Palos Verdes Peninsula Land Conservancy

Comprehensive Management and Monitoring Report

2013-2015

and

2015 Annual Report

For the

Rancho Palos Verdes Draft Natural Communities Conservation Plan and Habitat Conservation Plan

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COMPREHENSIVE MANAGEMENT AND MONITORING REPORT 2013-2015

for the

RANCHO PALOS VERDES DRAFT NATURAL COMMUNITIES CONSERVATION PLAN AND HABITAT CONSERVATION PLAN

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SECTION 1 OVERVIEW AND SUMMARY OF ACTIVITIES

1.1 INTRODUCTION

This Management and Monitoring Report (Report) for the Rancho Palos Verdes Natural Community Conservation Plan and Habitat Conservation Plan (NCCP/HCP) is the fourth comprehensive report for the Palos Verdes Nature Preserve (PVNP). This report was prepared to document the results of the focused surveys for NCCP/HCP-covered plant and wildlife species within the PVNP, identify potential disturbance factors/threats to NCCP/HCP-covered plant and wildlife species, and to make management recommendations for the preservation of the existing NCCP/HCP-covered plant and wildlife species populations. This report was prepared in accordance with the requirements of the NCCP/HCP (URS 2004) for the City of Rancho Palos Verdes (City), California.

The NCCP/HCP was prepared to "maximize benefits to wildlife and vegetation communities while accommodating appropriate economic development within the City and region pursuant to the requirements of the NCCP Act and Section 10(a) of the ESA (URS 2004a)." As a primary component of the Plan, the PVNP was proposed to conserve regionally important habitat areas and provide habitat linkages in order to benefit sensitive plants and wildlife.

The Initial Management and Monitoring Report (Dudek 2007) was authored in 2006/2007 as a baseline report in anticipation of the completion of the NCCP/HCP. As of the writing of this Report, the NCCP/HCP is still in draft format with completion forecasted for 2016-2017. Because this agreement will be signed in the near future, this comprehensive report was provided to satisfy the requirements of the both the Management Agreement with the City and the reporting requirements of the NCCP/HCP.

The comprehensive monitoring report is be prepared every three years and will include both a synthesis of all data collected in the preceding three years and an analysis of overall trends in biological resources. This comprehensive report includes the following:

1. Reports that detail surveys and data analysis regarding vegetation mapping, covered plants and wildlife;
2. A three year Habitat Restoration Plan.

This section of the Report documents an overview of the reporting process and of existing conditions in the PVNP. Section 2 contains covered plant and wildlife monitoring reports. Section 3 is a three year habitat restoration plan. Section 4 covers predator management. Section 5 reports on the Targeted Exotic Removal for Plants Program (TERPP). Discussion

and management recommendations are provided in Section 6. The Annual Report for 2015 is in Section 7.

1.2 EXISTING CONDITIONS

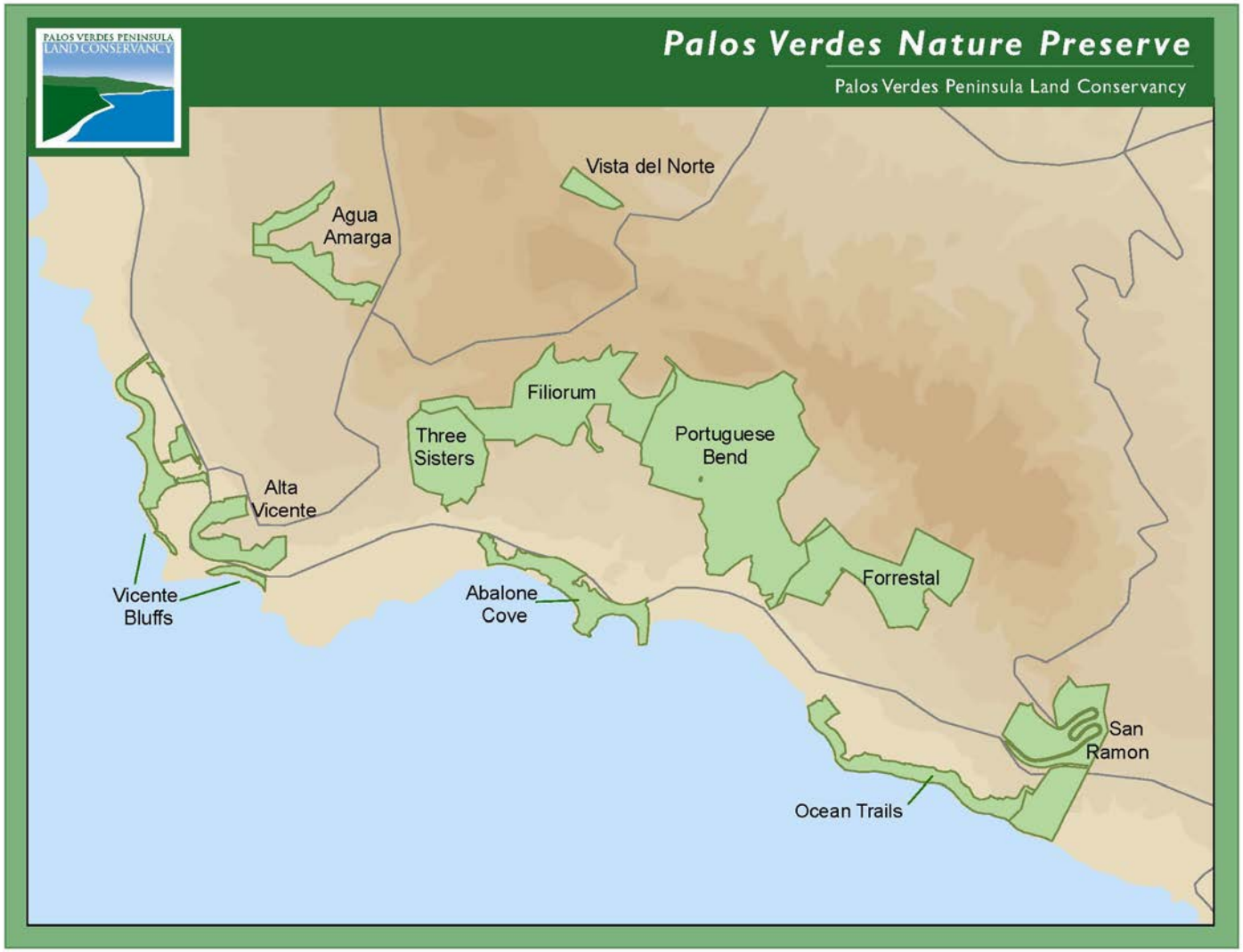
The PVNP is located on the southern side of the Palos Verdes Peninsula, north of the Pacific Ocean in the City of Rancho Palos Verdes, California (Figure 1). The approximately 1,382-acre survey area lies in unsectioned lands in the following U.S. Geological Survey (USGS) 7.5 minute topographic maps: Redondo Beach, San Pedro, Torrance and Rancho Palos Verdes quadrangles; Township 5 South, Range 14 West and 15 West.

The PVNP has been divided into ten Reserve areas, including Agua Amarga, Vicente Bluffs, Alta Vicente, Three Sisters, Abalone Cove, Portuguese Bend, Forrestal, San Ramon, Vista del Norte, and Filiorum (Figure 2). Topography is diverse, ranging from relatively flat lowland areas in the south, above steep coastal bluffs, to very steep slopes, ridgelines and gullies on the slopes to the north. Elevations range from approximately sea level along the coastal edges to approximately 1,300 feet above mean sea level at the northern most parcels. Adjacent land uses include single-family residences on most sides, open space associated with neutral lands on the peninsula, the Pacific Ocean to the south and west, and the Los Verdes and Trump National golf courses near the western and eastern ends of the PVNP.

Plant communities and land covers within the PVNP are representative of those found in this region. Vegetation mapping and coastal California gnatcatcher (*Polioptila californica californica*) (CAGN) and cactus wren (*Campylorhynchus brunneicapillus*) (CAWR) distribution data of the Peninsula used in the NCCP/HCP were prepared by Atwood et al. (1994) and updated and verified by Ogden (1999). Plant community classification in the NCCP/HCP generally follows Holland (1986), with some minor adaptations following Sawyer and Keeler-Wolf (1995). A new vegetation map for the Preserve was prepared in 2009 following the CNPS Vegetation Rapid Assessment protocol and the latest quantitative classification methods. Plant communities and land covers within the PBNP include coastal sage scrub (and coastal sage scrub sub-associations), southern cactus scrub, saltbush scrub, southern coastal bluff scrub, grassland, riparian scrub, exotic woodland, disturbed vegetation, cliff faces and rocky shores, disturbed areas, agriculture and developed areas.

In June 2014, a fire burned approximately 6.7 acres of the 14-acre Vista del Norte Reserve, affecting both native and non-native vegetation. No known nesting sites of the threatened coastal California gnatcatcher (*Polioptila californica californica*) and the special status cactus wren (*Campylorhynchus brunneicapillus*) were identified at the Reserve in recent surveys. PVPLC created a Fire Recovery Plan which included hydroseeding and monitoring (PVPLC 2015 Annual Report).

Figure 1. Palos Verdes Nature Preserve.



1.3 SUMMARY OF ACTIVITIES

Habitat Management Plan

The initial Preserve Habitat Management Plan (PHMP) for the Draft NCCP was created in 2007. A component of the PHMP was the Habitat Restoration Plan for the restoration of 5 acres per year for a total of 15 acres over the first 3-year period. The Habitat Restoration Plan concluded that Alta Vicente Reserve in the Preserve ranked the highest in terms of site suitability for an immediate restoration project. The Habitat Restoration Plan for Alta Vicente Reserve outlines appropriate revegetation locations and methodology to adequately comply with the Preserve Management requirements of the Rancho Palos Verdes NCCP. The following provides a brief description of the Habitat Restoration Plan for Alta Vicente Reserve.

The Habitat Restoration Plan for Alta Vicente Reserve provides guidelines for the establishment of coastal sage scrub (CSS), coastal cactus scrub (CCS), and butterfly habitat on a total of 15 acres during 3 consecutive years at the Alta Vicente Reserve. However, since the fire occurred at Portuguese Bend Reserve in August 2009, plans were adapted to focus immediate restoration at Portuguese Bend, and only Phase 1 and 2 were completed at Alta Vicente. Habitat restoration at Alta Vicente Reserve consists of two 5-acre phases, with one phase initiated each year. The first 5 acres of restoration (Phase 1) began with site preparation during the fall of 2007. Phase 1 plants were installed and hydroseeded during the winter of 2009/2010. Site preparation for Phase 2 began in fall 2008, and planting and seeding implemented in winter 2010/2011. Weed control has continued in both phases through 2015.

The Restoration Plan for Portuguese Bend covers restoration of 25 acres over 5 years (2010 to 2015). Site preparation at Portuguese Bend began in February 2010. Field staff weeded (hand/herbicide) the burn area in 2010. In February, 2011, goats were deployed to clear vegetation. Due to the high density of weeds, an additional year of weeding was implemented, and plants were installed on 10 acres in fall 2012 (Phase 1 and Phase 2). PVPLC obtained permission from the City to irrigate to enable "grow and kill" prior to plant installation, and improve seed and plant survival after planting. Phases 1, 2 and 3 were irrigated with overhead sprinklers. Drip irrigation was installed for Phases 4 in fall 2014 and for Phase 5 in fall 2015, coinciding with the plant installation for those phases. Weed control is implemented in all phases for 5 years minimum after they are initiated.

Additional Restoration

PVPLC attempts to seek additional funding when possible, to perform restoration on more than the minimum 5 acres required in the NCCP. Several opportunities of this nature occurred

during the reporting period. Detailed information can be found in the 2015 annual report (Section 7). Additional restoration that occurred during this reporting period (2013-2015):

- Abalone Cove: Funding from the National Fish and Wildlife Foundation (NFWF), the Santa Monica Bay Restoration Commission, the Coastal Conservancy, the U.S. Fish and Wildlife Service Coastal Program, and the California Trails and Greenways Foundation provided funding to restore and enhance five acres of coastal sage scrub and coastal bluff scrub. Three acres were planted in 2013 and an additional two acres were planted in 2014 and 2015.

- Agua Amarga: 0.25 acre of riparian scrub restoration at Lunada Canyon (Los Angeles County Sanitation District mitigation funds, 2011). A mitigation project (D&M Eight LTD) funded the planting of 147 riparian plants 2013. These sites were weeded and irrigated through 2015.
- 3 acres of coastal bluff scrub and El Segundo blue butterfly habitat at Vicente Bluffs Reserve. PVPLC added plants to this site in 2013, 2014, and 2015.
- 0.55 acres of trail-side habitat consisting of coastal sage scrub and cactus scrub to close unauthorized trails.
- Portuguese Bend: 9.5 acres of coastal sage scrub and perennial grassland restoration (City of El Segundo mitigation funds)

Figure 2 provides a site map for each restoration project from 2013 through 2015, including the restoration at Alta Vicente Reserve and Portuguese Bend Reserve that are to fulfill the requirements of the NCCP Habitat Restoration Plan, once the success criteria are met.

Figure 2. Locations of 2013-2015 Restoration Activities.

Targeted Exotic Removal Program for Plants

In 2013, PVPLC treated 28 populations of invasive plants, of which 17 populations were *Euphorbia terracina*. Other treatments included *Coronilla valentina* spp. *glauca* (3), *Schinus molle* (1), *Pistacia chinensis* (1), and *Acacia cyclopsis* (3). At Vicente Bluffs, a 0.5-acre site on the edge of a healthy coastal sage scrub restoration area was cleared of the following invasive species: *Cortaderia selloana, Foeniculum vulgare, Acacia cyclops* and *Schinus molle.*

In 2014, PVPLC treated 28 populations of invasive plants, of which 24 populations were *Euphorbia terracina*. PVPLC treated a population of *Acacia cyclops* at Portuguese Bend that was encroaching into cactus scrub and at Vicente Bluffs, an acacia population adjacent to coastal sage scrub was removed. At Vicente bluffs, a population of *Cortaderia selloana* located along the edge of coastal sage scrub was removed. At Portuguese Bend, staff is controlling new shoots in a *Eucalyptus globulus* population damaged by the 2009 fire.

In 2015, PVPLC treated 30 populations of invasive plants. Of the 30 TERPP treatments, four were new sites, and one was a site where we expanded the area of acacia removed. Of the retreated sites, 20 were *Euphorbia terracina* populations that were treated in previous years,

two were *Coronilla valentina* populations treated in 2013, two were previously treated *Cortaderia sellonoa* populations that reseeded, one was a previously treated *Arundo donax*. PVPLC treated two populations of *Acacia cyclops:* at Portuguese Bend, acacia encroaching into cactus scrub was removed and at Vicente Bluffs, acacia growing near El Segundo blue butterfly host plants were cleared to increase potential habitat. At Alta Vicente, acacia growing in cactus habitat were cleared. A large palm growing in cactus habitat was removed at Alta Vicente. At Abalone Cove, an *Arundo donax* that had previously been treated was retreated. Ice plant (*Cephalophyllum alstonii*) surrounding a population of *Aphanisma* was cleared.

Covered Plant Species

Six plant species occurring within the Palos Verdes Nature Preserve are listed as covered species under the NCCP, due to their rareness or limited distribution: *Aphanisma blitoides* (aphanisma), *Atriplex pacifica* (south coast saltbush), *Crossosoma californicum* (Catalina crossosoma), *Dudleya virens* spp. *insularis* (bright green Dudleya), *Lycium brevipes* var. *hassei* (Santa Catalina Island desert-thorn), and *Suaeda taxifolia* (woolly sea-blight). Under the NCCP, these species require targeted monitoring to determine whether a population is expanding, stable, or declining, and to provide information for guiding habitat management.

During this triennial monitoring period, the PVPLC conducted covered plant species monitoring during 2015. Based on recommendations from the 2012 Cumulative Report, populations were mapped with GPS and GIS maps were created to accurately show the populations distributions. In spite of the extended period of low rainfall, large numbers of *Atriplex* and *Aphanisma* were observed. A revised approach to better quantify the *Crossosoma californicum* population resulted in an increase of observed individuals from of 776 plants in 2011 to over 900 plants in 2015. Higher *Dudleya* counts were obtained in 2015 than 2010. Additionally, the lack of harmful invasive weeds due to sustained drought conditions made the dudleya clumps easier to see. The remaining two species' populations (*Lycium* and *Saueda*) were relatively unchanged from those observed during the initial 2006 survey.Threats to all species include invasive non-native species, cliff erosion, long-term drought, and trampling.

PVPLC is collecting seed of these covered plants for propagation and out-planting at restoration sites. In 2013, as part of a restoration funded by two grants (National Fish and Wildlife Foundation and Santa Monica Bay Restoration Commission/Coastal Conservancy grant), invasive plants were removed and covered species (*Atriplex, Aphanisma, Dudleya, Lycium*) were planted and are now thriving along the coastal bluffs at Abalone Cove.

PVPLC recommendations are to:

- Continue to remap stands to determine how and where boundaries change, especially for the annuals *Aphanisma* and *Atriplex* and for the perennial *Suaeda*.

- Install covered plant species in restoration efforts as feasible and where appropriate.
- Remove threatening invasive species in priority areas.
- Continue to seek restoration funding directed toward enhancing populations of these six species.

Covered Wildlife Species

El Segundo Blue Butterfly

Surveys for the El Segundo blue butterfly (ESB) were conducted in 2014. Within the Palos Verdes Nature Preserve, ESB inhabit the steep ocean bluffs around Point Vicente. The NCCP mandates triennial surveys for long-term population trending.

The 2014 survey was conducted at 15 sites with host plants. Weekly surveys were conducted from July 1 through August 4 – slightly later than the last survey in order to observe host plants in peak bloom. Two ESB were observed in the survey areas: one male at Pelican Cove and one male at Vicente Bluffs. In some areas, host plant health and distribution appear affected by prolonged drought conditions and is most likely the reason for the paucity of observed ESB. However, other sites at Abalone Cove and Vicente Bluffs experienced a large increase in host plant populations due to restoration efforts since the last survey. We are hopeful that these restoration efforts will bolster the ESB population.

California Gnatcatcher and Cactus Wren

Surveys for California gnatcatcher and cactus wren were conducted in 2015. The California gnatcatcher was present at 9 reserves, but absent at Vista del Norte. The estimate of California gnatcatcher territories for 2015 (33) was remarkably the same as observed in 2012, but lower than that of both 2006 (65) and 2009 (40). However, the CAGN population documented in 2015 is within the range of the annual counts of 26–56 CAGN breeding pairs reported by Atwood et al. (1996).

Counts of California gnatcatcher were dramatically down at Abalone Cove (1 territory in 2015, vs. 5 in 2012 and 3 in 2009); however, the detection of two individual birds in areas where a territory was not mapped and the fact that the far eastern portion of the reserve was not visited (area now removed from the NCCP), suggests that this estimate is artificially low. Aside from increases or decreases by a territory or two in areas where birds had been seen in prior years, the other area where gnatcatcher populations appear to have changed dramatically is Filiorum, where territories (four) were observed after being completely absent in 2012; this area was unsurveyed in 2006 and 2009. Notably, a pair of birds was also found for the first time since 2006 in the northern "arm" of Agua Amarga Canyon, the site of considerable habitat

restoration. PVPLC recommends monitoring the CAGN populations in the Palos Verdes Nature Preserve every three years, according to current plans. If funding allows, directed searches in the Preserve over the next three years could help to better understand population changes in the Preserve.

Cactus wrens were present at 5 reserves. They were not detected in surveys at Forrestal, Filiorum, San Ramon, or Vicente Bluffs or Vista del Norte. Counts of cactus wren were much lower than in 2012 in all sites, and they were detected only at half the reserves in 2015. Compared with previous surveys, the estimates of numbers of cactus wren territories (19-25) were reduced from 2012 (38-48). Eastern Abalone Cove was not monitored because it the area was removed from the Palos Verdes Nature Preserve. Lower numbers at Abalone Cove, Forrestal, and San Ramon could be due to variation in detectability, or to lower habitat quality due to increases in invasive plants and prolonged drought conditions. PVPLC will continue to restore habitat for CACW in the preserves. The PVPLC will continue to participate in the Coastal Cactus Wren Working Group that has formed to develop a coordinated approach to conserving cactus wren populations. In 2015, the PVPLC established a Citizen Science Cactus Wren Monitoring group, and is developing methods to monitor populations throughout the Reserves and better understand their behavior in relation to habitat quality.

Trails

The Palos Verdes Nature Preserve trails fall under the City's Public Use Master Plan (PUMP), which is a NCCP covered activity and, therefore, must follow certain avoidance and minimization measures and guidelines to protect covered species. City Council approved the updated Preserve Trails Plan in October 2012. The plan included authorized trails and trail user designations for Filiorum Reserve, based on 2010 public workshops and comments. The recommendations for the other Reserves in the PVNP were based on input from the PUMP Committee, the 2011 "State of the Trails" workshop and public comments. Small changes to the Trails Plan have been made since then including the removal of Packsaddle Trail at Forrestal and the addition of the Wanderer Trail at San Ramon. See Section 8 for trail maps.

PVPLC collaborated with City staff on the Public Use Master Plan, to present to City Council in 2013.

From 2013 to 2015, PVPLC staff and volunteers have closed off spur trails at Pelican Cove, the eastern portion of Alta Vicente, Abalone Cove, Forrestal (Flying Mane, Mariposa, Conqueror, Vista), and Portuguese Bend (Ishibashi, Peppertree, Rim, Peacock flats, Toyon, Garden).

PVPLC and the City of RPV have collaborated to create a Volunteer Trail Watch program to educate the public and improve trail etiquette, protect the natural resources of the Palos Verdes Nature Preserve, enhance the safety of, and promote an enjoyable experience for all Preserve visitors.

SECTION 2

PLANT AND WILDLIFE MONITORING

2.1 COVERED PLANT SPECIES REPORT

Covered Plant Species

2013 – 2015

Prepared By

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PALOS VERDES PENINSULA

LAND CONSERVANCY

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EXECUTIVE SUMMARY

Six plant species occurring within the Palos Verdes Nature Preserve (Preserve) are listed as covered species under the Natural Communities Conservation Plan (NCCP), due to their rareness or limited distribution: *Aphanisma blitoides* (*Aphanisma*), *Atriplex pacifica* (*Atriplex*), *Crossosoma californicum* (*Crossosoma*), *Dudleya virens* spp. *insularis* (*Dudleya*), *Lycium brevipes* var. *hassei* (*Lycium*), and *Suaeda taxifolia* (*Suaeda*). Under the NCCP, these species require targeted monitoring to determine whether a population is expanding, stable, or declining, and to provide information for guiding habitat management.

During this triennial monitoring period, the Palos Verdes Peninsula Land Conservancy (Conservancy) conducted covered plant species monitoring during 2015. Poorly defined boundaries at the monitoring sites in previous survey years have resulted in highly variable year to year population estimates (PVPLC 2013). To reduce this variability, all sites were mapped using GPS to create GIS maps to develop clearly defined boundaries for this and future surveys. Covered plant species stands resulting from Conservancy restoration projects or recent discovery were mapped as "supplemental" sites in addition to baseline reference sites established by the Preserve Habitat Management Plan of the NCCP.

Results from the survey include:

- Large numbers of the annual species *Atriplex* and *Aphanisma* were observed. Both of these species occupy relatively smaller tracts of land but occur in great numbers within their stands, with resulting high density values. In 2015 all of the observed stands were mapped, in order to better track the extent of these species.

- The best assessment of the numbers of *Crossosoma* within the very large stand was gained using two merged images viewed in a photoshop program. This resulted in a count of over 900 plants at Site Cc3, more than the previous count of 750.

- Higher *Dudleya* counts were obtained in 2015 than 2010, because the counts extended beyond previously mapped boundaries. Additionally, the lack of harmful invasive weeds due to sustained drought conditions made the *Dudleya* clumps easier to see.

- The remaining two species' populations were relatively unchanged from those observed during the initial 2006 survey. The count of *Lycium* increased by 25 individuals because it was easier to identify individuals in its deciduous state. The numbers for *Suaeda* increased from 122 in 2010-2012 to 528 in 2013-2015, primarily due to the completion of a survey at Site St3, which was inaccessible during the previous monitoring period (2010-2012) and successfully reached in 2015.

- Threats to all species include encroachment by harmful invasive plants, cliff erosion, long-term drought, and trampling.

The new GIS maps developed in 2015 that identify polygons for each species should be employed in order to provide consistent counts. The inclusion of GPS mapping will enable the tracking of changes in plant stands, especially for annuals like *Aphanisma* and *Atriplex*, and new plant installations in restored sites. Density metrics will enable variation to be measured across all stands, independent of the size and number of stands. Additionally, PVPLC should continue, when possible, to expand covered plant species populations. Specific recommendations include:

1. Utilize methodology described in this report, including
    a. Re-GPS stands to determine where boundaries have changed, especially for the annuals *Aphanisma* and *Atriplex* and the perennial *Suaeda.*
    b. Utilize the GIS maps for locating and counting stands.
    c. Calculate areas for each stand to develop aerial extents for each species
    d. Calculate density for measuring variation within stands for long-term assessments.
2. Continue seed collection for plant propagation.
3. Install covered plant species in restoration efforts and/or broadcast seed during periods of favorable precipitation.
4. Remove encroaching invasive plants with the following priority;
    a. *Atriplex pacifica*
    b. *Aphanisma blitoides*
    c. *Dudleya virens* spp. *insularis* – At Sites Dv1 and Dv3
    d. *Suaeda taxifolia*
5. Continue to seek restoration funding for enhancing populations of these six species.

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1.0 INTRODUCTION

The Natural Communities Conservation Plan and Habitat Conservation Plan (NCCP) for the Palos Verdes Nature Preserve (PVNP) provide a list of six plant species that are targeted for monitoring by the Palos Verdes Peninsula Land Conservancy (Conservancy) every three years. These species, known as covered species, have special status due to their rareness or limited distribution. Five of the six species, *Aphanisma blitoides* (*Aphanisma*), *Atriplex pacifica* (*Atriplex*), *Crossosoma californicum* (*Crossosoma*), *Dudleya virens* spp. *insularis* (*Dudleya*), and *Lycium brevipes* var. *hassei* (*Lycium*), are listed by the California Native Plant Society (CNPS) as List 1B plants which are rare, threatened, or endangered in California and elsewhere. The sixth, *Suaeda taxifolia* (*Suaeda*), is listed as CNPS List 4, which is a plant of limited distribution.

Under the terms of the NCCP, covered species are to be monitored to determine whether a population is expanding, stable, or declining. In recognition that the species differ phenologically during the year, each species should be monitored at its most appropriate time, generally in spring when the plant is blooming (Table 1). Also, because annual rainfall varies considerably, the monitoring of annual species should be conducted during those years when rainfall exceeds 75% of the long-term average annual precipitation. Longer-lived shrubs typically should be monitored once every three years.

A reconnaissance survey was conducted in 2006 to document the baseline population sizes of covered plant species for the Preserve Habitat Management Plan (PHMP) (Dudek 2007). The reconnaissance survey provided maps of surveyed stands of the covered species as well as three photo point locations to use in subsequent monitoring.

The Conservancy initiated the on-going monitoring in 2007 on a triennial basis, as mandated by the NCCP. The monitoring consists of collecting photo points at sites specified by Dudek (2007), counting the number of plants, and assessing the habitat at the sites. This report covers the photo point monitoring from 2013 through 2015. This report compares the 2013-2015 data from 2006 (Dudek 2007) and the 2007-09 and 2010-12 triennial reports (PVPLC 2011 and 2013). All plant species are referred to by their genus only, unless when compared to a congener.

As recommended in the 2010-12 report, the species' stands were mapped with a GPS unit for creating GIS maps. The digitized maps provide an accurate value for area and show the location of the photo point relative to the stand for use in data assessment.

Table 1. List of NCCP covered species, their CNPS status, recommended survey period, and images of the plants.

NCCP Covered Species	Plant Images
Aphanisma blitoides, aphanisma CNPS List 1 B.2 Annual, survey in April – May	 
Atriplex pacifica, south coast salt bush CNPS List 1 B.2 Annual, survey in April - May	 
Crossosoma californicum, California crossosoma CNPS List 1 B.2 Survey in summer when leaves are red	 
Dudleya virens ssp. *insularis*, bright green dudleya CNPS List 1 B.2 Survey in April – June	 
Lycium brevipes var. *hassei*, Santa Catalina Island desert boxthorn CNPS List 1 B. 2 Survey in June	 
Suaeda taxifolia, wooly sea-blite CNPS List 4 Survey in summer	 

2.0 METHODS

Targeted monitoring was conducted by the Palos Verdes Peninsula Land Conservancy for six special status plant species (Table 1) covered under the NCCP. Reference sites established in baseline monitoring of the Preserve Habitat Management Plan (PHMP) were monitored through photo documentation, population estimation, and population mapping. Populations of covered species discovered post baseline monitoring were additionally monitored as "supplemental surveys" in an effort to adaptively describe the habitation of NCCP covered plant species within the Palos Verdes Peninsula Nature Preserve (preserve). Supplemental surveys included identical methods to those used in the monitoring of reference sites, however results from supplemental surveys were not included in cross-year analysis.

2.1 Study Area

The preserve is located on the southern side of the Palos Verdes Peninsula, north of the Pacific Ocean in the City of Rancho Palos Verdes, California. The approximately 1,428-acre survey area lies in unsectioned lands in the following U.S. Geological Survey (USGS) 7.5 minute topographic maps: Redondo Beach, San Pedro, Torrance and Rancho Palos Verdes quadrangles; Township 5 South, Range 14 West and 15 West.

The preserve has been divided into ten Reserves. Four of these ten were identified by the PHMP to support NCCP covered plant species populations. These are Forrestal, Abalone Cove, Vicente Bluffs (Pelican Cove), and Ocean Trails (Figure 1).

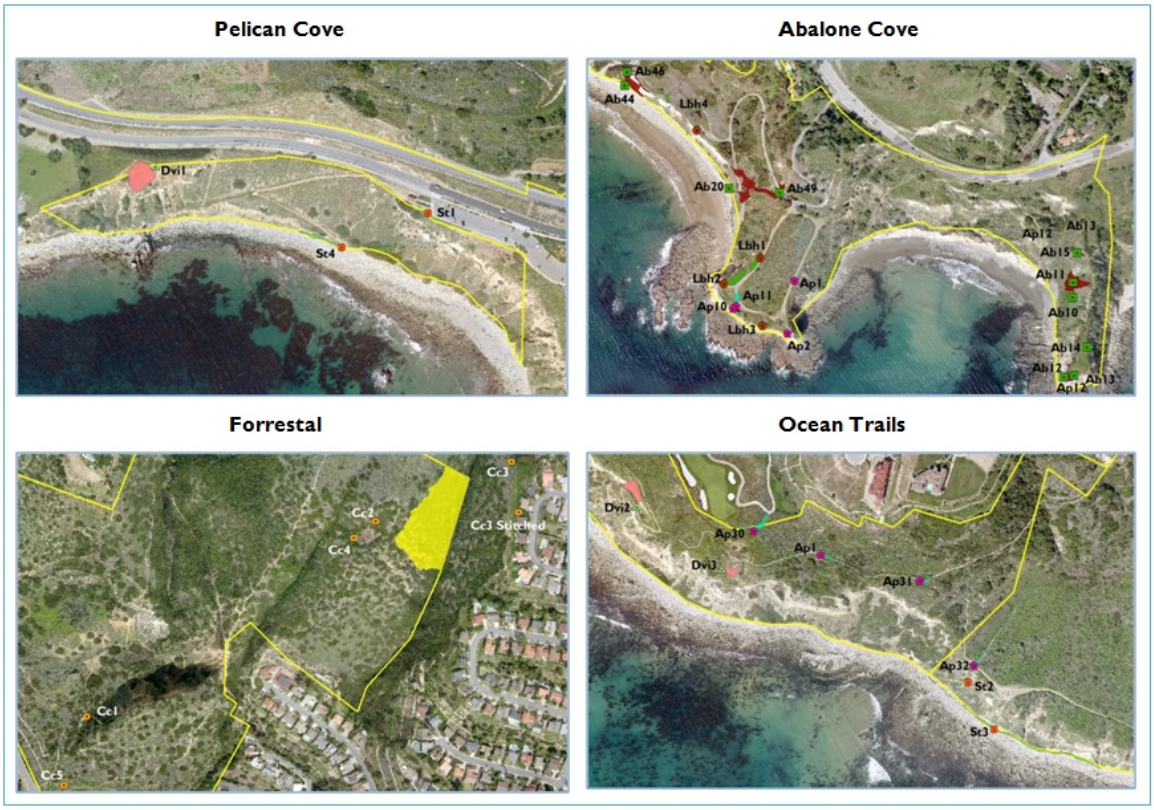

Figure 1. Locations of photo points for covered plant species monitoring. Detailed maps are provided in Appendix I. Circles and squares with central dots are photo point locations.

2.2 Rainfall

Rainfall data were obtained from the National Weather Service website (www.nws.noaa.gov/climate/index.php?wfo=lox) for the Long Beach Airport station. The annual average rainfall value provided by the NWS for the Long Beach Airport is 12.94", based upon data measured from 1971 through 2000, with monitoring to be conducted during years that exceed 75% of that value (9.05"). All rainfall data are provided in "rain years" from the months of July 1 through June 30, to accurately reflect the rainfall influencing the plant species' subsequent growth. The rain years under consideration include 20012-13, 2013-14, and 2014-15.

2.3 Covered Plant Species Survey

2.3.1 Photo-documentation

PHMP baseline surveys established photo-documentation points (photo points) for five of the six NCCP/HCP-covered species located onsite, including *Atriplex* (three locations), *Dudleya* (three locations), *Crossosoma* (three locations), *Lycium* (two locations) and *Suaeda* (three locations). Photo points were recorded with GPS or marked on survey maps for future monitoring periods (Figure 1). Each photo point location is referred to by the first letter of the genus name followed by the first letter of the species name followed by the number 1, 2, or 3. For example, Photo point 1 for *Atriplex pacifica* is referred to as Ap1.

Between May and August 2015 all established photo point locations were revisited and photo documentation data collected. In addition to data collected from photo points established in 2006 (reference sites), photo documentation data was also collected from supplemental sites except for *Dudleya.* Photo points for supplemental sites were established using the same methodology and coding used in the botanical surveys of the PHMP.

2.3.2 Population Estimates

Population estimation was completed by walking the observed extent of the NCCP covered species stand at each reference or supplemental site and counting the number of covered species individuals within the stand/site. Several of the species surveyed exhibit a variety of growth habitats which can make individual plant determination difficult. For example, island green *Dudleya* grows in clumps, with multiple pups originating from a centralized root structure. For instances when differentiating individual plants proved difficult, a standard method was developed in the field and used consistently throughout the surveys. For island green *Dudleya*, closely-spaced pups within a clump were counted as one individual. For *Suaeda* and *Lycium*, individual shrubs occasionally grow together to form masses. In this instance, individuals were estimated by counting the mounds of the approximate size of mature specimens within the masses of plants. For *Atriplex*, individual plants were typically discernible. For *Crossosoma*, photographs from two photo point locations, Cc3 and Cc3, were "stitched" together to

provide a full view of the stand. The stitched image was viewed in a photoshop program and individual plants were marked to obtain a total count.

Figure 2. *Left photo:* NCCP site Ap2 showing a stand that is very difficult to see. *Right photo:* Two individuals within the stand at Ap2, each ≤2 cm tall.

2.3.3 Population Mapping

All stands were digitally mapped using a Trimble GeoXT GPS unit, then transferred into GIS to create digital maps showing the photo point locations and stand areas (Figure 1, Appendix A). Both the original photographs and maps from Dudek (2007) and hand-drawn maps created in 2011-12 were used as references for the 2015 effort. Due to the rugged terrain, not all sites could be entirely walked, so the final polygons were hand-edited in GIS following contours from maps that were hand-drawn during the 2015 effort. Each polygon area was computed to the square meter within GIS. Both the field data sheets and GPS unit collected the same metrics: Photo Number, Phenology, Stand Structure, Recruits (Y/N), Threats, Population Size, Percent Cover for the Species, Other Natives, Non-natives, and Bare Ground. Comments were added to provide descriptive information for the stand.

2.3.4 Data Analysis

Field data sheets (survey forms) were completed for each of the NCCP covered plant photo point locations. These sheets captured data on site conditions (i.e., plant number estimates, population structure, natural recruitment, aspect, slope, soil texture, vegetation community, associated species and disturbance factors/threats). Data analysis will be performed as part of the Comprehensive Report every 3 years and may be performed in annual reports to detect trends. Recorded population parameters such as population size, plant density, and population structure (e.g., expressed as age class frequency) will be used to indicate whether a population is expanding, stable, or declining. Counts of individual covered species at all reference sites were summed to produce an estimate of the total stand size. The areas computed with GIS were used to develop a measure of the density of each stand (individuals/m^2).

Table 2. List of sites visited as Reference Sites (Dudek 2007) and as Supplemental Sites.

Species	Reference Sites	Supplemental Sites
Aphanisma blitoides	Ab44, Ab46, Ab49, Ab50*	Ab10, Ab11, Ab12, Ab13, Ab14, Ab15, Ab20
Atriplex pacifica	Ap1, Ap2, Ap3	Ap10, Ap11, Ap12, Ap30, Ap31, Ap32
Crossosoma californica	Cc1, Cc2, Cc3	Cc4, Cc5
Dudleya virens subsp. *insularis*	Dvi1, Dvi2, Dvi3	
Lycium brevipes var. *hassei*	Lbh1, Lbh2, Lbh3	Lbh 4
Suaeda taxifolia	St1, St2, St3	St4
* No *Aphanisma* identified at site		

3.0 RESULTS

3.1 Rainfall

This triennial reporting period took place during the well-known California drought. Low rainfall began in 2011-12 (7.57"). During the rain years 2012-13, 2013-14 and 2014-15, rainfall was 6.67, 4.37, and 7.92", respectively. The impacts of four successive years of below average rainfall were evident in the Preserve, particularly following the very dry 2013-14 year. Few plants flowered in this third year of drought. In 2014-15 precipitation arrived in normal amounts during November through January followed with unseasonably hot spring weather. Vegetation responded with strong growth, though annuals and spring blooms died-off during heat waves. Because no year within this three-year reporting period had adequate rainfall to trigger a survey (total rainfall greater than 75% of the average), the surveys were conducted in 2015. Any impacts from the drought are discussed below for each species.

3.2 Covered Plant Species Surveys

***Aphanisma bilitoides* (*Aphanisma*)**

The survey for *Aphanisma* was conducted during March and April when the plants were red and easily visible. The plants were very abundant and difficult to count because most stands are perched on steep bluffs that preclude close inspection. The three reference sites had abundant plants, totaling over 2,500 individuals per site, with a density range of 2.8-10.7 individuals/m^2. Two very large stands were observed in the Supplemental Sites, Ab11 located on the west flank of Inspiration Point and AB20 located on the west flank of Portuguese Point, each containing ≥1000 individuals. No plants were observed at the site identified by Dudek (2007).

***Crossosoma californica* (*Crossosoma*)**

Two supplemental sites were established for this monitoring period: Cc4, previously counted as part of Cc2, was mapped as an individual stand. Several seedlings and young plants were present at Cc4, with a significant increase in number of plants from the previous count to 40 individuals. Three *Crossosoma* plants were installed in at the base of Pirate Trail and mapped as Cc5. In 2010, three individuals were counted at Cc1, but only two were seen in 2015. Counting and marking individuals in photoshop for Cc3, which enables one to zoom-in to see the plants in detail, produced the highest count yet of over 900 individuals. The overall area encompassed by reference *Crossosoma* stands is large (11,220 $m^{2)}$, and density ranged from 0.5-1.3 individuals/m^2).

***Dudleya virens var insularis* (*Dudleya*)**

Dudleya was present at all three reference sites. Site Dv1 is located on top of a steep hill, making the task of counting clumps difficult. A total of 57 clumps were counted at this site. A total of 328 and 142 clumps were counted at Sites Dv2 and Dv3. Plant density ranged from 0.1-1.2 individuals/m^2. Shriveled and clearly dead specimens were observed at all sites.

***Atriplex pacifica* (*Atriplex*)**

This plant was surveyed multiple times throughout the survey period at nine sites due to its unpredictable appearance. This is a difficult annual to see, particularly for those plants located on both Portuguese and Inspiration Point. Over 500 individuals were present at Ap2, but fewer plants were found at the other Reference sites. Counts at the supplemental sites also showed great variation among sites. *Atriplex* plants at the Reference sites had high variation in density (0.3-27.8 individuals/m^2).

***Lycium brevipes var. hassei* (*Lycium*)**

The *Lycium* stands were similar in extent as in previous years, but the plants had very few leaves making it easy to view their base, especially at Lbh3 (Figure 3). The resulting counts at Lbh3

were much higher than previous counts (27 vs. 5 in 2010). The dense stands at Lbh1 and Lbh2 were difficult to count with resulting estimates of 200 and 400 plants for Lbh1 and Lbh2, respectively. All stands were dominated by mature plants. A supplemental stand, Lbh 4, was established at a restoration site at Abalone Cove, with 21 plants spread along the bluff edge. The density for the Reference stands ranged from 1.2-1.3 individuals/m^2.

***Suaeda taxifolia* (*Suaeda*)**

All reference sites were visited in 2015, including St3, where a deeply eroded channel that precluded access in 2010 had weathered to a passable large gully. All contiguous plants at St3 were mapped as a single stand. *Suaeda* grows from numerous small plants into indistinguishable large canopies, creating challenges in counting the number of plants (Figure 5). There were no individuals at the original location for St1, but several nearby bordering the fence adjacent to the parking lot at Pelican Cove. Fewer individuals were observed at St2 than in 2010, but plants were observed at the supplemental site St4, many of which many were small recruits. The density for the Reference sites ranged from 0.1-1.6 individuals/m^2.

Figure 3. *Upper photo:* Shriveled *Dudleya* clump counted as one.

Figure 4. The absence of leaves revealed numerous *Lycium* stems, providing a more accurate count of individuals (three shown by arrows).

Figure 5. Numerous young *Suaeda* individuals growing among mature plants that will eventually coalesce into a large canopy. The grey branches are dead individuals.

Table 3. Summary of estimated counts from all surveys of the reference sites conducted since 2006. The surveys conducted in 2015 utilized the methodology described above.

Species	2006	2007	2008	2010	2011	2015
Aphanisma blitoides	---	---	≥371	≥250	300	2,500
Atriplex pacifica	136	0	376	5	17	522
Crossosoma californica	540	---	≥198	783	---	946
Dudleya virens ssp. *insularis*	3,430	550	408	240	---	527
Lycium brevipes var. *hassei*	750	300	---	605	---	630
Suaeda taxifolia	455	55	48	122	---	528

Table 4. Results of Covered Plant Surveys for 2013-2015 (Reference Sites).

