plants, two could be restored to native species. The tamarisk patch is proposed to be restored to riparian scrub. The historic nursery site, proposed trail closures and non-native grasslands are proposed to be restored to Diegan coastal sage scrub. The invasive non-native annual grassland areas are a product of annual fuel modification activities, and as such, it would be difficult to restore the fuel modification zone to native grassland. However, focused weed eradication efforts could be used to prevent the fuel modification zones from becoming a source of invasive non-natives for the rest of the Preserve.

5.6 Fire Management

Current fire management activities in the Preserve include 30 to 50 foot fuel modification zones adjacent to homes along the western edge and parts of the southern edge, and a 30-plus foot fuel modification zone along Elfin Forest Road on the northern edge of the road (Figure 14). Additionally, there is one major access road through the Preserve suitable for fire engines. This road allows access to the western half of the Preserve.

Pursuant to current County and CALFIRE requirements, fuel modification zones should be maintained on the Preserve. Such maintenance activities should be sensitive to the fact that these areas support special-status species. Conversely these fuel modification zones are also a major entry point for invasive non-native species. Therefore, fuel modification should include active monitoring for special-status species, as well as suppression of non-native invasive species.

The trails/access roads beginning from the two access points along Elfin Forest Road should be maintained as a fuel-free access road for fire equipment. It may be useful to maintain the trails throughout the Preserve in a condition that allows emergency personnel ready accessThe Elfin Forest/Harmony Grove Fire Department have keys and/or locks to the recently gates to limit illegal off-road vehicle traffic on the Preserve,. Their service area covers the Preserve, with a fire station within a mile of the Preserve on Elfin Forest Road. The City of San Marcos Fire Department serves the area immediately north of the Preserve. Potentially, they should be granted access as well. All entities concerned with fire management on the Preserve, including



Source: AECOM (2009), County of San Diego (2008)

1 inch = 600 feet

0 150 300 600 Feet

Sage Hill Preserve Fuel Modification Zones

AECOM

Figure 14

DPR, CAL FIRE, Community of Elfin Forest/Harmony Grove, and perhaps the City of San Marcos should coordinate to determine what improvements need to be made to the Preserve in order to make emergency response feasible.

Vegetation management for fuels management is problematic within the Preserve. The presence of eleven special-status species requires that any such manipulative action requires careful prior environmental review. Any such future proposal needs to be coordinated with DPR and other county Agencies, CDFG, USFWS, and CAL FIRE. Additionally, DPR should work with these groups to map sensitive biological resources, potential staging areas, and viable routes for fire breaks in advance of any fire, to assist firefighters in avoiding damage to the Preserve during firefighting, to the extent feasible.

5.7 Additional Management Recommendations

5.7.1 Public Access

Currently, there are several locations that the public is using to access the Preserve. Some of these access points will be closed so that access can be directed to official access points that will have appropriate amenities and will be properly maintained. The access point off Caribe Road is proposed to be closed because there is not sufficient public parking at this location.

5.7.2 Fencing

The use of appropriate fencing and gates can serve to control access to the Preserve. Gates can be installed to discourage off-highway vehicle use while providing access to authorized maintenance and safety vehicles.

Temporary barriers may be necessary to control temporary trail closures or redirect visitors when an area is experiencing heightened sensitivity; such as, trail maintenance, restoration, or during the breeding season of a sensitive species. Appropriate fencing or barrier materials should be selected based on location, surroundings, and use. When possible, natural materials that are not a barrier to wildlife and are less visually intrusive than other materials should be used.

Fencing has been installed by DPR at the access points along Elfin Forest Road and along Carib Road. Fencing along Elfin Forest Road is intended to restrict Preserve access by off-road vehicles. The fencing along Carib Road is intended to restrict access from this location because there are no approved parking facilities available in this residential community.

5.7.3 Trails and Access Roads

According to the North County Framework Resource Management Plan, public access is appropriate in selected areas of the Preserve to allow entry for passive recreational purposes and to promote understanding and appreciation of the natural and cultural resources. Multi-use trails are proposed for the Preserve and include hiking, horseback riding, and mountain bike riding. These activities should only take place on designated trails. Existing trails wind through much of the Preserve and offer many viewpoints and scenic vistas; habitat diversity; interesting

geological features; and water sources. The existing trails also vary in length and difficulty, offering a varying level of rigor for visitors to choose from. These trails are being evaluated for use in the Public Access Plan.

There are approximately four miles of existing trails that traverse most of the Preserve, including three larger trails suitable for authorized vehicle access emanating from the existing access points with several smaller trails connecting them. The trail network is composed of existing trails that are currently being heavily used by hikers, and equestrians, with no apparent impact to the biological or cultural resources onsite. No new trails have been proposed at this time; however, it is likely that some portions of existing trails would be closed to inhibit public access as described in 5.7.1 above and for passive restoration.

In addition, the larger trails serve as access roads for DPR staff and police and fire department. The main trails with access off Elfin Forest Road are recommended to be maintained at the current width to support this use.

5.7.4 Signage and Education

Educational signage that serves to highlight or point out elements of the natural environment is an effective way to engage people in interacting with the natural environment. The use of educational and interpretive signage is needed to increase visitor knowledge of the ecology, geology, and history of the Preserve and the surrounding area. Signage also offers an opportunity to educate the public on low-impact visitor techniques and Preserve safety issues. Several viewpoints are proposed in the Sage Hill Preserve Public Acces Plan that provide opportunities for educational signage to address:

- The North County MSCP
- Sensitive Species (i.e., coastal California gnatcatchers)
- Cultural Resources
- Watershed
- Water Quality

In addition, the following is a list of Preserve use restrictions that should be posted on appropriate signage at the staging area. The appropriate local law enforcement agents would be responsible for enforcing the restrictions.

- All trail users should remain on designated trails for protection of adjacent sensitive resources and for their personal safety.
- No unauthorized motorized vehicles shall be driven on any trails within the Preserve. Authorized vehicles include emergency vehicles, Park Rangers' vehicles, or utility maintenance personnel (including SDG&E) vehicles.
- Hunting or discharge of firearms is an incompatible use in the Preserve, except for law enforcement, and/or emergency purposes.
- Poaching or collecting plant or animal species, archaeological or historical artifacts or fossils from the Preserve is prohibited.
- No fishing, swimming, or wading in creeks.
- No Camping (including homeless and itinerant worker camps).
- No Feeding of wildlife.
- No Domestic animals, except horses and leashed dogs.
- No Smoking.

- No Campfires/Open Flames.
- No Off-trail biking, equestrian use, or hiking.
- No Littering.