Species	Number of Sites	Total Area (m^2)	Total Count	Density Range (Individuals/m^2)
Aphanisma blitoides	3	553	2,500	2.8 – 10.7
Atriplex pacifica	3	37	552	0.3 – 27.8
Crossosoma californica	3	11,220	806	0.5 – 1.3
Dudleya virens subsp. *insularis*	3	990	527	0.1 – 1.2
Lycium brevipes var. *hassei*	3	501	630	1.2 – 1.3
Suaeda taxifolia	3	3,111	470	0.1 – 1.6

4.0 DISCUSSION

The 2010-2012 covered species report identified a potential inability to compare previous monitoring results due to the variation of monitoring methodologies (PVPLC 2013, Section 2). Part of the problem was uncertainty with the boundaries of observation areas, resulting in a recommendation to map each site. Dudek (2007) employed a 5-meter rule for annual species and a 10-meter rule for perennial species to separate polygons when mapping stands for the entire preserve. For mapping large stands, a one m^2 area was counted and extrapolated to the entire area, rounding to the nearest order of magnitude (e.g. 100, 500, and 1,000).

An attempt to develop consistent methodology was made for the 2010-2012 triennial monitoring, including drawing maps of specific areas for monitoring the photo point sites based on Dudek's methodology. The resulting report recommended surveyors map the areas to create GIS data that clearly defined the boundaries at the Reference photo point sites.

In 2015 the GIS sites were created from using GPS shapefiles mapped in the field (Figure 1, Appendix A). The resulting areas shown in the GIS maps closely follow the boundaries used in 2010-2012, a feat aided by having the same biologist conduct the monitoring. A revised methodology, detailing the mapping methods, was produced to ensure consistent monitoring (Appendix E). Furthermore, the GIS data generates accurate areal values from which computations, such as density for each stand, can be made (Table 3).

The most dynamic plant populations are, of course, the annuals *Aphanisma* and *Atriplex*. The early rains in 2014, though not a drought buster, were sufficient to stimulate these plants to grow in large numbers, especially for *Aphanisma.* As a result, the number of *Aphanisma* observed was ten times that observed previously at the Reference sites. In contrast, the number of *Atriplex* was low. Both are high density species and, as annuals, should be expected to have varying population sizes over time, the amount related to rainfall and the amount of weed cover.

The sheer size of the largest stand of *Crossosoma* (Cc3) on the eastern slope at Forrestal renders it difficult to count the hundreds of plants in the field, much less to delineate a subset of the slope that can be easily replicated. However, by counting this stand via merging two photos taken across the canyon, then viewing in photo-stitching software where zooming in enables one to see individual plants, we now have the best estimate of the number plants in the stand to date: over 900 individuals. The entire stand extends beyond the boundaries of the PVNP making this a stand of well over 1000 individuals. It is the largest known stand of *Crossosoma*, surpassing those found at Santa Catalina and San Clemente Islands significantly where typical stands consist of 5-7 plants (Kaius Helenurm, University South Dakota, personal communication). The other sites (Cc1, Cc2, Cc4, and Cc5) follow that standard more closely.

While we are confident that counting individuals from two stitched images on a computer screen generated the most accurate count to date for Cc3, it fails to depict seedlings and small plants very well. As described for Site Cc4, 40 seedlings and juvenile plants were present, all adjacent to the understory of the adult plant. Continued monitoring at Cc4 will provide insight into the development of adult plants that will be helpful for interpreting the data at the difficult to access Site Cc3.

The phenological response to rain/drought of *Crossosoma* can impact overall counts. For example, at Site Cc1 the number of plants has varied from five (Dudek 2007) to two in 2015, the latter survey conducted following four years of below average rainfall. As shown in the photopoint image (Figure 6), only one individual is seen, but hidden under the lemonade berry canopy stood the base of a leafless, but very much alive individual. Possibly there were other plants were hidden in the understory, but they were not observed. With the numerous seedlings observed at Cc4, *Crossosoma* has demonstrated that it is capable of reproducing in one location while appearing dormant in another. These phenological patterns are important to consider in context with weather patterns for assessing this species. At this time, the *Crossosoma* population appears to stable within Forrestal Reserve, and has the potential to expand the number of plants and stands as the Conservancy out-plants specimens in its restoration work.

Lycium numbers were similar to those observed previously, except at Lbh3 where an additional 25 individuals were discerned despite their leaf-less condition. Dudek (2007) noted 150 individuals at this site within an equivalent area, as shown in their maps (pg 22). This is a difficult species to count because of the dense manner that the plants grow. For example, despite the lack of leaves, it was still extremely difficult to count individuals in the very dense main stands, Lbh1 and Lbh2. However, the stand is consistently sized and was assessed to be the same number of plants. Within the three reference sites, most specimens are mature. Young plants are now present along the bluff above Abalone Cove Beach where the Conservancy out-planted at a restoration site, resulting in a net increase in *Lycium* coverage within the PVNP.

Figure 6. *Upper photo:* Only one canopy is seen at the Cc1 Photo Point (arrow). *Lower photo:* Live, multi-trunked base of a *Crossosoma* at Cc1 that lacked a canopy of leaves.

The numbers of *Dudleya* have varied considerably over the years, but counts from 2007 and 2015 are remarkably close (Table 4). The total number of *Dudleya* shown in the Dudek maps is 6,428, including a lumped

polygon for sites Dvi2 and Dvi3 without any individual photo point counts. Since the 2006 survey, counts were conducted at only the reference sites (Dvi1, Dvi2, and Dvi3) for a much reduced total count.

The impact of drought on *Dudleya* was quite evident, except at the supplemental site Dvi4 where the plants were irrigated as part of the restoration activities. All plants were dormant at the reference sites and the fleshy leaves were small and withered following the hot weather in spring and summer, though the size of their bases appeared unchanged. The drought hindered the growth of harmful invasive weeds making observing these plants easier.

Over time, the number of *Suaeda* individuals has varied considerably (Table 4). Two factors that may have influenced this variation are differences in area used for the surveys and ability to access the largest Reference stand, St3. Also, the ability of this plant to quickly colonize new areas, as demonstrated at the site St1, illustrates that stand boundaries are plastic and will change over time. While the GIS maps will aid in providing more consistency in the survey methods, the changing stand boundaries argue for inclusion of density metrics when assessing stand trends.

All surveys have consistently identified erosion as a threat. Competition from native and non-native plants and trampling are also threats. These latter threats can be addressed through the Conservancy's on-going stewardship efforts and public education. However, erosion along steep cliffs, as recognized by Dudek (2007), is unavoidable, given the geology of the Palos Verdes Peninsula. Continued monitoring as the bluff faces retreat is important so that appropriate measures can be taken to ensure the continued presence of these species.

We have observed that *Aphanisma* occurs in areas of steep, bare slopes that are also occupied by crystalline iceplant (*Mesembryanthemum crystallinum*). While normally considered a plant that outcompetes native species due to its ability to accumulate salt in the soil (Cal-IPC 2013), this plant may provide assistance to *Aphanisma*, possibly via added moisture. Salt should not be a problem for *Aphanisma*, for it occurs in saline wetlands, such as at Talbert Marsh and Upper Newport Bay in Orange County (Merkel & Associates 2004, Baldwin et al. 2012). The presence of crystalline iceplant may indicate suitable sites for out-planting or seeding for *Aphanisma.*

Due to the four-year drought, non-native harmful invasive species were limited in 2015. Limited presence of the harmful invasive species may have augmented total counts due to the greater visibility of the covered species, especially for the annuals *Aphanisma* and *Atriplex* and also the clumps of *Dudleya.*

4.1 Weather and Climate

Rainfall has been below average for all but two years since the establishment of the Palos Verdes Nature Preserve (Figure 7). Rainfall is highly variable in southern California, with wide swings from years with high precipitation to multiple years of below average rain. The 2015 survey were conducted after four consecutive years of low precipitation.

There has been no apparent loss of covered species plants following the drought. Specific examples of the leafless *Crossosoma* and withered *Dudleya* plants indicate that a degree of stress exists. At this time, predictions cannot be made on how these plants will fare in the future if long periods of low rainfall continue.

While rainfall is episodic in southern California, it also varies locally. Climate change poses a significant threat through reduced precipitation and more episodic rainstorms, heat waves, sea-level rise, and increased wildfires (Walsh et al. 2015). Locally precipitation is expected to decrease by ten percent by late this century (CalEPA 2012) providing challenges for determining the value for 75% of average rainfall for covered plant monitoring purposes.

While long-term drought has the potential to impact the survivorship of the more drought-sensitive species, heat waves and increased temperatures from climate change provide

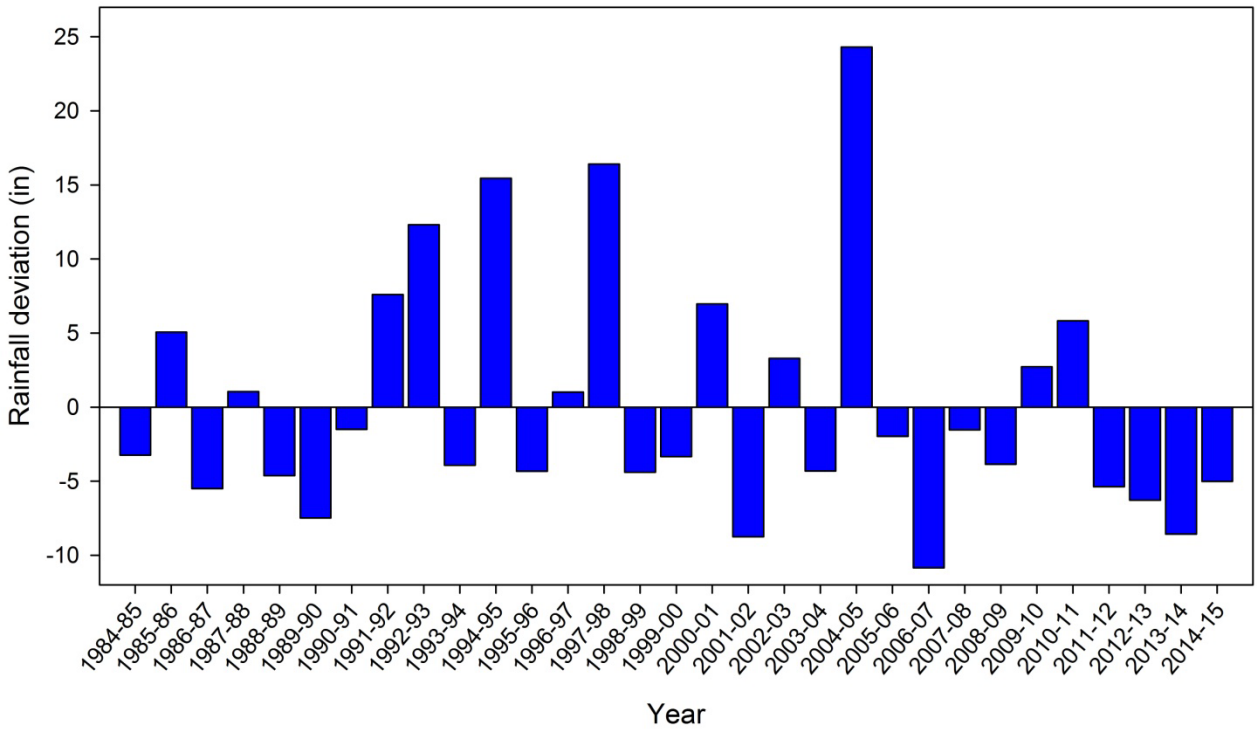

Figure 7. Deviation in precipitation for the rain years 1984-85 through 2014-15 based upon the Long Beach Airport 1971-2000 average annual precipitation value of 12.94 inches. The number of years with below average rainfall is 19, while the number of years with above average rainfall is 12.

additional stressors. In recent years, average temperatures have risen (Figure 8). Two heat waves occurred in March 2015, resulting in seven days with temperatures greater than 80 degrees (27 ˚C), nearly 25% of the month. The heat wilted seedlings and stressed adult plants to the extent that the spring bloom was halted and drought deciduous plants jettisoned their leaves.

Sea-level rise poses an additional threat to bluff-top species like *Dudleya*, *Lycium*, and *Suaeda*, through bluff erosion. Current predictions for the amount of rise by 2100 range from 0.33 to over 1.0 m, and will continue to rise for the next several centuries and beyond (Walsh et al. 2014). Currently the Palos Verdes Peninsula is experiencing low rates of cliff retreat (Hapke and Reid 2007) posing as a lower level, long-term threat. Still, bluff failures do occur, such as the November 2011 failure at White Point.

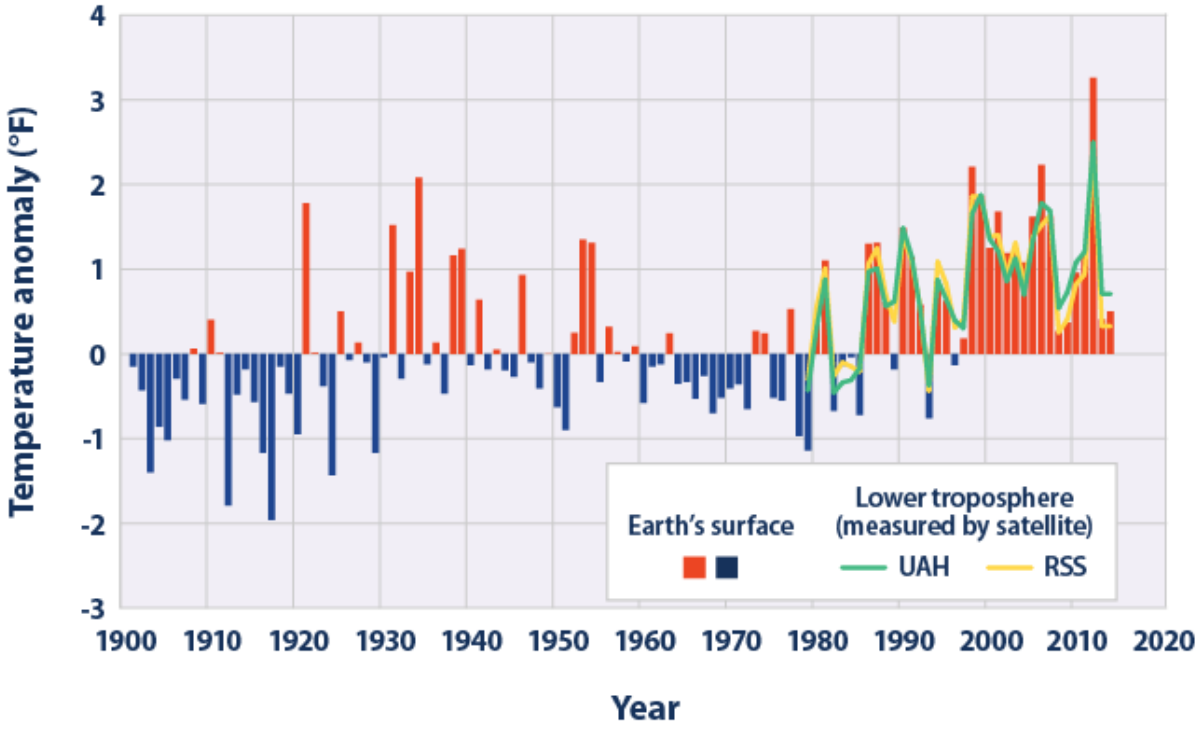

Figure 8. Temperature deviations for the contiguougs 48 states from 1901 through 2014, including satellite measurements starting in 1979 (EPA 2015).

4.2 Management

While the Conservancy cannot directly mitigate climate change, it is in a good position to monitor the status of covered and special concern species and to increase their populations through stewardship activities. Considerable attention is directed toward collecting seeds for growing individuals for on-site installation or broadcasting seed when weather conditions are amenable.

The addition of special status plants into the Conservancy's restoration projects coupled with natural stand movement or the colonization of new sites by covered species, creates variability that is not captured by the reference sites. The supplemental sites added to the monitoring in 2015 is a valuable management tool for gaining better insight to the special status species, especially when weather conditions are more favorable for the plants.

The Conservancy actively seeks grants for restoration, including projects along the coastal bluffs. Through a Santa Monica Bay Restoration Commission/Coastal Conservancy grant obtained in 2012, bluff habitat plants were installed at Abalone Cove in 2013, resulting in increased numbers of *Dudleya* and *Lycium*. Restoration plans starting in 2016 call for expansion of the Abalone Cove Reserve and at Alta Vicente Reserve.

5.0 RECOMMENDATIONS

The new GIS maps developed in 2015 and assessment procedures should be employed in order to provide consistent counts. The inclusion of GPS mapping will enable the production of maps showing changes in plant stands, especially for annuals like *Aphanisma* and *Atriplex*, and those resulting from restoration projects. Long-term trends analysis will be greatly aided by including density as a metric because enables variation to be measured across all stands, independent of the total number of stands. Additionally, PVPLC should continue expanding covered plant species populations through its stewardship. Specific recommendations include:

1. Utilize methodology described in this report, including
    a. Re-GPS stands to determine where boundaries have changed, especially for the annuals *Aphanisma* and *Atriplex* and the perennial *Suaeda.* Include the new shape files into the GIS maps for depicting year to year changes.
    b. Utilize the GIS maps for locating and counting stands.
    c. Calculate areas for each stand to develop aerial extents for each species
    d. Calculate density for measuring variation within stands for long-term assessments.
2. Continue seed collection for plant propagation

3. Install covered plant species in restoration efforts and/or broadcast seed during periods of favorable precipitation
4. Remove threatening invasive non-native species in stands with the following priority;
    a. *Atriplex pacifica*
    b. *Aphanisma blitoides* – as a short-term adaptive management strategy, remove all non-native species except crystalline iceplant (*Mesembryanthemum crystallinum*) which may help promote this species
    c. *Dudleya virens* spp. *insularis* – At Sites Dv1 and Dv3
    d. *Suaeda taxifolia*
5. Continue to seek restoration funding for specifically enhancing populations of these six species.

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APPENDIX A

Detailed GIS Maps

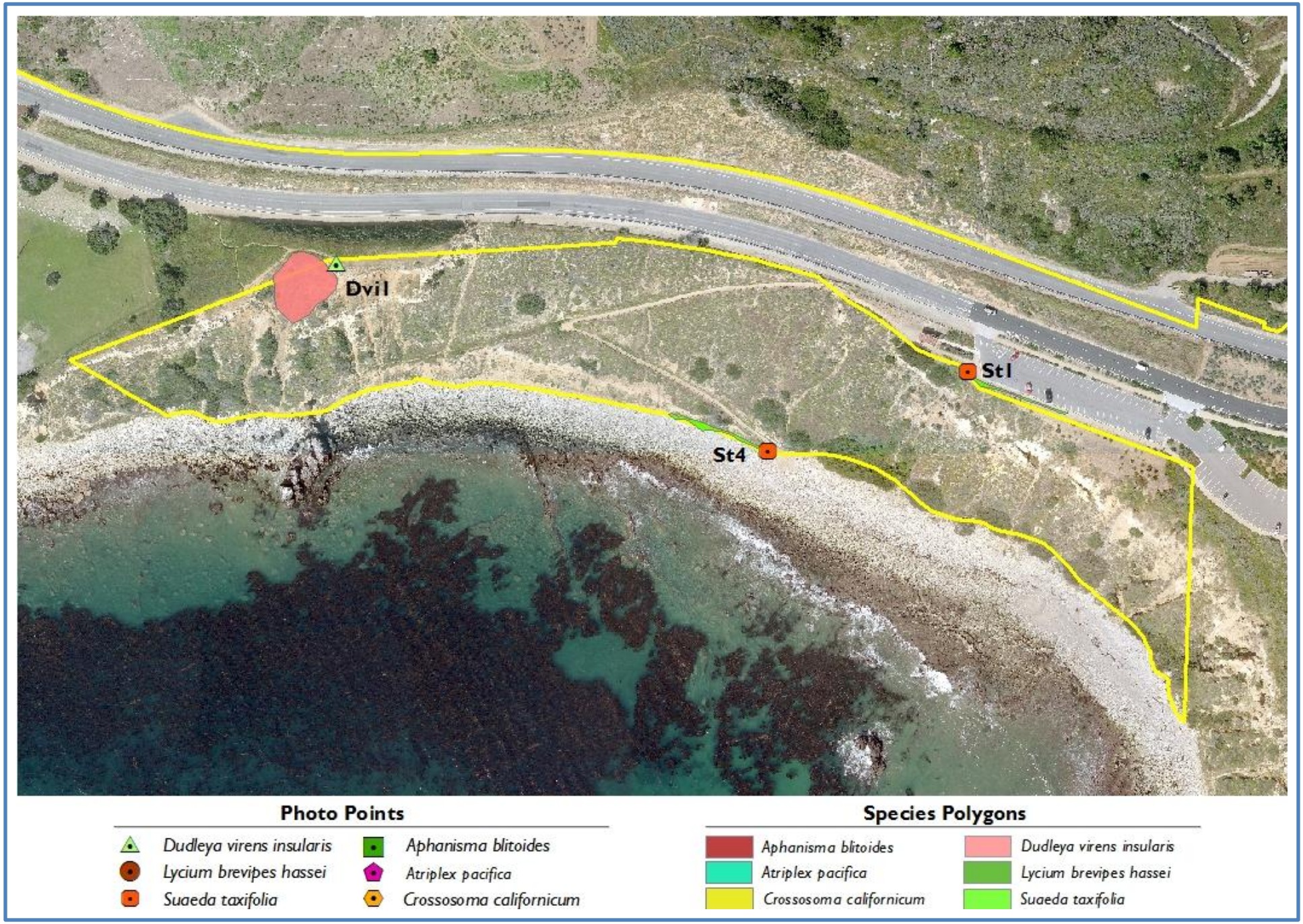

Figure A1. Pelican Cove showing locations of photo points and stand areas for *Dudleya* and *Suaeda* 2015.

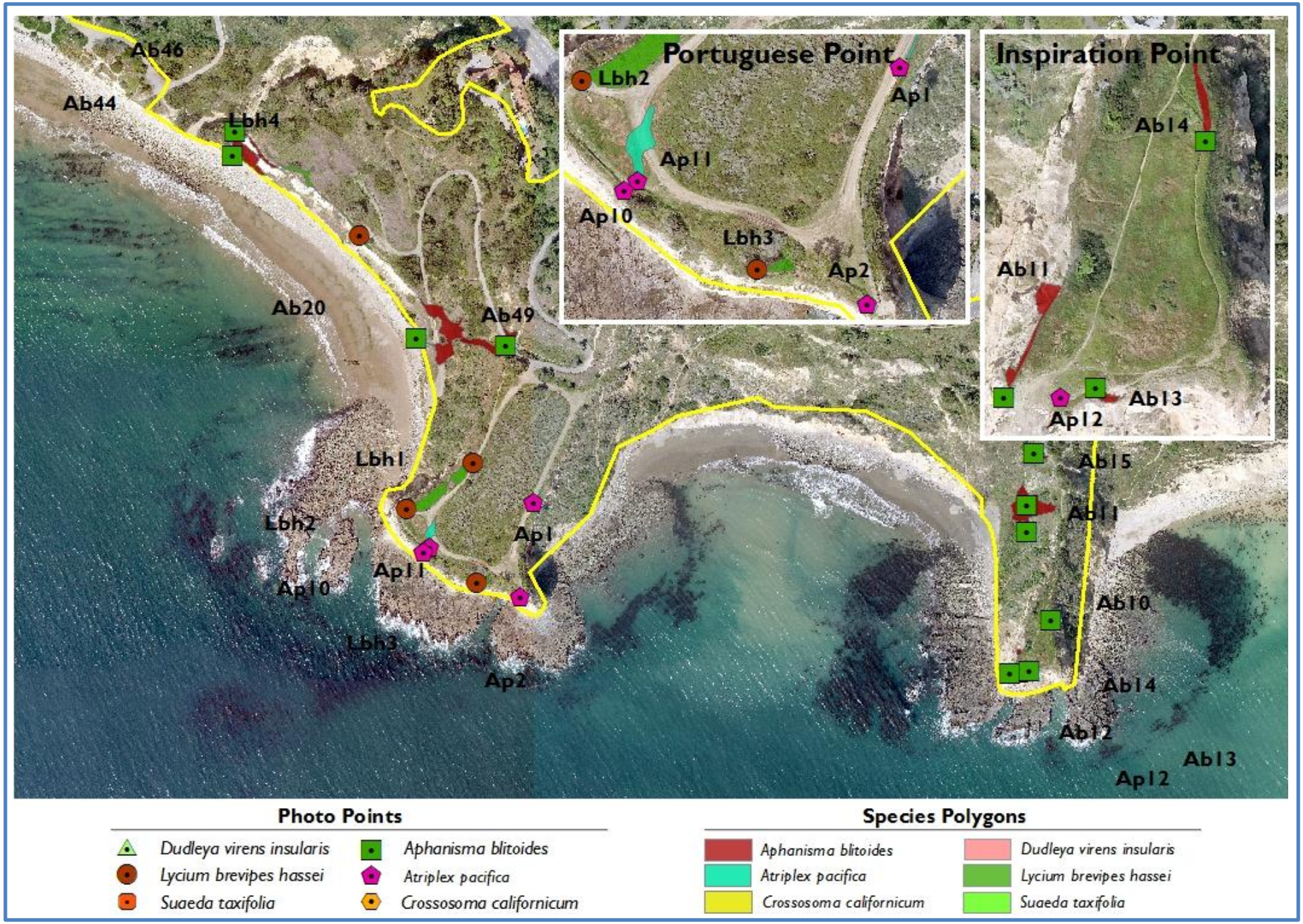

Figure A2. Abalone Cove showing locations of photo points and stand areas for *Aphanisma*, *Atriplex*, and *Lycium* 2015.

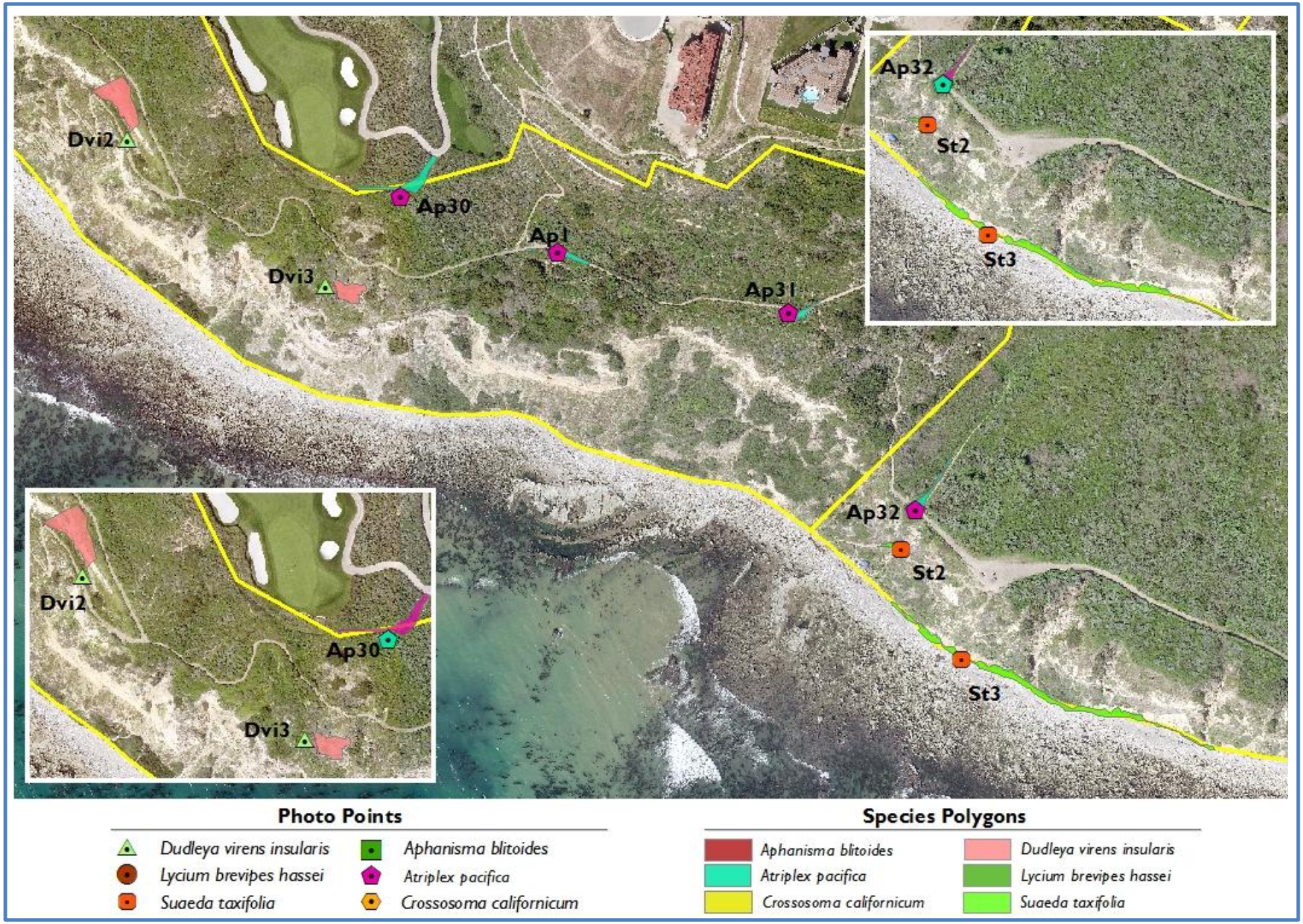

Figure A3. Ocean Trails showing locations of photo points and stand areas for *Dudleya*, *Atriplex*, and *Suaeda* 2015.

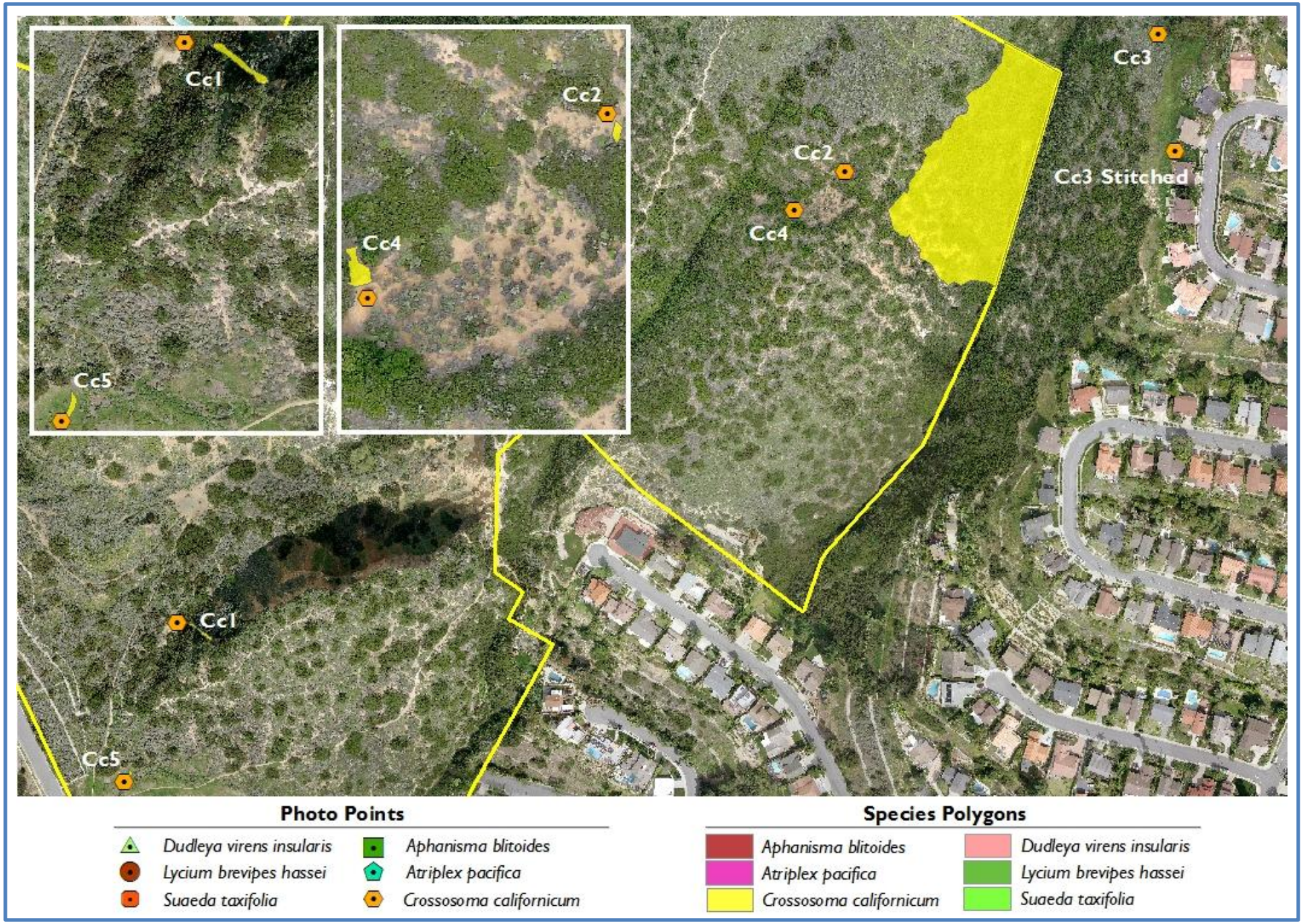

Figure A4. Pelican Cove showing locations of photo points and stand areas for *Crossosoma* 2015.

APPENDIX B

Covered Species Survey Data

Appendix B. Covered plant species field monitoring results for Reference photo points and supplemental photo points for 2015.

Photo Point Number	Phenology	Stand Structure	Recruits	Survey Area (m^2)	Plant Count	Percent Cover			
						Species	Other Natives	Non-Native	Bare
Aphanisma blitoides Reference Site photo points									
Ab44[1]	Flowering	Mixed	Yes	356	>1,000	2	2	36	60
Ab46[1]	Flowering	Mixed	Yes	93	>1,000	2	2	36	60
Ab49[1]	Withered	Mature	Yes	104	>500	5	10	50	35
Aphanisma blitoides supplemental photo points									
Ab10[3]	Withered	Mature	Yes	7	200	2	0	48	50
Ab11[3]	Withered	Mature	Yes	656	>1,000	3	5	27	65
Ab12[3]	Withered	Mature	Yes	28	150	2	3	16	79
Ab13[3]	Withered	Mature	Yes	4	200	1	0	5	94
Ab14[3]	Withered	Mature	Yes	20	6	1	0	45	54
Ab15[3]	Flowering	Mature	Yes	50	50	1	36	11	52
Ab20[1]	Flowering	Mixed	Yes	983	>1,000	2	36	53	9
Atriplex pacifica Reference Site photo points									
Ap1[2]	Fruiting/Seeding	Mixed	Yes	13	20	2	5	23	41
Ap2[2]	Non-Flowering	Young	Yes	18	>500	3	0	1	96
Ap3[4]	Fruiting/Seeding	Mature	No	6	2	1	0	10	88
Ap3[9]	Other	Mature	Yes	50	1	1	29	0	70
Atriplex pacifica supplemental photo points									

Ap10[3]	Non-Flowering	Mature	Yes	2	5	2	0	48	50
Ap11[3]	Non-Flowering	Mature	Yes	115	1	3	5	27	65
Ap12[3]	Non-Flowering	Mature	Yes	1	2	2	2	2	96
Ap30[4]	Fruiting/Seeding	Mixed	Yes	133	200	25	1	15	59
Ap31[4]	Fruiting/Seeding	Mixed	Yes	31	35	2	5	2	91
Ap32[4]	Fruiting/Seeding	Mixed	Yes	71	75	10	1	1	88
Crossosoma californicum Reference Site photo points									
Cc1[5]	Red-leaved	Mature	No	37	2	1	95	0	4
Cc2[5]	Red-leaved	Mature	No	3	4	10	50	0	40
Cc3[6]	Red-leaved	Mixed	Yes	11,180	>800	35	55	0	10
Crossosoma californicum supplemental photo points									
Cc4[5]	Red-leaved	Mixed	Yes	14	40	35	25	0	40
Cc5[5]	Red-leaved	Young	No	16	3	1	13	1	85
Dudleya virens spp. *Insularis* Reference Site photo points									
Dvi1[7]	Non-Flowering	Mature	No	576	57[10]	2	25	10	63
Dvi2[9]	Non-Flowering	Mature	Yes	292	328[10]	20	10	20	50
Dvi3[9]	Non-Flowering	Mixed	Yes	122	142[10]	5	15	5	80
Lycium brevipes var. *hassei* Reference Site photo points									
Lbh1[8]	Dormant	Mature	Yes	169	200	90	0	0	10
Lbh2[8]	Dormant	Mature	No	306	400	90	0	0	10
Lbh3[8]	Dormant	Mature	No	26	30	90	0	0	10
Lycium brevipes var. *hassei* supplemental photo points									
Lbh4[8]	Non-Flowering	Young	No	197	21	1	12	22	65

Suaeda taxifolia Reference Site photo points									
St1[7]	Non-Flowering	Mixed	Yes	48	29	3	23	30	44
St2[9]	Flowering	Mixed	Yes	11	13	10	30	1	60

St3[9]	Flowering	Mixed	Yes	411	31[11]	30	10	1	60
Suaeda taxifolia supplemental photo points									
St4[9]	Flowering	Mixed	Yes	58	175	10	5	20	65

Sample dates and annotations:
1 = May 17
2 = Apr 3
3 = Apr 30
4 = May 19
5 = Jul 16
6 = Jul 17
7 = Jul 23
8 = Jul 30
9 = Aug 6
10 = Clumps counted, ranging from 2 to several individuals
11 = Clumps counted, many juveniles merged into one plant making individuals indistinguishable

INTENTIONALLY LEFT BLANK

APPENDIX C

Reference Site Photo Points

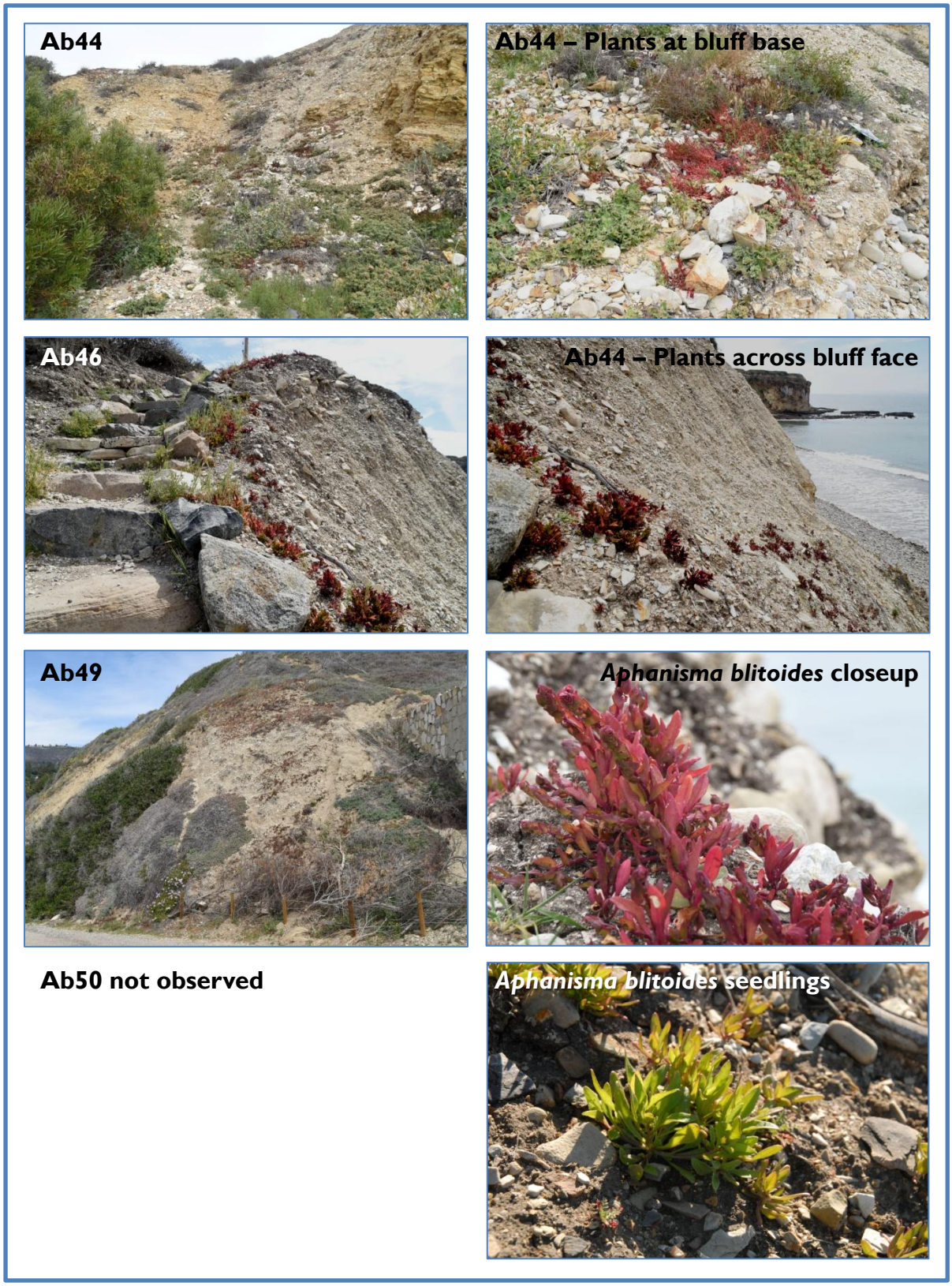

Figure C1. *Aphanisma blitoides* photo points from the 2015 survey.

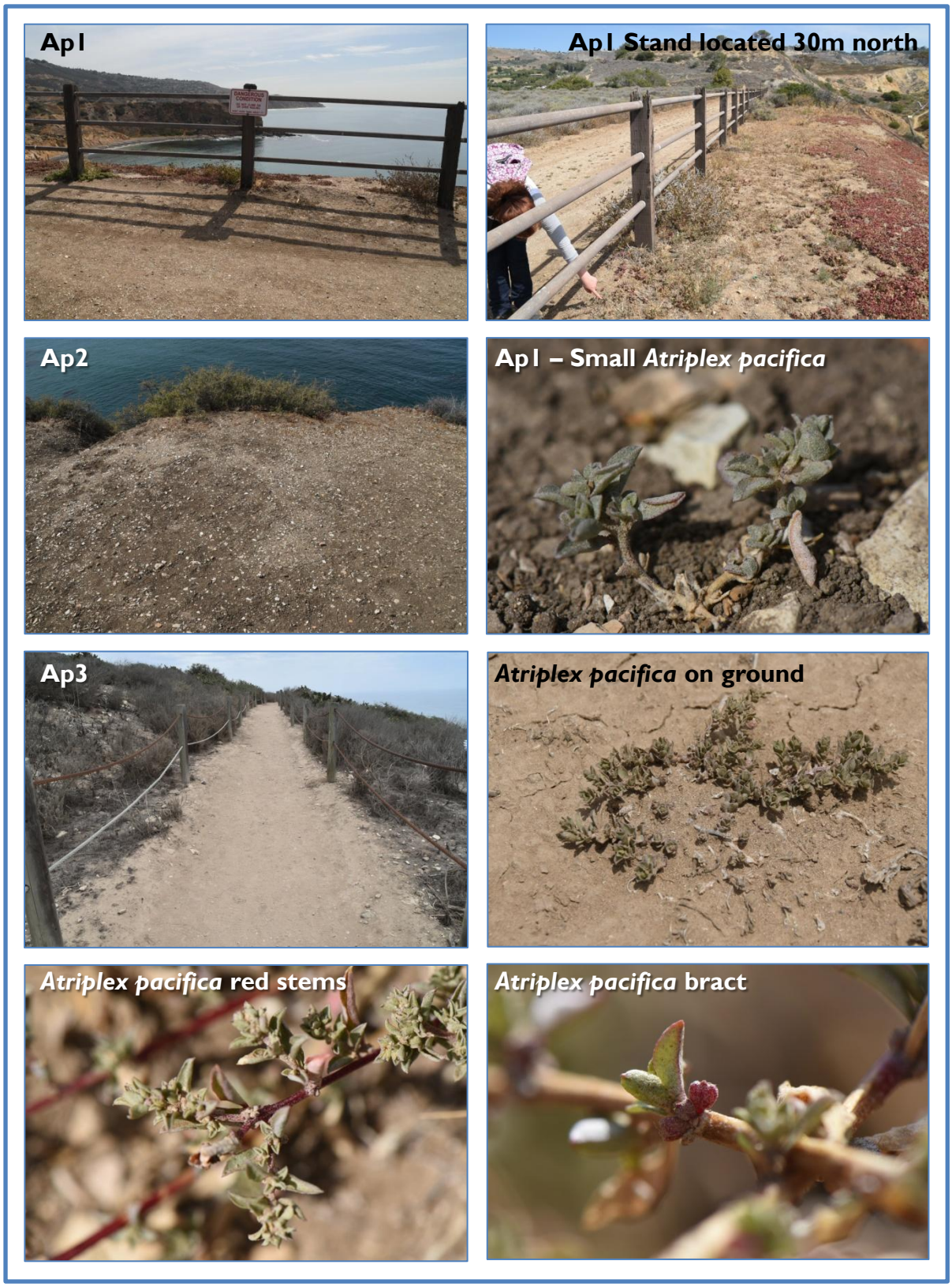

Figure C2. *Atriplex pacifica* photo points from the 2015 survey.