5.7.5 Litter and Trash Removal

Litter and trash dumping are currently not an issue within the Preserve; although there are miscellaneous materials in the historic nursery location that could be removed. However, illegal dumping has occurred at the dirt lot along Elfin Forest Road including construction material and a refrigerator. Signage in this area and routine patrolling will help reduce illegal dumping; however, occasional clean up should be anticipated as part of Preserve maintenance activities.

5.7.6 Illegal Off-road Activity

The Preserve is intended for passive recreational activities and recreational off-road vehicle use is prohibited. Illegal off-road activity can damage cultural sites, impact air quality, increase erosion, degrade habitat and create excessive noise that may impact breeding wildlife. Illegal off-road activity including 4x4 vehicles and motorcycles were observed during the field effort for this report. Signange and fencing at the Preserve access points is recommended to be designed to inhibit illegal off-road activity.

5.7.7 Hydrology Management

The Preserve is within the Escondido Creek Watershed, which is part of the Carlsbad Hydrologic Unit (CWN, 2009). An unnamed tributary of Escondido Creek bisects the Preserve north to south (Figure 5). The creek was historically an intermittent blue-line stream. Currently the primary watersource for the tributary appears to be nuisance run-off from the adjacent development, which flowed throughout the year in 2009. Some undercutting was observed where historic dams were installed along the creek, potentially to create ponds as a water source for livestock. The condition of the tributary should be monitored, particularly as development increases in the watershed to the northwest of the Preserve. High year-around flows of irrigation water can cause significant channeling of the creek, resulting in faster flow and less percolation.

5.7.8 Emergency and Safety Issues

Policies regarding allowable activities on the Preserve are important for personal safety as well as to maintain the condition of the Preserve. Section 5.7.4 lists the use restrictions including no fire arms, no camping, no swimming, and no recreational off-road vehicle use. These policies should be communicated through appropriate signage and are ultimately enforced by the appropriate law enforcement agency, including DPR staff and the San Diego County Sheriff Department. In addition, the Elfin Forest Volunteer Fire Department, located southest of the Preserve along Elfin Forest Road, would be among the first responders should an emergency situation occur on the Preserve.

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Appendix A Vegetation Data and Estimated Cover Calculation

As stated in section 3.1, surveys of the Sage Hill site followed used a simplified version of the CNPS rapid assessment protocol (CNPS 2007), where cover was estimated for the vegetation as a whole, and for the most common individual species. Cover was estimated in the classes shown in Table 2: <1 percent, 1-5 percent, 5-15 percent, 15-25 percent, 25-50 percent, 50-75 percent, and 75-100 percent. These classes and similar categories have a long history in vegetation science (Kent and Coker 1992). While they are imprecise, the advantage is that independent observers can derive the same estimates from the same vegetation. Those observers may argue whether a species 55 percent or 60 percent of a large area, they will agree that the species covers somewhere between half and three-quarters of the site.

Table A. Demonstration of Estimated Cover Calculation

	Cover class (Midpoint)									
	<1	**1-5**	**5-15**	**15-25**	**25-50**	**50-75**	**75-100**			**Est.**
Species	(0.001)	(0.025)	(0.100)	(0.200)	(0.385)	(0.625)	(0.855)	**Acres**	**%**	**Cover**
Black sage					4.55			1.75	38.50%	25-50%
Wart stemmed ceanothus					3.15			1.21	26.66%	25-50%
Coastal sagebrush	3.15			1.40				0.28	6.22%	5-15%
Laurel sumac			1.40					0.14	3.07%	1-5%
Fringed spineflower	3.15							0.00	0.07%	<1%
golden-yarrow	3.15							0.00	0.07%	<1%
two-color everlasting	3.15							0.00	0.07%	<1%
Poison oak	1.40							0.00	0.03%	<1%
Red brome*	1.40	3.15						0.08	1.76%	1-5%
Tocalote*	1.40							0.00	0.03%	<1%
Fountain grass*	1.40							0.00	0.03%	<1%
* non-native						**Total Acres**		**3.48**		

The estimated cover of individual species within each polygon was multiplied by the proportional area, and summed across all polygons of that vegetation type (Table A). For all but the <1 percent class, the process involved determining the midpoint of each cover class. For example, the midpoint of the 5-15 percent cover class is 10 percent. For the <1 percent class, the multiplier of 0.001 was used, rather than 0.005. The reason is that most plants in the <1 percent class are present as scattered individuals. However, 0.005 multiplied by a large area can result in an unrealistically large cover estimate for a species that is only sparingly present. Hence 0.001 was adopted, to represent the low area covered.

The percent cover per species for each vegetation type was determined by dividing the number of acres covered per species by the number of acres in that vegetation type (from Table 1, main text). Since this provides a falsely accurate result (e.g. black sage covering 38.5 percent of the vegetation in Table A), the resulting percentage was converted to the appropriate cover class (e.g. 38.5 percent becomes 25-50 percent).

The tables below present the estimated covers for the eight vegetation types found at Sage Hill: Diegan coastal sage scrub (Table B), southern maritime chaparral (Table C), coastal sage-chaparral scrub (Table D), coastal and valley freshwater marsh (Table E), southern coast live oak riparian forest (Table F), non-native grassland (Table G), disturbed habitat (Table H), and tamarisk scrub (Table I). Scientific names are those used by San Diego County (County of San Diego 2006). Where necessary, current scientific names are shown after common names. Non-native species are marked with an asterisk (*), and for convenience, they follow the native species in all tables.

Table B. Diegan Coastal Sage Scrub Species and Cover

Species	Estimated Cover
Salvia mellifera (Black sage)	25-50%
Malosma laurina (Laurel sumac)	5-15%
Eriogonum fasciculatum (California buckwheat)	5-15%
Artemisia californica (Coastal sagebrush)	5-15%
Ceanothus verrucosus (Wart stemmed lilac)	5-15%
Mimulus aurantiacus (Bush monkeyflower)	1-5%
Deinandra fasciculata (Fascicled tarplant)	<1%
Eriophyllum confertiflorum (golden-yarrow)	<1%
Baccharis pilularis (Coyotebrush)	<1%
Baccharis salicifolia (Mule fat)	<1%
Calochortus splendens (splendid mariposa lily)	<1%
Calystegia macrostegia (San Diego morning glory)	<1%
Cneoridium dumosum (Bush rue)	<1%
Cuscuta californica (Dodder)	<1%
Eleocharis montevidensis (Dombey's spikerush)	<1%
Galium angustifolium (Narrow-leafed bedstraw)	<1%
Hazardia squarrosa (Southern sawtooth goldenbush)	<1%
Lotus scoparius (Deerweed)	<1%
Malacothamnus fasciculatus (Bush mallow)	<1%
Nassella lepida (Slender needlegrass)	<1%
Nassella pulchra (Purple needlegrass)	<1%
Sisyrinchium bellum (Blue-eyed grass)	<1%
Yucca whipplei (Century plant, =*Hesperoyucca whipplei*)	<1%
Bromus madritensis ssp. *rubens* (Red brome)*	1-5%
Acacia cyclops (Cyclops acacia)*	<1%
Asphodelus fistulosus (Onionweed)*	<1%
Avena fatua (Wild oats)*	<1%
Brassica nigra (Black mustard)*	<1%
Bromus hordeaceus (Soft chess)*	<1%
Carduus pycnocephalus (Italian thistle)*	<1%
Centaurea melitensis (Tocalote)*	<1%
Cortaderia selloana (Pampasgrass)*	<1%
Erodium cicutarium (Filaree)*	<1%
Erodium moschatum (Filaree)*	<1%
Foeniculum vulgare (Fennel)*	<1%
Hirschfeldia incana (Mediterannean mustard)*	<1%
Hypochaeris glabra (Smooth cat's ear)*	<1%
Melilotus indica (Sour clover)*	<1%
Olea europaea (Olive)*	<1%
Pennisetum setaceum (Fountain grass)*	<1%
Picris echioides (Bristly ox-tongue)*	<1%
Vulpia myuros (Rat-tail fescue)*	<1%

Table C. Southern Maritime Chaparral Species and Cover

Species	Estimated Cover
Ceanothus verrucosus (Wart stemmed ceanothus)	75-100%
Salvia mellifera (Black sage)	5-15%
Adenostoma fasciculatum (Chamise)	<1%
Artemisia californica (Coastal sagebrush)	<1%
Bloomeria crocea (Common goldenstar)	<1%
Clarkia purpurea ssp. *quadrivulnera* (Four spot clarkia)	<1%
Comarostaphylis diversifolia ssp. *diversifolia* (Summer holly)	<1%
Eriogonum fasciculatum (California buckwheat)	<1%
Heteromeles arbutifolia (Toyon)	<1%
Malosma laurina (Laurel sumac)	<1%
Quercus agrifolia (Coast live oak)	<1%
Quercus X *acutidens* (Torrey's scrub oak)	<1%
Rhamnus crocea (Spiny redberry)	<1%
Bromus hordeaceus (Soft chess)*	1-5%
Bromus madritensis ssp. *rubens* (Red brome)*	1-5%
Asphodelus fistulosus (Onionweed)*	<1%
Avena fatua (Wild oats)*	<1%
Brassica nigra (Black mustard)*	<1%
Bromus diandrus (Ripgut grass)*	<1%
Centaurea melitensis (Tocalote)*	<1%
Chrysanthemum coronarium (Crown daisy, =Glebionis coronarium)*	<1%
Erodium cicutarium (Filaree)*	<1%
Opuntia ficus-indica (Indian fig)*	<1%
Vulpia myuros (Rat-tail fescue)*	<1%

Table D. Coastal Sage-Chaparral Scrub Species and Cover

Species	Estimated Cover
Salvia mellifera (Black sage)	25-50%
Ceanothus verrucosus (Wart stemmed ceanothus)	25-50%
Artemisia californica (Coastal sagebrush)	5-15%
Malosma laurina (Laurel sumac)	1-5%
Chorizanthe fimbriata var. *laciniata* (Fringed spineflower)	<1%
Eriophyllum confertiflorum (golden-yarrow)	<1%
Gnaphalium bicolor (two-color everlasting, =*Pseudognaphalium bioletii*)	<1%
Toxicodendron diversilobum (Poison oak)	<1%
Bromus madritensis ssp. *rubens* (Red brome)*	1-5%
Centaurea melitensis (Tocalote)*	<1%
Pennisetum setaceum (Fountain grass)*	<1%

Table E. Coastal and Valley Freshwater Marsh Species and Cover

Species	Estimated Cover
Carex spissa (San Diego sedge)	25-50%
Salix lasiolepis (Arroyo willow)	15-25%
Malosma laurina (Laurel sumac)	5-15%
Rorippa nasturtium-aquaticum (Water cress)	5-15%
Baccharis salicifolia (Mule fat)	5-15%
Typha latifolia (Cattail)	5-15%
Toxicodendron diversilobum (Poison oak)	1-5%
Artemisia palmeri (Palmer's sagewort)	1-5%
Cyperus eragrostis (Tall flatsedge)	<1%
Veronica peregrina var. *xalapensis* (Meixcan speedwell)	<1%
Scirpus pungens (Common three-square, =Schoenoplectus pungens)	<1%
Rumex crispus (Curly dock)*	1-5%
Mentha spicata (Spearmint)	1-5%
Picris echioides (Bristly ox-tongue)*	<1%
Polypogon monspeliensis (Annual beard grass)*	<1%

Table F. Southern Coast Live Oak Riparian Forest Species and Cover

Scientific Name	Estimated Cover
Toxicodendron diversilobum (Poison oak)	75-100%
Quercus agrifolia (Coast live oak)	50-75%
Salix lasiolepis (Arroyo willow)	1-5%
Calystegia macrostegia (San Diego morning glory)	<1%
Ceanothus verrucosus (Wart stemmed ceanothus)	<1%
Cyperus eragrostis (Tall flatsedge)	<1%
Hazardia squarrosa (Southern sawtooth goldenbush)	<1%
Heteromeles arbutifolia (Toyon)	<1%
Lonicera subspicata var. *denudata* (Southern honeysuckle)	<1%
Malosma laurina (Laurel sumac)	<1%
Rhus integrifolia (lemonadeberry)	<1%
Ribes malvaceum (Chaparral currant)	<1%
Ribes speciosum (Fuchsia-flowered gooseberry)	<1%
Rorippa nasturtium-aquaticum (Water cress)	<1%
Sambucus mexicana (Blue elderberry, =*Sambucus nigra* ssp. *caerulea*)	<1%
Bromus madritensis ssp. *rubens* (Red brome)*	<1%
Cortaderia selloana (Pampasgrass)*	<1%
Foeniculum vulgare (Fennel)*	<1%
Piptatherum miliaceum (Smilo grass)*	<1%