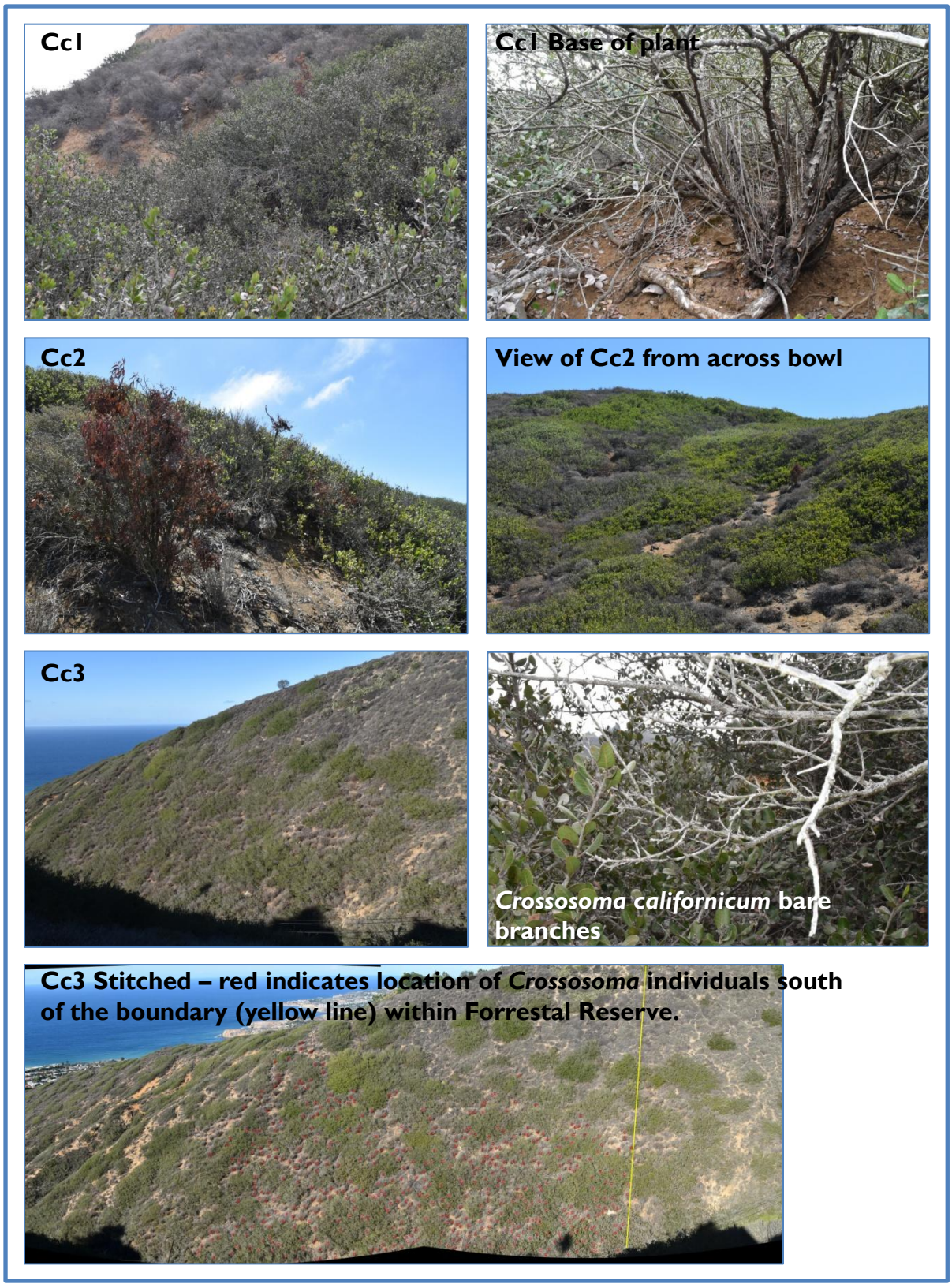

Figure C3. *Crossosma californicum* photo points from the 2015 survey.

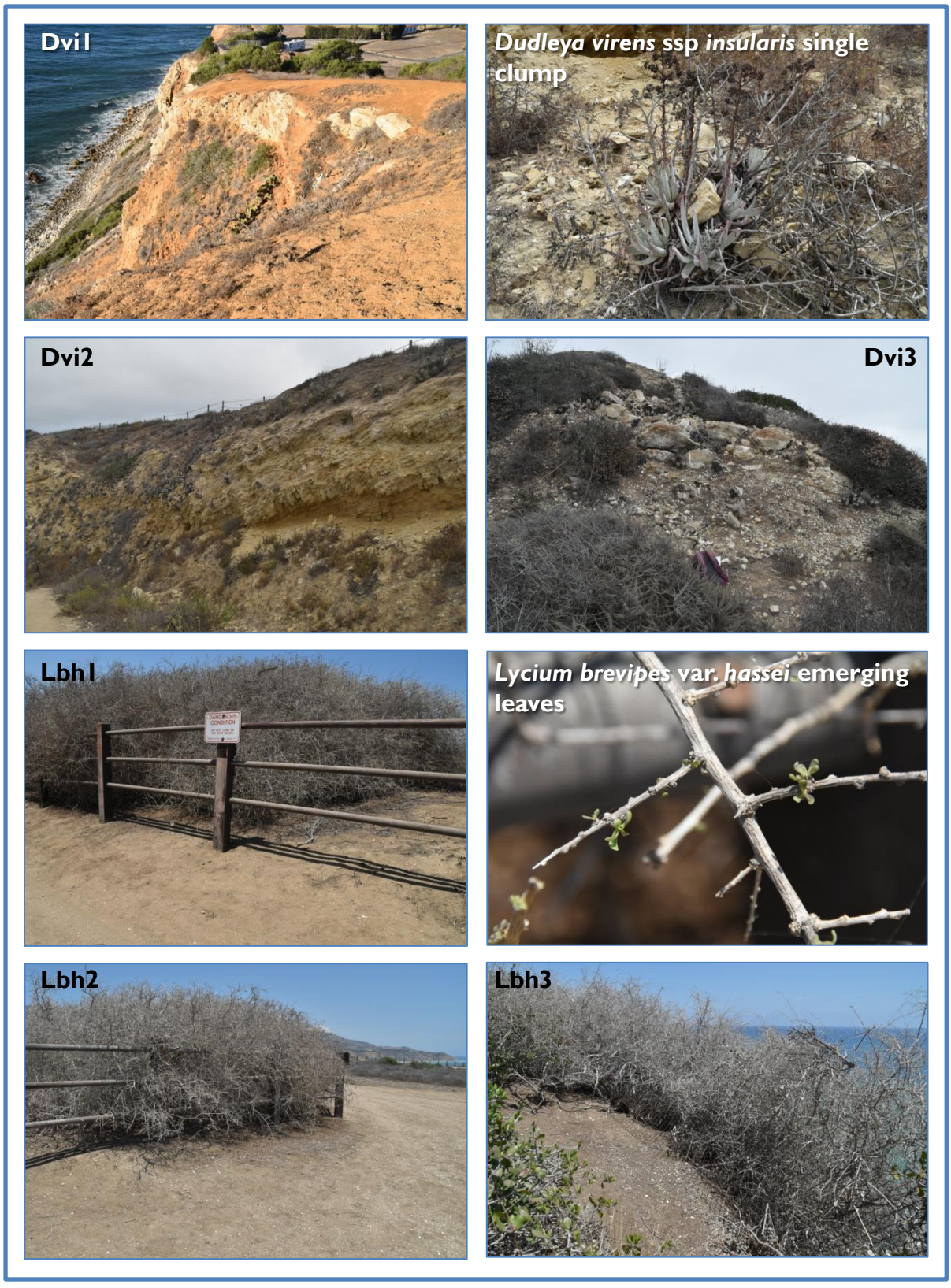

Figure C4. *Dudleya virens* ssp. *Insularis* and *Lycium brevipes* var. *hassei* photo points from the 2015 survey.

Figure C5. *Suaeda taxifolia* photo points from the 2015 survey.

APPENDIX D

Supplemental Photo Points

Figure D1. Additional sites for *Aphanisma blitoides* on Inspiration Point from the 2015 survey.

Figure D2. Additional sites for *Aphanisma blitoides* and *Atriplex pacifica* on Portuguese Point from the 2015 survey

Figure D3. Additional sites for *Atriplex pacifica* in Ocean Trails from the 2015 survey

Figure D4. Additional sites for *Crossosma californicum* from the 2015 survey.

APPENDIX E

Covered Plant Species Monitoring Methods

PALOS VERDES PENINSULA
LAND CONSERVANCY

Covered Plant Species Monitoring

January 28, 2016

Covered Plant:
Procedures for field methods, recording measurements, data entry, data QA/QC, and data assessment.






Method Overview

The Natural Communities Conservation Plan and Habitat Conservation Plan (NCCP) for the Palos Verdes Nature Preserve (PVNP) provides a list of six plant species that are to be targeted for conservation through restoration activities conducted by the Palos Verdes Peninsula Land Conservancy (PVPLC). These species, known as covered species, have special status due to their rareness or limited distribution. Five of the six species, *Aphanisma blitoides* (aphanisma), *Atriplex pacifica* (south coast saltbush), *Crossosoma californicum* (Catalina crossosoma), *Dudleya virens* spp. *insularis* (bright green Dudleya), and *Lycium brevipes* var. *hassei* (Santa Catalina Island desert-thorn), are listed by the California Native Plant Society (CNPS 2010) as List 1B plants which are rare, threatened, or endangered in California and elsewhere. The sixth, *Suaeda taxifolia* (woolly sea-blight), is listed as CNPS List 4, which is a plant of limited distribution.

Under the terms of the NCCP, covered species need to be monitored once every three years to determine whether a population is expanding, stable, or declining. In recognition that the species differ phenologically during the year, each species should be monitored at its most appropriate time, generally in spring when the plant is blooming (Table 1). Also, because annual rainfall varies considerably, the monitoring of annual species are to be conducted during those years when rainfall exceeds 75% of the long-term average annual precipitation.

A reconnaissance survey was conducted in 2006 to document the baseline population sizes of these species for the NCCP (Dudek 2007). The reconnaissance survey provided maps of surveyed stands of the covered species as well as three photo point locations to use in subsequent monitoring. These photo point locations provide the location to photograph and assess the respective covered plant species every three years (Figure 1).

Covered plant species monitoring consists of taking a photograph at each photo point, then counting the number of individuals within a specified area at the photo point and documenting conditions of the plant and general habitat. The three year periods began after the 2006 baseline survey: 2007-2009, 2020-2012, 2013-2015, etc. The trigger amount of rainfall for conducting covered plant species monitoring is 9.70", based upon rainfall measured by the National Weather Service at the Long Beach Airport for the period 1971 – 2000, average rainfall is 12.94". If less than 9.70" of precipitation falls during the first two years of the monitoring period, then the monitoring must be conducted in the third year to document the effects of prolonged low rainfall.

Table 1. List of NCCP covered species, their CNPS status, recommended survey period, and images of the plants.	
Aphanisma blitoides, aphanisma CNPS List 1 B.2 Annual, survey in survey when present in spring and/or summer	 
Atriplex pacifica, south coast salt bush CNPS List 1 B.2 Annual, survey when present in spring and/or summer	 
Crossosoma californicum, California crossosoma CNPS List 1 B.2 Survey in summer when leaves are red	 
Dudleya virens ssp. *insularis*, bright green liveforever CNPS List 1 B.2 Survey in April - Jun	 
Lycium brevipes var. *hassei*, Santa Catalina Island desert-thorn CNPS List 1 B. 2 Survey in June	 
Suaeda taxifolia, wooly sea-blite CNPS List 4 Survey in summer	 

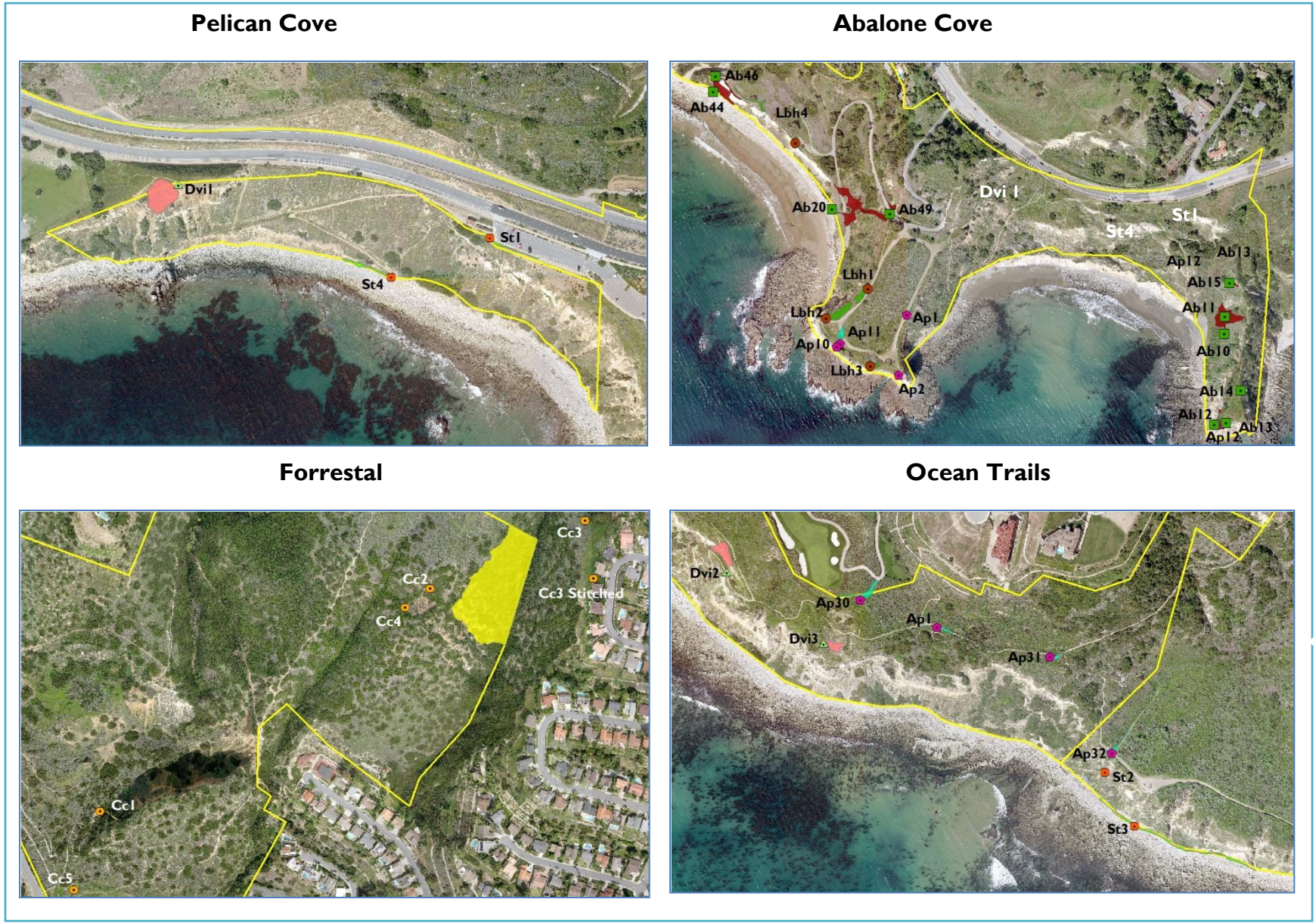

Figure 1. Locations of photo points for covered plant species monitoring. Detailed maps are provided in the Appendix to be used for the field surveys.

Prepare for Covered Species Monitoring

Prepare for field work, performed by the lead for Covered Species Monitoring

1. Print-out the following datasheets and forms found at Stewardship/Monitoring/Monitoring Forms/FieldDataSheets.xlsx
    a. Six copies of the Covered Species form, one for each species (Figure 2).
    b. CNPS Percent Cover Diagrams.pdf
    c. Detailed maps showing locations of the photo points (Appendix A).
    d. Photo point images and data appendix from the most recent Comprehensive Report
    e. Field procedures for covered species monitoring
2. Assemble the following equipment:
    a. Clipboard
    b. Pens and/or pencils
    c. Scratch paper
    d. Camera
    e. GPS unit for mapping cover extent and any additional sites. Use the Habitat Monitoring data dictionary on the Trimble GeoXT.
3. Obtain current rainfall amount for the July 1- June 30 rain year from Long Beach at the NWS' website: http://www.weather.gov/climate/index.php?wfo=lox .
    a. Alternatively, maintain the rainfallyearly.xlsx file in the Covered Species folder.

NCCP Covered Plant Species
Photo Point Monitoring

Species:_____ Date:_____

Rainfall to date[1]:_____ Comments:_____

Surveyors:_____

PP#	Photo Numbe	Phenology	Stand Structure	Recruits (Y/N)	Threats: Invasives, Erosion, Other	Comments:

Population Size: Area	Number	% Species Cover	% Other Natives	% Non-native	% Bare	Observed changes from previous survey

PP#	Photo Numbe	Phenology	Stand Structure	Recruits (Y/N)	Threats: Invasives, Erosion, Other	Comments:

Population Size: Area	Number	% Species Cover	% Other Natives	% Non-native	% Bare	Observed changes from previous survey

Figure 2. Example of Covered Plant Species Field Datasheet.

Field Methods

1. Safety first: It is best for two people to conduct the surveys together, especially for the difficult species *Crossosoma californicum*.
    a. The lead biologist is responsible for operating the GPS unit, making the assessments, and taking the photographs.
    b. The helper (may be staff or volunteer) is responsible for writing down all observations as dictated by the lead biologist and making sure all entries are complete.
2. Visit sites in the mid-day (9:00 am – 3:00 pm) when shadows are minimal.
3. Fill-out all survey information, including species, date, rainfall to date, surveyors, and any pertinent comments.
4. Take photo
    a. Find previously occupied site by looking at Photo Point location on the map and the images printed from the prior report.
    b. Take photo carefully to include the area shown in the most recent photos, using the original set for comparison in order to insure consistency in photographs.
5. Include all plants observed within the areas depicted in the GIS maps. Whenever possible, walk around the entire perimeter of the stand to insure all plants are counted.
6. Fill-out associated data
    a. Phenology – record the dominant state (>50%) of
        i. Flowering
        ii. Non-flowering
        iii. Fruiting
        iv. Dormant
        v. Dead
        vi. Withered (use for annuals that are spent, but still visible)
    b. Stand Structure – Record maturity of the stand:
        i. Mixed (young and old plants are present)
        ii. Mature (only old plants are present)
        iii. Young (only young plants are present)
    c. Recruits – Yes or No: are recruits present?
    d. Threats
        i. Invasives –invasives are growing over the species
        ii. Erosion –the stand is in an unstable area
        iii. Other – provide a comment
    e. Percent Cover – asses the approximate cover of:
        i. Covered species
        ii. Other native plant species
        iii. Non-native plant species
        iv. Bare ground
    f. Observed changes from previous survey are made comparing viewed conditions to those depicted in images printed from the prior report.
7. Make population estimate

a. Occupy the photo point site as shown in Figure 1 using the GPS unit and accessing the 2015 files: e.g. CoveredSpecies 150429.
    i. If a new site is surveyed, or resurveyed, name the file as: CoveredSpecies yymmdd.
b. Determine area to be counted by referencing photo point maps, GIS maps, images printed from prior report, and conditions on hand
c. Use the area estimates established in 2010 as noted in the 2010-12 Cumulative Report and shown on GIS maps (to be created).
d. Count individuals within the area.

8. If the stand has changed size and location, then map with GPS unit as best as possible. Draw outline on paper map to use when editing the feature later in GIS. This is common for the annuals *Aphanisma blitoides* and *Atriplex pacifica*. It should be anticipated for new stands resulting from restoration efforts.
9. Special considerations
    a. *Crossosoma californicum* – Site 3 (Cc3) is accessed from the utility easement between 30433 and 30443 Ganado Drive (accessed from Crest Drive). While the original photo point was taken north from the easement and is accessed by following a faint coyote trail half-way down the slope, then traversing north to a pine tree stand. This site does not provide an identifiable stand in which individual plants can be counted.
        i. Next, take two photos from the easement to create a panorama image. This image will need to be photo-shopped together, then printed in ledger format for counting the number of plants present. The bright red *Crossosoma* are readily distinguished from *Eriogonum fasciculatum*, which are more rust-red. See the prior Comprehensive Report and archived images.
        ii. Use free, downloadable MicroSoft product (or any other) to stitch the two photos together.
        iii. Using Adobe PhotoShop (available in Development) or double click the image within Windows Explorer for Windows file editing softwer, magnify image to identify plants, covering each one with a **C** to denote a counted plant.
            1. Take care to count only within the preserve boundary
            2. The plants number in the hundreds and individuals are very difficult to distinguish.
    b. *Dudleya virens* ssp *insularis* – Count clumps of plants where pups are merged with adult, as shown in the image at right.

Examples of *Dudleya* clumps containing multiple pups, each clump distinguished by space between adjacent clumps.

GPS Data Transfer and GIS Mapping

1. Compile all files into a single file for the CoveredSpecies map. Although GPS files may be created over a few months during the monitoring, they can be combined into a single shapefile for transferring to GIS using GPS PathFinder Office or within GIS.
2. To combine the files within GIS, seek help for experienced GIS user.
3. To combine the files within GPS PathFinder:
    a. First, transfer all files from the GeoXT and process as normal in Path Finder Office (see directions in SOP GeoXT GPS Use.pdf).
    b. Within GPS PathFinder Office do the following steps
        i. Go to Utilities and select Combine…
        ii. Select Browse and select the Covered Spp yyyy.cor files from the monitoring season
        iii. Click OK to output a compined.cor file.
        iv. Export the new file as a shapefile for GIS.
        v. Rename and project as normal, storing the file in the appropriate folder with the appropriate name.
4. Open the previous Covered Species Map and rename to the year the survey was conducted. Add the newly created Combined Covered Spp yyyy shapefile.
    a. Because it's usually impossible to walk the entire area, the shapes must be edited by hand.
    b. Adjust the shapes using Editor within GIS.

Data Assessment

1. First things first
    a. The survey lead assembles all datasheets and reviews data sheets for completeness.
    b. The survey lead checks the photographs and insures that they were properly placed onto the server into the respective folder: Stewardship/Palos Verdes Nature Preserve/Monitoring/Covered Plant Species Monitoring/Year/Photo Points
        i. At this time, the lead biologist may take the option to rename the photos to indicate their location. Do this prior to deleting the images from the camera to prevent loss of images in the renaming process. Use the following format:
            1. Species abbreviation, Photo point number year (yyyy), photo number

2. Example: Ap3_2010_420.jpg
3. Include any additional photos

2. Access the Attributes Table in GIS and correct any errors in editor mode.
    a. Export data into an Excel file.
3. *Optional* Enter data into the database, open the Monitoring Database.
    i. Under "To enter data" click Covered Plant Species Monitoring
    ii. This will open a form, instructions are provided on the form.
        1. Enter Species name and all survey metadata
        2. Once in the lighter green box, fill out all information for the first Photo Point Number (PP#). Use the tab key to move from one field to the next. When first PP# is complete, tab until subform clears out and then enter the next PP#
        3. Alternatively, click the small asterisk in the light green box to clear the form for new data.
        4. To begin a new species, click the asterisk at the bottom of the dark green box to clear the form for new data.
    iii. When all data are entered, click Return to Main Form to return to the Switchboard form.
    b. When all data are inputted, print-out the QA Covered Plant Species Photo Point report and check entered data against field datasheet for correctness.
    c. Write Data Entered, your initials, and date at the top of the data sheet
    d. At this point, persons that will input data the database and those performing the QA/QC steps should be identified.

4. Quality Assurance
    a. Compare the printed QA report with the information on the datasheet.
    b. Correct any entries with a red pen
    c. Once the data are corrected on paper, then enter the database and to correct the data.
        i. It is best to check off each correction as they are made
        ii. It is important to work carefully as you are working in an application that is very unforgiving. Any changes are permanent and not retrievable.
    b. Write Data QAd, your initials, and date at the top of the data sheet.
    c. File data sheets in a folder marked PVNP Covered Plant Monitoring *Year.*

Data Extraction

Optional if data are archived in GIS.
All data are archived in the Monitoring database, in an Access application. It is easy to run queries if you are familiar with using Access. Do not try to extract the data if you are

inexperienced with Access and find someone to help. Access is an unforgiving application which can lead to accidental permanent loss of data.

1. To extract data from the database for transferring to another application, follow these steps
    a. Open the Monitoring database and navigate to the query section. Currently there are no pre-made queries for extracting Covered Species data.

Data Analysis

Follow the format provided in previous formats for reporting on Covered Species. Be prepared to provide an assessment of the density of plants in each polygon for comparison to prior years. An Excel file with computations are provided in the 2015 folder.

Crossosoma californicum – This plant was sampled by Professor Kaius Helenurm, from the University of South Dakota, in 2011 for a genetic variability analysis. Check his university website to see if any results have been published. He indicated at the time of sampling that it will be some time before any results are published.

Literature Cited

California Native Plant Society. 2010. Rare Plant Program: http://www.cnps.org/cnps/rareplants/. Accessed July 21, 2010.

CNPS. See California Native Plant Society.

Dudek. 2007. Initial Management and monitoring report for the Rancho Palos Verdes Natural Community Conservation plan. *Prepared for:* The City of Rancho Palos Verdes. *On behalf of:* Palos Verdes Peninsula Land Conservancy. Encinitas, CA. 69 pp. + Appendices.

2.2 CALIFORNIA GNATCATCHER AND CACTUS WREN SURVEYS

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Stacey Love
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September 7, 2015

Ms. Love,

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

Daniel Cooper

Daniel S. Cooper
President, CEM, Inc.
USFWS Permit #TE 100008-1

Palos Verdes Nature Preserve Survey for the California Gnatcatcher and the Cactus Wren
Palos Verdes Peninsula Land Conservancy
Los Angeles County
2015

Final Report

Abalone Cove, Palos Verdes Peninsula (photo. by Daniel S. Cooper)

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September 7, 2015

Introduction and Summary

We report on a single-season survey of two sensitive bird species, the (coastal) California gnatcatcher *Polioptila californica californica* (Federally Threatened) and the coastal-slope population of the cactus wren *Campylorhynchus brunneicapillus* (formerly a Candidate for federal listing; now treated as a California Bird Species of Special Concern[1]) on the Palos Verdes peninsula in 2015. Our study area extended across nine reserves covering a combined 1,225 acres managed by the Palos Verdes Peninsula Land Conservancy (Figures 1a and 1b). Our survey may be compared with previous surveys for these two birds conducted at most of the same sites in 2006, 2009 and 2012 (Dudek 2007, Hamilton 2009, CEM 2013), as well as with more limited surveys conducted at various locations on the peninsula since 2010 (e.g., CEM 2011, 2013, and 2014).

In 2015, both California gnatcatcher and cactus wren were present together at five reserves, with the California gnatcatcher absent (or presumed absent) at just one, and the Cactus wren absent at five[2]. Vista del Norte likely had neither target species, as in prior years, though it was incompletely surveyed in 2015. Compared with previous surveys, the estimate of California gnatcatcher territories for 2015 (33) was exactly the same as that of 2012, but lower than in prior years (65 territories in 2006; 40 in 2009); numbers of cactus wren territories (25) were much lower than in 2012 (48 territories), but were roughly the same as in 2009 (18; a major site, Upper Filiorum, was not counted in 2009). Census methods differed so much in 2006 that counts of cactus wrens then are not readily comparable to either year (see below).

Methods

I (Daniel S. Cooper, TE 100008-2, SC-10615) conducted targeted surveys for the California gnatcatcher and the cactus wren through 34 visits to nine reserves at the southwestern tip of the Palos Verdes peninsula (Table 1; Figures 1a, 1b) across 15 survey days between 07 March and 24 June 2015[3]. More than one site was visited on most days, for a total of 39 survey hours (roughly 30% fewer hours than in 2012; Table 1). We used a two-visit protocol, with surveys spread at least one week apart. In 2012, we made one early-season visit during March and early April ("Round 1") and one late-season visit during May and early June ("Round

[1] In 2008, coastal populations of the cactus wren north of southern Orange County were deemed distinct from those in southern Orange County (termed *C. b. sandiegensis*) by the most recent publication of California Bird Species of Special Concern (Shuford and Gardali 2008). However, this view is not widely held within the ornithological community, and due to their extreme isolation and a life history that is essentially identical with coastal-slope populations to the south into San Diego County, we, as well as regulatory agencies like the Calif. Dept. of Fish and Game (CDFG; L. Comrack, pers. comm., April 2008), treat the Palos Verdes birds as a sensitive species under state law. In addition, CDFG requires that all playback surveys for the cactus wren in coastal-slope Los Angeles Co. (and Ventura Co.) be conducted under a Memorandum of Understanding reserved for special-status species.

[2] An incidental observation later in the season confirmed presence at one of these, described in detail below.

[3] Survey days in 2015: 7, 19, 22, 24, 26 and 30 March; 06, 07, 14, and 23 May; 9, 15, 17, 18 and 24 June. Some surveys included were part of pre-work surveys for City of Rancho Palos Verdes (brush-clearing/weed abatement for fire prevention).

2"); however, a late start to the survey in 2015 compressed the survey window[4]. Surveys on reserves made by Cooper for other projects in spring 2015 were incorporated into these results where appropriate, as noted below.

Following the established protocol for California gnatcatcher surveys (USFWS 1997), visits were made between 6:00 a.m. and noon, typically beginning late morning when ambient morning temperatures were above 55 degrees F. Surveys were not conducted under extreme weather (temperature, wind) conditions. Taped vocalizations of each species were employed on all surveys, as outlined in guidelines provided by PVPLC and approved by U.S. Fish and Wildlife Service/Department of Fish and Game ("7.3.2 Animal Species Monitoring"). A "zigzag" walking route was used to cover each preserve, following as closely to the most recent (2009) survey as possible (Appendix A). No more than 80 acres of coastal sage scrub was surveyed on any single day, following USFWS (1997) guidelines. Portions of several reserves contained only scattered patches of coastal sage scrub, or had inaccessible areas that could not be reached during the survey; these were generally skipped in 2015 to focus most efficiently on prime coastal sage scrub and cactus habitat within the reserve network, as was done in 2012.

All surveys were carried out by Daniel S. Cooper (TE 100008-2; SC-10615). Cooper has extensive experience with California gnatcatcher surveys throughout Los Angeles and Ventura County, and conducted similar target bird surveys at the Portuguese Bend Reserve in prior years for the Palos Verdes Peninsula Land Conservancy. The survey routes used in 2012 were intended to follow those used by previous surveyors (Dudek 2007, Hamilton 2009), with the continuation of a newer site added in 2012, Upper Filiorum reserve, located between Three Sisters and Portuguese Bend. Despite efforts to maintain a similar schedule as in 2012, I spent 32% fewer hours surveying in 2015 as compared with 2012 (c. 40 hrs, vs. 58 hrs[5]), despite spending a few more days afield.

In addition to recording aural detections of both species, visual scans (using Leica 8x42 Ultravid binoculars) were made of all cactus habitat for cactus wren nests, and sightings of the brown-headed cowbird (*Molothrus ater*), a known parasite of songbird nests, as well as other sensitive species were noted. Basic weather conditions were observed at the start and end of each visit (Table 2). All observations of the two target species were recorded directly onto aerial photographs, with special attention paid to documenting the number and breeding/territorial status of each in notes. For each sighting of a target species, we recorded:

- Date and start time of sighting (sightings were typically very brief, so stop times were typically not recorded unless more than a few seconds);
- Sex/age of individual(s) (if known);
- Banding information (color-banded, metal-banded, etc.);
- Habitat type where found (only if not coastal sage scrub for California gnatcatcher or cactus scrub for cactus wren);
- Number of birds associated with individual (e.g., family group, pair, etc.); and

[4] The 2006 reserve-wide surveys had used a 3-visit protocol; a reduction in effort for 2009 and 2012 was made per the NCCP guidelines for RPV.

[5] Comparisons of effort with prior years' is difficult, particularly 2009 when vegetation was surveyed and mapped, a time-consuming process.

- Breeding activity observed

Locations of all target/special-interest species were transferred from field maps onto Google Earth maps and converted to digital files (.kmz). These are presented in Appendix B.

From these sightings, we estimated the number of territories for each reserve, cognizant that two visits were insufficient to provide a confident estimate of territory boundaries. Therefore, our territory numbers should be treated as rough approximations, rather than indications of actual population estimates. To allow for the most useful comparisons with prior surveys, we follow Hamilton's (2009) definition of a "territory" to include any discrete location where a territorial bird (male, in the case of the gnatcatcher) or pair was present on at least one visit. Locations where we detected an unmated adult bird of either species, or juvenile(s) of either species away from adults, were not considered "territories". In mapping locations of birds, we noted movements with arrows on our field maps, but mapped only the site of initial detection on the digital maps (otherwise, they would be nearly impossible to read, particularly given multiple visits).

Comparisons among years have limited validity due to differences in methodology and timing. The two-visit schedule was similar to that of Cooper (in 2012) and Hamilton (in 2009), but the survey timing (May – early June) was later than the (March – early June) timeframe used in 2009 and 2012; Dudek (2007) used three visits in 2006, most done later in the summer (June through August). It is also unclear how intensive the cactus wrens surveys were in 2006; while the "2006 Initial Management and Monitoring Report" (*Ibid*) described conducting "focused surveys" for Cactus Wren, the original survey report provided to USFWS (Dudek 2006) describes the same effort as a "focused presence/absence survey" for California gnatcatcher alone, and states only that "point locations of all observed San Diego cactus wrens…were mapped during the survey", presumably without a concerted effort to determine territory boundaries or the existence of paired versus single birds. As pointed out by Hamilton (2009), this may have led to an over-estimate of the number of unmated adults, or, at least complicates year-to-year comparisons. Hamilton also spent more time at each site in 2009, as he was also mapping habitat in addition to surveying birds. Finally, there exists inherent variability in estimates that rely on a small number of visits, so claims of species increasing or decreasing at a given site based on two or three visits must be made with caution[6]. However, changes in territory numbers and locations contribute to a baseline of observations that may be used to inform management decisions in future years.

[6] Atwood et al. (1998a) recommended a minimum of six visits during early spring and time of fledging to accurately determine territory size for the gnatcatcher, based on surveys on the Palos Verdes Peninsula.

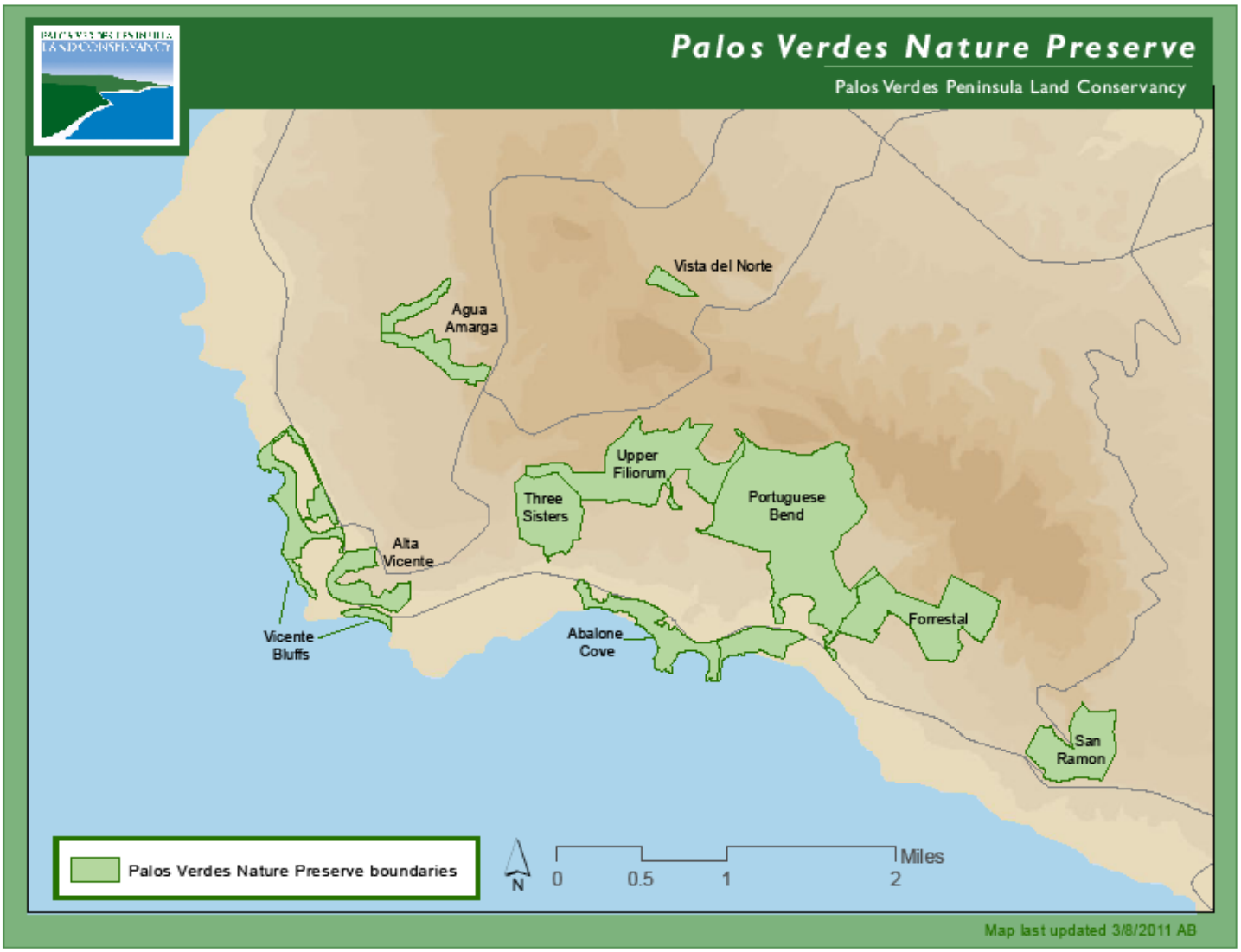

Figure 1a. Reserves in the Palos Verdes Nature Preserve in Rancho Palos Verdes (indicated in top of legend) surveyed during this study in 2015. Figure courtesy PVPLC.

Figure 1b. Aerial view of reserves surveyed during this study. Clockwise, from upper left: L = Agua Amarga (formerly "Lunada Cyn."); N = Vista del Norte, U = Filiorum (formerly "Upper Filiorum"); C = Portuguese Bend (formerly "Canyons"); F = Forrestal; R = San Ramon; A = Abalone Cove (east and west); T = Three Sisters; B = Vicente Bluffs (upper and lower); V = Alta Vicente. Figure from Hamilton 2009, courtesy of PVPLC.

Table 1. Reserve acreage and total survey hours, 2015. Note that multiple sites were surveyed on some days (see Table 2).

Reserve	Acres	Days surveyed 2012	Time afield 2012	Days surveyed 2015	Time afield 2015
Abalone Cove	64	3	7:10	6	5:17
Agua Amarga	59	2	5:05	3	3:21
Alta Vicente	55	2	4:35	4	4:52
Forrestal	155	4	8:40	4	4:05
Portuguese Bend	399	4	12:00	5	6:51
San Ramon	95	3	4:10	2	2:05
Three Sisters/Filiorum (combined)	300	4	10:35	7	9:43
Vicente Bluffs	84	2	4:40	2	2:42
Vista del Norte	14	2	1:05	1	0:20
TOTAL	**1,225**	**26**	**58 hours**	**34**	**c. 40 hrs[7]**

Table 2. Summary and description of survey effort in 2015 (wind <5 mph on each visit unless noted). Number of birds listed is the maximum number of adults encountered.