Table G. Non-Native Grassland Species and Cover

Species	Estimated Cover
Artemisia californica (Coastal sagebrush)	1-5%
Malosma laurina (Laurel sumac)	<1%
Eriogonum fasciculatum (California buckwheat)	<1%
Deinandra fasciculata (Fascicled tarplant)	<1%
Salvia mellifera (Black sage)	<1%
Vicia americana var. *americana* (American vetch)	<1%
Baccharis pilularis (Coyotebrush)	<1%
Hazardia squarrosa (Southern sawtooth goldenbush)	<1%
Quercus agrifolia (Coast live oak)	<1%
Calystegia macrostegia (San Diego morning glory)	<1%
Eschscholzia californica (California poppy)	<1%
Ambrosia psilostachya (Western ragweed)	<1%
Lotus scoparius (Deerweed)	<1%
Nassella pulchra (Purple needlegrass)	<1%
Sisyrinchium bellum (Blue-eyed grass)	<1%
Heterotheca grandiflora (Telegraph weed)	<1%
Erodium cicutarium (Filaree)*	5-15%
Bromus madritensis ssp. rubens (Red brome)*	5-15%
Avena fatua (Wild oats)*	1-5%
Bromus hordeaceus (Soft chess)*	1-5%
Brassica nigra (Black mustard)*	1-5%
Bromus diandrus (Ripgut grass)*	<1%
Carpobrotus edulis (Hottentot-fig)*	<1%
Centaurea melitensis (Tocalote)*	<1%
Cynara cardunculus (Artichoke thistle)*	<1%
Erodium moschatum (Filaree)*	<1%
Foeniculum vulgare (Fennel)*	<1%
Hirschfeldia incana (Mediterannean mustard)*	<1%
Hordeum murinum (Glaucous barley)*	<1%
Hypochaeris glabra (Smooth cat's ear)*	<1%
Lolium multiflorum (Italian ryegrass)*	<1%
Pennisetum setaceum (Fountain grass)*	<1%
Rumex crispus (Curly dock)*	<1%
Salsola tragus (Russian thistle)*	<1%
Schinus molle (Peruvian pepper tree)*	<1%
Vulpia myuros (Rat-tail fescue)*	<1%

Table H. Disturbed Habitat Species and Cover

Species	Estimated Cover
Ceanothus verrucosus (Wart stemmed ceanothus)	<1%
Heteromeles arbutifolia (Toyon)	<1%
Malosma laurina (Laurel sumac)	<1%
Quercus agrifolia (Coast live oak)	<1%
Baccharis pilularis (Coyotebrush)	<1%
Deinandra fasciculata (Fascicled tarplant)	<1%
Chrysanthemum coronarium (Crown daisy, =*Glebionis coronarium*)*	25-50%
Brassica nigra (Black mustard)*	15-25%
Eucalyptus globulus (Tasmanian blue gum)*	1-5%
Agave americana (Agave)*	<1%
Nicotiana glauca (Tree tobacco)*	<1%
Parkinsonia sp. (Palo verde)*	<1%
Pinus sp (Pine)*	<1%
Vinca major (Periwinkle)*	<1%
Bromus madritensis ssp. *rubens* (Red brome)*	<1%
Centaurea melitensis (Tocalote)	<1%
Foeniculum vulgare (Fennel)*	<1%
Picris echioides (Bristly ox-tongue)*	<1%
Rumex crispus (Curly dock)*	<1%

Table I. Tamarisk Scrub Species and Cover

Species	Estimated Cover
Salix lasiolepis (Arroyo willow)	5-15%
Tamarix ramosissima (Tamarisk)*	50-75%
Carduus pycnocephalus (Italian thistle)*	5-15%
Chrysanthemum coronarium (Crown daisy, =*Glebionis coronarium*)*	1-5%
Anagallis arvensis (Scarlet pimpernel)*	<1%
Bromus madritensis ssp. *rubens* (Red brome)*	<1%
Eucalyptus globulus (Tasmanian blue gum)*	<1%
Foeniculum vulgare (Fennel)*	<1%
Galium aparine (Common bedstraw)*	<1%

Appendix B Vascular Plant Species Observed within Sage Hill Preserve

Lycophytes
Selaginellaceae
- spike moss (*Selaginella bigelovii*)

Ferns
Pteridaceae
- lip fern (*Cheilanthes clevelandii*)

Conifers
Pinaceae
- Canary Island pine (*Pinus canariensis*)*
- Torrey pine (*Pinus torreyana* – planted)

Magnoliids
Saururaceae
- yerba mansa (*Anemopsis californica*)

Monocots
Agavaceae
- agave (*Agave americana*)*
- century plant (*Hesperoyucca whipplei*)

Asphodelaceae
- onionweed (*Asphodelus fistulosus*)*

Cyperaceae
- San Diego sedge (*Carex spissa*)
- tall flatsedge (*Cyperus prob eragrostis*)
- Dombey's spikerush (*Eleocharis montevidensis*)
- California bulrush (*Scirpus californicus*)

Hyacinthaceae
- amole, soap plant (*Chlorogalum parviflorum*)

Iridaceae
- blue-eyed grass (*Sisyrinchium bellum*)

Juncaceae
- rush (*Juncus* sp.)

Liliaceae
- Weed's mariposa lily (*Calochortus weedii* var. *weedii*)
- splendid mariposa lily (*Calochortus splendens*)

Poaceae
- wild oats (*Avena fatua*)*
- ripgut grass (*Bromus diandrus*)*
- soft chess (*Bromus hordeaceus*)*
- red brome (*Bromus madritensis* ssp. *rubens*)*
- pampasgrass (*Cortaderia selloana*)*
- glaucous barley (*Hordeum murinum*)*
- giant ryegrass (*Leymus condensatus*)
- Italian ryegrass (*Lolium multiflorum*)*
- slender needlegrass (*Nassella lepida*)
- purple needlegrass (*Nassella pulchra*)
- fountain grass (*Pennisetum setaceum*)*
- smilo grass (*Piptatherum miliaceum*)*
- annual beard grass (*Polypogon monspeliensis*)*
- rat-tail fescue (*Vulpia myuros*)*

Themidaceae
- common goldenstar (*Bloomeria crocea*)
- blue dicks (*Dichelostemma capitatum*)

Typhaceae

cattail (*Typha latifolia*)

Eudicots

Adoxaceae
- blue elderberry (*Sambucus nigra* ssp. *caerulea*)

Aizoaceae
- hottentot-fig (*Carpobrotus edulis*)*

Anacardiaceae
- laurel sumac (*Malosma laurina*)
- lemonadeberry (*Rhus integrifolia*)
- sugar bush (*Rhus ovata*)
- Peruvian pepper tree (*Schinus molle*)*
- poison oak (*Toxicodendron diversilobum*)