Date	Survey round	Time	Temp. start (F)	Temp. end (F)	Sky	Subarea, if applicable	# CAGN	# CACW
Abalone Cove (A)								
7 March[8]	1	08:00-10:00	63	70	Clear	West	0	0
22 March[10]	1/2	08:39-09:45	61	64	Ptly Cldy	(both)	2	0
26 March[10]	2/3	08:15-09:10	70	77	Clear	(both)	2	0
30 March[10]	3	08:42-09:12	62	65	Overcast	West	0	0
06 May	1	10:04-10:29	64	65	Overcast	(East)[9]	1	0
24 June	2	11:09-11:50	73	73	Clear	(East)[9]	1	0
Agua Amarga (L)								
19 March[10]	1	10:42-11:07	70	72	Ptly cldy	North	0	0
14 May	1	07:50-08:35	57	57	Overcast	East	2	3
24 June	2	07:48-09:59	66	64	Clear	N/A	5	2
Alta Vicente (V)								
14 May	1	09:45-10:30	57	57	Overcast	East	5	1
24 June	2	10:09-11:00	67	70	Hazy	East	2	4
14 May	1	08:45-11:05	63	66	Overcast	West	8	8
17 June	2	09:06-10:02	66	66	Overcast	West	5	5
Forrestal (F)								
06 May	1	08:52-09:51	61	61	Overcast	East	5	0

[7] Actual time surveying: 39:16
[8] Cactus Wren monitoring project volunteer training
[9] Vic. archery range west of main reserve
[10] City of RPV brush-clearance pre-work survey

15 June	2	09:07-10:18	62	62	Fog	East	8	0
07 May	1	08:20-09:00	58	58	Ptly cldy	West	6	0
09 June	2	07:15-08:30	63	63	Overcast	West	9	0
Portuguese Bend (C)								
22 March	1	07:10-08:30	61	64	Ptly cldy	South	5	0
24 March	2	09:40-11:00	73	75	Clear	South	3	0
30 March	3	07:15-08:35	58	64	Overcast	South	6	0
26 March	1	09:20-11:10	75	81	Clear	North	1	0
23 May	2	07:42-08:23	51	56	Ptly Cldy	North	5	0
San Ramon (R)								
07 May	1	06:53-08:12	57	63	Ptly Cldy	N/A	5	2
15 June	2	08:14-09:00	64	62	Fog	N/A	0	0
Three Sisters (T)								
07 May	1	10:32-12:02	61	64	Ptly cldy	N/A	7	6
18 June	2	08:49-10:52	63	70	Overcast	N/A	7	6
Filiorum (U)								
19 March	1	9:40-10:35	70	72	Ptly cldy	Northwest	0	3
22 March	2	10:35-11:00	66	68	Ptly cldy	Northwest	0	4
24 March	3	12:05-12:35	73	75	Clear	Northwest	0	4
23 May	1	09:10-11:20	60	61	Ptly cldy	Lower	2	2
17 June	2	06:45-08:55	59	59	Fog	Lower	5	4
Vicente Bluffs (B)								
6 May	1	10:37-11:39	61	61	Overcast	Lower	5	0
15 June	2	09:20-11:00	64	72	Clear	(both)	10	0
Vista del Norte (N)								
26 March	N/A	7:34-7:54	59	59	Clear	Lower	0	0

Results

California gnatcatcher

Maps showing all locations of California gnatcatcher and cactus wren observations, including nests, from the 2015 survey are provided in Appendix B, and are detailed in a table in Appendix C. To summarize differences between the 2006, 2009, 2012 and 2015 surveys, the number of California gnatcatcher territories estimated for the reserves (33) was, remarkably, exactly the same as the 2012 estimate (Table 3). However, the number of cactus wren territories in 2015 appears to have fallen by nearly 50% compared to 2012 observations, with an estimated 25 pairs, 19 if one excludes Upper Filiorum Reserve, which was not visited in 2009. This count is very similar to the 2009 estimate of 18 territories (excluding Filiorum).

Counts of California gnatcatcher were dramatically down at Abalone Cove (1 territory in 2015, vs. 5 in 2012 and 3 in 2009); however, the detection of two individual birds in areas where a territory was not mapped (one of which may have been a male but was not seen), and the fact that the far eastern portion of the reserve was not visited[11], suggests that this estimate is artificially low. Aside from increases or decreases by a territory or two in areas where birds had been seen in prior years, the other area where gnatcatcher populations appear to have changed dramatically is Upper Filiorum, where territories (four) were observed after being completely absent in 2012; this area was unsurveyed in 2006 and 2009, but a single pair was heard in the upper portion during surveys of Three Sisters in 2009 (Hamilton 2009). Notably, birds were also found for the first time since 2006 in the northern "arm" of Agua Amarga Canyon, the site of considerable habitat restoration, with a pair here on 24 June 2015.

Cactus wren

Counts of cactus wren were much lower than in 2012, and they were detected only at half the reserves in 2015. As in 2012, the majority (19 of 25 territories) were found at just three sites, Three Sisters (n=8), Upper Filiorum (n=6), and Alta Vicente (n=5). Wrens were absent at three reserves where present in 2012: Abalone Cove (3 in 2012), Portuguese Bend (3 in 2012) and Forrestal (1 in 2012). No site had cactus wrens that didn't also have cactus wrens in at least two of the prior survey years (2006, 2009 or 2012).

Brown-headed cowbird

No brown-headed cowbirds were noted during the 2015 (just one was detected in 2012).

[11] Extremely unstable ground made walking here dangerous, so it was avoided in 2015.

Table 3. Estimates of territories of California gnatcatcher and cactus wren, by reserve. Note that Dudek (2007) conducted three visits during the 2006 survey, while Hamilton (2009) and Cooper (2012 and 2015) made two.

	CAGN				CACW			
	2006	2009	2012	2015	2006	2009	2012	2015
Abalone Cove[1]	8	3	5	1	9 ad.	0	3	0
Agua Amarga	4	3	1	3	4 ad.	4	6	3
Alta Vicente	8	5	5	4	4 pr., 7 ad.	4	13	5
Forrestal	12	5	9	7	6 ad.	2	1	0
Portuguese Bend	14	7	6	6	4 ad.	2	3	0[12]
San Ramon	7	3	1	2	10 ad.	1	2[13]	3
Three Sisters	8	4	2	2	7 pr., 1 ad.	5[14]	10	8
Filiorum	N/A	N/A	0	4	N/A	N/A	9[15]	6
Vicente Bluffs	4	10	4	4	0	0	0	0
Vista del Norte	0	0	0	0	0	0	0	0
TOTAL	**65**	**40**	**33**	**33**	**11 pr. + 41 adults**	**18**	**48(38)[16]**	**25(19)[16]**

[1] Eastern portion of Abalone Cove not surveyed in 2015

Discussion

The following is a more detailed description of observations of California gnatcatcher and cactus wren by site, with reference to results from prior surveys.

Abalone Cove

Abalone Cove saw the most dramatic decline for both target species of any other reserve. No more than four individual California gnatcatchers, and no cactus wrens, were observed in 2015. The low number of gnatcatchers (one territory est. for 2015) is clearly down from 2012, but additional visits might have confirmed more territories; two of the four detections were of single birds, so were not mapped as territories; thus, it is possible that these represented two additional/separate territories; the conservative methodology simply precluded us from assuming there was more than a single (nesting) pair/territory this year.

[12] Does not include a pair found in July 2015 (see below).

[13] At least one cactus wren territory was located southeast of San Ramon reserve in 2012, within city open space; this was mapped but not counted toward the total here.

[14] One of these wren territories was just off the northeastern boundary of Three Sisters, land now part of Upper Filiorum Reserve.

[15] Includes two probable territories off the southern boundary.

[16] Number in parenthesis excludes counts from Filiorum for comparison, which was not included in 2009 surveys.

However, it is worth noting that birds were found only in the central portion of the reserve, and not in the heavily used western area along the main path to the beach, nor in the far eastern area adjacent to Portuguese Bend. This latter area had at least one bird in 2006, was graded in 2009, had recovered enough to support at least one territory in 2012, and was not visited in 2015 because it was removed from the Palos Verdes Nature Preserve that year. It is possible another pair was present here in 2015, however the "decline" of California gnatcatcher in 2015 may in fact be a result of a low number of visits and reduced acreage of this reserve. It does appear that at least the far western area of the reserve is becoming increasingly unsuitable for the species, as invasion by acacia and other non-native shrubs overtakes stands of native scrub. The central portion is also seeing invasion by large acacia shrubs, and the eastern portion of the reserve occupied by the archery range is no longer in the Palos Verdes Nature Preserve.

The decline in cactus wren is likely very real, as no birds and no fresh nests were noted, meaning that at least by June 2015, the species was extirpated here. However, wrens were absent in 2009, and recolonized in 2012, so it is probable that Abalone Cove is a somewhat peripheral site, supporting the species when the population on the peninsula is high, and winking out when fewer pairs are around. It is possible that (at least during "good years") it supports spillover pairs from the adjacent Filiorum reserve, located just to the north across Palos Verdes Dr. North, where wrens were detected, albeit in reduced numbers, in 2015. However, we noted that the cactus stands at Abalone Cove are looking thinner and more sickly each year, with patches that supported nests in 2012 sparse and clearly unsuitable for nesting wrens.

Figure 2. California gnatcatcher territory (white box). Note: far eastern portion of reserve was not visited in 2015 and is no longer a part of Abalone Cove Reserve.

Agua Amarga

A major bright spot for the 2015 survey was the discovery of a pair of California gnatcatcher in the northern "arm" of Agua Amarga, where not found since 2006 (where a pair, "LCG5" was present that year in roughly the same area); an additional family group midway down the southern arm and a territorial male in the far southeast were similar to findings in 2006 and 2009 (yet just a single female was found in the entire reserve in 2012).

The status of cactus wren is more difficult to determine; time constraints precluded a fuller exploration of the northern slope of the southern arm where most of the territories are located. Even where recorded in 2015, we detected only brief glimpses of birds, and snippets of calls, and got rained-out during the first (of just two) visits. Thus, interpretation of our results was difficult – finding multiple nests, but no birds, in a given area on both visits was treated as a single territory, but there may well have been multiple pairs here, simply being inactive on the given survey dates. Thus, the three territories estimated in 2015 should be considered a conservative count, and the 4-6 territories estimated for 2009-12 might be more reflective of the "normal" population here. Still, it is worth noting that again, cactus wren was only detected in the south arm, and aside from a single bird that called briefly, only on the northern slope of this arm.

Figure 3. California gnatcatcher territories (white boxes); cactus wren territories (yellow boxes), Agua Amarga.

Alta Vicente

The California gnatcatcher population at Alta Vicente appears to be little-changed from the past two visits (2009, 2012), with 4-5 territories each year. While we did not detect a nesting pair directly in the restoration area in the lower, southwestern corner, we did find a family group here on two dates, indicating that it may well have been the same territory from 2012.

Unlike in 2012, territorial cactus wrens were very inactive during the survey visits in 2015, with very little calling. This might be attributed to the presence of multiple juveniles, and birds carrying food; birds feeding young can be secretive and will not advertise their presence. Thus, the drop in pairs here (5 pairs, vs. 13 in 2012) may be partly due to survey timing; additional surveys done by volunteers this year should help confirm this. Overall, however, several areas with fresh nests in 2012 were found to not support either nests or birds; thus, the drop in numbers is likely real, and was more similar to the estimate for 2009 (4 territories), and well below that estimated in 2006 (4 pairs plus 7 individuals). Thus, it is possible that numbers at Alta Vicente are simply variable/cyclical, up for a year or two, then dropping, possibly due to the drought and resultant changes in vegetation (including cactus health). Substantial stands of both cholla and prickly-pear cactus remain here, and while acacia shrubs continue to expand and overtake these native stands, wrens are continuing to build nests in cactus at the edge of these shrubs.

Figure 4. California gnatcatcher territories (white boxes); cactus wren territories (yellow boxes), Upper Vicente.

Forrestal

An estimated 7 territories of California gnatcatchers were observed at Forrestal in 2015, down from the 9 estimated in 2012, but seemingly "average" for the 5-12 territories estimated since 2006. Birds were in roughly the same areas as found in prior years, split between the western and eastern halves of the reserve. Apparent family groups (juveniles heard and/or seen) were noted at three territories across the reserve, indicating a successful breeding season.

Unlike in all prior years, cactus wren was entirely missed here, and may well be extirpated, as no old or new wren nests were observed, and the cactus scrub here appeared even sparser and more desiccated than in previous surveys. The leaf-blower noise was as loud along the southeastern border as in prior years, though an apparent pair of gnatcatchers was detected here (scolding) on May 6

Figure 5. California gnatcatcher territories (white boxes), Forrestal.

Portuguese Bend

Portuguese Bend is one of the few reserves that has been surveyed for California gnatcatcher and cactus wren more of less annually since 2009 (e.g., Cooper 2011). In the general, the pattern of 5-7 territories, most in the southern half, with a smattering of sightings in the northern half, has held since then. In 2015, a likely family group (based on vocalizations of multiple birds) was found along Fire Station Trail, an area where several birds were also present in 2011 (Cooper 2011) but not in years before or after. This area is just outside/north of the 2009 burn zone (which has yet to support a gnatcatcher territory since

then), and supports seemingly high-quality, intact coastal sage scrub and the species' absence from this area in so many prior years is puzzling (but consistent). Another area of irregular presence for the species is Klondike Canyon in the southeastern portion of the reserve, where at least one California gnatcatcher was present in 2015 (Figure B-5; "CAGN h").

The cactus wren went completely undetected at Portuguese Bend in 2015 for the first time since the surveys began in 2006. However, after the survey period, a photograph and video of a pair of cactus wrens along the "Barn Owl Trail" at the far eastern edge of Portuguese Bend (near a consistent use area at Klondike Canyon) was taken by local resident Donna McLaughlin on July 9, 2015 (via A. Dalkey, PVPLC.). Cactus wrens were absent from the lower Burma Rd. area where they had been found in 2006 and 2009 (and sporadically in 2010/11; see CEM 2011), and unlike 2012, no older nests were observed here.

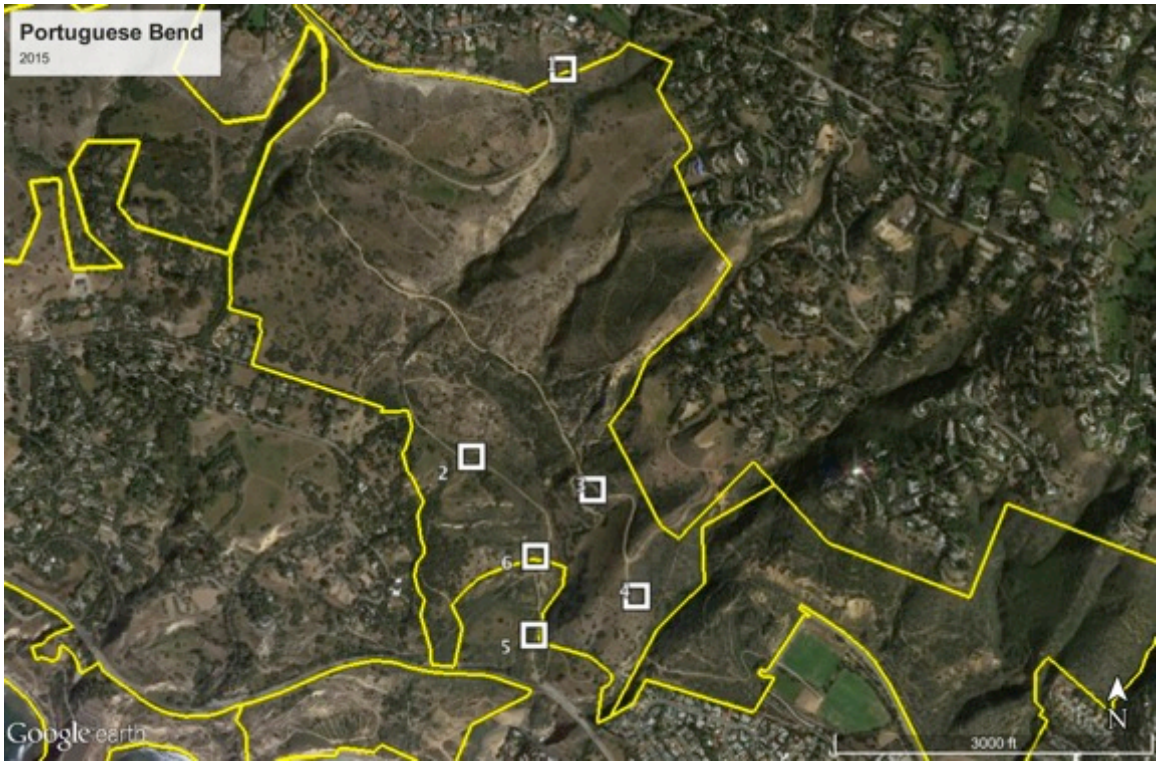

Figure 6. California gnatcatcher territories (white boxes), Portuguese Bend.

San Ramon

Both California gnatcatcher and cactus wren were observed in essentially the same areas as in 2009 and/or 2012 (2006 surveys found gnatcatchers much more widely, well away from suitable habitat). I estimate two territories of gnatcatcher, vs. one in 2012, and three of cactus wrens, vs. two in 2012. However, the actual number might be slightly higher, as the far southeastern edge of the reserve was not visited in 2015 due to time constraints[17]; this area held a single California gnatcatcher territory in 2009 and 2015 (and possibly in 2006),

[17] I walked along Palos Verdes Dr. East for the survey, adjacent to the northern edge of the strip of cactus-rich coastal sage scrub between that road and Palos Verdes Dr. North, but due to traffic noise on both dates, it was difficult to hear birds.

and a cactus wren territory in 2009 (with sightings of at least three birds here and just to the south in 2006). The habitat quality appeared more or less similar to 2012 and, based on mapping, 2009, and San Ramon remains a consistent site for low numbers of both species, among the most the easterly location on the peninsula where both occur.

As noted in 2012, traffic noise was very loud in the southern portion of this reserve regardless of time of morning, and noise may have hindered additional detections of both species (principally from Palos Verdes Dr. South), or may be actually reducing habitat quality here. Tellingly, neither the gnatcatcher nor the wren was observed south of Palos Verdes Dr. East, i.e., in the lowermost strip of habitat along Palos Verdes Dr. North, where traffic (and in 2015, home construction) noise was loudest. Future years that show detections only in the middle and northern portions of the reserve may suggest a contraction due to this ongoing disturbance.

Figure 7. California gnatcatcher territories (white boxes); cactus wren territories (yellow boxes), San Ramon.

Three Sisters/Upper Filiorum

Note: These reserves are directly adjacent to one another, and so will be discussed together here.

While the population of California gnatcatcher was basically unchanged at Three Sisters from 2009 and 2012 (two territories), this species appears to have dramatically colonized adjacent Upper Filiorum since 2012, with no fewer than four territories found here in 2015 (vs. zero in 2012, when the reserve was surveyed for the first time). At least two of these

territories successfully produced young, with two family groups on June 17, 2015. Both territories at Three Sisters also produced young, with two family groups here on both survey dates (5/7 and 6/18). Continued recovery of coastal sage scrub on the east side of Upper Filiorum should eventually link up populations of California gnatcatcher in the northern section of Portuguese Bend with those at Three Sisters/Filiorum, though they remain scarce in both of these subareas. Despite extensive habitat restoration at Three Sisters, the estimate of California gnatcatcher appears little-changed from prior years; however, it has increased at Upper Filiorum where restoration has also been ongoing for several years. Reasons for these differing trends are not known, but the coastal sage scrub plantings at Three Sisters appeared seriously drought-stressed in 2015 (many dead adult plants, few seedlings emerging); thus it is possible, as was speculated in 2012, that the vegetation is simply not dense enough. In the case of Upper Filiorum, gnatcatchers were largely detected in natural/non-planted coastal sage scrub, where they were simply (and puzzlingly) absent during the 2012 survey.

Cactus wren were again detected at both reserves in relatively high numbers, and observations included adults bring food to fledglings and nest-building, signs of a self-sustaining population here. Troublingly, the interface zone between Three Sisters and Upper Filiorum, a deep canyon with intact cactus patches on the slopes, had no wrens during two visits (to the Upper Filiorum side), and it is likely that the territories detected here in 2012 [(territories 28, 33, 34 and 35 in Cooper (2013)] may not have been active in 2015.

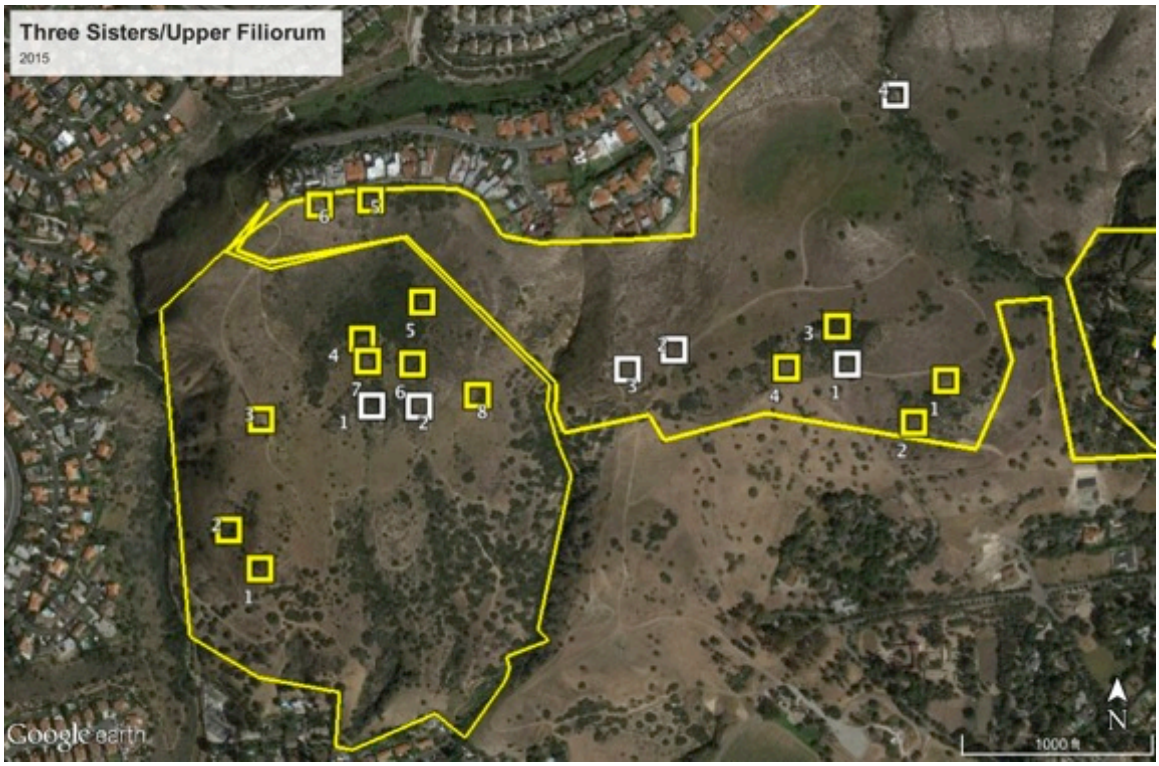

Figure 8. California gnatcatcher territories (white boxes); cactus wren territories (yellow boxes), Three Sisters/Upper Filiorum.

Vicente Bluffs

As was speculated in 2012, the California gnatcatcher population at Vicente Bluffs appears to have stabilized at four pairs, the same number that had been estimated in 2006 and again found in 2012, despite a large spike in 2009 (when up to 10 pairs were estimated). Presumably, the vegetation did indeed become ideal in structure for the species in the late 2000s but has now grown very dense and mesic over much of the site, rendering only patches suitable (more or less in the same areas as was found in 2012). Encouragingly, all four territories appear to have successfully hatched young in 2015, based on observed behavior and/or young.

Cactus wren was unrecorded at Vicente Bluffs in this and all prior surveys, 2006-2015, and no large cactus patches appear to have been planted as part of the restoration.

Figure 9. California gnatcatcher territories (white boxes), Vicente Bluffs.

Additional notes

Reviewing what I wrote about the last (2012) survey…

> "The apparent declines in gnatcatcher territories and increases in cactus wren territories should be interpreted with caution. These were based on as few as four visits, over four years, for many reserves, which is far too few to make

> claims of population trends. So, while these surveys are probably sufficient for presence/absence information – such as that neither species has colonized Vista del Norte reserve, or that California gnatcatcher may be nearing extirpation at Agua Amarga – numbers of both species vary naturally annually, and from decade to decade." (Cooper 2013)

It is clear that indeed, apparent population changes need to be analyzed carefully and not assumed to be "real". If anything, California gnatcatchers clearly had a better year in 2015 than cactus wrens, holding steady at 33 territories across the reserves surveyed, vs. a roughly 50% decline for wrens in 2015 within the same area. Gnatcatchers also appear to be in the process of re-colonizing Agua Amarga, though they still have yet to appear at tiny Vista del Norte reserve (which has almost no coastal sage scrub).

As was also pointed out in 2012, "Atwood et al. (1998b) noted [gnatcatcher] population swings of c. 50% during annual surveys on the peninsula from 1993-1997, ranging from a high of 56 in 1994 to a low of 26 pairs the following year (1995); our 2012 estimate of 33 pairs fits within this range, as does Hamilton's in 2009 (40 pairs) which used similar methodology. Therefore, only through repeated surveys over multiple years will we be able to assess trends with any confidence."

While coastal populations of cactus wrens have been much less studied over time on the peninsula or across their range in southern California, preliminary information suggests a pattern of very high population fluctuation in most areas of their range, with large numbers of territories active in certain "good years", and range contractions in others.

The 2012 report expressed concern for the California gnatcatcher at three reserves, Agua Amarga, Forrestal, and San Ramon, all areas where gnatcatchers seem – again, based on 2015 data – rather secure, or at least consistently present albeit in low numbers. The finding of just a single confirmed pair at Abalone Cove would suggest adding this site to the list of areas where gnatcatchers are in jeopardy of vanishing, though it is highly likely that they will also persist here in low numbers in future years, and may rebound to reclaim earlier-filled territories (which seems to be the pattern in reserves elsewhere on the peninsula).

Three areas where I expressed concern for cactus wren in 2012 were Abalone Cove, Forrestal, and San Ramon; the fact that they were found to be absent from two of these three is cause for concern. I would add Portuguese Bend to this list, since the fire in 2009 appears to have had a lasting effect on territories here; not only have cactus wren not recolonized the burn zone, neither were they detected in the unburned portion of the reserve in 2015 (though a pair here in the unburned section in early July just after the survey's end is cause for some optimism). Though found in reduced numbers this year compared to 2012, they appear to be holding their own in the remaining areas where present in prior years, including Agua Amarga, Alta Vicente, Three Sisters/Upper Filiorum, and San Ramon.

It is worth nothing that 33 pairs of gnatcatchers in 2015 represents "holding steady" from 2012, yet it is a decline from the 40 territories estimated prior survey in 2009, and was treated as such in the 2012 report. Whether this difference is real (i.e., not a result of different effort, survey methodology or data analysis), or is significant, remains to be seen. It is possible that with additional survey hours, even more gnatcatchers would have been detected, particularly

in areas not walked in the 2015 survey, such as the eastern portion of Abalone Cove, the full trail network of Portuguese Bend, etc. The fall in cactus wren numbers, however, does seem "real", since very little cactus habitat visited in 2012 was not visited in 2015 (it is much less widespread and easier to cover than gnatcatcher habitat). Whether this might be related to the ongoing drought (2015 marked year four) is not known, nor is it known the extent to which survey timing may have affected detections (counting nests is not helpful, as a single pair can build and maintain multiple nests across a fairly large area of cactus). Finally, the timing of the bulk of the surveys has varied across prior years (i.e., very late in 2006, early in 2009, mixed in 2012, and late in 2015), which might also affect detection in terms of numbers, and even the determination of presence/absence, given how many "new" territories were found during the second round of surveys in 2012 (see Cooper 2013).

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APPENDICES

Appendix A. Approximate walking routes taken by surveyor (Cooper) in 2015. Different colors represent routes taken on different survey days.

Figure A-1. Agua Amarga routes.

Figure A-2. Vista del Norte routes

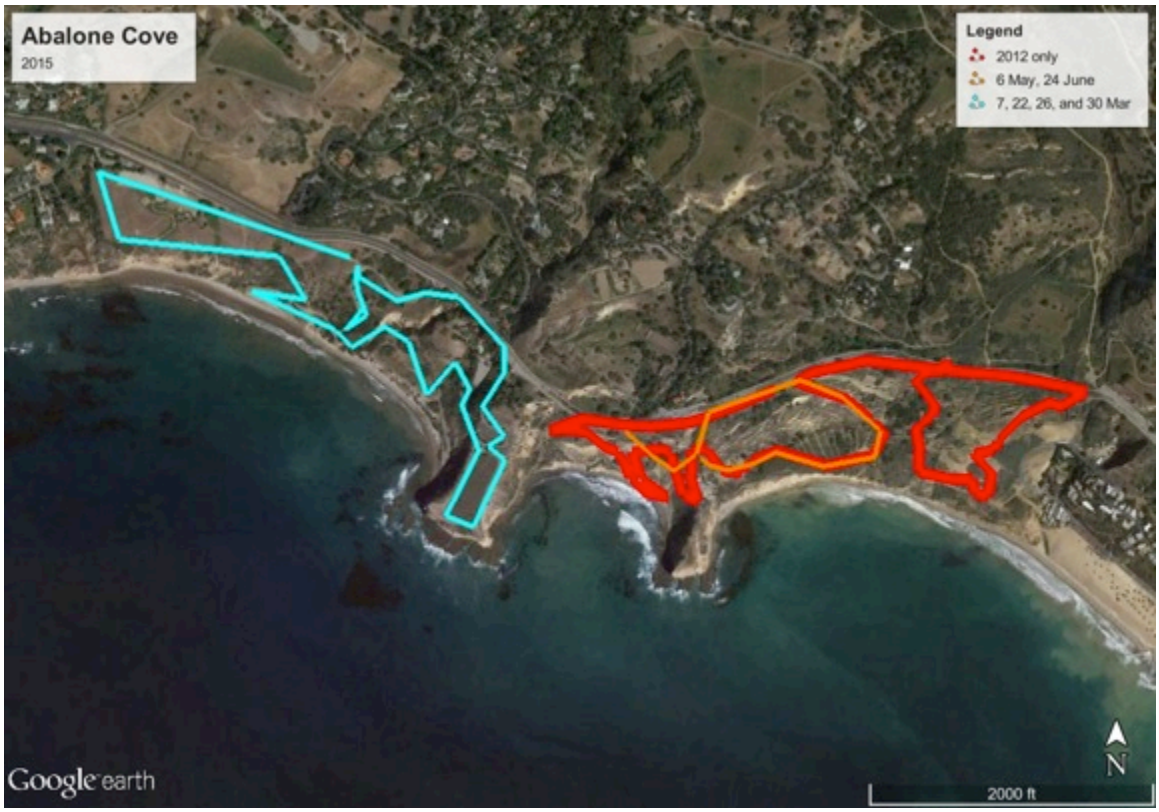

Figure A-3. Abalone Cove routes.

Figure A-4. Forrestal routes.

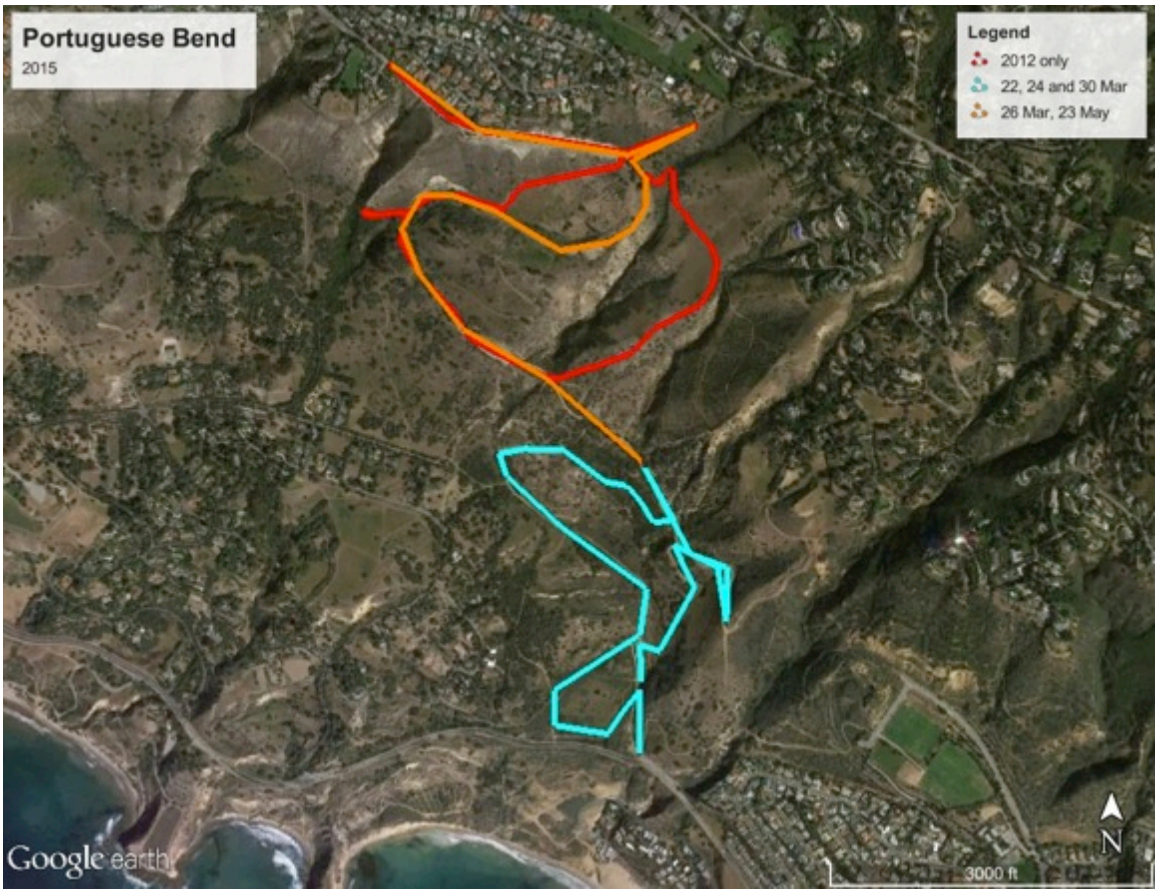

Figure A-5. Portuguese Bend routes.

Figure A-6. San Ramon routes.

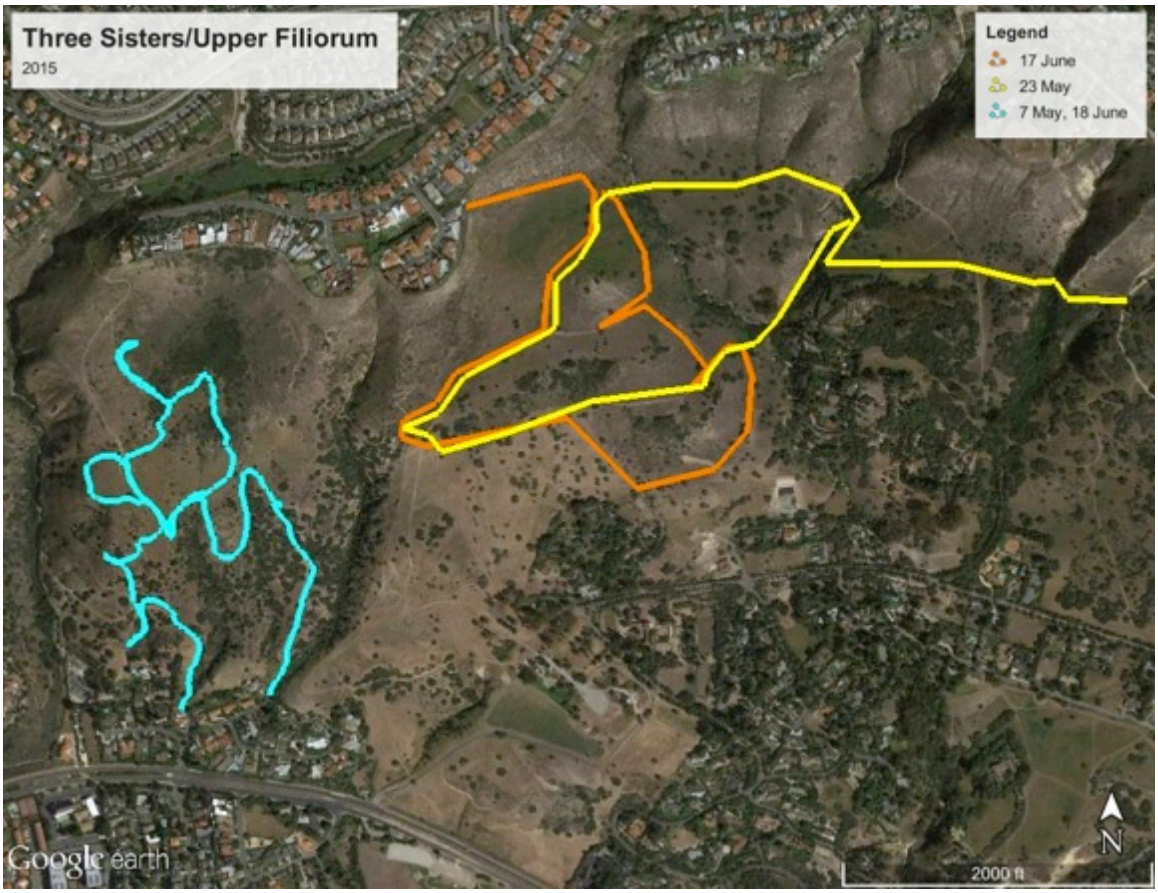

Figure A-7. Three Sisters/Upper Filiorum routes.

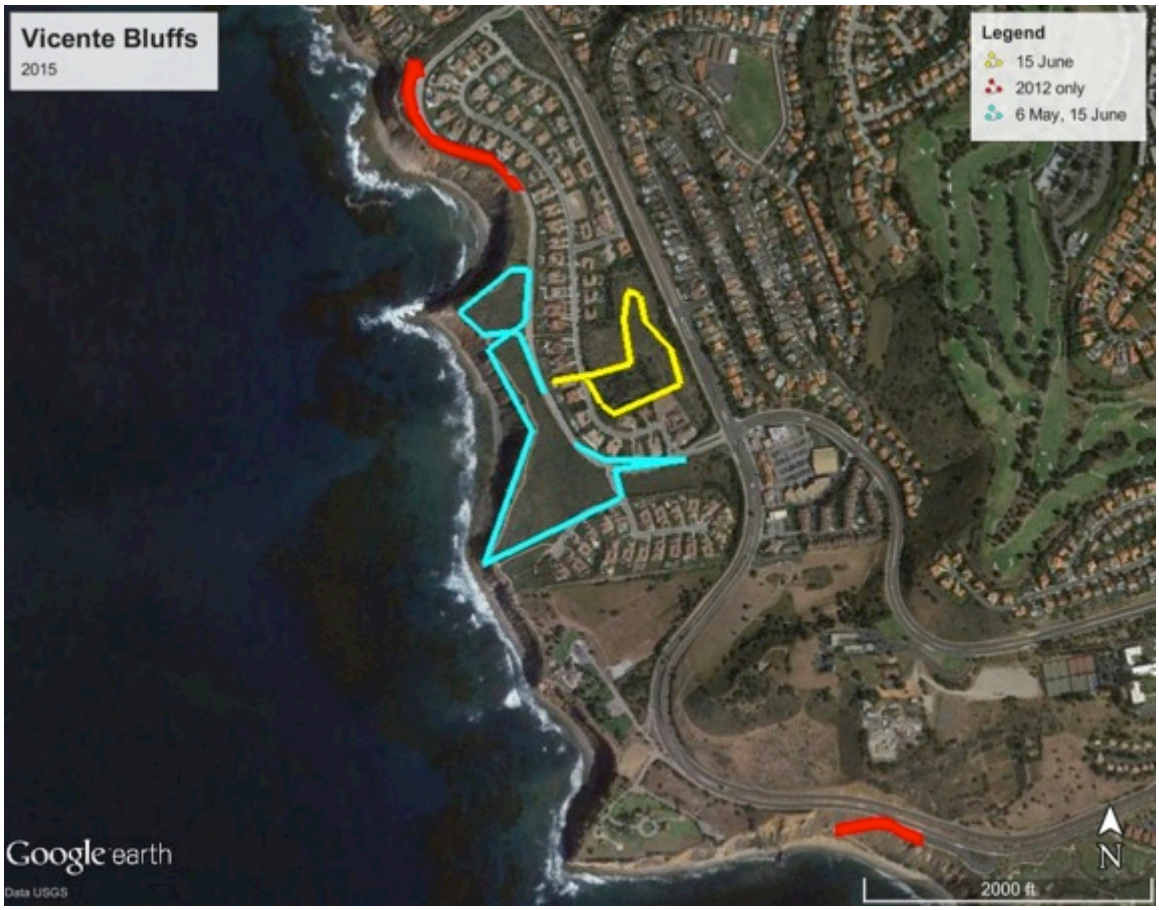

Figure A-8. Vicente Bluffs routes.

Figure A-9. Alta Vicente Routes.

Appendix B. Maps of all California gnatcatcher/cactus wren detections, including nests, 2015. Yellow pins represent gnatcatchers, green pins represent cactus wrens. Please refer to Appendix C for additional details on each.

Figure B-1. California gnatcatcher and cactus wren observations, Abalone Cove.

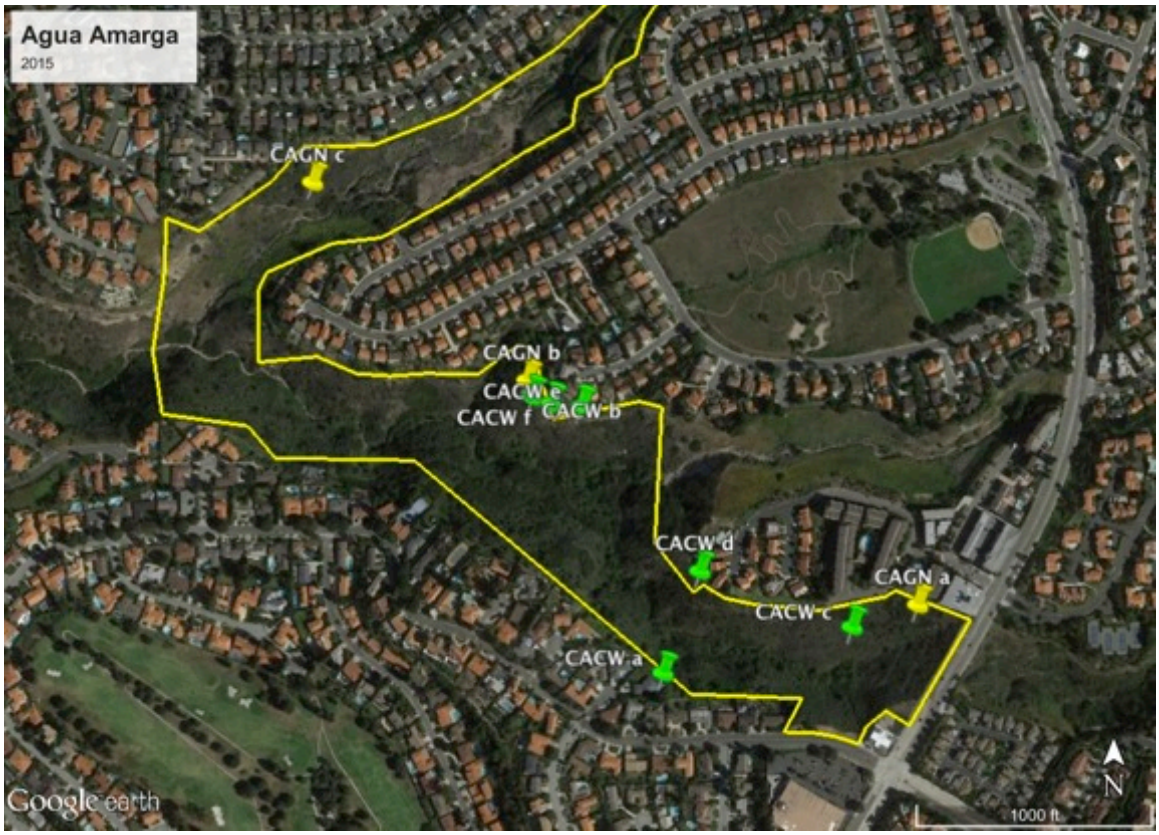

Figure B-2. California gnatcatcher and cactus wren observations, Agua Amarga.

Figure B-3. California gnatcatcher and cactus wren observations, Alta Vicente.

Figure B-4. California gnatcatcher and cactus wren observations, Forrestal.

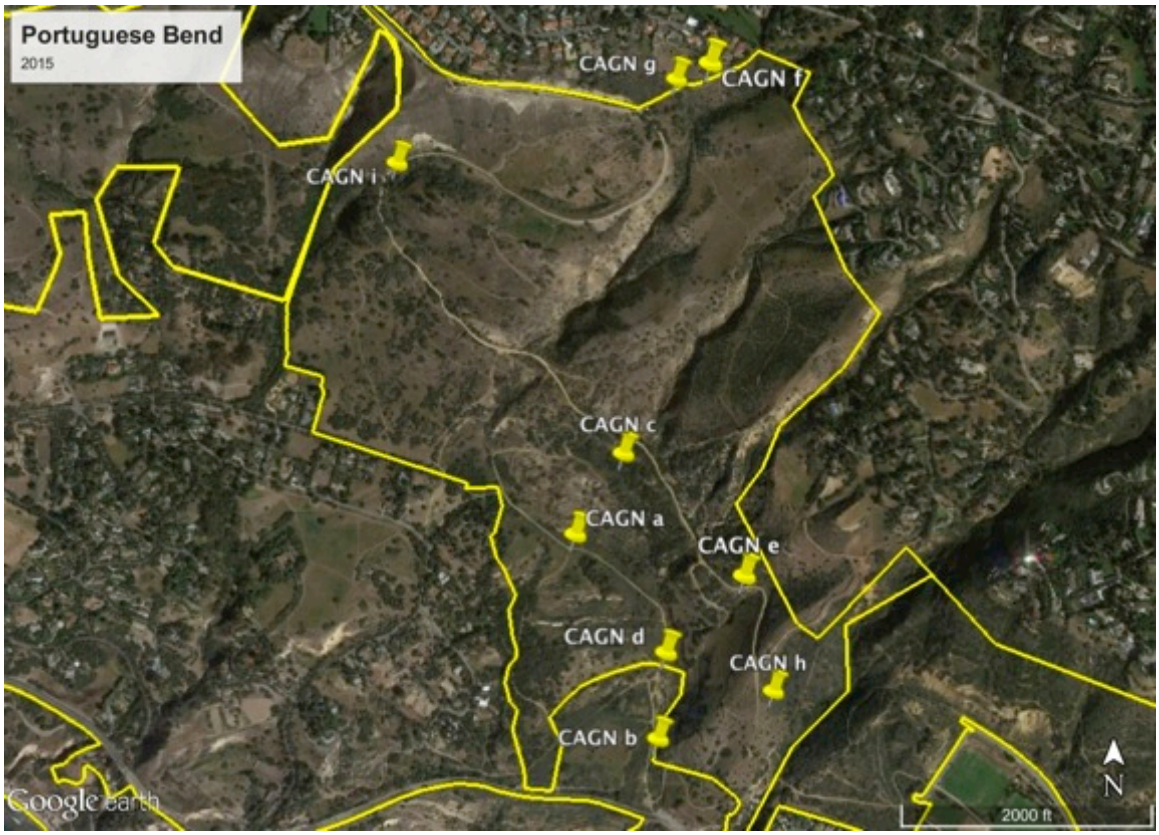

Figure B-5. California gnatcatcher and cactus wren observations, Portuguese Bend.

Figure B-6. California gnatcatcher and cactus wren observations, San Ramon.

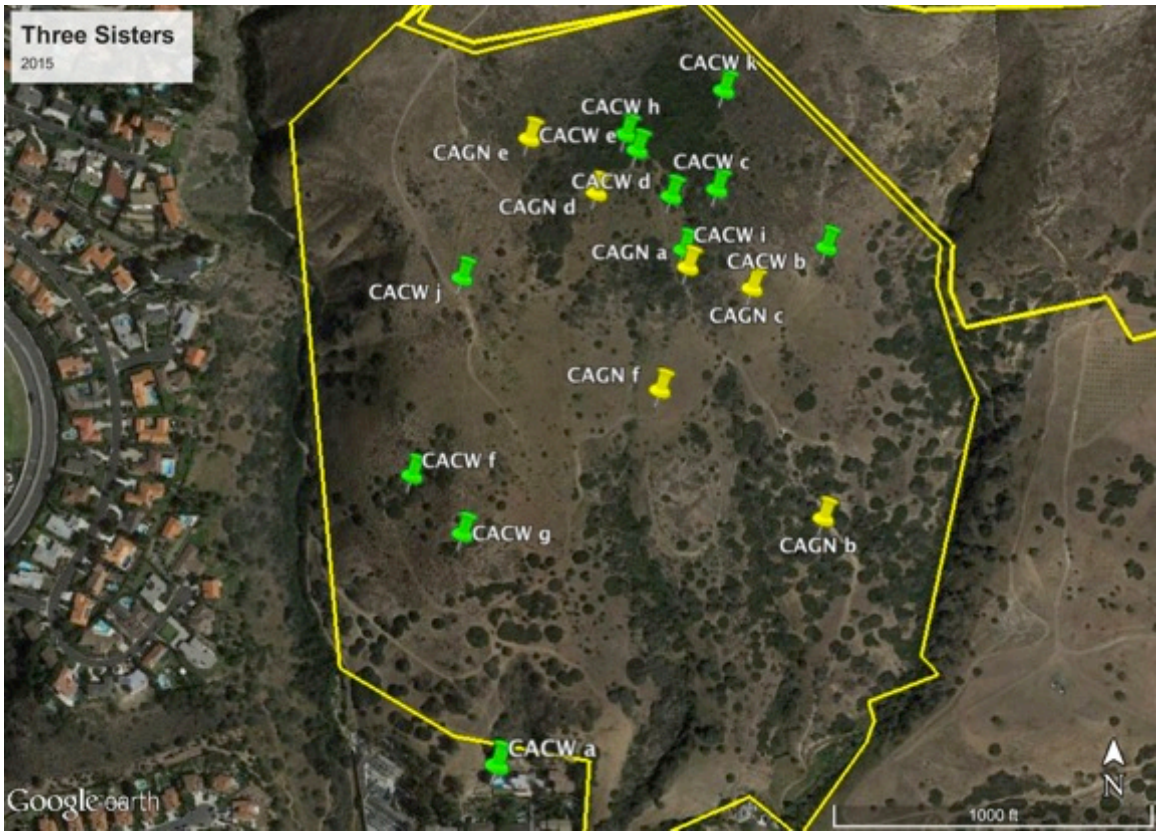

Figure B-7. California gnatcatcher and cactus wren observations, Three Sisters

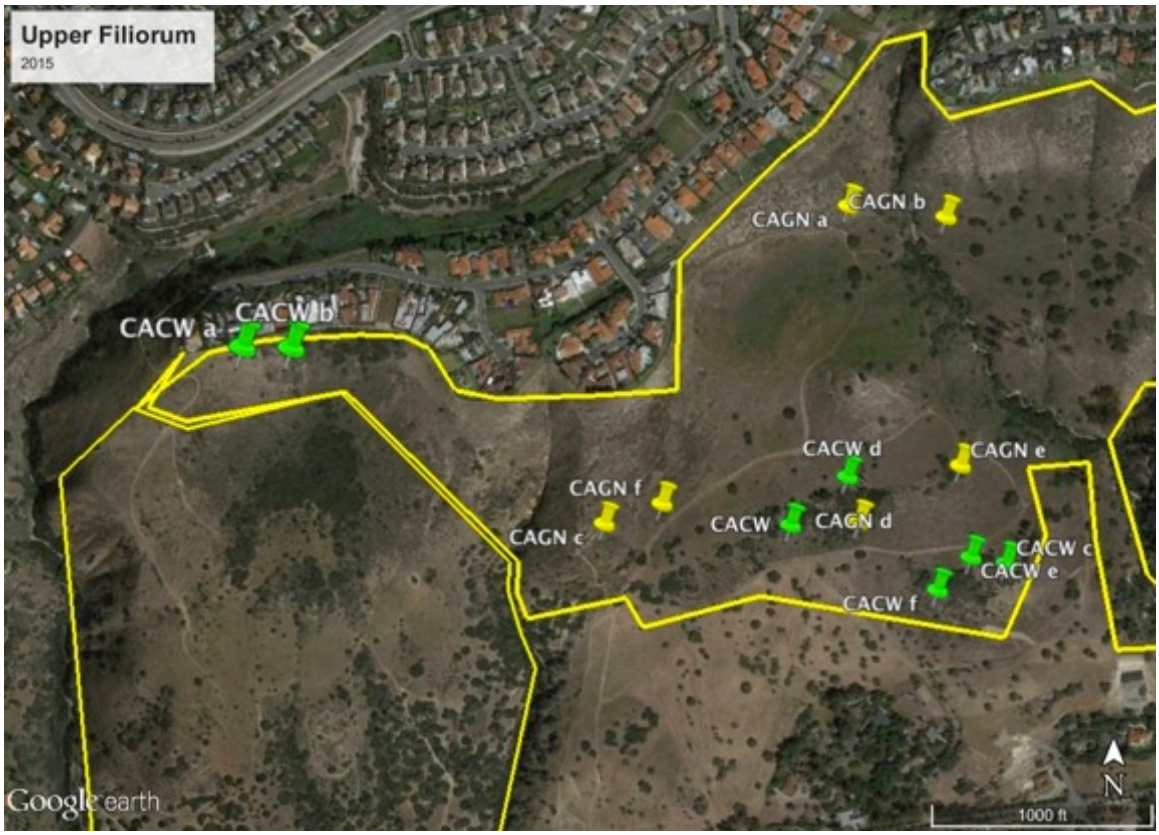

Figure B-8. California gnatcatcher and cactus wren observations, Filiorum.

Figure B-9. California gnatcatcher and cactus wren observations, Vicente Bluffs.

Appendix C. List of all California gnatcatcher ("CAGN" shaded) and coastal cactus wren (CACW) observations during 2015 survey, by reserve.
"Status": P = Pair; S = Single; F = Family group; J = Juvenile; N = Nest m/f = male/female; CF = Carrying food; NM = (Carrying) nesting material

Abalone Cove					
Subarea	**Date**	**Species**	**Status**	**Time**	**Notes**
	22 Mar.	CAGN a	P	9:15	CF into same patch; also on 26 Mar.
	6 May	CAGN b	S	10:16	Mewing
	24 June	CAGN c	S	11:10	Silent; J?
Alta Vicente					
Subarea	**Date**	**Species**	**Status**	**Time**	**Notes**
	14 May	CAGN a	S	9:52	Mewing; poss. 2 birds
	14 May	CAGN b	S	9:59	2 female types; 3rd bird (= CAGN a?) heard downslope.
	14 May	CAGN c	P	10:25	Pr; single female-type on 24 June (10:29)
	24 June	CAGN d	S	10:45	Female/young male mewing
	14 May	CAGN e	Sm	8:54	Mewing; flew to CAGN j
	14 May	CAGN f	F	9:03	3 total, incl. mewing adult
	14 May	CAGN g	S	9:24	2 birds, female-type+unk. (= J's?), w/ 2 more birds audible (near CAGN f)
	14 May	CAGN h	S	9:03	2 birds, female-type
	14 May	CAGN i	S	9:20	Female-type flew in from north
	14 May	CAGN j	(S)	8:54	Location where CAGN a flew toward
	17 June	CAGN k	S	9:10	Mewing
	17 June	CAGN l	F	9:25	P + 2 J; flew in from vic. CAGN k
	14 May	CACW a	F,N	N/A	Ad. + 2 J; fresh N; CACW (J?) also calling 24 June
	14 May	CACW b	S		Calling (same bird as CACW a?)
	14 May	CACW c	S,N	N/A	Calling; fresh N's on 24 June
	14 May	CACW d	S	N/A	Flew north CF; same/2nd bird a few min. later did same flight
	14 May	CACW e	J,N	N/A	Flew toward area w/ 4 fresh N
	24 June	CACW f	S,N	N/A	Ad. + N; CF
	24 June	CACW g	N	N/A	
	24 June	CACW h	P	N/A	
	24 June	CACW i	F	N/A	P + 2 J
	17 June	CACW j	N?	N/A	Partially-built
Agua Amarga					
Subarea	**Date**	**Species**	**Status**	**Time**	**Notes**
	14 May	CAGN a	Sm	7:50	Alarm call ("ch-ch-ch")/tee-d up; also on 24 June (7:48)
	24 June	CAGN b	Sf, J	8:49	Flew in to recording, then moved east.
	24 June	CAGN c	P	9:28	
	14 May	CACW a	S	N/A	Calling from *Yucca elephantipes*
	14 May	CACW b	N	N/A	
	24 June	CACW c	S	N/A	
	14 May	CACW d	P, N	N/A	
	24 June	CACW e	N	N/A	
	24 June	CACW f	N	N/A	
Forrestal					
Subarea	**Date**	**Species**	**Status**	**Time**	**Notes**

East	6 May	CAGN a	P?	8:55	Two birds heard, scolding
East	6 May	CAGN b	Sm	9:00	
East	6 May	CAGN c	S	9:16	Mewing; also heard on 15 May
East	15 June	CAGN d	S	10:07	1-2 birds mewing
East	15 June	CAGN e	S	9:25	Scolding
East	15 June	CAGN f	F	9:38	P + 1 J (or more)
West	7 May	CAGN g	S	8:26	Mewing from cactus
West	7 May	CAGN h	Sm	8:30	Silent/in flight – foraging?
West	7 May	CAGN i	Sm	8:34	Flew over ridge toward NW
West	7 May	CAGN j	Sm	8:48	Flew in to recording; J heard 19 June
West	7 May	CAGN k	Sm	8:56	Flew in (silent); F (P + 2 J + fem.) at 7:40 on 19 June
West	19 June	CAGN l	S	7:16	Mewing
West	19 June	CAGN m	S	7:38	Mewing
West	19 June	CAGN n	J?	8:22	Weak mewing
West	19 June	CAGN o	F	8:19	2 adults made long flights to SW over ridge while 2 J's remained.
Portuguese Bend					
South	Late Mar.[18]	CAGN a	P	N/A	Scolding
South	Late Mar.	CAGN b	P	N/A	Scolding
South	30 Mar.	CAGN c	S	N/A	Mewing
South	30 Mar.	CAGN d	S	N/A	Scolding
South	30 Mar.	CAGN e	P	N/A	CF/NM to probable nest site
North	26 Mar.	CAGN f	S	N/A	Mewing
North	23 May	CAGN g	F	7:53	2-3 birds, both sides of trail
South	23 May	CAGN h	S	8:47	Mewing
North	23 May	CAGN i	Sf?	9:00	Mewing; female or young male
Vicente Bluffs					
Subarea	**Date**	**Species**	**Status**	**Time**	**Notes**
	6 May	CAGN a	Sm	10:42	Flew in (silent, territorial?); on 15 June 3 birds present incl. 2 apparent J's.
	6 May	CAGN b	P	10:18	Also P + J (CF) on 15 June (11:08)
	6 May	CAGN c	Sm	11:31	Male CF into buckwheat; J heard?
	15 June	CAGN d	Sf	12:00	Female type feeding silently
	15 June	CAGN e	F	12:05	Ad. (pr?) w/ 2 J
San Ramon					
Subarea	**Date**	**Species**	**Status**	**Time**	**Notes**
	7 May	CAGN a	S	7:15	Poss. 2nd bird
	7 May	CAGN b	F	7:25	Pr. + 2 J
	7 May	CACW a	S	N/A	
	7 May	CACW b	S	N/A	Calling simultaneously (w/ CACW a)
	7 May	CACW c	S	N/A	Poss. 2nd bird
Three Sisters					
Subarea	**Date**	**Species**	**Status**	**Time**	**Notes**
	7 May	CAGN a	F, F	11:06	Two family groups w/ begging J's
	18 June	CAGN b	F	9:03	Male + 2 J
	18 June	CAGN c	S	9:10	Mewing
	18 June	CAGN d	F	9:27	4 birds total, mewing/begging
	18 June	CAGN e	Sm	9:36	Silent
	18 June	CAGN f	S	10:11	Mewing

[18] Censused over three dates, 22, 24 and 30 Mar. 2015 during surveys for brush-clearance. No specific times recorded during this survey.

	18 June	CACW a	N	N/A	Fresh nest
	7 May	CACW b	P	N/A	Calling back and forth
	7 May	CACW c	S	N/A	Also recorded 18 June
	7 May	CACW d	S, N	N/A	Adult flew west w/ NM
	7 May	CACW e	N	N/A	
	7 May	CACW f	S, N	N/A	Nest found on 18 June
	7 May	CACW g	S	N/A	Flew into patch w/ NM
	18 June	CACW h	S	N/A	"tuk" call
	18 June	CACW i	F	N/A	P calling + probable J
	18 June	CACW j	P	N/A	Calling either side of trail
	18 June	CACW k	S	N/A	Calling
Filiorum					
Subarea	**Date**	**Species**	**Status**	**Time**	**Notes**
	23 May	CAGN a	S	9:52	Location approximate
	23 May	CAGN b	S	10:50	
	17 June	CAGN c	F	7:16	P + 2 J (begging); flew west
	17 June	CAGN d	S	7:40	Mewing
	23 May	CAGN e	S	10:30	Flew south to cactus patch
	17 June	CAGN f	F	7:04	Adult + 2-3 J
	24 Mar	CACW a	P, N	N/A	
	19 Mar	CACW b	N	N/A	2 nests
	23 May	CACW c	S	N/A	Poss. heard; also poss. heard 17 June
	17 June	CACW d	S	N/A	Calling
	17 June	CACW e	N	N/A	Nest
	17 June	CACW f	S	N/A	CF to nest (= 2nd nest in patch)

2.3 EL SEGUNDO BLUE BUTTERFLY SURVEYS

El Segundo Blue Butterfly (*Euphilotes battoides allyni*) 2014 Survey Results

By

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December 31, 2014

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SUMMARY

Surveys for the El Segundo blue butterfly (ESB) were conducted within preserve managed by the Palos Verdes Peninsula Land Conservancy (PVPLC) under permit number TE-217663-1. The ESB is listed as Federally Endangered and are included in California's Wildlife Action Plan as State-Endemic Special Status Invertebrates. Within the Palos Verdes Nature Preserve ESB inhabit the steep ocean bluffs around Point Vicente. Due to the ESB's endangered status, it is governed by the Palos Verdes Nature Preserve Natural Community Conservation Planning/Habitat Conservation Plan (NCCP) that mandates triennial surveys for long-term population trending. Additional ESB habitat has been restored at the Palos Verdes Nature Preserve since the 2011 survey.

El Segundo Blue Butterfly – The 2014 ESB survey was conducted over six consecutive weeks from July 1 through August 4. Sites monitored in previous years and new restorations planted with the host plant dune buckwheat (*Eriogonum parvifolium*) were included in this survey. Only two ESBs were observed, one at a Pelican Cove restoration site and the other at a Pt. Vicente restoration site, none at naturally occurring host plant stands. Effects of the three-year drought were apparent at the naturally occurring stands, where host plant abundance had decreased. A 33% reduction in host plants occurred at the base of Vicente Bluffs.

Incidental observations by me and local naturalist Jess Morton indicate the flight season can begin as early as late May in flat areas subject to a full day's insolation. Because the survey began in early July, there is a chance that the full flight season was not captured in the six-week survey. A non-protocol survey along the bluff top host plants beginning in mid-May, 2015 will be helpful in providing data about the flight season in these bluff top areas. The data will be useful for planning the next triennial monitoring that will take place in the 2016-2018 NCCP monitoring cycle.

1 INTRODUCTION: EL SEGUNDO BLUE BUTTERFLY

The El Segundo blue butterfly (ESB) is a member of the *Euphilotes battoides* complex that utilizes wild buckwheat species (*Eriogonum* spp.). The ESB is unique to this group in that it is dependent upon a single buckwheat species, dune buckwheat (*Eriogonum parvifolium*), for its entire life cycle (egg, larvae, pupae, and adult) (Mattoni 1990). Although the ESB possesses unique, but microscopic morphological characters, it is otherwise virtually identical to the Bernardino blue (*Euphilotes bernardino*) (Pratt 2006a). In the field, the butterfly is identified by its association with dune buckwheat.

Historically, the ESB inhabited dune habitat that ranged continuously along the coast from Santa Monica to Malaga Cove on the Palos Verdes Peninsula (Mattoni 1990). Intensive development that started in the 1890's has significantly reduced the habitat, leaving less than 10% of the dunes that is highly fragmented (Mattoni 1993). With the loss of habitat, ESB populations declined and it was listed as endangered in 1976.

The recovery plan for ESB identified four recovery units: Ballona, Airport Dunes, El Segundo, and Torrance (U.S. Fish and Wildlife Service (USF&WS) 1998). In the 2008 El Segundo Blue Butterfly 5-year Review, the butterfly was found to be absent at the Ballona Unit and present at all other units (USF&WS 2008). The Review considered that by 2007 ESB populations had increased at their respective recovery units; Airport Dunes and Torrance and colonized habitat at recent dune restoration projects at Dockweiler Beach, Redondo Beach, and Torrance Beach (2006, 2004, and 2003, respectively). Since the 2008 review, ESBs were found at Ballona Wetlands (Karina Johnston, Santa Monica Bay Restoration Commission, personal communication). More encouraging news was the discovery of ESB on the bluffs around Point Vicente on the Palos Verdes Peninsula, a site not included in the recovery plan (Osborne 2001 and Pratt 2006b). Despite occupying a different habitat, steep shale bluffs instead of loose dune sands, the butterflies at this latter site were found solely on dune buckwheat and are considered El Segundo blue butterflies until taxonomic uncertainties of this genus are clarified (USF&WS 2008). Due to the fragmented populations and continued habitat degradation threats, ESB retains the endangered status (USF&WS 2008).

Within the Palos Verdes Nature Preserve, ESBs have been observed at Vicente Bluffs in front of the Oceanfront Estates development and at Pelican Cove (formerly Fishing Access) (Dalkey 2011). Because Pelican Cove and Vicente Bluffs within in the Palos Verdes Nature Preserve, they are covered under a Natural Communities Conservation Plan and Habitat Conservation Plan (NCCP/HCP) that requires triennial ESB monitoring. In the 2011 survey, only two El Segundo blue butterfly individuals were observed on the western side of Vicente Bluffs (Dalkey 2011). In contrast, three individuals were observed in a single day in early July 2009 during a preliminary survey (Dalkey 2009).

Since the 2011 surveys, PVPLC has added host plants at Vicente Bluffs and Pelican Cove. Host plants were included in a 2010 restoration project at Pelican Cove, with installation of container plans and seed ball (dried clay containing host plant seeds) dispersal. Seed balls can be tossed from the bluff onto the steep cliffs below where they protect seeds until winter rains stimulate the seeds to grow. The tops of Vicente Bluffs were planted with host plants in 2012-2013, invasive non-native acacia were removed on the lower bluffs, and seed balls were tossed onto the cliffs. A new restoration took place in 2013 at Abalone Cove and a 2009 restoration containing host plants at Alta Vicente was inspected for the butterfly.

2 METHODS

This work was conducted under Permit Number TE-217663-1.

The ESB surveys described in this report were conducted in accordance with the NCCP guidelines. The document requires that monitoring be conducted for six consecutive weeks during the peak flight period, for a total of six surveys. This report documents numbers of adults detected, sex, behavior, weather, and condition of the larval habitat, including host plant abundance and condition, and an estimate of the number of host plants. Also, any new areas with occupied or potential habitat for the butterflies are surveyed.

Due to the steep bluffs occupied by ESB, transect surveys as recommended by Mattoni et al. (2001) are precluded. Point observations were conducted at a total of 15 sites at four different locations:

- Vicente Bluffs – Sites 2-6, 10, 13, and 14 (Appendix A, Figure A-1). Site 1 was not visited because it is no longer accessible due to slope failure on the bluff slope below the stand (Dalkey 2011). Two new sites (13, 14) were established along the bluff top where PVPLC installed host plants in 2012 and 2013 (Appendix A, Figure A-1).
- Pelican Cove (formerly called Fishing Access) – Sites 7, 11, and 12 (Appendix A, Figure A-1)
- Abalone Cove – Sites 8, 9, and 15. Site 15 was established at a 2013 restoration that included the ESB's host plant. It was walked as a transect due to its accessibility and relatively large size (Appendix A, Figure A-2).
- Alta Vicente – Site 16 (Appendix A, Figure A-1). This site is located in a restoration that began in 2009 and contains host plants. It is not directly located on an ocean bluff, but is across the street from Vicente Bluffs where an ESB could conceivably reach the habitat.

During the 2011 survey, the host plants did not begin to flower until late-June, peaking in mid-July (Dalkey 2011). Therefore, the 2014 survey was scheduled to begin on July 1 in order to capture the full bloom period for the host plants. Each site was visited weekly through August 4. Site 16, at Alta Vicente, was visited once on a cursory basis for the 2014 survey. Numbers of ESB butterflies, including female, male, or unknown sex, were recorded as well as other lycaenid species. Concurrently, the number of dune buckwheat present was recorded along with general assessments of the habitat.

Safety concerns mandated that additional persons be present during the surveys. PVPLC interns Mike Mrocek and Michael James Calacsan accompanied me for the base Vicente Bluffs the surveys, but did not actively participate in the surveys. The surf also posed a safety risk, rendering access to Site 6 inaccessible during periods of high tides for all but the July 16 survey.

3 RESULTS

A summary of all observations and comments are presented in Appendix A, Table A-1. Images from each site are provided in Appendix A, Figures 3 and 4.

Table 1. Summary of host plants present at survey transects and counts of ESB at each transect.

	Dune Buckwheat					El Segundo Blues 201			
Site	**Adult**	**Recruit**	**Total 2014**	**Total 2011**	**2014 Comments**	**F**	**M**	**Unk**	**Total**
Vicente Bluffs - 2	23	0	23	57	5 individuals dormant				
Vicente Bluffs - 3	55	5	60	112					
Vicente Bluffs - 4	48	1	49	51	5 individuals dormant				
Vicente Bluffs - 5	19	0	19		2 individuals dormant				
Vicente Bluffs - 6	1	0	1	7					
Vicente Bluffs -10	0	0	0	10	No sign of any plants				
Vicente Bluffs -13	136	0	136	26					
Vicente Bluffs -14	19	0	19				1		1
Pelican Cove – 7	0	0	0	8					
Pelican Cove -11	18	0	18	6	4 dead or moribund				
Pelican Cove -12	22	0	22	26			1		1
Abalone Cove – 8	14	2	16	20	2 recruits at cliff base				
Abalone Cove – 9	56	0	56	59					
Abalone Cove - 15	0	185	185						
Alta Vicente - 16	34	0	34	n/a					
Total	**445**	**193**	**638**	**388**			**2**		**2**

A total of 2 butterflies were observed in July, one male each at Site 14 in Vicente Bluffs and at Site 12 in Pelican Cove. Both of these locations are habitat restoration sites that included host plants specifically for the butterfly. Additional butterfly species observed included marine blue (*Leptotes marina*), pygmy blue (*Brephidium exilis*), gray hairstreak (*Strymon melinus*), and checker white (*Pyrgus albescens*) butterflies. All co-occurring butterflies were observed at sites within restoration areas: Sites 11, 12, 13, 14, 15, and 16. Lycaenid larvae were observed at Sites 11, 12, and 13, photographed, and later verified as non-El Segundo blue butterfly larvae by Ken Osborne. The ESBs were seen around the dune buckwheat plants along the Terranea Resort's adjacent parking lot during the early part of July (see Comments, Appendix A, Table A-1).

Fewer host plants were present at the sites surveyed in 2011 along the base of Vicente Bluffs (Sites 2-6) and at Abalone Cove (Sites 8 and 9) (Table 1). Interestingly, a few recruits were present at the base of cliffs in both Vicente Bluffs and Abalone Cove. A small stand located at the top of a well-used entry point to the bluff base was no longer present at Site 10. The recent restoration sites at the top of Vicente Bluffs and at Abalone Cove contained abundant dune buckwheat. These plants were reaching their peak bloom at the beginning of the survey (first two weeks of July). After a very hot and dry May and June, fogs and day-long overcast skies appeared in July and all host plants responded by increasing their blooms. Later in July, as days became clearer and warmer, the plants began going to seed.

4 DISCUSSION

The only locations where any butterflies were observed, including El Segundo blue butterflies and other lycaenids, were at sites within the active restoration areas. Because the restoration sites were provided supplemental irrigation, the host plants and other native species had lush growth and plenty of flowers. In contrast, the existing habitat areas had fewer numbers of dune buckwheat than previously observed and, those still present, had canopies with smaller amounts of flowers. A number of these plants appeared to be either dormant or moribund. Figure 4A illustrates three plants: one dead, one stressed or moribund, and one healthy at Site 5.

The number of the dune buckwheat plants found on the walls at Vicente Bluffs (Sites 2-6) has decreased from a total of 227 to 152 (Table 1). There were also fewer host plants at Abalone Cove, but the reduction was not as dramatic as at Vicente Bluffs. It would be difficult to not credit the last three years of below average rainfall as the driver for the loss of dune buckwheat plants as well as the absence of ESBs.

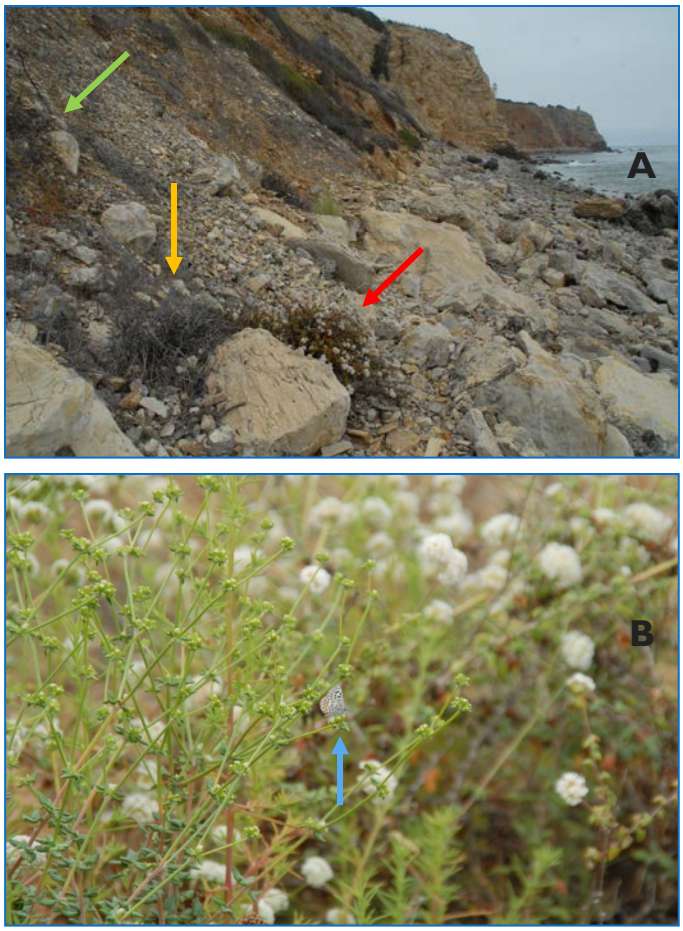

Figure 1. Contrasting host plant conditions. **A:** The green arrow shows healthy plants; the red arrow shows a plant with few blooms and red leaves; the yellow shows a dead plant. **B**: The lush vegetation at Site 14 with an ESB in the center (blue arrow).

The irrigated restoration sites contained abundant host plants with full canopies. Site 13 had 26 naturally occurring dune buckwheat plants in 2011. It was planted with new plants that were hand watered which increased the number of plants at the site to 136. Site 14 was restored concurrently and was the location of the single ESB observed at Vicente Bluffs. While efforts were made to look for larvae, no ESB larvae were found. A certain discount must be given to my lack of experience in searching for larvae, although I am relatively inexperienced at searching for larvae.

Site 13 is located on the bluff top directly above Sites 2 and 3. The 26 naturally occurring plants at Site 13 are sufficiently large to harbor ESBs, but I have not observed any since first discovering the plants' presence in 2011. Site 14, where a male ESB was observed (Figure 4B), is located above Site 6 that has only a single remaining host plant rendering it an unlikely source for colonizing Site 14. A more likely source of colonizing ESBs is found on US Coast Guard property at Pt. Vicente. There, hundreds of dune buckwheat plants are present on the bluffs, about 300 m from Site 14 (Figure 1). I incidentally observed it in early May 2011 and found that the dune buckwheat stand was extensive.

Plants are abundant on the bluff slopes from approximately 25 m upcoast and 25 m downcoast, then become less dense from 25-50 m upcoast. The stands contain a mix of juvenile to mature plants. Determining whether any ESBs are present at the location will be extremely difficult because the site can only be reached during very low tides. Unfortunately, summer low tides generally occur during the early morning, often before sunrise, rendering access impossible. Given the size of the stand, it is likely that the butterfly is present, but cannot be easily determined definitively.

Figure 2. View of dune buckwheat plants on the upcoast side of Pt. Vicente. All dark green spots on the cliff face in this image are dune buckwheats.

Only one single ESB was observed at Site 14, on July 2. No ESBs were observed on the buff faces where the habitat had declined following three years of drought.

Pratt (2006a) commented that variation of eclosion responses occurs more due to variation in weather conditions than actual population variation. While there was a decline in host plant numbers on the bluffs, small-scale environmental variation may also be a factor. I have observed that dune buckwheat plants bloom earlier on the flat areas of the bluff tops than the steep bluff cliffs. By scheduling the survey from July 1 to August 8, peak flight season on the bluff tops likely may have been missed.

At Vicente Bluffs, the bluff tops and bluff cliffs receive different patterns of insolation that impact the ground temperatures, creating small scale differences. The mostly west-facing cliffs of Vicente Bluffs are shielded from the morning sun, making them quite cooler and less sunny than the flat areas. As seen in Figure B-3, host plants at the seaward toe of Site 3 were blooming, while the plants located in a highly shaded, narrow chute were not blooming on the day of the photograph (July 2). Bloom development was closely tracked in my 2011 report, showing that these dune buckwheat plants reached full bloom (≥50%) later than those at the flat areas (Dalkey 2011, Table B-1). Incidentally I have observed numerous ESBs in late May and early June at the Redondo Beach restoration site, where the host plants receive plenty of insolation on the flat habitat areas.

I witnessed a noticeable divergence in the peak flight season in 2008 while participating in the mid-June to August synoptic survey at habitats ranging from Dockweiler Beach to Malaga Cove. During this survey, the greatest abundance of ESBs occurred in mid-June (Osborne 2010). However, I noticed butterflies at the south end of Torrance Beach, at the base of Paseo de la Playa back yards, were not observed until August. While the overall data, as shown in Osborne's report (2010) illustrate a classic Poisson distribution of butterflies observed over time, it does not clearly depict the dichotomy in abundance between flat sites and those located on the bluffs.

Historically, the flight season of the ESB has been considered to occur from mid-June into August or September (Arnold 1990 and Mattoni 1992). Incidental observations by me at Redondo Beach and at the Pt. Vicente area by local naturalist Jess Morton (personal communication) indicate that the flight

season is beginning as early as late-May. By following the NCCP guidelines of conducting a six consecutive week survey, the ability to capture peak flight time at the bluff top locations may have been missed. If, as incidental observations indicate, a small-scale divergent flight season exists, a six consecutive week survey cannot capture the peak flight season at both the flat bluff-tops and steep bluff cliffs.

Documentation would be needed to explore this divergent peak flight season concept. It could begin with a concerted effort to document the first appearance of the El Segundo blue butterfly along the bluff tops within the Pt. Vicente area. If the butterfly is observed as expected, the results can be used to amend the duration of the flight season as described by Arnold (1990) and Mattoni (1992).

Figure 3. The single El Segundo blue butterfly observed at the Pelican Cove restoration site.

5 RECOMMENDATIONS

Because the NCCP requires triennial surveys for the El Segundo blue butterfly, steps to clarify the peak flight season at bluff tops will be helpful in preparing for the 2016-2018 NCCP monitoring cycle within the Palos Verdes Nature Preserve. A non-protocol survey will be conducted along the bluff tops with host plants beginning in mid-May, 2015 to look for the presence of El Segundo blue butterflies. The resulting data can be used in preparing for the next triennial monitoring.

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APPENDIX A

Topographic Map, Data and Survey Images

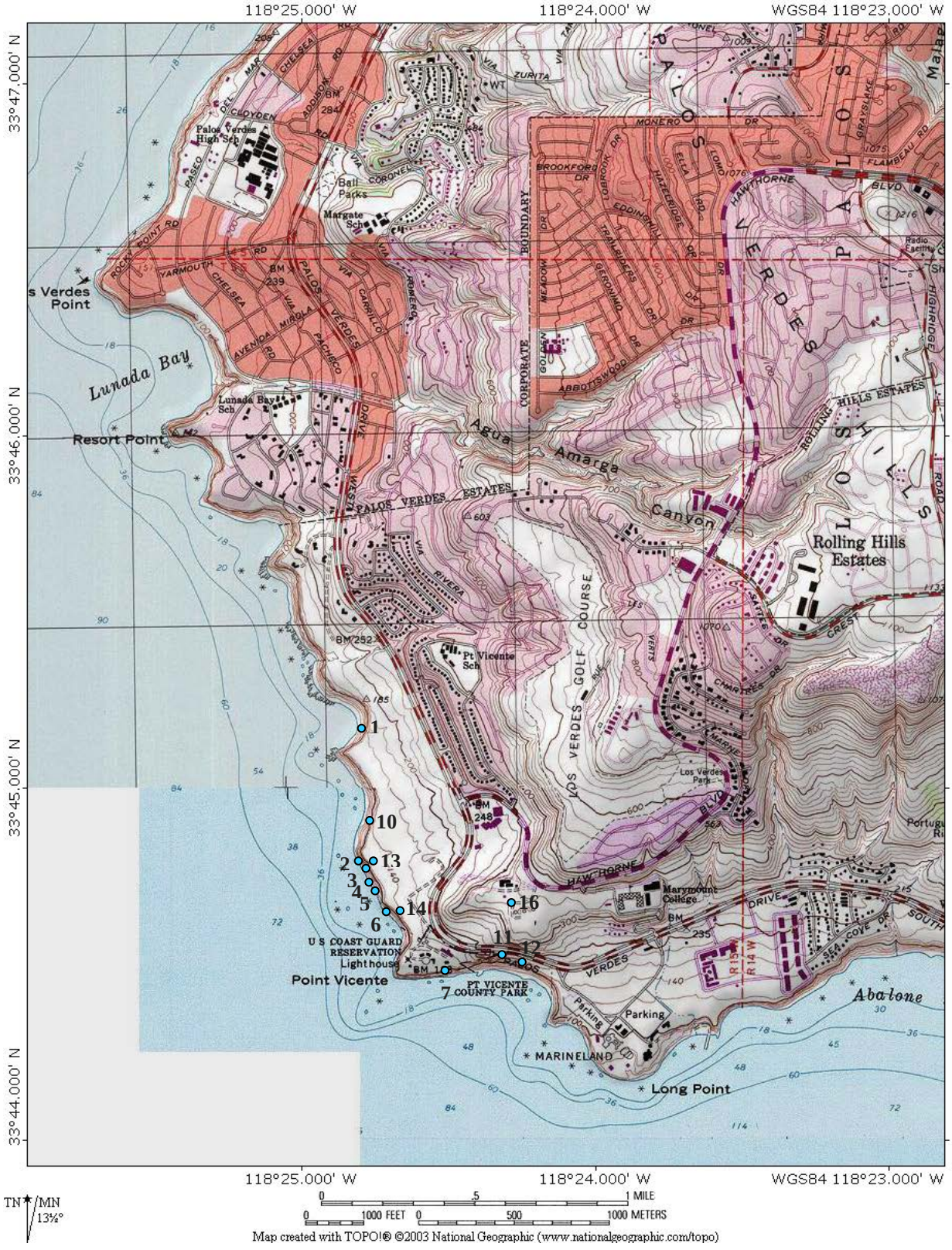

Figure A-1. Topographic map of locations of sites surveyed in the Palos Verdes Nature Preserve, Vicente Bluffs Reserve, Sites 1 – 6, 10, 14, an 15, Alta Vicente Reserve Site 16, plus Pelican Cove (formerly Fishing Access), Sites 7, 11, and 12.

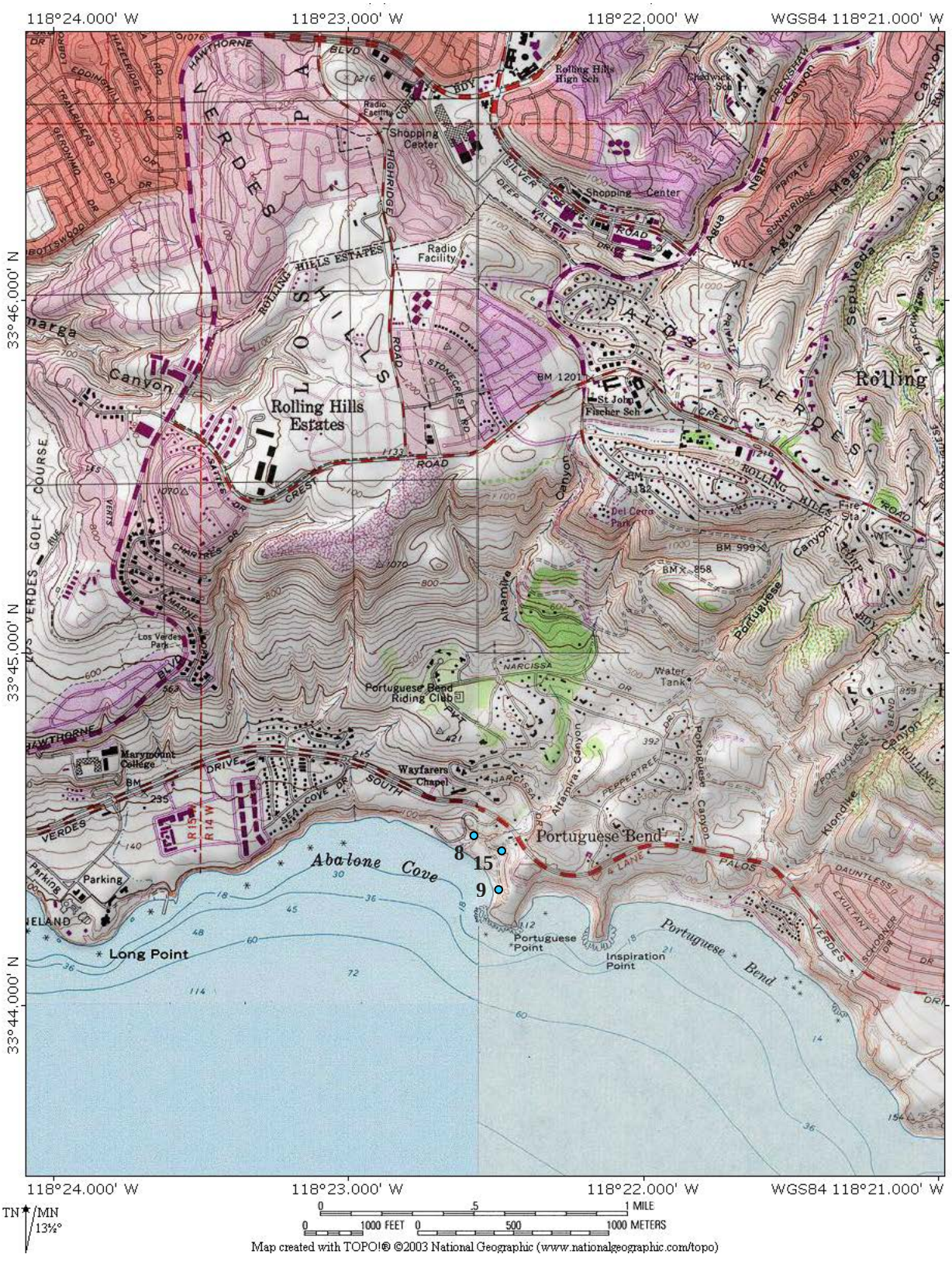

Figure A-2. Topographic map of locations of sites surveyed in the Palos Verdes Nature Preserve, Abalone Cove, Sites 8, 9, and 13.