Apiaceae
- fennel (*Foeniculum vulgare*)*
- little-jim sanicle (*Sanicula arguta*)
- southern tauschia (*Tauschia arguta*)

Apocynaceae
- periwinkle (*Vinca major*)*

Asteraceae
- western ragweed (*Ambrosia psilostachya*)
- coastal sagebrush (*Artemisia californica*)
- Palmer's sagewort (*Artemisia palmeri*)
- coyotebrush (*Baccharis pilularis*)
- mule fat (*Baccharis salicifolia*)
- italian thistle (*Carduus pycnocephalus*)*
- tocalote (*Centaurea melitensis*)*
- artichoke thistle (*Cynara cardunculus*)*
- fascicled tarplant (*Deinandra fasciculata*)
- african daisy (*Dimorphotheca pluvialis*)*
- common encelia (*Encelia californica*)
- golden-yarrow (*Eriophyllum confertiflorum* var. *confertiflorum*)
- crown daisy (*Glebionis coronarium*)*
- green everlasting (*Gnaphalium californicum*)
- southern sawtooth goldenbush (*Hazardia squarrosa*)
- cretan weed (*Hedypnois cretica*)*
- telegraph weed (*Heterotheca grandiflora*)
- California-aster (*Lessingia filaginifolia* var. *filaginifolia*)
- bristly ox-tongue (*Picris echioides*)*
- two-color everlasting (*Pseudognaphalium bioletii*)
- russian thistle (*Salsola tragus*)*
- common groundsel (*Senecio vulgaris*)*

Boraginaceae
- rancher’s fiddleneck (*Amsinckia menziesii*)
- cryptantha (*Cryptantha* sp.)
- phacelia (*Phacelia* sp.)
- popcornflower (*Plagiobothrys* sp.)
- black mustard (*Brassica nigra*)*
- mediterannean mustard (*Hirschfeldia incana*)*
- peppergrass (*Lepidium* spp.)
- water cress (*Rorippa nasturtium-aquaticum*)

Cactaceae
- indian fig (*Opuntia ficus-indica*)*
- coast prickly-pear (*Opuntia littoralis*)

Caprifoliaceae
- southern honeysuckle (*Lonicera subspicata* var. *denudata*)

Caryophyllaceae
- indian pink (*Silene laciniata*)

Chenopodiaceae
- goosefoot (*Chenopodium* sp.)

Cistaceae
- peak rush-rose (*Helianthemum scoparium*)

Convolvulaceae
- San Diego morning glory (*Calystegia macrostegia*)
- bindweed, orchard morning-glory (*Convolvulus arvensis*)*
- dodder (*Cuscuta californica*)

Crassulaceae
- pygmy-weed (*Crassula connata*)
- chalk lettuce (*Dudleya pulverulenta*)

Cucurbitaceae
- wild cucumber (*Marah macrocarpus* var. *macrocarpus*)

Ericaceae
- summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*)

Euphorbiaceae
- dove weed (*Eremocarpus setigerus*)

Fabaceae
- cyclops acacia (*Acacia cyclops*)*
- wild sweet pea (*Lathyrus vestitus* var. *alefeldii*)
- deerweed (*Lotus scoparius*)
- arroyo lupine (*Lupinus succulentus*)
- sour clover (*Melilotus indica*)*
- plume albizia (*Paraserianthes lopantha*)*
- Mexican palo verde (*Parkinsonia aculeata*)*
- american vetch (*Vicia americana* var. *americana*)

Fagaceae
- coast live oak (*Quercus agrifolia*)
- Torrey's scrub oak (*Quercus* X *acutidens*)

Geraniaceae
- filaree (*Erodium cicutarium*)*
- filaree (*Erodium moschatum*)*

Grossulariaceae
- chaparral currant (*Ribes malvaceum*)
- fuchsia-flowered gooseberry (*Ribes speciosum*)

Lamiaceae
- horehound (*Marrubium vulgare*)
- spearmint (*Mentha spicata*)*
- white sage (*Salvia apiana*)
- black sage (*Salvia mellifera*)

Malvaceae
- bush mallow (*Malacothamnus fasciculatus*)

Myrtaceae
- bottlebrush (*Callistemon citrinus*)*
- Tasmanian blue gum (*Eucalyptus globulus*)*
- silver dollar gum (*Eucalyptus polyanthemos*)*
- red iron-bark (*Eucalyptus sideroxylon*)*

Nyctaginaceae
- wishbone bush (*Mirabilis californica*)

Oleaceae
- olive (*Olea europaea*)*

Onagraceae
- four spot clarkia (*Clarkia purpurea* ssp. *quadrivulnera*)

willow-herb (*Epilobium ciliatum*.)

Orobanchaceae
- indian paint brush (*Castilleja affinis* ssp. *affinis*)
- purple owl's clover (*Castilleja exserta*)

Oxalidaceae
- bermuda buttercup (*Oxalis pes-caprae*)*

Paeoniaceae
- peony (*Paeonia californica*)

Papaveraceae
- California poppy (*Eschscholzia californica*)
- Coulter's matilija poppy (*Romneya coulteri,* planted)

Phrymaceae
- bush monkeyflower (*Mimulus aurantiacus*)

Plantaginaceae
- dot-seed plantain (*Plantago erecta*)
- mexican speedwell (*Veronica peregrina* var. *xalapensis*)

Polygonaceae
- fringed spineflower (*Chorizanthe fimbriata* var. *laciniata*)
- California buckwheat (*Eriogonum fasciculatum*)
- sheep sorrel (*Rumex acetosella*)
- curly dock (*Rumex crispus*)*

Portulaceae
- scarlet pimpernel (*Anagallis arvensis*)*
- red maids (*Calandrinia ciliata*)
- miner's lettuce (*Claytonia perfoliata*)

Rhamnaceae
- wart stemmed lilac (*Ceanothus verrucosus*)
- spiny redberry (*Rhamnus crocea*)

Rosaceae
- chamise (*Adenostoma fasciculatum*)
- toyon (*Heteromeles arbutifolia*)

Rubiaceae
- narrow-leafed bedstraw (*Galium angustifolium*)
- common bedstraw (*Galium aparine*)*

Rutaceae
- bush rue (*Cneoridium dumosum*)
- white sapote (*Casimiroa edulis*)*

Salicaceae
- arroyo willow (*Salix lasiolepis*)

Simaroubaceae
- tree-of-heaven (*Ailanthus altissima*)*

Solanaceae
- tree tobacco (*Nicotiana glauca*)*
- purple nightshade (*Solanum xanti*)