Table A-1. Detailed observations from El Segundo blue butterfly surveys within the Palos Verdes Nature Preserve 2014

Date	Site	Time	Temp ◦C	Wind m/s	Sky	F	M	Ukn	Total	Plant Phenology	Comments
1-Jul-14	7	9:56		0.4							Trail blocked by illegal camp, reported to ranger. Site not visited
1-Jul-14	11	10:13	19	0.9	Ovcst	0	0	0	0	Flowering	4 dead or moribund.
1-Jul-14	12	10:26	20	0.4	Ovcst	0	0	0	0	Flowering	1 - *Brephidium exilis*; Several B. exilis at adjacent Terranea site and observed one ESBm there. Plants blooming nicely. Cliff is smaller than previous visit (2011) from a small landslide on the west side. Host plant there gone and replaced with *Salsola tragus*.
1-Jul-14	9	11:11	20	0.9	Ovcst	0	0	0	0	Dormant	A few host plant flowering, but mostly dormant
1-Jul-14	15	11:25	20	<0.4	Ovcst	0	0	0	0	Juvenile	Site of PVPLC restoration. Only plants visible from trail counted. A few were blooming, some could be moribund.
1-Jul-14	8	11:43	20	0.4	Ovcst	0	0	0	0	Non-blooming	20% flowering; two juvenile at base of cliff
1-Jul-14	9	11:10	20	0.9	Ovcst	0	0	0	0	Dormant	Some plants flowering
1-Jul-14	15	11:25	20	<0.4	Ovcst	0	0	0	0	Juvenile	Restoration site, some juveniles starting to bloom
1-Jul-14	8	11:43	20	0.0	Ovcst	0	0	0	0	Non-flowering	Juveniles at base of cliff wall
2-Jul-14	10	9:30	21	1.3	Ovcst	0	0	0	0		No sign of any plants observed previously
2-Jul-14	5	10:55	21	1.6	Ovcst	0	0	0	0	Flowering	2 individuals dormant
2-Jul-14	4	11:05	21	0.5	Ovcst	0	0	0	0	Dormant	
2-Jul-14	3	11:20	21	0.5	Ovcst	0	0	0	0	Flowering	40 plants at base of cliffs, 20 on cliffs
2-Jul-14	2	11:36	21	0.5	Ovcst	0	0	0	0	Flowering	All plants on lower bluffs have ≤50% flower, many ≤10% flower
2-Jul-14	13	11:57	21	0.5	Ovcst	0	0	0	0	Flowering	2012 restoration site
2-Jul-14	14	12:20	21	0.0	Ovcst	0	1	0	1	Flowering	2012 restoration site
8-Jul-14	7			1.4							Trail blocked by illegal camp, reported to ranger again. Site not visited
8-Jul-14	11	10:10	23	1.4	Ovcst	0	0	0	0		
8-Jul-14	12	10:20	23	1.4	Pcloudy	0	1	0	1		Larvae observed, photographed for ID, tended by Argentine ants
8-Jul-14	9	11:48	23	0.7	Clear	0	0	0	0		
8-Jul-14	15	11:59	23	0.7	Clear	0	0	0	0		3-*Pyrgus albescens*, 1-*Brephidium exilis*, and 1-*Pontia protodice* nectaring on *E. parvi*
8-Jul-14	8	12:17	24	1.7	Clear	0	0	0	0	40% flowering	Increase in % flower
8-Jul-14	16	12:51	23	0.4	Pcloudy	0	0	0	0		2009 restoration site, plants mature; 1-*Strymon melinus*, 1-*Leptotes marina*
9-Jul-14	5	9:32	21	0.4	Ovcst	0	0	0	0		Inspected plants for larvae and larval damage, none found
9-Jul-14	4	10:17	21	0.3	Ovcst	0	0	0	0		Inspected plants for larvae and larval damage, none found
9-Jul-14	3	10:22	21	0.7	Ovcst	0	0	0	0		Inspected plants for larvae and larval damage, none found
9-Jul-14	2	10:31	21	2.0	Ovcst	0	0	0	0		Inspected plants for larvae and larval damage, none found

9-Jul-14	13	11:00	22	1.9	Ovcst	0	0	0	0		Plants still pushing blooms
9-Jul-14	14	11:18	22	1.2	Ovcst	0	0	0	0		Many *Brephidium exilis* (salt bush nearbby); Plants still pushing blooms with continued am/pm overcast (3-4 wks) & tropical moisture since 14 Jul
15-Jul-14	9	11:23	21	1.2	Ovcst	0	0	0	0		≥0.1" (0.25 cm) rain prior night, host plants looking better.
15-Jul-14	16	11:35	21	0.7	Ovcst	0	0	0	0	30-50% flowering	Larger host plants still pushing new flowers
15-Jul-14	8	11:42	22	1.5	Ovcst	0	0	0	0		Host plants with more flowers, dormant individuals with new leaves
15-Jul-14	12	12:42	22	1.5	Ovcst	0	0	0	0		Wind at different heights: 45 cm above plant 6.4; 15 cm: 3.8, behind plant: 0
15-Jul-14	11	13:00	22	0.0	Ovcst	0	0	0	0		Host plants with more flowers; 1-Leptotes marina
15-Jul-14	7			2.1							Trail still blocked by illegal camp. Site not visited
16-Jul-14	6	9:40	19	1.1	Pcloudy	0	0	0	0	Non-flowering	Site good for E parvi seed balls.
16-Jul-14	5	11:12	21	1.1	Pcloudy	0	0	0	0	Starting fruiting	
16-Jul-14	4	11:21	21	1.0	Pcloudy	0	0	0	0	Starting fruiting	
16-Jul-14	3	11:35	21	1.6	Clear	0	0	0	0	Full bloom	
16-Jul-14	2	11:48	21	3.1	Clear	0	0	0	0	Full bloom	Site suitable for seed balls
16-Jul-14	13	12:15	21	0.8	Clear	0	0	0	0	Full bloom	1-*Strymon melinus*, *Brephidium exilis* flying; no sign of larvae; wind 1.9 by host plant
16-Jul-14	14	12:31	21	1.1	Clear	0	0	0	0	Full bloom	Many *Brephidium exilis*
22-Jul-14	7	9:54	20	0.7	Clear	0	0	0	0	Dead	1 dead plant visible where previously 3 individuals were present
22-Jul-14	11	10:20	21	0.4	Clear	0	0	0	0		Lycaenid larvae present, image sent for ID
22-Jul-14	12	10:34	21	1.1	Clear	0	0	0	0		
22-Jul-14	9	11:03	21	1.4	Pcloudy	0	0	0	0	Flowering	Beginning to produce fruit
22-Jul-14	15	11:21	21	0.9	Pcloudy	0	0	0	0	Flowering	Larger plants beginning to produce fruit
22-Jul-14	8	11:31	21	0.0	Pcloudy	0	0	0	0	Flowering	2 plants going to seed, juvenile plants non-flowering
30-Jul-14	5	9:56	21	0.0	Clear	0	0	0	0		No larvae observed, Argentine ants present on one plant
30-Jul-14	4	9:58	21	0.7	Clear	0	0	0	0		Plants to high on cliff to look for eggs, larvae
30-Jul-14	3	10:15	21	0.0	Clear	0	0	0	0		More exposed plants fruiting, 1 non-lycaenid larva present
30-Jul-14	2	10:28	21	0.0	Clear	0	0	0	0		
30-Jul-14	13	10:51	21	1.2	Clear	0	0	0	0		1-*Strymon melinus*; 1-*Leptotes marina*
30-Jul-14	14	11:07	21	1.9	Clear	0	0	0	0		Plants in full bloom, producing new blooms, some fruiting
4-Aug-14	12	10:22	19	2.5	Clear	0	0	0	0	Fruiting	Rain prior Sunday (Aug 3); >50% fruiting
4-Aug-14	11	10:30	19	0.9	Clear	0	0	0	0	Fruiting	>50% fruiting
4-Aug-14	7										

4-Aug-14	9	10:56	20	1.2	Clear	0	0	0	0	Fruiting	>50% fruiting
4-Aug-14	15	11:04	20	4.9	Clear	0	0	0	0	Various	Phenology variable; 1-*Pyrgus albescens*
4-Aug-14	8	11:22	20	2.2	Clear	0	0	0	0	Flowering	2 juvenile plants grew and are ≥50% larger

Figure A-3. Images of El Segundo blue butterfly survey sites at Vicente Bluffs visited during El Segundo blue butterfly surveys, July – August 2014.

Figure A-4. Images of El Segundo blue butterfly survey sites at Pelican Cove, Abalone Cove, and Alta Vicente visited during El Segundo blue butterfly surveys, July – August 2014.

2.4 WILDLIFE MONITORING

Wildlife Monitoring:

Coyote, Gray Fox, and Red Fox in the Palos Verdes Nature Preserve 2013-2015

Prepared By Ann Dalkey and Josh Weinik
February, 2016

Wildlife Monitoring: Coyote, Gray Fox, and Red Fox in the Palos Verdes Nature Preserve 2013-2015

Executive Summary

Surveys of canids inhabiting the Palos Verdes Nature Preserve--coyote (*Canis latrans*), gray fox (*Urocyon cinereoargeneus*), and red fox (*Vulpes vulpes*)--were conducted annually from November into March in 2012-13, 2013-14, and 2014-15. All three species are found within the Preserve, though most of the observations were based upon scat. Few prints were observed during this monitoring period.

A Citizen Science Wildlife Tracking program was established in 2013-14 with successful results. The new volunteers provided additional wildlife trackers, augmenting the university students serving as Land Conservancy Interns. As a result of the additional help, the surveys were more comprehensive, covering more of the Preserve to provide better insight into trends.

Coyote and fox activity was much greater in the Portuguese Bend Reserve than in the Forrestal Reserve during the monitoring period. In fact, the activity in Forrestal Reserve was considerably reduced to the point where few observations were made in 2014-15. Factors affecting the decline of wild canid presence in Forrestal reserve are currently unclear and warrant further investigation.

The coyote scat contents revealed a high amount of cat, 24 % and 28 % in 2013-14 and 2014-15, respectively. Most interesting was the amount of cat preyed upon during November and December 2014 (38.8 %). This survey period followed the 2013-14 year of record low rainfall when there was a paucity of forbs, grasses, and flowers in the preserves, leaving little forage for herbivores. The lack of natural prey impacted the wild canids, as seen by the increase in cat predation. Once the rains returned in December, the coyotes' diet shifted in January and February 2015 to one containing less cat (25.0 %).

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Introduction

Three wild species of canids inhabit the Palos Verdes Nature Preserve (PVNP, Preserve): coyote (*Canis latrans*), gray fox (*Urocyon cinereoargeneus*), and red fox (*Vulpes vulpes*). At one point, coyotes were extirpated from the Palos Verdes Peninsula, but then in the mid-1990s, the species returned (J. Lowery, pers. comm.). As top predators in the Preserve, all three species function as consumers of small mammals, lizards, and birds, along with vegetative matter (Gehrt et al. 2010). The ranges of these three species are not necessarily confined to the PVNP and are expected to include developed areas as well (Gehrt et al. 2010). Understanding the presence of wild canids within the Preserve will provide important information about their distribution and habits, enabling the City and Conservancy to make better informed management decisions and public outreach.

The Conservancy has regularly conducted wildlife tracking activities since 2006. The Natural Communities Conservation Plan and Habitat Conservation Plan (NCCP) for the PVNP includes provisions to describe biological data collected on wildlife movements, and frequency of road-killed wildlife, as such information is available. The NCCP also recommends the development of a program for disseminating information on responsible pet ownership. In response to these requirements, the Conservancy initiated a wild animal tracking program to develop an understanding of where the animals are found and what they eat.

This report provides a summary of tracking data collected during 2010-2012 on coyote, gray fox, and red fox. Scat investigations were also included and combined with data from the prior triennial survey to develop a more robust assessment on the prey consumed by these wild canids.

Methods

Tracking activities took place when canid activity was highest (November through April) and within reserves (Portuguese Bend, Filiorum, and Forrestal) that receive the highest occurrences of wild canids. Filiorum was not surveyed prior in 2013, but was added and surveyed in 2014 - 2015 as a result the conservancy's expanding Citizen Science Wildlife Tracking program.

Observations of scat and/or tracks were recorded, the species identified following Lowery (2006 and 2013). Tracks have limited value, for imprints are left only during the dry season in certain sections of trail where fine dust accumulates. Because we cannot identify fox scat to species, only coyotes were considered for scat investigations. When encountered, scat contents were examined on the ground to determine the prey using the following categories:

- Avian
- Feline
- Invertebrate
- Small Mammal (animals eaten whole)
- Large Mammal (animals eaten in parts)
- Rodent
- Unidentified
- Vegetation

Previous survey work (2007 – 2012) included the category "lagamorph" to describe the presence of rabbit remains within canid scat. More recent survey work (2013 - 15) identifies remains deemed to be rabbit within the "mammal" category. For graphing purposes, prey remains deemed to be "small mammal" without specific identifying features (skeletal remains) which would lead to a "rodent" categorization were also graphed as "mammal".

Survey participants walked established routes within the study area documenting presence of wild canid tracks (paw imprint) or scat (fecal remains). Observations of wild canid presence were recorded on field data sheets (Appendix C) and photographed. Species identifications of tracks or scat were made through reference of Lowery (2013). Recorded information included trail name and location to allow the potential of trail-specific analysis of wild canid presence. The majority of surveys were conducted in Portuguese Bend reserve, the area of highest wild canid activity observed in previous studies (Palos Verdes Peninsula Land Conservancy 2011 and 2013).

Priority investigative effort was given to scat rather than tracks, as the seasonality of quality imprints are not commonly found during the survey period but rather during the dry season (summer months) when fine grain/dust accumulates on trail surfaces. The high presence of domestic dogs and human foot traffic within the study area also created difficulties in locating or discerning wild canid tracks. Because fox scat is not easily detectable to species, only coyotes were considered for scat investigations. When coyote scat was encountered, scat contents were examined in the field through mild disturbance of the scat pellet and visual observation. Scat content was categorized to a presumptive source through the identification of prey species morphology closely associated with a particular animal type. For example, the presence of a feather would indicate the remains of a bird and the presence of mammal hair 2.5 cm or longer would indicate the presence of a feline species.

Wildlife trackers recorded their observations on map worksheets (Appendix C) and took photos of the scat, its contents, and prints, when present. The wildlife trackers data were logged into an Excel spreadsheet and emailed to the Conservancy with their photos for verification. The data were uploaded into an Access database for archiving and extraction for assessment purposes. Data was normalized through the development of an observation rate, or percentage of total surveys per reserve which resulted in a wild canid observation. SigmaPlot (v10.0) was used for a Kruskal-Wallis One Way analysis of Variance to compare year to year variations in diet.

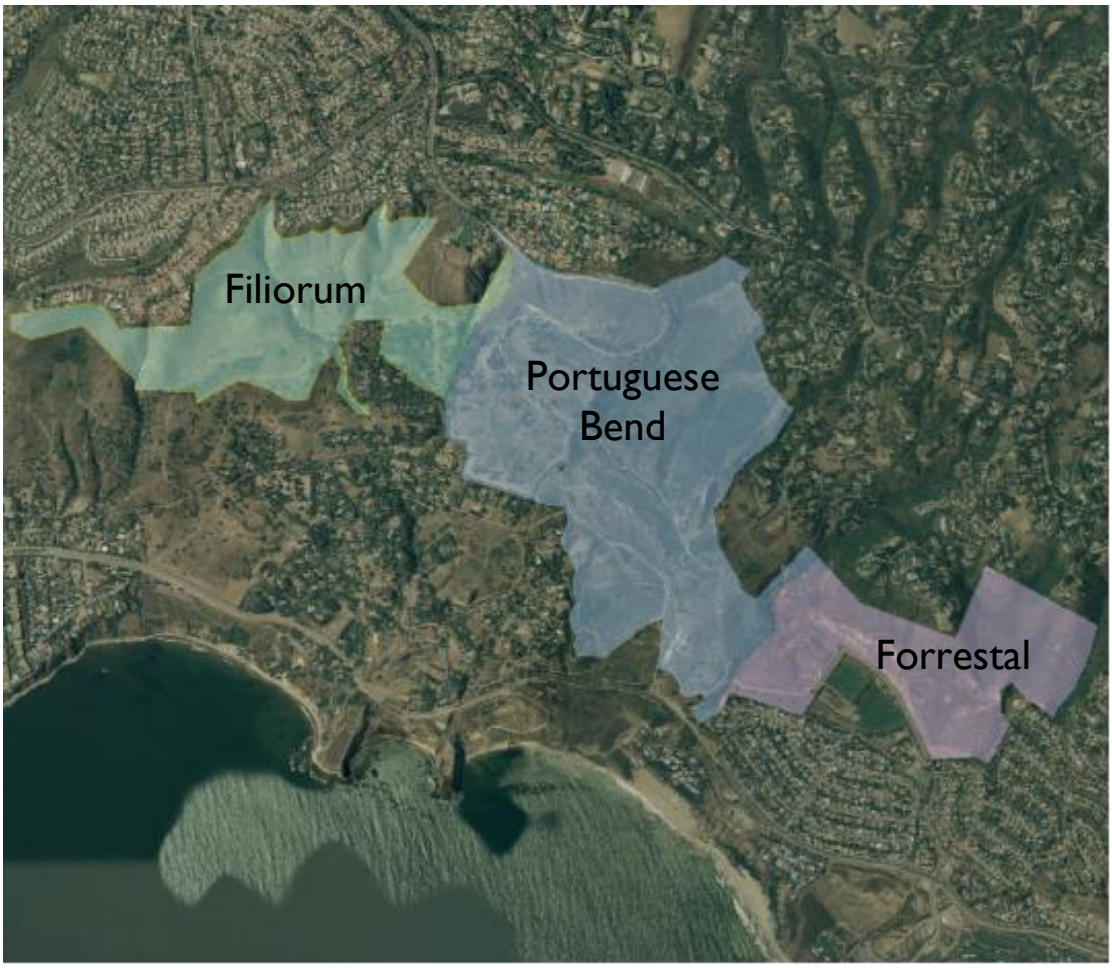

Figure 1. Map of Reserves where tracking activities took place.

Results

The total number of visits for the 2013 – 2015 survey period was 82. Portuguese Bend received the most visits (53), while Filiorum (11) and Forrestal (18) received less.

The number of wild canid track and scatt observations in 2013-2015 decreased in previously surveyed reserves (Portuguese Bend and Forrestal) when compared to survey results of 2009-2012 (Table 2). Higher scat counts of 2009-2012 are more likely a result of the higher number of surveys in Forrestal (42) and Portuguese Bend (78) in 2009-2012 than actual shifts in wild canid presence. Coyotes detected on trails within Forrestal and Portuguese Bend that received high visitation rates (percent of site visits detecting wild canid presence) were similar for both periods. However, fox visitation rates in 2013-2015 were considerably lower (11% in 2013-2015 and 77% in 2009-2012) within the Forrestal reserve and found to be higher in Portuguese Bend reserve than previous surveys.

Table 1. Direct counts of coyote and fox scats and resulting observation rates, calculated as a percent of total surveys for that preserve for the 2009-10 through 2011-12 and 2012-13 through 2014-15 periods. Overall observation rate could not be calculated for Portuguese Bend Reserve due to different numbers of surveys.

Trail	Coyote				Fox			
	2009 – 2012		2013 – 2015		2009-2012		2013-2015	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Filiorum Reserve								
Eucalyptus Trail			1	9.1				
Jack's Hat Trail			1	9.1			1	9.1
Pony Trail			2	18.2			1	9.1
Zote's Cutacross Trail			3	27.3			1	9.1
Total			7	63.6			**3**	27.3
Forrestal Reserve								
Cactus Trail			2	11.1	4	9.5		
Canyon Trail	9	18.8			1	2.4		
Conqueror Trail	1	1.3			1	1.3	1	5.6
Cristo Que Viento Trail	2	4.2						
Dauntless Trail	2	4.2			1	2.4		
Flying Mane Trail	8	16.7	3	16.7	2	4.8		
Forrestal Drive	2	4.2			2	4.8		
Intrepid Drive	2	4.2				0.0		
Mariposa Trail	13	27.1			3	7.1		
Pirate Trail	21	43.8	4	22.2	7	16.7	1	5.6
Purple Sage Trail			1	5.6				
Vista Trail	8	16.7			1	2.4		
Total	**67**	**85.9**	**14**	**77.8**	**11**	**26.2**	**2**	**11.1**
Portuguese Bend Reserve								
Barn Owl Trail	5	6.4			5	6.4		
Burma Road	6	7.7	1	3.0	2	2.6	6	18.2
Eagle's Nest Trail							1	3.0
Fire Station Trail	10	12.8	10	30.3	3	3.8	12	36.4
Gary's Gulch Trail			1	8.3			2	16.7
Grapevine Trail	22	28.2	5	62.5	5	6.4	18	54.5
Ishibashi Trail	20	25.6			8	10.3	3	9.1
Kelvin Canyon Trail			1	8.3				
Klondike Canyon Trail	2	2.6	6	75.0				
Kubota Trail			1	8.3				
Lower Burma Road	1	1.3						
Paintbrush Trail			2	6.1			3	2.0
Panorama Trail	3	3.8			3	3.8		
Rim Trail	10	12.8	6	18.2	2	2.6	8	24.2
Toyon Trail	5	6.4						
Vanderlip Trail	5	6.4	6	5.0			1	8.3
Water Tank Trail			1	8.3				
Total	**90**	**115.4**	**40**	**n/a**	**29**	**37.2**	**56**	**n/a**

Both fox and coyote were observed along similar trails in 2013-2015 as in previous surveys. Commonly used trails shared similar characteristics of being located within close proximity to areas of dense vegetation and connecting to preserve entry points (Fire Station Trail and Pirate Trail). Favored trails for both coyote and fox include:

- Filiorum: Pony Trail and Zote's Cutacross Trail
- Forrestal: Canyon Trail, Flying Mane Trail, and Mariposa Trail
- Portuguese Bend: Burma Road, Fire Station Trail, Grapevine Trail, Ishibashi Trail, Panorama Trail, and Rim Trail.

The year to year locations of scat, serving as a proxy for the animal's presence, varies, as shown in Figure 4. In 2007-08 there was a large amount of activity in the Forrestal Reserve. In contrast, the activity was much less at Forrestal in 2014-15 and greater in Portuguese Bend as indicated by the size and number of circles on the maps. Filiorum Reserve was first surveyed in 2014-15 which revealed activity of both coyote and fox.

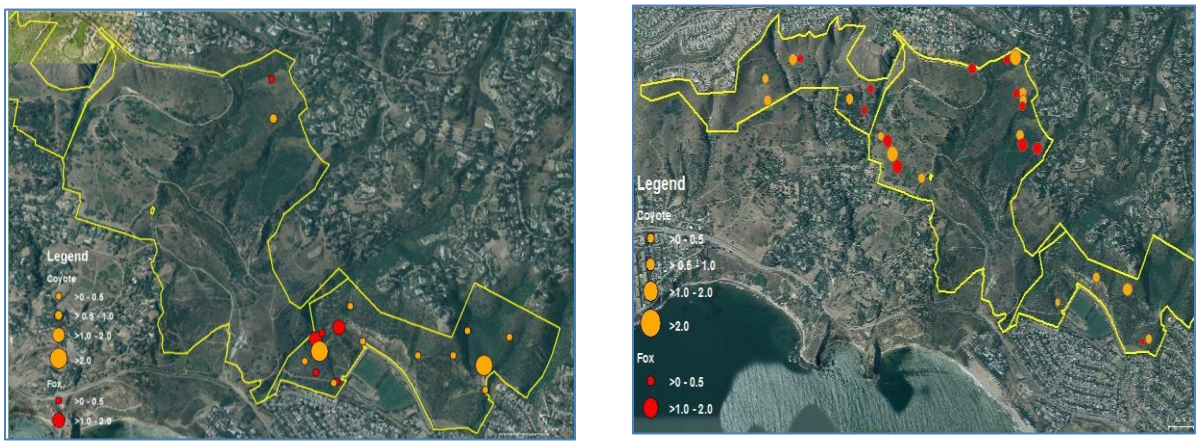

Figure 2. Maps depicting coyote and fox observation rates that were observed in 2007-08 and 2014-15 tracking seasons. Number of observations were normalized against number of surveys to compare across Reserves and years.

Results of the scat analysis are detailed in Appendix A. A summary of prey items for coyotes is provided for five years 2007-08, 2009-10, 2011-12, 2013-14 and 2014-15 in Figure 5. Because fox scat cannot be distinguished to species, only coyote is shown. Prey contents varied over the year, in part due to capability of the Citizen Science volunteers. Additionally, the categorization of prey items varied slightly throughout the years before being clearly defined upon the development of the formal Citizen Science Program for the 2013-14 tracking season.

One consistent feature is the amount of feline remains found in the scats. It is easy to identify cat remains in a scat by their claws and long, silky fur (≥ 2.5cm). The percent of cat in the scat ranged from 11% in 2011-12 to 28% in 2014-15. Mammals and rodents constituted the major portion of coyotes' diet. In this comparison, the Large Mammal and Small Mammal (Lagamorph) categories utilized in 2013-14 and 2014-15 were lumped so they could be compared to earlier studies

when such distinctions were not made. When subjected to the Kruskal-Wallis One Way Analysis of Variance on Ranks, the inter-year variation was shown to be not significant (Table 2).

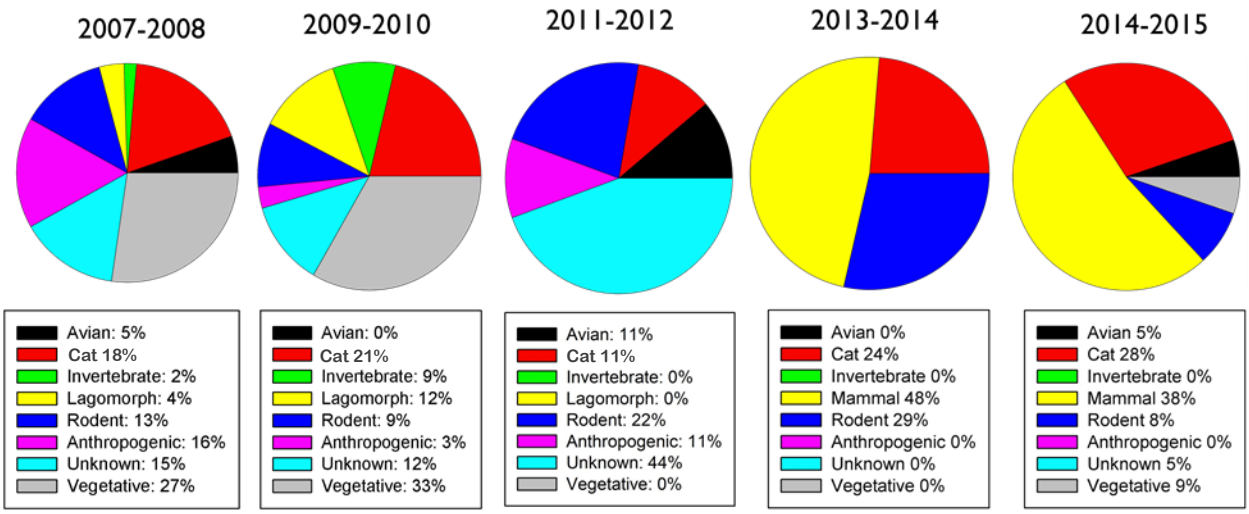

Figure 3. Percentages of prey consumption for all surveys, including pie graphs to show relative proportions of prey items over time.

Table 2. Results of the Kruskal-Wallis One Way Analysis of Variance on Ranks comparing all years of the prey analyses.

Group	N	Missing	Median	25%	75%
07-08	8	0	0.136	0.0455	0.173
09-10	8	0	0.106	0.0606	0.167
11-12	8	0	0.0938	0.000	0.156
13-14 Coyote	8	0	0.000	0.000	0.262
14-15 Coyote	8	0	0.0513	0.000	0.179

H = 1.911 with 4 degrees of freedom. (P = 0.752)

Wild Canid Presence

In prior reports, we found that coyote, gray fox, and red fox are present in the Preserve, but tend to avoid each other as indicated by the lack of overlap in species occurrences (PVPLC 2011 and 2013). During this triennial monitoring period, we found that fox and coyote scats were frequently found in the same areas, though not usually during the same survey, indicating that the animals frequented the same areas but at different times. Our observations are consistent with behavior observed in other localities, including the Santa Monica Mountains, particularly for gray fox, which is preyed upon by coyote (Riley et al. 2003).

Previously surveyed reserves (Portuguese Bend and Forrestal) exhibited modest declines in wild canid observations during the most recent survey period. Forrestal reserve experienced the most severe reduction in wild canid observations. The causal factors driving the disproportionate decline in wild canid presence in Forrestal reserve are currently unclear. Potential areas of investigation specific to Forrestal reserve include prey source population dynamics, drought impacts to native vegetation, and the design of adjacent governmental trapping activity.

There were few tracks observed during this triennial reporting period, often the Citizen Science volunteers mistake domestic dog prints for coyote. However, a good set of gray fox tracks was observed in November 2013 along Dauntless Trail in Forrestal. Gray fox has been regularly observed at Forrestal in this area, which is adjacent to the deep Klondike Canyon that is filled with dense vegetation. While not noted to occupy fragmented and urbanized areas (Gehrt et al. 2010), the Peninsula's gray foxes defy general convention and persist in this environment. On occasion, they are spotted by local residents. In general, gray fox keep a low profile and illustrate a negative abundance relative to coyotes, which prey on fox, as described by Fedriani et al. (1999) for Santa Monica Mountains.

Scat Content Analysis

Scat content analysis focused on coyote because of the difficulty in distinguishing gray and red fox scat. The consistent trend among coyotes found in the PVNP has been the high amount of cat consumed. In contrast, coyotes from the Santa Monica Mountains have essentially no cat in their diet (Fedriani et al. 2000). The difference between the two localities is that the Santa Monica Mountains has large tracts of intact habitat whereas open space areas of the PVNP are in close proximity to residential areas. Coyotes, being intelligent and accustomed to the urban environment (Gehrt et al. 2009), can easily take advantage of opportunities to prey on cats as they forage in the preserves and residential areas.

In 2013-14 and 2014-15, the proportion of cat increased over that observed in previous years (Figure 5) which may be explained by the multi-year drought's negative impact to small herbivorous mammal populations. In 2013-14 4.37 inches (11.1 cm) of rain fell, following two years of below average precipitation (7.57 inches (19.2 cm) in 2011-12 and 6.67 inches (16.9 cm) in 2012-13) (National Weather Service at Long Beach). During the 2013-14 rain year, few plants produced flowers and annual species (including the harmful invasive weeds) grew in sparse densities. As a result, the normal crop of seeds and small herbaceous plants were absent or at least dramatically reduced within the preserves. This reduction of forage material could certainly be a factor in deleteriously impacting herbivores in the reserves. Casual observations in the field indicated as much, with few rabbits seen in the Preserve.

Alternatively, during November and December 2014, significant rains fell, delivering 5.08 inches (12.9 cm) of precipitation. In the weeks following this period of rainfall, annual species grew in greater densities and abundance than in more drought effected years. This positive growth pattern observed by the annual species and increased flowering by perennial plants resulting in

high seed production. During this period of abundant forage for small herbivores, cat decreased as a prey source of coyotes within the PVNP from 38% in November and December to 25% in January and February 2015.

We interpret this shift in coyote diet away from cat as a prey source as being inversely related to drought stress and ultimately decreased forage availability to small mammalian herbivores. Through the loss of forbs and seeds, the abundance of small rodents and even rabbits appeared to be greatly reduced. We expect that coyotes and fox had insufficient natural prey in times of extended drought, thus becoming more reliant on cats. The lack of wild prey may also cause increased movement of coyotes into residential areas in an effort to locate prey sources as those within PVNP become scarce. These conclusions are inferred due to our lack of data on the herbivore populations.

Additional Benefits

Two students from California State University Dominguez Hills, Alex Lepicier and Juan Julian (JJ) Baraja, participated in the 2014-15 wildlife tracking season and volunteered as Conservancy Interns to assess the data. They presented their work as a poster at the May 2015 Southern California Academy of Sciences' Annual Meeting for which they received Honorable Mention and were able to share a cash award of $250. Their poster is shown adjacent as Figure 7.

Do coyotes (*Canis latrans*) residing on the Palos Verdes Peninsula select different prey as a result of residing in a wildland-urban interface?

Introduction

The coyotes of the Palos Verdes Reserve live in a wildland urban interface which is a transitional zone between unoccupied land and human development. It is believed that this kind of environment influences what the coyotes eat. We focused on prey consumed by coyotes and contrast our results with those obtained in other areas, particularly the Santa Monica Mountains. Monitoring was also done for the National Communities Conservation Plan (NCCP)

Figure 1. Location of Filiorum, Portuguese Bend, and Forrestal Reserves on.the Palos Verdes Peninsula

Methods

- Trackers were individually taught by Ann Dalkey for consistency in data collection in all surveys.
- Each year tracking was conducted November thru March over consistent routes.
- Coyote tracks and scat location were noted on a map and also investigated for prey items.
- Data were electronified and assembled in a database.
- Prey categories included unidentified, Avian (bird), Cat, Invertebrate, Rodent, Small mammal, Large mammal, Anthropogenic and Vegetation.
- During 2007-2008 and 2009-2010, scat samples were analyzed for prey using stereoscopes.
- Prey items were determined in the field for the later datasets.
- Scat deposition patterns were mapped using GIS software.
- Prey data normalized against survey rates for each preserve to calculate relative abundance
- Prey categories were subjected to aKruskal-Wallis One Way Analysis of Variance in significant trends using Sigma Plot/Stat.

Figure 2. Normalized coyote and fox scat deposition 2007-08.

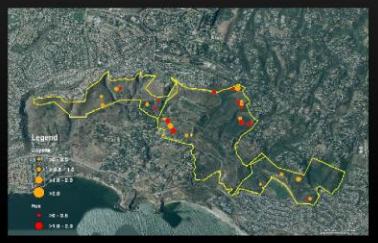

Figure 3. Normalized coyote and fox scat deposition 2014-15.

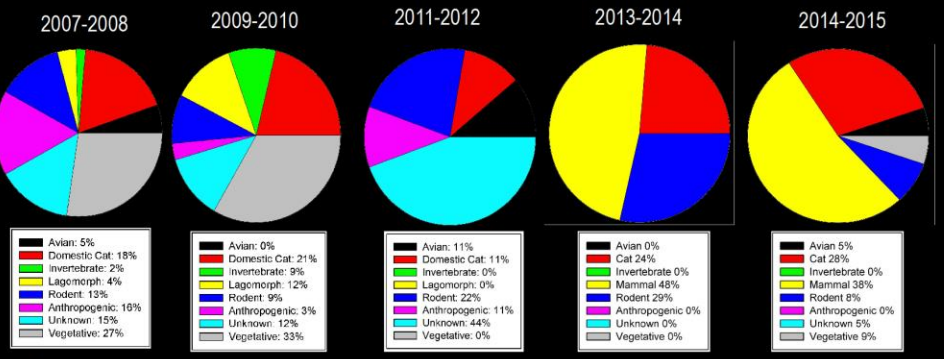

Figure 4. Percentages of prey consumption for all surveys.

Table 1. Results of the Kruskal-Wallis One Way Analysis of Variance on Ranks over five years.

Group	N	Missing	Median	25%	75%
2007-08	8	0	0.136	0.0455	0.173
2009-10	8	0	0.106	0.0606	0.167
2011-12	8	0	0.0938	0.000	0.156
2013-14	8	0	0.000	0.000	0.262
2014-15	8	0	0.0513	0.000	0.179

H = 1.911 with 4 degrees of freedom. (P = 0.752)

Results

The dietary patterns of coyotes are influenced by the rain. When it is dry the plants give out less food and that causes a decline in coyotes main source of food large mammals and rodents. This causes them to eat domesticated cats as an alternative food source. When there is rain the plants give out more food and this causes the rodent and rabbit populations to increase, and thus leads to coyotes turning their attention back to them.

Discussion

- There was more coyote scat observed in 2007-08 at Forrestal preserve. Changes of 2007-08 scat data compared with 2014-15 data shows an decrease in coyote visitation rate in Forrestal (Fig. 2).
- In 2014-15 there was coyote depredation in the City of Rolling Hills, nearby the preserves which may have been a factor.
- Coyote diet had the highest proportion of cat during the years of 2013-2014 (24%) and 2014-2015 (28%) (Figure 4)..
- We believe that the recent drought has impacted the availability of prey due to the lack of forage of forbs and other seed producing plants.
- However there was no significant difference in prey categories from 2007-2008 (Table 1).
- However we believe a trend is present, resulting from impacts on prey availability as a result of the drought.
- For example, during Nov-Dec 2014 the prey percentages for cat were high while the percentages for rabbits and rodents were small.
- Then the percentages reversed for Jan-Mar 2015 after it rained with rodents and rabbits increased and cats declined (personal observation).
- Our results are different compared to that found by Fedriani et. al. (2000) in the Santa Monica Mountains where coyotes diet mainly consist of rodents and rabbits and there is a smaller human population with associated cats to prey upon.

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Acknowledgments

Ann Dalkey
Palos Verdes Peninsula Land Conservancy
ESRI

Citizen Science Wildlife Tracking Program

The Citizen Science Wildlife Tracking Program has been very successful in bringing enthusiastic volunteers to the monitoring program. The Conservancy has a goal of developing a base of permanent Wildlife Tracking volunteers that will help guide novice trackers to generate better quality data. After two years, the Conservancy has developed a training program, established portions of trails for surveying, and effective mechanisms for transferring the collected data from the volunteer to the Conservancy for archiving in the Conservancy's database.

By involving Citizen Science volunteers, more of the Preserve was covered during the tracking season. The additional and more comprehensive data gained through the program will enable the Conservancy to better elucidate trends, both in this report and in future years.

Recommendations

The Wildlife Tracking program has been in place for a decade resulting in a rich set of data for assessing the coyote, gray fox, and red fox activities in the Preserve. By continuing this program, a long-term dataset will be developed that can potentially answer increasingly complex questions and improve trend analysis. Continuing and growing the Citizen Science Wildlife Tracking Program is essential for success of the program. Care should be made to conduct the tracking in the same manner as established in the wildlife tracking protocol to allow for year-to-year comparisons. Additionally, counts of rabbits observed during each survey should be continued in order to increase our understanding of available natural prey sources for wild canids.

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Riley, S. P. D., R. M. Savajot, T. K. Fuller, E. C. York, D. A. Kamradt, C. Bromley, and R. K. Wayne. 2003. Effects of urbanization and habitat fragmentation on bobcats and coyotes in Southern California. Conservation Biology 17: 566-576.

APPENDIX A

Wildlife Tracking Survey Data

Appendix A. Table of all wildlife tracking data collected for coyote and fox (includes gray and red fox) during 2012-13, 2013-14, and 2014-15. Columns are color-coded to facilitate reading the table, where light tan = Species and light purple = Prey. Rabbit counts were initiated in 2014-15 for future long term analysis of prey versus rabbit availability.

Date	Preserve	Trail	Species	Photo File Name	Prey	Rabbit Count	Comments
November 2012-April 2013							
01-Nov-12	Portuguese Bend A	Water Tank	Coyote	CS 121101 Rodent.jpg			mammal
04-Nov-12	Portuguese Bend A	Panorama	Fox		vegetative matter		
06-Nov-12	Portuguese Bend B	Burma Road	Coyote	CS 121106 Mammal.jpg	small mammal		perhaps a rodent / pic of bones= CS 121106 Bones.jpg (horse scat also included)
06-Nov-12	Portuguese Bend B	Grapevine	Coyote	CS_110612_73, CS_110612_74, CS_110612_75, CS_110612_76	Mammal		Fur, Rodent jaw bone
06-Nov-12	Portuguese Bend B	Grapevine	Fox	FS_110612_63, FS_110612_66	Mammal, Plant		Fur, grass
06-Nov-12	Portuguese Bend B	Rim	Coyote	CS_110612_77, CS_110612_78	Mammal		Whiter fur, maybe rabbit
10-Nov-12	Portuguese Bend B		None				
10-Nov-12	Portuguese Bend B		None				
11-Nov-12	Portuguese Bend B	Burma Road	Coyote	CS 121111 Mammal.jpg	mammal		looked like bunny fur / Pic of bones= CS 121111 Bones.jpg
11-Nov-12	Portuguese Bend A	Kelvin Canyon	Coyote	CS 121111 Mammal2.jpg	mammal		all fur, no bones- looked pretty old
12-Nov-12	Portuguese Bend A	Burma Road	Coyote				mammal
12-Nov-12	Portuguese Bend A	Burma Road	Coyote				vegetative
12-Nov-12	Portuguese Bend A	Burma Road	Coyote				vegetative
12-Nov-12	Portuguese Bend A	Burma Road	Fox				mammal
12-Nov-12	Portuguese Bend A	Burma Road	Fox				mammal, vegetative
12-Nov-12	Portuguese Bend A	Burma Road	Fox				vegetative
12-Nov-12	Portuguese Bend A	Vanderlip	Coyote	CS 121112 Cat.jpg			cat
13-Nov-12	Forrestal	Canyon View	Coyote		rodent		
13-Nov-12	Forrestal	Flying Mane	Coyote		Avian		
13-Nov-12	Forrestal	Mariposa	Coyote		Avian		possible California towhee
13-Nov-12	Forrestal	Mariposa	Coyote		small mammal		
13-Nov-12	Portuguese Bend B		None				
20-Nov-12	Portuguese Bend B		None				
20-Nov-12	Portuguese Bend B		None				
24-Nov-12	Portuguese Bend D	Barn Owl	Fox		undetermined		
24-Nov-12	Portuguese Bend D	Burma	Coyote		small mammal, anthropogenic material		
24-Nov-12	Portuguese Bend B	Burma Road	Coyote	CS 121124 Mammal.jpg,	Mammal		all fur, no bones
24-Nov-12	Portuguese Bend B	Burma Road	Fox	CS 121124 Mammal2.jpg	Rodent		perhaps a rodent / pic of bones= CS 121124 Bones2.jpg
24-Nov-12	Portuguese Bend D	Klondike Canyon	Coyote		fur		
25-Nov-12	Portuguese Bend A		None				
25-Nov-12	Portuguese Bend A		None				
27-Nov-12	Portuguese Bend B	Burma Road	Coyote	CS 121127 Mammal.jpg	mammal		all fur, no bones

27-Nov-12	Portuguese Bend B	Fire Station Trail	Coyote	CS_112712_106.JPG, CS_112712_105.JPG, CS_112712_104.JPG	Mammal		Fur, bones that appeared to be knee, rib, and vertabrae
27-Nov-12	Portuguese Bend B	Fire Station Trail	Coyote	CS_112712_97.JPG, CS_112712_102.JPG, CS_112712_103.JPG	Mammal		Fur, small bone fragments. Undecided based on color concluded Coyote scat.
27-Nov-12	Portuguese Bend B	Fire Station Trail	Fox	FS_112712_95.JPG, FS_112712_96.JPG	small mammal		Fur
27-Nov-12	Portuguese Bend C	Rim Trail	Fox	FS_112712_108.JPG, FS_112712_107.JPG	Mammal		Fur
29-Nov-12	Forrestal	Cactus Latrine	Coyote		undetermined		
29-Nov-12	Forrestal	Cactus Latrine	Coyote		undetermined		
29-Nov-12	Forrestal	Cactus Latrine	Fox		red squirrel		
29-Nov-12	Forrestal	Flying Mane	Coyote		cat		
29-Nov-12	Forrestal	Mariposa	Coyote		avian		
29-Nov-12	Forrestal	Mariposa	Coyote		undetermined		
29-Nov-12	Forrestal	Mariposa	Coyote	CS 121113 031 Entire scat.jpg,CS 121113 033 Sm mammal.jpg, CS 121113 034 Sm mammal.jpg	small mammal		
29-Nov-12	Forrestal	Pirate	Coyote		undetermined		
04-Dec-12	Portuguese Bend D		None				
06-Dec-12	Forrestal	Cactus Latrine	Coyote		mammal		
06-Dec-12	Forrestal	Flying Mane	Coyote		mammal		
06-Dec-12	Forrestal	Flying Mane	Coyote		mammal		
06-Dec-12	Forrestal	Fossil Latrine	Fox		undetermined		
06-Dec-12	Forrestal	Mariposa	Fox		small mammal		
06-Dec-12	Forrestal	Pirate	Coyote		cat		
06-Dec-12	Forrestal	Pirate	Fox		mammal		
08-Dec-12	Portuguese Bend D	Barn Owl/Klondike	Coyote		fur, small mammal		
11-Dec-12	Forrestal	Mariposa	Coyote		avian		
11-Dec-12	Forrestal	Pirate	Coyote		small mammal		
11-Dec-12	Portuguese Bend B		None				
11-Dec-12	Portuguese Bend C	Rim Trail	Coyote	CS_121112_128.JPG, CS_121112_129.JPG, CS_121112_133.JPG, CS_121112_135.JPG, CS_121112_134.JPG	mammal		
21-Dec-12	Forrestal	Pirate	Coyote		Undetermined		
21-Dec-12	Forrestal	Pirate	Coyote		Undetermined		
21-Dec-12	Forrestal	Pirate	Coyote		Undetermined		
21-Dec-12	Forrestal	Pirate	Coyote		Undetermined		
21-Dec-12	Forrestal	Pirate	Coyote		Undetermined		
21-Dec-12	Forrestal	Pirate	Coyote		Undetermined		
22-Dec-12	Portuguese Bend B		None				
27-Dec-12	Portuguese Bend A	Burma Road	Fox				mammal

27-Dec-12	Portuguese Bend A	Ishibashi	Coyote				vegetative
02-Jan-13	Forrestal	Canyon View	Fox		Undetermined		
02-Jan-13	Forrestal	Canyon View	Fox	FS 130102 Undetermined lg mammal 133.jpg	Undetermined		lots of fur, looks like dog with large white hairs
02-Jan-13	Forrestal	Canyon View	Fox		Undetermined		
02-Jan-13	Forrestal	Canyon View	Fox		Undetermined		
02-Jan-13	Forrestal	Mariposa	Coyote		Small mammal		
02-Jan-13	Forrestal	Mariposa	Coyote		Undetermined		
02-Jan-13	Forrestal	Mariposa	Coyote	CS 130102 Rodent 129.jpg, CS 130102 Rodent 130.jpg	Rodent		
04-Jan-13	Portuguese Bend B		None				
08-Jan-13	Forrestal	Pirate	Coyote		Rabbit		
08-Jan-13	Portuguese Bend A		None				
08-Jan-13	Portuguese Bend A		None				
09-Jan-13	Portuguese Bend B	Burma Road	Coyote	CS 130109 Mammal.jpg	Rabbit		all fur, no bones
09-Jan-13	Portuguese Bend B	Fire Station	Coyote		Mammal		Fur
11-Jan-13	Portuguese Bend D	Barn Owl/Klondike	Coyote		fur, undetermined		Rabbit fur?
15-Jan-13	Portuguese Bend A		None				
15-Jan-13	Portuguese Bend A		None				
16-Jan-13	Forrestal	Mariposa	Coyote		Avian		may be California towhee
16-Jan-13	Forrestal	Pirate	Coyote		Large mammal		may be cat
16-Jan-13	Portuguese Bend B	Burma Road	Fox	CS 130116 Bones.jpg, CS 130116 Bones2.jpg	Mammal		few bones/ pic of bones=CS 130116 Bones2.jpg Scats for this date may be related to eachother/came from same Coyote. Found about 10ft apart.
16-Jan-13	Portuguese Bend B	Burma Road	Fox	CS 130116 Mammal2.jpg	Mammal		few bones/ pic of bones=CS 130116 Bones.jpg
16-Jan-13	Portuguese Bend B	Fire Station	Coyote	Fresh	Mammal		Fur
19-Jan-13	Portuguese Bend B		None				
19-Jan-13	Portuguese Bend B		None				
20-Jan-13	Portuguese Bend D	Klondike Canyon	Coyote		fur, undetermined		
20-Jan-13	Portuguese Bend D	Panorama	Fox		vegetative matter, fur		
22-Jan-13	Portuguese Bend B	Fire Station	Coyote	CS_12213_162	Rodent		Fur, rodent tooth, small and large scat
22-Jan-13	Portuguese Bend B	Fire Station	Unk	Unk_012213_160	Mammal		Feline claw?
22-Jan-13	Portuguese Bend B	Rim Trail	Coyote		Mammal		fur
28-Jan-13	Portuguese Bend B		None				
28-Jan-13	Portuguese Bend B		None				
29-Jan-13	Forrestal	Canyon View	Fox		mammal		
29-Jan-13	Forrestal	Mariposa	Coyote		mammal		
29-Jan-13	Forrestal	Mariposa	Fox		mammal		
29-Jan-13	Portuguese Bend A	Vanderlip	Coyote				mammal
02-Feb-13	Portuguese Bend B		None				
02-Feb-13	Portuguese Bend B		None				
03-Feb-13	Forrestal	Flying Mane	Coyote		Rabbit		
03-Feb-13	Forrestal	Fossil Latrine	Fox		Mammal		black fur, perhaps skunk

03-Feb-13	Forrestal	Mariposa	Coyote		Avian		
03-Feb-13	Forrestal	Pirate	Fox		Vegetative		looked like gray Fox
03-Feb-13	Forrestal	Vista Latrine	Fox		Mammal		looked like squirrel
03-Feb-13	Portuguese Bend D	Burma	Coyote		fur, undetermined		
04-Feb-13	Portuguese Bend B	Burma Road	Coyote		mammal		darker grey fur, no bones
04-Feb-13	Portuguese Bend B	Peacock Flats	Fox	CS 130204 Mammal2.jpg	mammal		all fur, no bones
04-Feb-13	Portuguese Bend B	Peacock Flats	Fox	CS 130204 Mammal.jpg	mammal		all fur, no bones
06-Feb-13	Portuguese Bend A	Burma Road	Coyote				mammal
09-Feb-13	Portuguese Bend B		None				
11-Feb-13	Portuguese Bend D	Burma Road	Coyote		CS 110213 Mammal.jpg		mammal
12-Feb-13	Forrestal		None				
12-Feb-13	Forrestal		None				Fossil hill area not included in survey
12-Feb-13	Portuguese Bend D		None				
16-Feb-13	Portuguese Bend A		None				
17-Feb-13	Portuguese Bend B	Fire Station Trail	Coyote	CS_022413_230			Fresh
17-Feb-13	Portuguese Bend B	Fire Station Trail	Coyote		Cat		Fur and bone fragments including claw
17-Feb-13	Portuguese Bend B	Grapevine Trail	Coyote	CS_021713_190, CS_021713_192	Mammal		Fur and bone fragments
17-Feb-13	Portuguese Bend B	Rim Trail	Coyote	CS_021713_195, CS_021713_198, CS_021713_204, CS_021713_208, CS_021713_209, CS_021713_210, CS_021713_211, CS_021713_213, CS_021713_216	Mammal		Fur large bones some hollow
18-Feb-13	Portuguese Bend B	Burma Road	Coyote		CS 180213 Mammal.jpg		rodent
18-Feb-13	Portuguese Bend B	Burma Road	Fox		FS 180213 Peacock.jpg		peacock
18-Feb-13	Portuguese Bend B	Eagle's Nest Trail	Coyote		CS 180213 Bird2.jpg		bird
18-Feb-13	Portuguese Bend B	Eagle's Nest Trail	Coyote		CS 180213 Bird1.jpg		bird, rodent
19-Feb-13	Forrestal	Canyon View	Coyote		Cat		orange fur
19-Feb-13	Forrestal	Fossil Latrine	Coyote		Cat		black & white fur
19-Feb-13	Forrestal	Mariposa	Coyote		Mammal		
19-Feb-13	Forrestal	Mariposa	Coyote		Small mammal		rodent or vole
19-Feb-13	Forrestal	Pirate	Coyote		Mammal		probably a pocket gopher
19-Feb-13	Forrestal	Pirate	Fox		Avian		
19-Feb-13	Forrestal	Vista Latrine	Coyote		Rabbit		IDd through fur
21-Feb-13	Portuguese Bend B	Ishibashi	Coyote				mammal
23-Feb-13	Portuguese Bend D		None				
25-Feb-13	Portuguese Bend A	Peacock Flats	Coyote		CS 250213		mammal

					Mammal2.jpg		
25-Feb-13	Portuguese Bend A	Upper Burma Road	Fox		FS 250213 Mammal1.jpg		mammal
26-Feb-13	Forrestal	Fossil Latrine	Coyote		Cat		
26-Feb-13	Forrestal	Pirate	Fox		Rodent, Avian		Possible lg mammal. Wondering if Fox is feeding on Coyote left overs
26-Feb-13	Forrestal	Pirate	Fox		Rodent		
28-Feb-13	Portuguese Bend A	Burma Road	Coyote				mammal
02-Mar-13	Portuguese Bend B		None				
04-Mar-13	Portuguese Bend D		None				
05-Mar-13	Forrestal	Flying Mane	Fox	FS_130305 Undisturbed.jpg FS_130305 Disturbed to show contents.jpg			Lg Mammal
05-Mar-13	Forrestal	Pirate	Coyote				Mammal
07-Mar-13	Portuguese Bend A	Burma Road	Coyote				mammal
07-Mar-13	Portuguese Bend A	Burma Road	Fox	FS 130307 Rodent.jpg			mammal
10-Mar-13	Portuguese Bend B	Grapevine Trail	Coyote				Mammal
10-Mar-13	Portuguese Bend B	Grapevine Trail	Coyote				Mammal
10-Mar-13	Portuguese Bend B	Grapevine Trail	Coyote				Mammal
10-Mar-13	Portuguese Bend B	Rim Trail	Coyote				Mammal
11-Mar-13	Portuguese Bend A	Burma Road	Fox		FS 110313 Mammal.jpg		mammal
17-Mar-13	Portuguese Bend A		None				
19-Mar-13	Forrestal		None				
23-Mar-13	Portuguese Bend A	Peacock Flats	Fox	FS 230313 Mammal.jpg	mammal		looks like bunny fur
25-Mar-13	Portuguese Bend B		None				
26-Mar-13	Forrestal	Cactus	Fox		FS 130326_720		vegetative
26-Mar-13	Forrestal	Cactus	Fox				
30-Mar-13	Portuguese Bend B		None				
01-Apr-13	Portuguese Bend A	Burma Road	Coyote	CS 010413 Mammal.jpg	mammal		mostly fur, 3 unidistinguishing bones
01-Apr-13	Portuguese Bend A	Peacock Flats	Fox	FS 010413 Mammal.jpg	mammal		all fur, no bones
04-Apr-13	Portuguese Bend A	Upper Burma Road	Coyote	CS 040413 Mammal.jpg	cat, rabbit		mostly fur, few unidistinguishing bones, cat tooth, field notes indicate rabbit f ur also
07-Apr-13	Portuguese Bend D	Lower Burma Road	Fox	FS 070413 Rodent Teeth.jpg	rodent		brown fur/ Pic of teeth=FS 070413 Rodent Teeth.jpg
07-Apr-13	Portuguese Bend A	Peacock Flats	Coyote	CS 070413 Rodent.jpg	rodent		brown fur/ Pic of bones=CS 070413 Bones Rodent.jpg
08-Apr-13	Portuguese Bend B		None				
11-Apr-13	Portuguese Bend B		None				
14-Apr-13	Portuguese Bend A		None				
18-Apr-13	Portuguese Bend D		None				
22-Apr-13	Portuguese Bend A	Peacock Flats	Coyote	CS 220413 Rodent Bones.jpg	rodent		brown fur/ Pic of bones=CS 220413 Bones.jpg
25-Apr-13	Portuguese Bend B		None				
28-Apr-13	Portuguese Bend D		None				
29-Apr-13	Portuguese Bend B	Eagle's Nest Trail	Coyote	CS 290413 Mammal.jpg	mammal		looks like bunny fur

November 2012-March 2013

12-Oct-13	Forrestal	Canyon View Trail	Coyote				
12-Oct-13	Forrestal	Canyon View Trail	Coyote				
12-Oct-13	Forrestal	Canyon View Trail	Coyote	CS 131119 Large Mammal Squirrel 577	Large mammal		Looks like squirrel
12-Oct-13	Forrestal	Canyon View Trail	Fox		Vegetation		Also small mammal
12-Oct-13	Forrestal	Canyon View Trail	Fox		Unidentified		
12-Oct-13	Forrestal	Flying Mane Trail	Coyote		Cat		
12-Oct-13	Forrestal	Flying Mane Trail	Coyote		Small mammal	0	
12-Oct-13	Forrestal	Pirate Trail	Coyote		Cat		
19-Oct-13	Forrestal	Canyon View Trail	Coyote		Cat		
19-Oct-13	Forrestal	Canyon View Trail	Fox		Small mammal		Also vegetation
19-Oct-13	Forrestal	Flying Mane Trail	Fox		Skunk		
19-Oct-13	Forrestal	Mariposa Trail	Fox		Anthropogenic		
19-Oct-13	Forrestal	Mariposa Trail	Fox		Skunk		
05-Nov-13	Portuguese Bend B	Burma Road Trail	Fox	FS131105 Vegetation 535.jpg	vegetation	0	Some sort of orange fruit
05-Nov-13	Portuguese Bend B	Fire Station Trail	Coyote	CS 131105 Small Mammal 531.jpg	small mammal	0	fairly old
05-Nov-13	Portuguese Bend B	Grapevine Trail	Fox	FS 131105 Rodent 533.jpg	small mammal	0	perhaps a rat
05-Nov-13	Portuguese Bend B	Grapevine Trail	Fox	FS 131105 Insect 534.jpg	Invertebrate	0	
05-Nov-13	Portuguese Bend B	Ishibashi Trail	Fox		vegetation	0	Some sort of orange fruit
05-Nov-13	Portuguese Bend B	Ishibashi Trail	Fox		vegetation	0	Some sort of orange fruit
12-Nov-13	Forrestal	Klondike Canyon Trail	Coyote		Large mammal	0	Rabbit
12-Nov-13	Forrestal	Klondike Canyon Trail	Coyote		Large mammal	0	Rabbit
12-Nov-13	Portuguese Bend B	Burma Road Trail	Fox	FS 131112 Small Mammal 554.jpg	small mammal	1	
12-Nov-13	Portuguese Bend B	Fire Station Trail	Fox	FS 131112 Rodent 537.jpg	rodent	0	Jaw with incisor observed, several feathers also observed
12-Nov-13	Portuguese Bend B	Grapevine Trail	Coyote	CS 131112 Large Mammal 552.jpg	Large mammal	0	Possibly raccoon? Very windy – could not get good photo of fur
12-Nov-13	Portuguese Bend B	Grapevine Trail	Coyote	CS 131112 Cat 547.jpg	Cat	0	Claws
12-Nov-13	Portuguese Bend B	Grapevine Trail	Fox	FS 131112 Cat 544.jpg	Cat	0	Claws
12-Nov-13	Portuguese Bend B	Ishibashi Trail	Fox	FS 131112 Vegetation 540.jpg	vegetation	0	Some sort of orange fruit
15-Nov-13	Portuguese Bend A	Burma Road Trail	Fox	FS 131115 Vegetation 655.JPG	Vegetation	1	seeds and food wrapper
15-Nov-13	Portuguese Bend A	Kelvin Canyon Trail	Coyote	CS 131115 Cat 658.JPG	Cat	0	orange fur, bone fragment
15-Nov-13	Portuguese Bend A	Kubota Trail	Coyote	CS 131115 Small Mammal 660.JPG	small mammal	0	short fur, tiny bones
15-Nov-13	Portuguese Bend A	Vanderlip Trail	Coyote	CS 131115 Large Mammal Rabbit 659.JPG	large mammal	0	short fur, bone fragments - Change from Lg mammal to rabbit
19-Nov-13	Portuguese Bend B	Burma Road Trail	Coyote	CS 131119 Large Mammal 577.jpg	Large mammal	0	Possibly Fox squirrel
19-Nov-13	Portuguese Bend B	Burma Road Trail	Fox	FS 131119 Large Mammal	Large mammal	0	Possibly Fox squirrel

				580.jpg			
19-Nov-13	Portuguese Bend B	Fire Station Trail	Fox	FS131119 Vegetation 568.jpg	vegetation	0	Some sort of orange fruit
19-Nov-13	Portuguese Bend B	Grapevine Trail	Fox	FS 131119 Insect 571.jpg	Invertebrate	1	Also fur, possibly small mammal
25-Nov-13	Portuguese Bend A	Peacock Flats Trail	Fox	FS 131125 Anthropogenic 661.JPG	Anthropogenic	1	paper
26-Nov-13	Forrestal	Conqueror Trail	Coyote		Cat		
26-Nov-13	Forrestal	Conqueror Trail	Coyote		Cat		Smaller scat, same prey as above, appears to be juvenile scat
26-Nov-13	Forrestal	Klondike Canyon Trail	Coyote	CS 131126 Sm Mammal qrySquirrel or other.jpg	Small mammal	0	Undetermined, unique claws, uncinus looking ? Squirrel
26-Nov-13	Forrestal	Klondike Canyon Trail	Coyote		Small mammal		Smaller scat, same prey as above, appears to be juvenile scat
26-Nov-13	Portuguese Bend B	Fire Station Trail	Fox	FS 131126 Avian 582.jpg	avian	0	
26-Nov-13	Portuguese Bend B	Grapevine Trail	Fox	FS131126 Vegetation 583.jpg	vegetation	0	Some sort of orange fruit
03-Dec-13	Forrestal	Klondike Canyon Trail	Coyote		Small mammal	0	Possibly rabbit also
03-Dec-13	Forrestal	Klondike Canyon Trail	Coyote		Small mammal		Smaller scat, same prey as above, appears to be juvenile scat
03-Dec-13	Portuguese Bend B	Rim Trail	Fox	FS 131203 Vegetation 594.jpg	Vegetation	0	Juvenile?, same orange fruit as last month
10-Dec-13	Forrestal	Conqueror Trail	Fox		Vegetation	0	Probably Gray Fox scat
10-Dec-13	Portuguese Bend B	Fire Station Trail	Fox	FS 131210 Vegetation 596.jpg	Vegetation	0	Large mammal also, possibly rabbit
18-Dec-13	Portuguese Bend B	Fire Station Trail	Coyote	CS 131218 Large Mammal 656.jpg	Large Mammal	0	Possibly squirrel – see claw.
18-Dec-13	Portuguese Bend B	Fire Station Trail	Fox	FS 131218 Large Mammal 655.jpg	Large Mammal	0	
18-Dec-13	Portuguese Bend B	Fire Station Trail	Fox	FS 131218 Rodent 657.jpg	Rodent	0	Originally record3ed as FS 131218 Large Mammal 657.jpg
18-Dec-13	Portuguese Bend B	Grapevine Trail	Fox	FS 131218 Rodent 658.jpg	Rodent	0	Originally record3ed as FS 131218 Large Mammal 658.jpg
18-Dec-13	Portuguese Bend B	Grapevine Trail	Fox	FS 131218 Cat 659.jpg	Cat	0	2 claws observed.
24-Dec-13	Portuguese Bend B	Fire Station Trail	Fox	FS 131224 Vegetation 669.jpg	Vegetation	0	Orange fruit
24-Dec-13	Portuguese Bend B	Grapevine Trail	Fox	FS 131224 Large Mammal 670.jpg	Large mammal	0	Possibly cat - black fur with no trace of skunk odor. Also avian and vegetation.
24-Dec-13	Portuguese Bend B	Grapevine Trail	Fox	FS 131224 Avian 672.jpg	Avian	0	Distinct striped feathers (black/tan). Also large mammal.
01-Jan-14	Portuguese Bend B	Rim Trail	Coyote	CS 140101 Large Mammal 674.jpg	Large mammal	0	Long silky gray hair, possibly cat or ground squirrel. Large bone fragments.
08-Jan-14	Portuguese Bend B	Fire Station Trail	Coyote	CS 140108 Cat 677.jpg	Cat	0	Note paw clump of bone and fur at 4 cm mark.
08-Jan-14	Portuguese Bend B	Fire Station Trail	Fox	FS 140108 Avian 676.jpg	Avian	0	Also short gray fur, possibly squirrel.
08-Jan-14	Portuguese Bend B	Grapevine Trail	Fox	FS 140108 Large Mammal 678.jpg	Large mammal	0	Very small – possibly juvenile. Prey difficult to determine.
08-Jan-14	Portuguese Bend B	Rim Trail	Fox	FS 140108 Large Mammal 679.jpg	Large mammal	0	Possibly cat.
15-Jan-14	Portuguese Bend B	Grapevine Trail	Fox	FS 140115 Large Mammal 696.jpg	Large mammal	0	Very close to previous sample. Possibly same individual or adult and juvenile. Prey

							appears to be the same, probably rabbit. Note large clump of tri-colored fur.
15-Jan-14	Portuguese Bend B	Grapevine Trail	Fox	FS 140115 Large Mammal 693.jpg	Large mammal	0	Very small – possibly juvenile.
22-Jan-14	Portuguese Bend B	Grapevine Trail	Coyote	CS 140122 Large Mammal 697.jpg	Large mammal	0	Silky fur, possibly cat. No bone fragments or claws.
22-Jan-14	Portuguese Bend B	Rim Trail	Fox	FS 140122 Large Mammal 700.jpg	Large mammal	0	Tri-colored fur, possibly rabbit.
24-Jan-14	Forrestal	Pirate Trail	None		Unidentified	0	No scat or tracks today
29-Jan-14	Portuguese Bend B		None			0	
04-Mar-14	Portuguese Bend B	Rim Trail	Fox	FS 140304 Large Mammal 735.jpg	Large mammal	0	Wet.
12-Mar-14	Portuguese Bend B	Eagle's Nest Trail	Fox	FS 140312 Rodent 737.jpg	Rodent	0	Incisor at 7 mm mark. Lots of fur from a large mammal
12-Mar-14	Portuguese Bend B	Fire Station Trail	Fox	FS 140312 Large Mammal 736.jpg	Large mammal	0	Looks like rabbit fur
18-Mar-14	Portuguese Bend B	Fire Station Trail	Fox	FS 140318 Rodent 748.jpg	Rodent	1	Claws at 8 cm mark
18-Mar-14	Portuguese Bend B	Grapevine Trail	Fox	FS 140318 Large Mammal 749.jpg	Large mammal	0	Large vertebrae. Tri colored fur possibly rabbit.
26-Mar-14	Portuguese Bend B	Fire Station Trail	Coyote	CS 140326 Large Mammal 759.jpg	Large mammal	1	
26-Mar-14	Portuguese Bend B	Fire Station Trail	Coyote	CS 140326 Large Mammal 758.jpg	Large mammal	1	
26-Mar-14	Portuguese Bend B	Fire Station Trail	Fox	FS 140326 Large Mammal 760.jpg	Large mammal	1	Interesting bones above 6 cm mark.
26-Mar-14	Portuguese Bend B	Grapevine Trail	Fox	FS 140326 Avian 763.jpg	Avian	0	Peacock.
26-Mar-14	Portuguese Bend B	Grapevine Trail	Fox	FS 140326 Rodent 762.jpg	Rodent	0	Claw above 7.5 cm mark.
26-Mar-14	Portuguese Bend B	Grapevine Trail	Fox	FS 140326 Large Mammal 761.jpg	Large mammal	0	

November 2014 – March 2015

01-Nov-14	Portuguese Bend B	Fire Station Trail	Coyote	CS 141001 CS Scat 4379.jpg, 4381.jpg & 4382.jpg	Small mammal	0	very long taper, perhaps femur of rat, many pieces of bone perhaps half skull
05-Nov-14	Filiorum Reserve	Eucalyptus	Coyote	CS1 051114 Large Mammal.jpg	large mammal + avian	0	Long Fur, Lagomorph teeth and bone fragments, and down feathers
05-Nov-14	Filiorum Reserve	Kelvin Canyon	Fox	FS 121002 Large Mammal.jpg	large mammal	0	Long fur and vertebrate bone fragment
05-Nov-14	Filiorum Reserve	Zote's Cutacross	Coyote	CS2 051114 Small Mammal.jpg;	Small Mammal	0	Short fur, small bone fragments, small jaw bone; possibly rodent
05-Nov-14	Filiorum Reserve	Zote's Cutacross	Coyote	CS3 051114 Small Mammal.jpg	Small Mammal	0	Short fur, small rib and skull bone fragments; possibly rodent
06-Nov-14	Forrestal	Mariposa Trail	Coyote	CS 141106 Cat 274.jpg; CS 141106 Cat 698.jpg; CS 141106 Cat 714.jpg; CS 141106 Cat 980.jpg; CS 141106 Cat 315.jpg; CS 141106 Cat 339.jpg	Cat	0	scat scattered over about a 5 ft area & lots of it; lots of white fur; found a claw but few bones
06-Nov-14	Forrestal	Mariposa Trail	Coyote	CS 141106 Rodent 701.jpg;CS	rodent	0	found mandible but not incisors but

				141106 Rodent 828.jpg; CS 141106 Rodent 878.jpg; CS 141106 Rodent 791.jpg; CS 141106 Rodent 820.jpg			appears to be rat; fur was coarse, not fluffy
06-Nov-14	Forrestal	Pirate Trail	Fox	FS 141106 Small Mammal 680.jpg; FS 141106 Small Mammal 903.jpg; FS 141106 Small Mammal 814.jpg; FS 141106 Small Mammal 034.jpg	small mammal	0	mostly fur present (tan/golden); one bone that looked like a scapula; possibly a small rodent
06-Nov-14	Forrestal	Purple Sage Trail	Coyote	CS 141108 Cat 587; CS 141108 Cat 818; CS 141108 Cat 093; CS 141108 Cat 263; CS 141108 Cat 418; CS 141108 Cat 448	Cat	0	scat scattered over about a 3-5 ft area; lots of white fur; same found on 11-06-14; found what appears to be a caudal bone
11-Nov-14	Portuguese Bend B	Fire Station Trail	None				None
13-Nov-14	Filiorum	Gary's Gulch Trail	Fox	131114 FS Unidentified.jpg	Unidentified	1	Short fur (small mammal?), unidentified fragments, sunflower seed
13-Nov-14	Filiorum	Pony Trail	Coyote	131114 CS Small Mammal.jpg	Small mammal	0	Short fur, bone fragments: molar teeth, jaw bone, vertebrate, ball-and-socket joint
17-Nov-14	Portuguese Bend C	Paintbrush Trail	Coyote	CS 141117 Large Mammal 1238.jpg	large mammal		
17-Nov-14	Portuguese Bend C	Paintbrush Trail	Fox	FS 141117 Large Mammal 1237.jpg	large mammal		
17-Nov-14	Portuguese Bend C	Paintbrush Trail	Fox	FS 141117 Large Mammal 1232.jpg	large mammal		
17-Nov-14	Portuguese Bend C	Rim Trail	Fox	FS 141117 Small Mammal 1231.jpg	small mammal	0	feathers and claw also present.
21-Nov-14	Filiorum		None	n/a		0	No scat or tracks observed
22-Nov-14	Forrestal	Flying Mane Trail	Coyote	CS 141122 Large mammal 131; CS 141122 Large mammal 152; CS 141122 Large mammal 408; CS 141122 Large mammal 467	Large mammal	0	secondary - found vegetation (seeds of some sort)
22-Nov-14	Forrestal	Pirate Trail	Coyote	CS 141122 Cat 230; CS 141122 Cat 792	Cat	0	found cat claw and two small claws that appear to be a different smaller mammal
23-Nov-14	Portuguese Bend B	Fire Station Trail	Coyote	CS 141123 Cat jpg;CS 141123 Large mammal jpg	Cat	0	Hair puffs out 3 times the size as scat,
29-Nov-14	Filiorum	Pony Trail	Coyote	112914 FS Unidentified.jpg	Unidentified	0	Only short fur in scat; Scat listed as Fox b/c of light brown color, but my determination is not confident
30-Nov-14	Portuguese Bend A	Water Tank Trail	Coyote	CS 141130 Large Mammal 725.jpg	Large Mammal	0	
07-Dec-14	Forrestal	Pirate Trail	Coyote	CS 141207 Small mammal 699; CS 141207 Small mammal 798; CS 141207 Small mammal 907	Small mammal	0	The bones found were fragmented and large.
07-Dec-14	Portuguese Bend A	Gary's Gulch Trail	Fox	FS 120714 Large Mammal.jpg	Large Mammal	0	Only long fur present in scat; possibility of small mammal
07-Dec-14	Portuguese Bend A	Vanderlip Trail	Fox	FS 120714 Small Mammal.jpg	Small mammal	0	Short fur and small bone fragments,

							including a jaw bone fragment of a small mammal
07-Dec-14	Portuguese Bend B	Fire Station Trail	Coyote	CS 141207 Cat 762.jpg	Cat	0	High Ew Factor, no bones
13-Dec-14	Portuguese Bend A		None	n/a		0	No Scat observed, but possible tracks observed (See pdf)
13-Dec-14	Portuguese Bend B		None				Windy after a rainy day.
21-Dec-14	Forrestal	Pirate Trail	Coyote	CS 141221 Cat 096.jpg; CS 141221 Cat 508.jpg; CS 141221 Cat 776.jpg	Cat	0	only fur present with one little sliver of bone; fur could be cat
21-Dec-14	Portuguese Bend A		None	n/a		0	No scat or discernible tracks observed
22-Dec-14	Filiorum		None			0	
28-Dec-14	Filiorum		None	IMAG0743, IMAG0742,IMAG0736, IMAG0737, IMAG0738	vegetation	0	Thought they were Fox
30-Dec-14	Portuguese Bend A	Gary's Gulch Trail	Coyote	123014 CS Large MammalA.jpg	Cat	0	Long fur and small fragments of considerably large bones - toe nail, hip bones, vertebrae, and leg bones
30-Dec-14	Portuguese Bend A	Gary's Gulch Trail	Fox	123014 FS UnidentifiedA.jpg	Small mammal	0	Scat composed entirely of small fur; possible small mammal
03-Jan-15	Portuguese Bend A		None	n/a		0	No scat or discernible tracks observed
03-Jan-15	Portuguese Bend B	Fire Station Trail	Coyote	CS 140103 Cat IMG_5143, and IMG_5144	Cat	0	Hair puffs out. No bones. High ewe factor.
04-Jan-15	Forrestal	Flying Mane Trail	Coyote	CS 150104 Large mammal 411.jpg; CS 150104 Large mammal 822.jpg; CS 150104 Large mammal 079	Large mammal	0	Large bones; vegetation secondary; fur was coarse
04-Jan-15	Forrestal	Pirate Trail	None		Unidentified	0	No scat or tracks today
06-Jan-15	Filiorum	Jack's Hat Trail	Coyote	IMAG0747,IMAG0748, IMAG0749, IMAG0750, IMAG 0751	Large mammal	0	bones and claws
09-Jan-15	Portuguese Bend B	Rim Trail	Fox	CS 150109 CS scat IMG_5227 and IMG_5228 bone	Small mammal	0	Perhaps forelimb of a rodent
10-Jan-15	Forrestal	Mariposa Trail	Coyote	CS 150110 Cat 721.jpg; CS 150110 Cat 086.jpg; CS 150110 Cat 274.jpg; CS 150110 Cat 315.jpg; CS 150110 Cat 410.jpg; CS 150110 Cat 449; CS 150110 Cat 453.jpg; CS 150110 Cat 633.jpg; CS 150110 Cat 739.jpg; CS 150110 Cat 789.jpg; CS 150110 Cat 970.jpg	Cat	0	
12-Jan-15	Portuguese Bend A	Vanderlip Trail	Coyote	011215 CS AvianA.jpg	Avian	0	Scat was very fresh (high eww factor); some short fur and feathers, hollow bones, skull fragments
15-Jan-15	Filiorum	Zote's Cutacross	Coyote	IMAG0756, 0757, 0758, 0759, 0760, 0764	Cat	0	Feathers in the scat

16-Jan-15	Portuguese Bend B	Fire Station Trail	Coyote	CS 150116 CS scat IMG_5299 and IMG_5300 bones	Cat	0	Hair puffed out immediately. Soft silky dark gray hair
17-Jan-15	Forrestal		None		Unidentified	0	No scat or tracks today
19-Jan-15	Portuguese Bend A		None	n/a		0	No scat or tracks observed
20-Jan-15	Portuguese Bend C	Rim Trail	Coyote		large mammal	0	fur present, likely rabbit; near closed trail
20-Jan-15	Portuguese Bend C	Rim Trail	Fox		Vegetation		persimmon seeds present
24-Jan-15	Portuguese Bend A	Vanderlip Trail	Coyote	012415 CS Small MammalA.jpg	Small mammal	0	Older scat (probably overlooked from previous monitoring events). Consisted of mostly short fur and small bone fragments including a scapula
24-Jan-15	Portuguese Bend A	Vanderlip Trail	Coyote	012415 CS Large MammalA.jpg	Large mammal	0	Intersection of Gary's Gulch and Vanderlip Trail. Scat was relatively fresh. Mostly long fur and bone fragments and toenails
25-Jan-15	Portuguese Bend B		None				None
27-Jan-15	Portuguese Bend C	Grapevine Trail	Fox		Unidentified	0	
27-Jan-15	Portuguese Bend C	Rim Trail	Coyote		large mammal		fur and bone fragments present, possible juvenile
27-Jan-15	Portuguese Bend C	Rim Trail	Coyote		large mammal		fur and bone fragments present, possible juvenile scat present also
28-Jan-15	Portuguese Bend B	Burma Road Trail	Fox	FS 150128 FS scat IMG_5504 , IMG_5505 scat opened up and IMG_5506 bones	Large mammal	0	taper, fragmented bones, dark brown.
01-Feb-15	Filiorum		None				
01-Feb-15	Filiorum	Zote's Cutacross	Fox	IMAG0775	Vegetation	0	Not 100% sure it is a Fox
02-Feb-15	Portuguese Bend B	Burma Road Trail	Fox	FS 150202 FS IMG_5549 scat, and IMG_5548 bones	Large mammal	0	Brown/redish, small fragmented pieces of bone.
03-Feb-15	Portuguese Bend C	Grapevine Trail	Coyote		rodent	0	identified jaw fragment
07-Feb-15	Forrestal	Pirate Trail	None		Unidentified	0	No scat or tracks today
10-Feb-15	Portuguese Bend C	Paintbrush Trail	Coyote		Unidentified		
10-Feb-15	Portuguese Bend C	Paintbrush Trail	Fox		large mammal		
10-Feb-15	Portuguese Bend C	Rim Trail	Coyote		large mammal	0	
11-Feb-15	Portuguese Bend B		None				None
15-Feb-15	Portuguese Bend A	Vanderlip Trail	Coyote	021515 CS1 Large Mammal A.jpg	Large mammal	0	Long Fur, whole foot (probably rabbit), small bone fragments
15-Feb-15	Portuguese Bend A	Vanderlip Trail	Coyote	021515 CS2 Large Mammal A.jpg	Large mammal	0	Long fur, small bone fragments
15-Feb-15	Portuguese Bend A	Vanderlip Trail	Fox	021515 FS Large Mammal A.jpg	Large mammal	0	Long fur, toe nails, small bone fragments, unknown piece
16-Feb-15	Filiorum		None			0	
16-Feb-15	Forrestal	Flying Mane Trail	Coyote	CS 150216 Avian 342.jpg; CS 150216 Avian 407.jpg; CS 150216 Avian 472.jpg; CS 150216 Avian 749.jpg; CS 150216 Avian 881.jpg; CS 150216 Avian 975.jpg	Avian	0	The scat was a gray ball; found only feathers
16-Feb-15	Forrestal	Pirate Trail	Coyote	CS 150216 Rodent 052.jpg; CS	Rodent	1	Fairly fresh; the fur was wet; fur was

				150216 Rodent 142.jpg; CS 150216 Rodent 200.jpg; CS 150216 Rodent 326.jpg; CS 150216Rodent 328.jpg; CS 150216 Rodent 716.jpg; CS 150216 Rodent 825.jpg; CS 150216 Rodent 835.jpg			grayish with white; could be cat
17-Feb-15	Portuguese Bend C	Grapevine Trail	Fox		rodent	0	jaw/tooth fragments present, photo p29-30
17-Feb-15	Portuguese Bend C	Rim Trail	Fox		rodent		rib and jaw/tooth fragments identified, photo p31-32
18-Feb-15	Portuguese Bend B		None			0	None
22-Feb-15	Forrestal	Pirate Trail	None		Unidentified	0	No scat or tracks today. Rabbit pellets on Mariposa Trail near Cristo que Viento.
24-Feb-15	Portuguese Bend C	Rim Trail	None			0	heavy rain over previous weekend could have disrupted normal behavior
25-Feb-15	Portuguese Bend B		None			0	None
28-Feb-15	Forrestal	Mariposa Trail	Coyote	CS 150228 Large mammal 225.jpg; CS 150228 Large mammal 374.jpg; CS 150228 Large mammal 521.jpg; CS 150228 Large mammal 601.jpg; CS 150228 Large mammal 654.jpg; CS 150228 Large mammal 851.jpg; CS 150228 Large mammal 873.jpg; CS 150228 Large mammal 876.jpg	Large mammal	0	Scat was mainly fur with two pieces of bone; fur could be cat?
04-Mar-15	Portuguese Bend B	Fire Station Trail	Fox	FS 150304 FS IMG_5868 scat, and IMG_5870 scat contents	Rodent	0	Rodent paw- maybe a gopher, fragmented pieces, and vegetation.
08-Mar-15	Filiorum		None				
08-Mar-15	Forrestal	Pirate Trail	None		Unidentified	0	No scat or tracks today. Rabbit pellets on Mariposa Trail near Cristo que Viento.
10-Mar-15	Portuguese Bend C	Rim Trail	Coyote		Large mammal	0	
11-Mar-15	Portuguese Bend B		None			0	None
15-Mar-15	Forrestal	Pirate Trail	None		Unidentified	0	Plethora of rabbit pellets on Flying Mane Trail at Packsaddle

APPENDIX B

Wildlife Tracking Methods

Citizen Science Wildlife Tracking:
Procedures for field methods and data submission.




Method Overview

The Palos Verdes Peninsula Land Conservancy and the City of Rancho Palos Verdes (RPV) manage the Palos Verdes Nature Preserve under the guidance of the Natural Communities Conservation Plan (NCCP), a document developed by the US Fish and Wildlife Service (F&WS) along with the California Department of Fish and Wildlife (DF&W). This document specifies that activity of wildlife mesopredators such as coyotes, gray fox, and red fox be monitored. The results of this monitoring is reported to RPV, F&WS, and DF&W. The Conservancy began monitoring these animals in 2006 and has developed established protocols for such monitoring, which are described in this document.

The monitoring is conducted when the animals are most active, November through March by walking along specific routes in the preserves. While walking along marked trails, surveyors search for evidence of coyotes, gray fox, and red fox which is usually in the form of scat or track imprints. Scat is the most frequent observation made, with tracks a distant second. Once found, a clear photograph must be taken and location along with appropriate comments noted on a datasheet. When scat is found, a closer look is required to determine, if possible, what the predator has eaten. When tracks are found, the length and width of the track is measured along with a measurement of the animal's stride, when possible.

Training is required for participants to develop the necessary skills for optimal accuracy in identifying scat, its contents, and tracks. At minimum, initial training requires four 2-3 hour sessions, which are conducted on Saturdays in October. Additionally Citizen Science participants are encouraged to accompany advanced trackers to enhance their skills. Photographs of observations are an important tool for confirming the accuracy of observations. The Conservancy provides additional support as needed and occasionally host 1-day workshops featuring experts in the field to further extend people's tracking skills.

Recorded data are submitted electronically to the Conservancy using Excel worksheets and pdf (or photos) of the field datasheets. These data are uploaded into the Conservancy's Monitoring Database for data assessment and reporting. It is not unusual to have no observations during a survey. In this case, surveyors must submit an Excel report stating None for observations. This information is necessary in order to determine visitation frequency that is calculated from the total number of surveys for each specific preserve section.

Recommended literature includes:
The Trackers Field Guide by James C. Lowery, 2nd Ed. 2013
Scats and Tracks of the Pacific Coast by James Halfpenny 1999

Summary of tasks

1. Tracking takes place November through March on a weekly basis, weather permitting.
2. Prepare for field work
3. Walk specified section of trail, make observations, and take photographs
    a. Observe scat, photograph, investigate for prey content, and photograph, recording on approximate location on field datasheet
    b. Observe track, photograph, measure print width, length, and stride length (when possible), recording on back of field datasheet
4. Enter data into WildlifeTracking FieldData.xlsx spreadsheets following convention provided as examples (see Wildlife Illustrated Field Manual)
5. Rename scat and track photos following convention provided as examples
6. At the end of each month, send spreadsheet and photos to Ann Dalkey at adalkey@verizon.net.