Tamaricaceae
- tamarisk (*Tamarix ramosissima*)*

Violaceae
- johnny-jump-up (*Viola pedunculata*)

* = non-native

Appendix C Invasive Plant Species Summary

Species		US/CA Weed List	CAL IPC Rating	Imp	Inv Pot	Dis	Distribution (Veg Type: Polygon)		
Common Name	Scientific Name						Throughout	Openings	Trail Edge
Onionweed	**Asphodelus fistulosus*	NW, Q	M*	B	A	C	Dist: 33, 70	Chap: 1	Chap: 45, 56, 77, CSS: 40, Dist: 63
Artichoke thistle	**Cynara cardunculus*	B	M	B	B	B	Grass: 14		
Italian thistle	**Carduus pycnocephalus*	C	M	B	B	A	Grass: 12, 70, Tamarisk: 60		CSS: 02
Fountain grass	**Pennisetum setaceum*	C, Q	M	B	B	B	CSS: 13, 22, Dist: 33, Grass: 12, 14, 71		CSS: 02, CSS-Chap: 43
Tamarisk	**Tamarix ramosissima*		H	A	A	A	Tamarisk: 60		
Pampas grass	**Cortaderia selloana*		H	A	A	B	Dist: 66, Grass: 12	CSS: 72, Marsh: 76	CSS: 28, Oak 10, 11
Red brome	*Bromus madritensis* ssp. *rubens*		H	A	B	A	CSS: 07, 13, Dist: 34, 58, 66, Grass: 09, 12, 17, 48, 70, Tamarisk: 60	Chap: 01, CSS: 08, 18, 35, 44, 49, 67, 72	Chap: 05, 41, 45, 56, 77, CSS: 02, 23, 32, 40, 42, 47, 68, 69, 73, 74, 75, CSS-Chap: 39, 43, Oak: 11
Hottentot-fig	**Carpobrotus edulis*		H	A	B	A	Grass: 17		
Fennel	*Foeniculum vulgare*		H	A	B	A	Dist: 34, 66, Grass: 09, 12, 48, 70, Tamarisk: 60	CSS: 08, Marsh: 76	CSS: 28, 40, Oak: 11
Wild oats	*Avena fatua*		M	B	B	A	CSS: 07, 22, Dist: 58, Grass: 09, 12, 14, 71	Chap: 01, CSS: 08, 18, 35, 44, 67, 72	Chap: 56, 77, CSS: 02, 28,
Black mustard	*Brassica nigra*		M	B	B	A	CSS: 07, 22, Dist: 34, 58, 66, Grass: 9, 12, 14, 48, 70, 71	Chap: 01, CSS: 08, 44, 49, 67	Chap: 45, 56, 77, CSS: 02, 40, 47, 68, 69
Ripgut brome	*Bromus diandrus*		M	B	B	A	Grass: 14, 71		Chap: 05, 56, 77
Mediterannean mustard	*Hirschfeldia incana*		M	B	B	A	Grass: 17		CSS: 32, 73, 74, 75
Italian ryegrass	*Lolium multiflorum*		M	B	B	A	Grass: 14, 71		
Rat-tail fescue	*Vulpia myuros*		M	B	B	A	CSS: 22, Grass: 12		Chap: 05, CSS: 02, 40, 42
Tree-of-Heaven	**Ailanthus altissima*		M	B	B	B		Chap: 1, CSS: 72	Oak: 10

Appendix C Invasive Plant Species Summary

Species		US/CA Weed List	CAL IPC Rating	Imp	Inv Pot	Dis	Distribution (Veg Type: Polygon)		
Common Name	Scientific Name						Throughout	Openings	Trail Edge
Tocalote	*Centaurea melitensis*		M	B	B	B	CSS: 13, 22, Dist 34, 66, Grass: 12, 48, 70	CSS: 08, 49	Chap: 05, 45, 56, 77, CSS: 02, 23, 28, 32, 47, 68, 69, 73, 74, 75, CSS-Chap: 43
Crown daisy, =*Glebionis coronariium*	**Chrysanthemum coronarium*		M	B	B	B	Dist: 33, 34, 64, 66, Tamarisk: 60		Chap: 45
Tasmanian blue gum	*Eucalyptus globulus*		M	B	B	B	Dist: 33, 34, 64, Grass: 12, 14, 70, 71, Tamarisk: 60	CSS: 18	Chap: 41, CSS: 40, CSS-Chap: 43
Tree tobacco	*Nicotiana glauca*		M	B	B	B	Dist: 33, 64	Marsh: 76	
Periwinkle	*Vinca major*		M	B	B	B	Dist: 33, 64		
Mexican fan palm	**Washingtonia robusta*		M*	B	B	C	Dist: 33 Grass: 14		
Soft chess	*Bromus hordeaceus*		L	B	C	A	CSS: 07, 22, Dist: 58, Grass: 14, 17, 48, 70, 71	Chap: 01, CSS: 08, 44, 67	CSS: 23, 47, 68, 69
Smooth cat's ear	*Hypochaeris glabra*		L	C	B	B	CSS: 13, Grass: 17		
Olive	*Olea europaea*		L	C	B	B			CSS: 08
Bristly ox-tongue	*Picris echioides*		L	C	B	B	Dist: 34, 66, Marsh: 61	Marsh: 76	CSS: 28
Smilo grass	*Piptatherum miliaceum*		L	C	B	B			Oak: 11
Russian thistle	*Salsola tragus*		L	C	B	B	Grass: 17		
Peruvian pepper tree	*Schinus molle*		L	C	B	B	Grass: 14		
Filaree	*Erodium cicutarium*		L	C	C	A	CSS: 22, Grass: 14, 17, 48, 70, 71	CSS: 08	Chap: 56, 77, CSS: 02, 23
Curly dock	*Rumex crispus*		L	C	C	A	Dist: 34, 66, Grass: 12, Marsh: 61	Marsh: 76	
Annual beard grass	*Polypogon monspeliensis*		L	C	C	B	Marsh: 61		
Filaree	*Erodium moschatum*			D	C	A	CSS: 13, Grass: 12		
Cyclops acacia	*Acacia cyclops*								CSS: 02
Agave	*Agave americana*						Dist: 33, 64		
Scarlet pimpernel	*Anagallis arvensis*						Tamarisk: 60		
Red iron-bark	*Eucalyptus sideroxylyon*						Dist: 33		
Common bedstraw	*Galium aparine*						Tamarisk: 60		
Glaucus barley	*Hordeum murinum*						Grass: 48, 70		
Sour clover	*Melilotus*							Marsh: 76	CSS: 28

Appendix C Invasive Plant Species Summary

Species		US/CA Weed List	CAL IPC Rating	Imp	Inv Pot	Dis	Distribution (Veg Type: Polygon)		
Common Name	Scientific Name						Throughout	Openings	Trail Edge
	indica								
Spear mint	*Mentha spicata*							Marsh: 76	
Indian fig	*Opuntia ficus-indica*								Chap: 45
Mexican palo verde	*Parkinsonia aculeata*						Dist: 33		
plume albizia	*Periserianthes lopantha*						Dist: 66		
canary Island Pine	*Pinus canariensis*						Dist: 64		

Species: * before the species means that the species is discussed further and mapped in Figure 10.

US/CA weed list codes : NW: Federal Noxious Weed (USDA 2006): **Q:** California quarantine list (CDFA 2003): **A:** California list A noxious weed (CDFA 2003): **B:** California list B noxious weed (CDFA 2003): **C:** California list C noxious weed (CDFA 2003)

CAL-IPC Rating (CAL-IPC 2006)
* = Species has "Alert" status with CAL-IPC
H = High. Species causes major biotic and physical impacts, they can spread rapidly, and they are generally widely distributed.
M = Moderate. Species has substantial and apparent biotic and physical impacts, have moderate to high rates of dispersal, and their range varies from limited to widespread.
L = Limited. These species are invasive but either have limited impacts or are insufficiently known to justify a higher rating. They have low to moderate rates of dispersal, and a limited range, but may be locally persistent and problematic.

Imp = Ecological impact (CAL-IPC 2006)
Inv Pot = Invasiveness potential (CAL-IPC 2006)
Dis = Distribution within California (CAL-IPC 2006)
These categories are coded as A=high/widespread, B=moderate, C=limited, D=none.
Vegetation Type Codes: Chap = Southern Maritime Chaparral: **CSS** = Diegan Coastal Sage Scrub: **CSS-Chap** = Coastal sage-Chaparral Scrub: **Dist** = Disturbed Habitat: **Grass** = Non-Native grassland: **Marsh** = Coastal and Valley Freshwater Marsh: **Oak** = Southern Coast Live Oak Riparian Forest: **Tamarisk** = Tamarisk Scrub
Numbers: The numbers 1-71 refer to the polygons in Figure 1. For example "1" is polygon V001.

Appendix D Wildlife Species Within Sage Hill Preserve

Invertebrates

Insects

Hesperidae	
Erynnis funeralis	Funeral duskywing
Lycaenidae	
Brephidium exile	Pygmy blue
Glaucophsyche lygdamus australis	Southern blue
Plebejus acmon	Acmon blue
Nymphalidae	
Coenonympha tullia california	California ringlet
Junonia coenia	Common buckeye
Vanessa sp.	Painted lady
Papilionidae	
Papilio rutulus	Western tiger swallowtail
Pieridae	
Anthocharis sara	Sara Orange tip
Colias eurydice	California dogface
Pieris rapae	Cabbage white
Pontia protodice	Checkered/Common White
Riodinidae	
Apodemia mormo virgulti	Behr's metalmark

Vertebrates

Amphibians

Bufonidae	
Bufo boreas halophilus	California Toad
Spea hammondii	Western Spadefoot
Hylidae	
Hyla regilla	Pacific Treefrog
Ranidae	
Rana catesbeiana	Bullfrog

Reptiles

Phrynosomatidae	
Phrynosoma coronatum	Coast Horned Lizard
Sceloporus occidentalis	Western Fence Lizard
Uta stansburiana	Common Side-blotched Lizard
Scincidae	
Eumeces skiltonianus	Western Skink
Teiidae	
Cnemidophorus tigris stejengeri	Coastal California Whiptail
Anguidae	
Elgaria multicarinata webii	Southern Alligator Lizard
Colubridae	
Hipsiglena torquata	Night Snake

Lampropeltus getulus californiae	California Kingsnake
Masticophis lateralis	California Whipsnake

Birds

Odontophoridae	
Callipepla californica	California Quail
Ardeidae	
Butorides virescens	Green Heron
Accipitridae	
Elanus leucurus	White-tailed Kite
Accipiter cooperii	Cooper's Hawk
Buteo lineatus	Red-shouldered Hawk
Buteo jamaicensis	Red-tailed Hawk
Rallidae	
Fulica americana	American Coot
Columbidae	
Zenaida macroura	Mourning Dove
Tytonidae	
Tyto alba	Common Barn Owl
Strigidae	
Otus kennicottii	Western Screech Owl
Bubo virginianus	Great Horned Owl
Caprimulgidae	
Phalaenoptilus nuttallii	Common Poorwill
Trochilidae	
Archilochus alexandri	Black-chinned Hummingbird
Calypte anna	Anna's Hummingbird
Alcedinidae	
Ceryle alcyon	Belted Kingfisher
Picidae	
Melanerpes formicivorus	Acorn Woodpecker
Picoides nuttallii	Nuttall's Woodpecker
Tyrannidae	
Empidonax difficilis	Pacific-slope Flycatcher
Sayornis nigricans	Black Phoebe
Myiarchus cinerascens	Ash-throated Flycatcher
Tyrannus vociferans	Cassin's Kingbird
Corvidae	
Aphelocoma californica	Western Scrub-Jay
Corvus brachyrhynchos	American Crow
Corvus corax	Common Raven
Hirundinidae	
Hirundo pyrrhonota	Cliff Swallow
Paridae	
Baeolophus inornatus	Oak Titmouse
Aegithalidae	
Psaltriparus minimus	Bushtit
Troglodytidae	
Thryomanes bewickii	Bewick's Wren

Troglodytes aedon	House Wren
Sylviidae	
Polioptila caerulea	Blue-gray Gnatcatcher
Polioptila californica californica	Coastal California Gnatcatcher
Turdidae	
Sialia mexicana	Western Bluebird
Timaliidae	
Chamaea fasciata	Wrentit
Mimidae	
Mimus polyglottos	Northern Mockingbird
Toxostoma redivivum	California Thrasher
Ptilogonatidae	
Phainopepla nitens	Phainopepla
Parulidae	
Geothlypis trichas	Common Yellowthroat
Thraupidae	
Piranga ludoviciana	Western Tanager
Emberizidae	
Pipilo maculatus	Spotted Towhee
Pipilo crissalis	California Towhee
Aimophila ruficeps	Rufous-crowned Sparrow
Melospiza melodia	Song Sparrow
Cardinalidae	
Pheucticus melanocephalus	Black-headed Grosbeak
Icteridae	
Agelaius phoeniceus	Red-winged Blackbird
Molothrus ater	Brown-headed Cowbird
Icterus cucullatus	Hooded Oriole
Fringillidae	
Carpodacus mexicanus	House Finch
Carduelis psaltria	Lesser Goldfinch

Mammals

Vespertilionidae	
Myotis californicus	California Myotis
Myotis yumanensis	Yuma Myotis
Pipistrellus hesperus	Western Pipistrelle
Eptesicus fuscus	Big Brown Bat
Molossidae	
Tadarida brasiliensis	Mexican Free-tailed Bat
Eumops perotis	Western Mastiff Bat
Geomyidae	
Thomomys bottae	Botta's Pocket Gopher
Heteromyidae	
Chaetodipus fallax fallax	Northwestern San Diego Pocket Mouse
Chaetodipus californicus femoralis	Dulzura Pocket Mouse
Dipodomys simulans	Dulzura Kangaroo Rat
Muridae	

Reithrodontomys megalotis longicaudis	Western Harvest Mouse
Peromyscus californicus insignius	California Mouse
Peromyscus eremicus fraterculus	Cactus Mouse
Peromyscus maniculatus gamelii	Deer Mouse
Neotoma lepida	Desert Woodrat
Rattus rattus	Black Rat
Microtus californicus sanctidiegi	California Vole
Canidae	
Canis latrans	Coyote
Cervidae	
Odocoileus hemionus	Mule Deer

Appendix E Summary of Bat Survey Data

Table E.1
Bat Short-Term Monitoring Station Results for June Surveys

Species		Location(s)	Number of Calls (by site)	Frequency of Occurrence
Common Name	**Scientific Name**			
Big Brown Bat	*Eptesicus fuscus*	1, 2, 4, 5	2, 1, 14, 14	31.6%
California Myotis	*Myotis californicus*	3, 4, 5, 6, 7	2, 3, 5, 1, 4	15.3%
Yuma Myotis	*Myotis yumanensis*	2	2	2.0%
Western Pipistrelle	*Pipistrellus hesperus*	1, 2, 3, 4, 5, 7	3, 2, 12, 5, 6, 8, 5	41.8%
Mexican Free-tailed Bat	*Tadarida brasiliensis*	4, 6	4, 2	6.1%
Western Mastiff Bat	*Eumops perotis*	2, 6	1, 2	3.0%

Table E.2
Bat Short-Term Monitoring Station Results for August Surveys

Species		Location(s)	Number of Calls (by site)	Frequency of Occurrence
Common Name	**Scientific Name**			
Big Brown Bat	*Eptesicus fuscus*	1, 2, 5	4, 4, 7	8.5%
California Myotis	*Myotis californicus*	3, 4, 5, 6, 7	5, 12, 22, 12, 9	34.1%
Yuma Myotis	*Myotis yumanensis*	NA	NA	0.0%
Western Pipistrelle	*Pipistrellus hesperus*	1, 2, 3, 4, 5, 7	13, 15, 22, 12, 9, 4, 9	47.7%
Mexican Free-tailed Bat	*Tadarida brasiliensis*	4, 6	7, 5	6.8%
Western Mastiff Bat	*Eumops perotis*	2	5	2.8%

Table E.3
Bat June Walking Survey Results

Species		Habitat Type(s)	Relative Abundance (by habitat type)	Frequency of Occurrence
Common Name	**Scientific Name**			
Big Brown Bat	*Eptesicus fuscus*	CSS, Marsh, Oak/Riparian	3, 6, 2	23.9%
California Myotis	*Myotis californicus*	CSS, Cliff, Riparian	4, 3, 2	19.6%
Yuma Myotis	*Myotis yumanensis*	NA	NA	0.0%
Western Pipistrelle	*Pipistrellus hesperus*	CSS, Cliff, Marsh, Oak/Riparian	12, 2, 4, 4	47.8%
Mexican Free-tailed Bat	*Tadarida brasiliensis*	CSS, Marsh	1, 2	6.5%
Western Mastiff Bat	*Eumops perotis*	CSS	1	2.2%

Table E.4
Bat August Walking Survey Results

Species		Habitat Type(s)	Relative Abundance (by habitat type)	Frequency of Occurrence
Common Name	**Scientific Name**			
Big Brown Bat	*Eptesicus fuscus*	CSS, Marsh	22, 12	34%
California Myotis	*Myotis californicus*	CSS, Cliff, Riparian	4, 4, 5	13%
Yuma Myotis	*Myotis yumanensis*	NA	NA	0%
Western Pipistrelle	*Pipistrellus hesperus*	CSS, Marsh, Oak/Riparian	23, 10, 12	45%
Mexican Free-tailed Bat	*Tadarida brasiliensis*	CSS, Marsh	3, 2	5%
Western Mastiff Bat	*Eumops perotis*	CSS	2	2%

Appendix F Photographs



California Mouse (*Peromyscus californicus*)



California Pocket Mouse (*Chaetodipus californicus*)

Source: AECOM; 2009

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No Scale

Sage Hill Site Photos

AECOM

Appendix F



Southern Maritime Chaparral Habitat



Southern Maritime Chaparral Habitat

Source: AECOM; 2009

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Appendix F



Diegan Coastal Sage Scrub Habitat



Diegan Coastal Sage Scrub Habitat

Source: AECOM; 2009

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Sage Hill Site Photos

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Appendix F



Pitfall Array Located in Diegan Coastal Sage Scrub Habitat



Snake Trap Located in Diegan Coastal Sage Scrub Habitat

Source: AECOM; 2009

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Appendix F



Coastal and Valley Freshwater Marsh Habitat



Southern Coast Live Oak Riparian Forest Habitat

Source: AECOM; 2009

No Scale

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California Kingsnake (*Lampropeltis getula californiae*)



Dusky Footed Woodrat (*Neotoma fuscipes*)

Source: AECOM; 2009

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Non-native Grassland Habitat



Non-native Grassland Habitat

Source: AECOM; 2009

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Pitfall Array Located in Non-native Grassland Habitat

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Source: AECOM; 2009

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Pitfall Array Located in Southern Coast Live Oak Riparian Forest Habitat



Snake Trap Located in Southern Coast Live Oak Riparian Forest Habitat Habitat

Source: AECOM; 2009

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Appendix F



Western Spadefoot (*Spea hammondii*)



Western Spadefoot (*Spea hammondii*)

Source: AECOM; 2009

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Appendix F



Tamarisk Scrub Habitat

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Source: AECOM; 2009

No Scale

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Sage Hill Site Photos

Appendix F