Prepare for Wildlife Tracking

1. Print-out specific maps of the reserve where you will be doing the tracking (see WildlifeTracking Maps.pdf)
2. Bring with you:
    a. Tracking ruler supplied by PVPLC,
    b. Datasheet for your area
    c. Clipboard and pen
    d. Camera
3. Safety: Always take a cell phone. Reception is very good in most parts of the preserves
4. Comfort recommendation: Sturdy shoes and long pants, plus a hat

Field Methods

1. Observation
    a. While hiking, continuously scan the trail and sides of trail
    b. If working in a group, determine individual tasks
        i. Recorder – this person is responsible for filling-out the forms and watching the work in progress to insure all data are collected
        ii. Measurer – this person measures tracks, when found, in investigates the scat
        iii. Photographer
2. Scat investigations – Mark data directly on datasheet
    a. Determine species, photograph (Figure 1)
        i. Coyote scat is gray, generally full of fur and bones, and located near trail intersections.
        ii. Fox scat is brown, often tapered, and located. It is very difficult to distinguish gray fox from red fox, so they are recorded as fox.
    b. Tease scat apart to determine the identity of the prey using the following categories (see Wildlife Prey Illustrations and (Figure 1):
        i. Avian
        ii. Cat (for domestic cat)
        iii. Invertebrate
        iv. Rabbit
        v. Rodent
        vi. Small mammal (many skeletal parts are present)
        vii. Large mammal (only fragments of bones are present)
        viii. Trash (anthropogenic material)
        ix. Vegetation (includes grass, seeds, etc.)
        x. Unidentified
    c. Add comments as needed
3. Track investigations – Use back of datasheet to record observations.
    a. Determine species, photograph for report with ruler in field of view (Figure 1).
    b. Measure track's width and length in millimeters (mm), noting whether it is a fore or hind paw and left or right, if possible.
    c. Obtain as many measurements as possible when multiple prints are present, including stride length in centimeters (cm).
4. Photographic documentation – follow this convention for naming photos that will be submitted with your data:
    a. SpeciesScat (FS or CS) Date (as yymmdd) Contents PhotoNumber. For example: FS 131021 Rodent 468.jpg
    b. SpeciesTrack (GFT or RFT or CT) Date (as yymmdd) Paw PhotoNumber. For example: GFT Hind R131021 468.jpg

Data Review and Input

1. Create electronic version of the field datasheet.
    a. Make a pdf iteration using a scanner, or take a photo with your camera making sure all features are clearly visible.
    b. Rename the file as **PreserveSec Map yyyymmdd YourName.** For example: PortBendD Map 20130927 Dalkey.pdf.
2. Input data into Excel workbook WildlifeTracking Field Data.xlsx
    a. Rename (Save As) file as **Preserve Sec yyyymmdd YourName**. The software will automatically add the correct extension (.xlsx) For example: PortBendD 20130927 Dalkey.xlsx.
    b. Transcribe your data from the field datasheet into the appropriate pages. Note each page has a format example to follow
        i. Scat
        ii. Tracks
        iii. Misc Comments – this is where you add comments provided to you by hikers you interface with along the trail.

Figure 1. Common scat, prints, and prey examples.

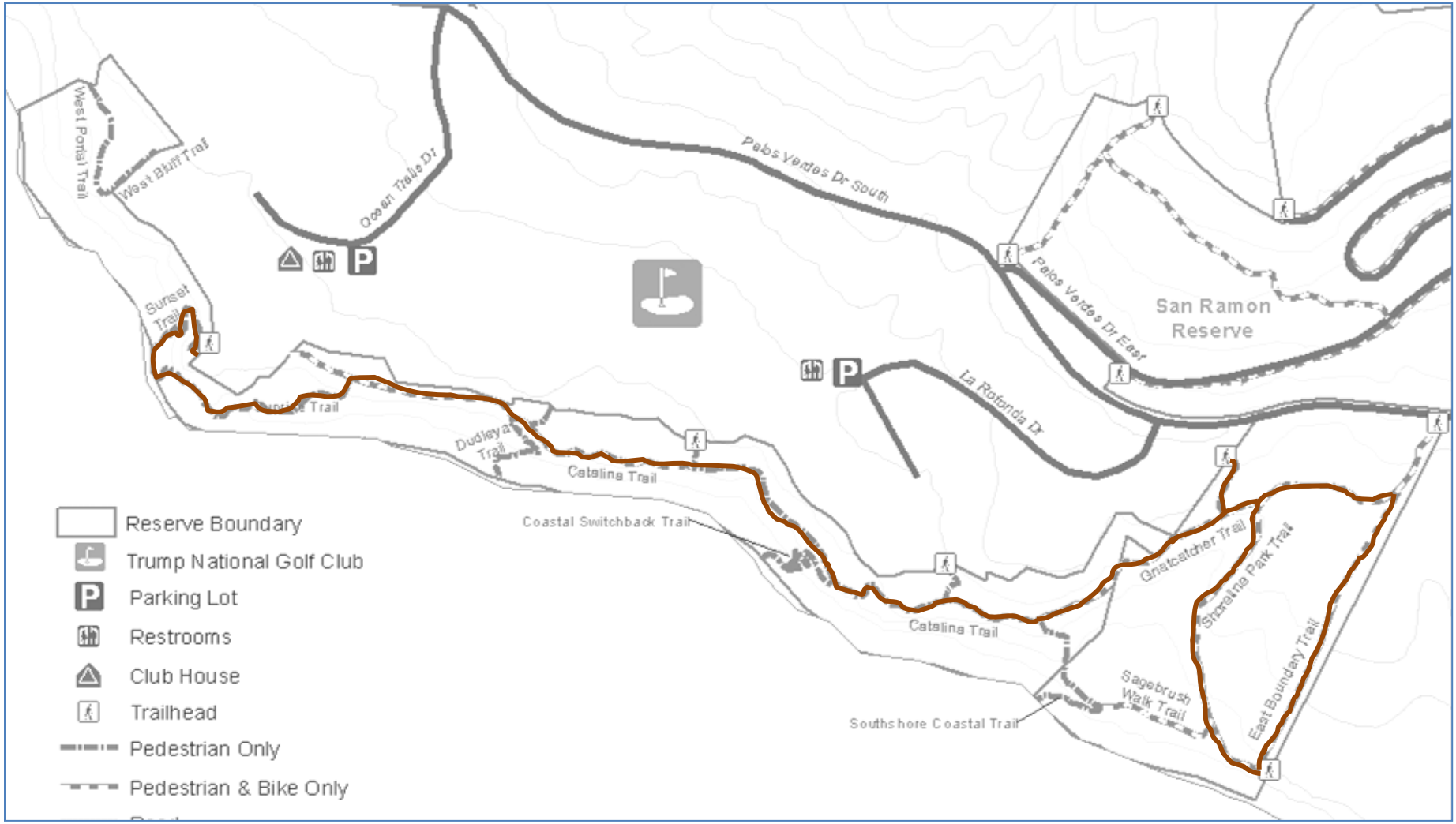
APPENDIX C

Wildlife Tracking
Field Datasheets And Maps

Ocean Trails Reserve

Tracker: _____ **Survey Date:**_____ **Number Rabbits Observed:**_____

Comments: _____

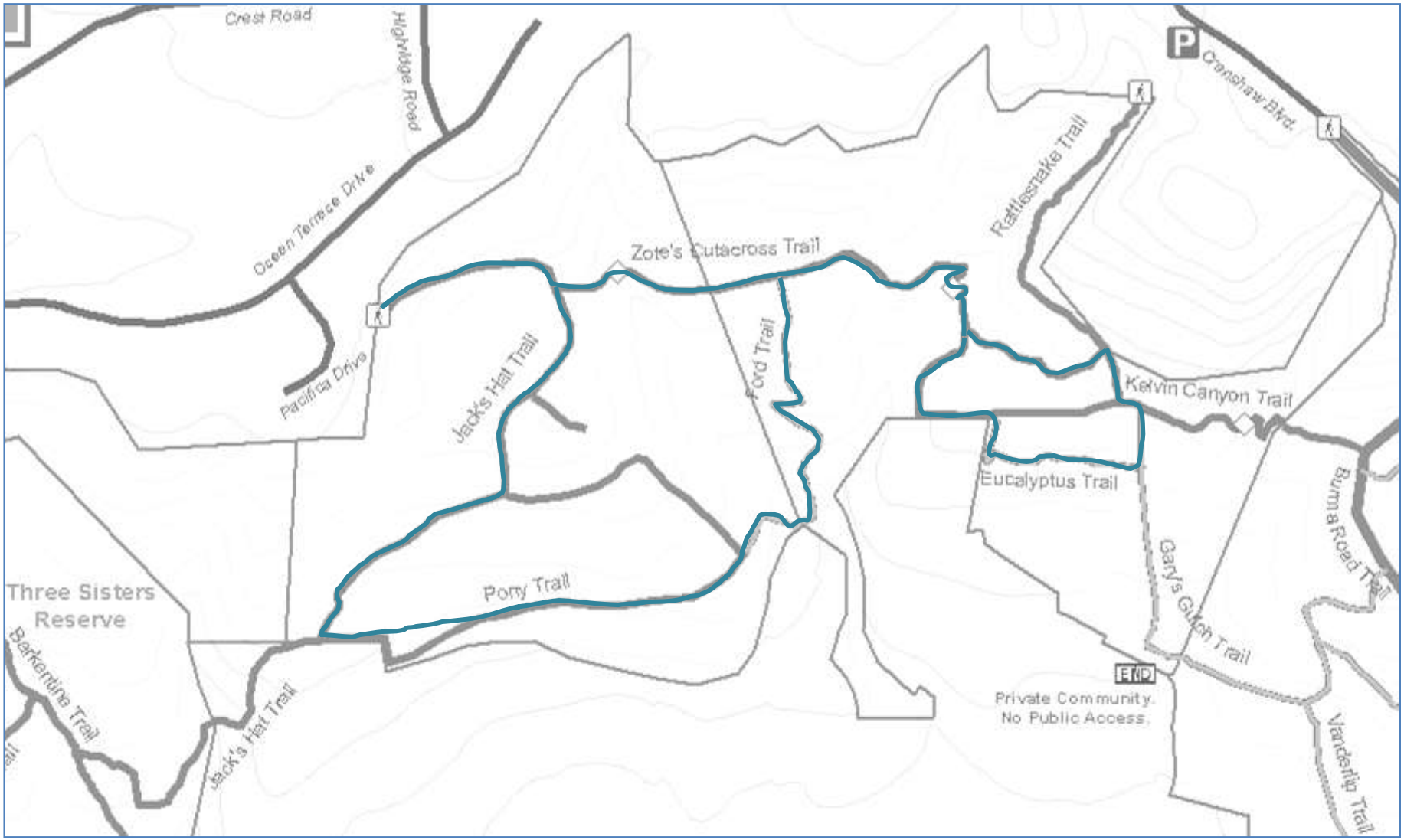


Key:	Scat:	FS = Fox scat	CS = Coyote Scat		OS = Other, note in comments
	Track:	GFT = Gray fox track	RFT = Red fox track	CT = Coyote Track	OT = Other, note in comments
Prey Categories:		Avian	Invertebrate	Small Mammal	Anthropogenic
	Unidentified	Cat	Rodent	Large Mammal	Vegetation

Filiorum Reserve

Tracker: _____ **Survey Date:**_____ **Number Rabbits Observed:**_____

Comments: _____



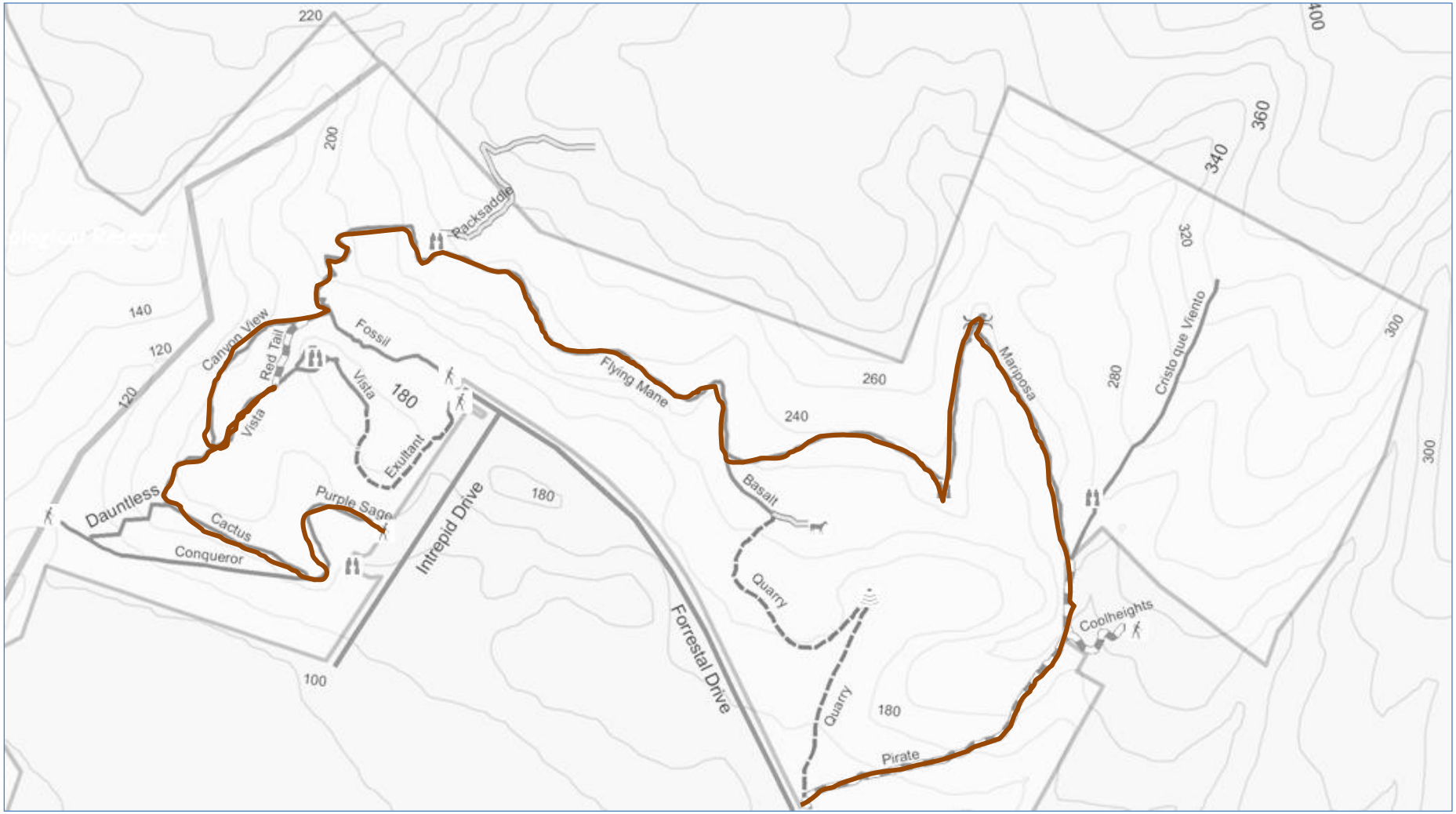
Key:	Scat:	FS = Fox scat	CS = Coyote Scat		OS = Other, note in comments
	Track:	GFT = Gray fox track	RFT = Red fox track	CT = Coyote Track	OT = Other, note in comments

Prey Categories:	Avian	Invertebrate	Small Mammal	Anthropogenic
Unidentified	Cat	Rodent	Large Mammal	Vegetation

Forrestal Reserve

Tracker: _____ **Survey Date:**_____ **Number Rabbits Observed:**_____

Comments: _____



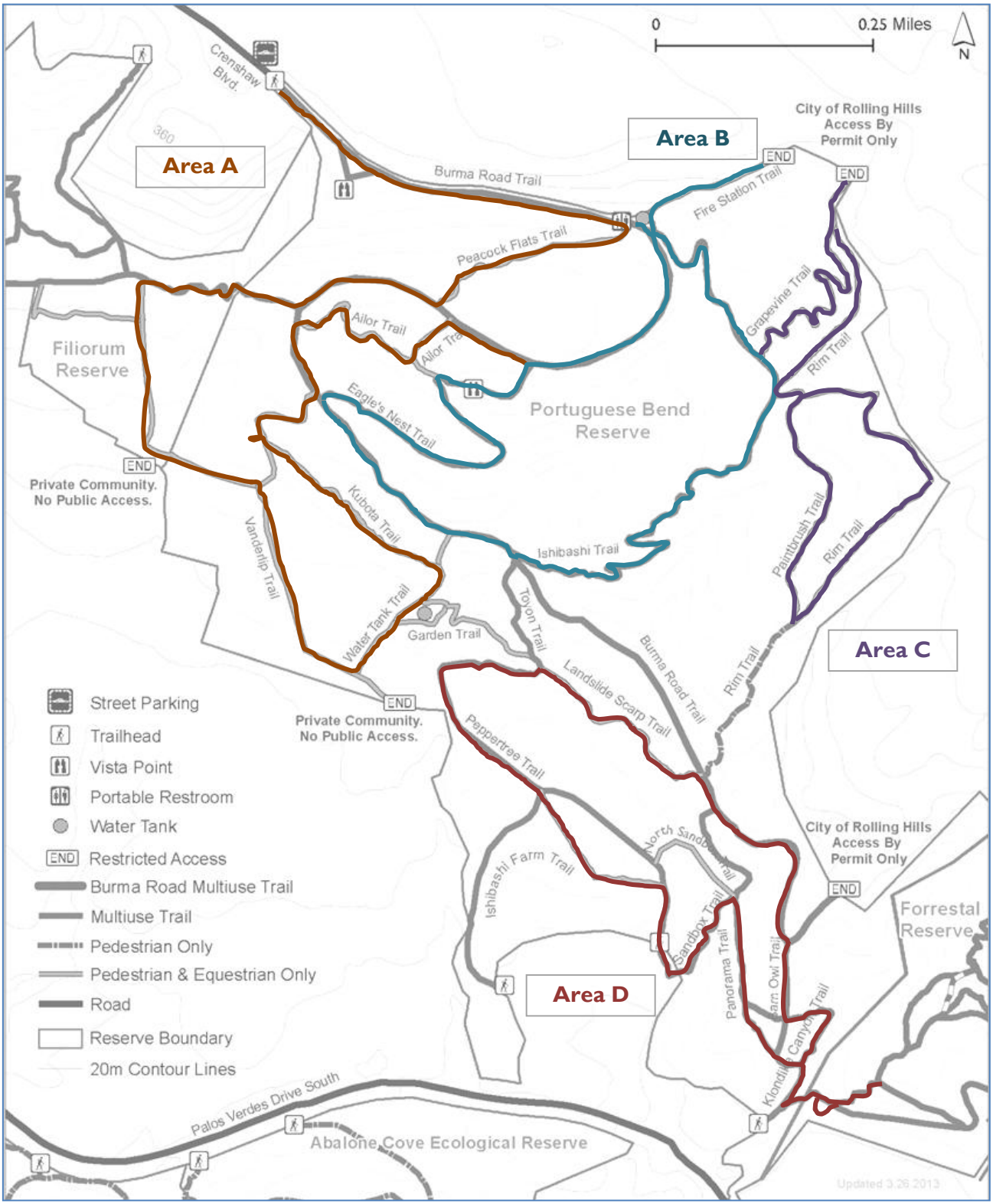
Key:	Scat:	FS = Fox scat	CS = Coyote Scat		OS = Other, note in comments
	Track:	GFT = Gray fox track	RFT = Red fox track	CT = Coyote Track	OT = Other, note in comments
Prey Categories:		Avian	Invertebrate	Small Mammal	Anthropogenic
Unidentified		Cat	Rodent	Large Mammal	Vegetation

PORTUGUESE BEND RESERVE

Tracker: _____ **Survey Date:**_____ **# Rabbits Obsvd:**_____

Comments:

_____



Key:	Scat:	FS = Fox scat	CS = Coyote Scat		OS = Other, note in comments
	Track:	GFT = Gray fox track	RFT = Red fox track	CT = Coyote Track	OT = Other, note in comments
Prey Categories:	Avian		Invertebrate	Small Mammal	Anthropogenic
Unidentified	Cat		Rodent	Large Mammal	Vegetation

SECTION 3

HABITAT RESTORATION PLAN

PALOS VERDES NATURE PRESERVE THREE YEAR RESTORATION PLAN 2017-2019

The restoration schedule for 2017-2019 utilizes two plans: the 2016 Habitat Restoration Plan for the Alta Vicente Reserve (Dudek 2016), and the 2016 Habitat Restoration Plan for Portuguese Bend Reserve (Dudek 2016).

The proposed restoration schedule phases are as follows:

- 2017: Alta Vicente Phase 4 (7 acres)
- 2018: Portuguese Bend (4 acres)
- 2019: Portuguese Bend (4 acres)

Alta Vicente Phase 4, described in the 2016 Alta Vicente Restoration Plan, covers 7 acres of coastal sage scrub, cactus scrub and butterfly garden. This phase will complete much of the area at Alta Vicente Reserve suitable for large-scale restoration.

The restoration for years 2018 and 2019 will total 8 acres combined, to offset the extra two acres above the required restoration commitment that will be planted in Alta Vicente Phase 4 in 2017. We will implement sections of the 2016 Portuguese Bend Restoration Plan by removing invasive weeds (mustard and Acacia) that have consumed the site after the 2009 fire and restoring native habitat to support rare birds and wildlife. The plant palette will consist of coastal sage scrub and cactus scrub species.

Please feel free to contact me with questions regarding these plans.

Sincerely,

Adrienne Mohan
Conservation Director
Palos Verdes Peninsula Land Conservancy
916 Silver Spur Road, Rolling Hills Estates, California 90274
amohan@pvplc.org
310-541-7613 X 203

Habitat Restoration Plan for the

Alta Vicente Ecological Reserve in the Palos Verdes Nature Preserve




FEBRUARY 2016

PREPARED BY:

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and

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605 Third Street
Encinitas, CA 92024

HABITAT RESTORATION PLAN
for the
Alta Vicente Reserve
in the
Palos Verdes Nature Preserve

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FEBRUARY 2016

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APPENDIX

1 INTRODUCTION

This Habitat Restoration Plan (HRP) was prepared for the Alta Vicente Reserve within the Palos Verdes Nature Preserve (PVNP) located in the City of Rancho Palos Verdes, California (Figures 1 and 2). The Alta Vicente Reserve is one of ten ecological reserves within the approximately 1,400-acre PVNP. The PVNP is owned by the City of Rancho Palos Verdes while habitat and conservation protection is managed by the Palos Verdes Peninsula Land Conservancy (PVPLC).

This HRP discusses implementing approximately 12.9 acres of restoration, consisting of 10.4 acres of coastal sage scrub, 1.0 acre of cactus scrub, 1.0 acre of Palos Verdes blue butterfly habitat, and 0.5 acre of wildflower field in a disturbed area of the Alta Vicente Reserve currently dominated by non-native plant species. The HRP addresses restoration design, planting recommendations, installation procedures, maintenance requirements, monitoring methodology, and performance standards.

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FIGURE 1

Regional Map

Habitat Restoration Plan for the Alta Vicente Ecological Reserve in the Portuguese Bend Nature Preserve

Document Path: Z:\Projects\9085\01\MAPDOC\MAPSIRESTOR Alta Vicente\AV Figure1-Regional.mxd

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SOURCE: USGS 7.5-Minute Redondo Beach, San Pedro Series Quadrangles.

FIGURE 2
Vicinity Map

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Habitat Restoration Plan for the Alta Vicente Ecological Reserve in the Portuguese Bend Nature Preserve

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2 EXISTING CONDITIONS

2.1 Site Description

The Alta Vicente Reserve is located on the southwestern portion of the Palos Verdes Peninsula near the Rancho Palos Verdes City Administration building (City Hall). The entire Alta Vicente Reserve is approximately 55 acres and is located along the coast of the peninsula. The Reserve is north and east of Palos Verdes Drive West opposite from the Point Vicente Lighthouse. The proposed restoration area is located just north of the City Hall, bounded on the west by Palos Verdes Drive West and on the east by Hawthorn Boulevard (Figures 1 and 2).

2.2 Vegetation Communities

Plant communities and land covers within the Alta Vicente Reserve are typical of plant communities found in this region, exhibiting some level of prior disturbance, but containing some relictual elements of the native plant communities. Vegetation mapping of the reserve was prepared by PVPLC and the California Native Plant Society (CNPS) (PVPLC and CNPS 2010). According to the vegetation mapping conducted by PVPLC and CNPS, the proposed restoration area consists of non-native grassland, disturbed coastal sage scrub, disturbed Saltbush scrub, and exotic woodland. The existing vegetation communities present in the restoration area are described further below.

2.2.1 Non-native Grassland

Non-native grasslands, which were mapped by CNPS as fennel stands, Avena (*A. barbata, A. fatua*) stands, Bromus (*B. diandrus, B. hordeaceus*) stands, and California annual and perennial grassland macrogroup dominate the grassland habitat at Alta Vicente Reserve (PVPLC and CNPS 2010). Annual, non-native grassland generally occurs on fine-textured loam or clay soils that are moist or even waterlogged during the winter rainy season and very dry during the summer and fall. This plant community is characterized by dense to sparse cover of annual grasses, often with a combination of native and non-native annual forbs (Holland, 1986). Annual grassland is a disturbance related community that may have replaced native grassland or coastal sage scrub in many localities. On site, grassland habitats generally consist of brome grasses (*Bromus diandrus*, *B. hordeaceus, B. rubens*), wild oat (*Avena fatua, A. barbata*), fennel (*Foeniculum vulgare*) and other annual grasses (PVPLC and CNPS 2010).

2.2.2 Disturbed Coastal Sage Scrub

Disturbed coastal sage scrub within the Alta Vicente restoration area was mapped by CNPS as Non-native/naturalized Mediterranean scrub vegetation, and *Artemisia californica* association

(PVPLC and CNPS 2010). Coastal Sage Scrub is composed of low, subshrubs approximately 1 meter (3 feet) high, many of which are drought-deciduous (Holland, 1986). Dominant shrub type varies across this vegetation type, depending on localized factors and levels of disturbance, but often includes California Sagebrush (*Artemisia californica*) and California Brittlebush (*Encelia californica*). In this community the shrub layer primarily forms a continuous canopy, but it contains areas with an open canopy and a fairly well-developed understory.

2.2.3 Disturbed Saltbrush Scrub

Saltbrush scrub is dominated by quailbush (*Atriplex lentiformis*). Shrubs are less than 3 meters (10 feet) tall with closed to open canopies (Sawyer and Keeler-Wolf, 1995). The saltbrush scrub on site, mapped by CNPS as *Atriplex lentiformis* alliance, has an open canopy and an understory consisting primarily of non-native annuals (PVPLC and CNPS 2010).

2.2.4 Exotic Woodland

The exotic woodland in the restoration area is composed of non-native, and in some cases invasive, tree species. CNPS mapped these areas as acacia cyclops, but they include the additional exotic species Brazilian pepper (*Schinus terebinthifolius*), gum tree (*Eucalyptus* sp.), and Phoenix palm (*Phoenix canariensis*) among others (PVPLC and CNPS 2010).

2.3 Geology and Soils

The Palos Verdes Peninsula is primarily an old marine terrace with relatively steep eroded canyons which drain southwesterly into the Pacific Ocean. The underlying geologic material consists of marine sedimentary and basaltic rocks. The area is seismically active, with active Palos Verdes and San Pedro fault zones that have caused the peninsula to uplift relative to the adjacent Los Angeles Basin and the offshore bedrock.

According to the Report and General Soil Map for Los Angeles County (USDA 1969), the soils within the Alta Vicente Reserve are composed of the Altamont-Diablo association (30–50% slopes) and the Diablo-Altamont association (2%-9% slopes). Soils of the Altamont-Diablo association occur on gently sloping to rolling foothills throughout the Los Angeles basin as far north as Point Dume. Altamont soils are described to be 24–36 inches deep, are well drained, and have slow subsoil permeability. Diablo soils are described to be 22–52 inches deep, are well drained, and have slow subsoil permeability. They have dark brown, neutral, clay surface layers about 12 inches thick underlain by a brown, calcareous clay subsoil. The Altamont-Diablo association is comprised of approximately 60% Altamont soils and 30% Diablo soils, while the Diablo-Altamont association is composed of approximately 60% Diablo soils and 30% Altamont soils.

Three site specific soil samples were collected from the proposed restoration area (Figure 5). The soil samples consisted of composite samples representative of the general soil conditions at various locations on site. The composite samples were submitted to Wallace Laboratories for analysis of standard soil constituents, agricultural suitability, texture, and cation exchange capacity. Based on the results of the analysis, the soils are clay, with a slow infiltration rate and fair organic matter (Appendix A). The soils on site are slightly alkaline (pH = 7.87 - 7.95) and the salinity is low (ECe = 0.40 – 0.55 mho/cm). However, sodium is very high at soil sample site 1 with 536 mg/kg soil. The sodium adsorption ratio (SAR) is also high (6.8) at soil sample site 1 (increasing problems start at 3) but low at soil sample sites 2 and 3 (2.0 – 2.4). Additionally, major nutrients (nitrogen and phosphorus) are low.

The soil chemistry found in the restoration site is generally what is expected given the location and site characteristics. The soils appear to be suitable for establishment of the target habitats without soil remediation or extensive soil amendments. Seed germination may be limited by elevated sodium and the moderately high SAR at sample site 1, but many species of native plants should be able to tolerate the elevated sodium if planted as container plants.

While the soils on site pose no significant problems to establishment of native habitat, as native soils they have low levels of major nutrients. Native species are adapted to lower nutrient soils, but will benefit from some supplemental nutrient augmentation during planting to initiate establishment (e.g., slow-release fertilizer packet).

2.4 Special-Status Species

Two special-status wildlife species have been documented within the Alta Vicente Reserve, though not in the specific area identified for restoration. Coastal California gnatcatcher (*Polioptila californica californica*) (CAGN) has been observed just south of the restoration area (Dudek and PVPLC 2007). Additionally, cactus wren (*Campylorhynchus brunneicapillus*) (CAWR) has been observed south of the restoration area (PVPLC 2012) (Figure 3). Additionally, Catalina mariposa lily (*Calochortus catalinae*), which is included on the CNPS Inventory of Rare and Endangered Plants list as a rank 4.2 species, exists on the boundaries (south and east) of the proposed restoration area (CNPS 2015; PVPLC and CNPS 2010) (Figure 3).

In addition to special-status species, the host plant coastal buckwheat (*Eriogonum parvifolium*) for the federally listed, endangered, El Segundo blue butterfly (*Euphilotes battoides allyni*) is known to occur in the vicinity of the proposed restoration area and was observed at Alta Vicente in 2015 (A. Dalkey [PVPLC] personal communication). The host plant, locoweed (*Astragalus trichopodus* var. *lonchus*) for the federally listed, endangered, Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*) also occurs within the Alta Vicente Reserve.

2.5 Non-Native Invasive Species

Non-native species are abundant within the areas identified for restoration, and compose the majority of the existing vegetative cover. Controlling non-native species during the plant establishment phase will present a significant challenge, and should be prioritized as the most critical aspect of the maintenance program. The most predominant non-native species include non-native annual grasses, coastal wattle (*Acacia cyclops*), and fennel. These species, as well as additional non-native species observed or expected on site, are provided in Table 1 with their associated rating in the California Invasive Plant Council's (Cal-IPC) Inventory of Invasive Plant Species (2015).

Table 1
Non-Native Plant Species and Associated Cal-IPC Ratings

High
Bromus madritensis ssp. *madritensis*—compact brome
Carpobrotus edulis—hottentot fig
Foeniculum vulgare—fennel
Moderate
Atriplex semibaccata—Australian saltbush
Avena barbata—slender oat
Brachypodium distachyon – false brome
Brassica nigra – black mustard
Bromus diandrus—ripgut brome
Centaurea melitensis—Maltese star-thistle
Euphorbia terracina—Geraldton carnation weed
Glebionis coronaria—crowndaisy
Hordeum murinum—mouse barley
Mesembryanthemum crystallinum—common iceplant
Myoporum laetum—myoporum
Pennisetum setaceum—crimson fountaingrass
Limited
Bromus hordeaceus—soft brome
***Eucalyptus* spp. – red gum, blue gum
Erodium cicutarium—redstem stork's bill
Helminthotheca echioides – bristly ox-tongue
Marrubium vulgare—horehound
Olea europaea—olive
***Phoenix canariensis*—Phoenix palm
Ricinus communis—castorbean
Salsola tragus—prickly Russian thistle
Schinus terebinthifolius—Brazilian peppertree

Table 1
Non-Native Plant Species and Associated Cal-IPC Ratings

None
**Acacia cyclops*—coastal wattle
**Malva parviflora*—cheeseweed mallow
**Melilotus indicus*—annual yellow sweetclover
***Pinus* sp.—pine
**Tropaeolum majus*—nasturtium

* Note that while there are several species on the list that do not have a Cal-IPC rating for the state of California, that some of these species can be locally invasive. Species with an asterisk are considered to be moderately invasive within the region and should be aggressively controlled. The Targeted Exotic Removal Program for Plants (TERPP) provides additional target invasive species (PVPLC 2013) that may occur on site

** Note that some of these mature non-native ornamental trees that are not presenting a significant threat of invasion will be left in place and not removed in order to retain avian habitat and the general character of the site. Seedlings and young saplings less than 5 feet tall will be removed.

2.6 Additional Considerations

A fifteen foot wide sewer easement currently bisects the restoration area, from north to south, along the visible access road (Alta Vicente Trail). The City of Rancho Palos Verdes granted a perpetual easement to the County Sanitation District No. 5 of Los Angeles County, allowing right-of-way for sewer purposes, with the requirement to repair and replace the surface of the ground and its improvements if damaged during operation. No buffers for restoration are required but it is suggested that restoration activities do not impede access to the man holes along the access road.

In addition, one or more electric utility poles intersect the restoration area on the southwestern border. Restoration activities should allow a 15-foot buffer around utility poles, with these areas being monitored and managed for only particularly weeds identified as highly invasive by Cal IPC, that threaten to spread into the restoration areas. Fuel modification areas on the periphery of the reserve, adjacent to built areas, will be managed in a similar manner.

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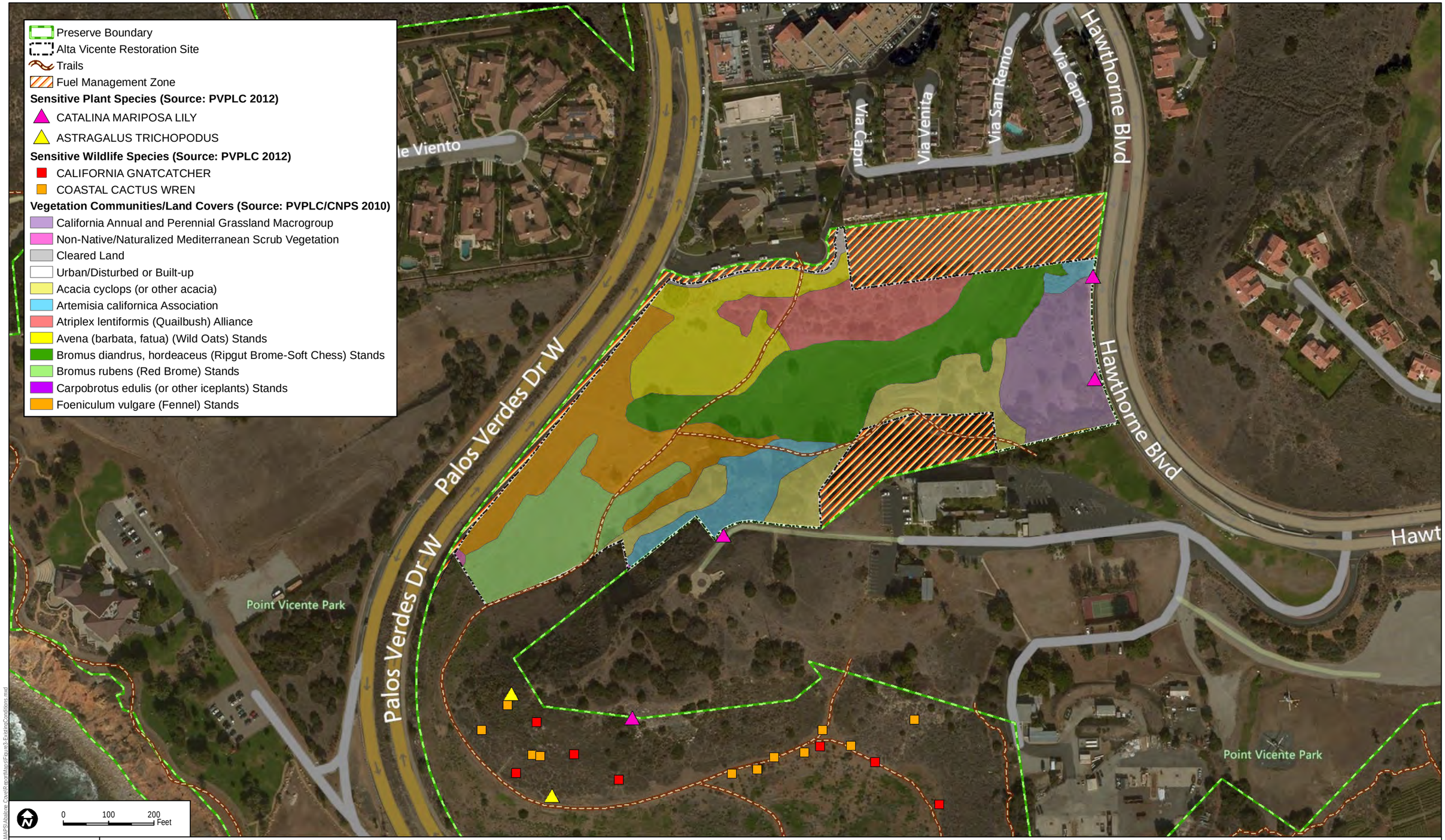

Z:\Projects\7718001\MAPDOC\MAPS\Habitat Over\RaunMapsFinal\3-ExistingConditions.mxd

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SOURCES: Palos Verdes Peninsula Land Conservancy 2012; Bing Maps 2015

FIGURE 3

Existing Conditions

Habitat Restoration Plan for the Alta Vicente Ecological Reserve in the Portuguese Bend Nature Preserve

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3 RESTORATION PROGRAM

This HRP outlines the restoration implementation strategy for upland habitat at the Alta Vicente Reserve and proposes to provide for the restoration of approximately 12.9 acres of habitat restoration. The approach to restoration in this HRP is to assist the recovery of the degraded ecosystem through planting and seeding in order to re-establish or enhance biological functions and services within portions of the Alta Vicente Reserve.

3.1 Restoration Site Goals and Objectives

The disturbed habitat that exists in the proposed restoration location has limited wildlife value and provides opportunity for the spread and establishment of invasive weed species to native habitat and previously restored areas within the Alta Vicente Reserve. The planting of native habitat is intended to improve habitat contiguity and provide increased nesting, cover, and foraging opportunities for wildlife. In particular, the overarching goal of this restoration plan is to provide habitat for coastal California gnatcatcher, coastal cactus wren and the Palos Verdes blue butterfly.

The habitat restoration program will focus on the establishment of habitat for the covered species listed in the NCCP/HCP with the objective of increasing the overall habitat carrying capacity for the target species populations. Coastal scrub restoration is intended to provide improved foraging habitat for resident and migrating wildlife species, and potential nesting and foraging habitat for target species such as the coastal California gnatcatcher, southern California rufous-crowned sparrow, and other sensitive wildlife species. Palos Verdes blue butterfly habitat restoration is meant to provide improved habitat and increased numbers of larval host plants for the Palos Verdes blue butterfly. Cactus scrub restoration is meant to provide habitat for the coastal cactus wren. Achievement of the performance standards described herein would create suitable habitat for these species. However, occupation of the site by these species is not a requirement for successful project completion.

In addition to these broad goals, the following site-specific objectives for the Alta Vicente Reserve restoration site have been incorporated into this HRP in the interest of minimizing adverse impacts to biological resources:

- Avoid additional or unplanned disturbance to existing native habitats during implementation of the project construction and long-term maintenance activities;
- Prevent any impacts to sensitive plant or wildlife species during implementation of the project construction and long-term maintenance activities;

- Control non-native invasive weed species considered to be highly or moderately invasive on the Cal-IPC Invasive Plant Inventory (2015), and others identified by PVPLC as locally invasive (PVPLC 2013);
- Utilize erosion control measures in the form of "Best Management Practices" (BMPs) on the site as conditions necessitate;
- Reintroduce special-status plant species listed in the NCCP/HCP as components of the planting plans where feasible and as appropriate.

3.2 Habitats to be Established

The habitat restoration program consists of site preparation (primarily non-native plant species removal), native planting, seeding, supplemental watering, maintenance, and monitoring. Proposed planting for the target habitat types will focus primarily on the installation of container plants to achieve the project goals. A native seed mix will also be applied as a supplemental measure to increase cover and diversity.

The habitat restoration area is currently dominated by non-native species. The existing grasslands in the western and central portions of the restoration area are composed largely of non-native annual herbs, including fennel, brome grasses, Russian thistle, and wild oat grasses (Figure 4). A number of non-native perennials, such as coastal wattle, Phoenix palm, and Brazilian pepper are also common within the restoration area.

Coastal sage scrub habitat will make up the majority of the restored habitat within the restoration area (Figure 5). Additionally, cactus scrub is planned for the slope immediately west of Hawthorne Boulevard and Palos Verdes blue butterfly habitat is planned for the gently sloping area in the eastern portion of the restoration site. A wildflower field to provide habitat for pollinators has also been planned for an approximately 0.5-acre area in the northwestern portion of the restoration area near Palos Verdes Drive West. Each specific habitat type to be restored is described below. It is expected that all planting will be installed to mimic the natural distribution and vegetation mosaic of adjacent healthy habitats.

Photo 1: Representative view of lower restoration area (facing north)

Photo 2: Non-native plants in the lower restoration area (black mustard, brome grasses, coastal wattle)

Photo 3: Trail on the southern side of the restoration area

Photo 4: Northern border of the restoration area (facing south-west)

Photo 5: Invasive perennial weeds in the eastern section of the restoration area (Coastal wattle, Phoenix palm)

Photo 6: Invasive annual weeds in the restoration site (Fennel, black mustard, wild oat)

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SOURCES: Palos Verdes Peninsula Land Conservancy, 2014; Bing Maps 2015

FIGURE 5

Alta Vicente Restoration Area

Habitat Restoration Plan for the Alta Vicente Ecological Reserve in the Portuguese Bend Nature Preserve

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3.2.1 Coastal Sage Scrub

The restoration strategy for coastal sage scrub habitat on the Alta Vicente Reserve restoration site includes reintroducing locally appropriate native coastal sage scrub species that are currently present in adjacent native habitats. The plant palette includes a container plant and seed mix composition (Table 2) that has been designed to replicate the native composition of a healthy coastal sage scrub plant community similar to existing coastal sage scrub habitat present on the Alta Vicente Reserve site, and with the specific intent to provide habitat suitable for occupation by coastal California gnatcatcher. The planting palette has thus been designed to contain a composition of shrub species that are dominant in coastal sage scrub habitat occupied by coastal California gnatcatcher (Atwood et al. 1994). On the Palos Verdes Peninsula, the primary coastal sage scrub dominants include California sagebrush, California brittlebush, and coastal buckwheat, with coast goldenbush, common deerweed, lemonadeberry, California buckwheat, sages, bladderpod, coast prickly-pear, and wishbone bush as common constituents. The plant palette assumes 100% coverage of container plants. The seed mix is provided for erosion control and species diversity, and will be applied as a supplemental measure as needed, and as determined by PVPLC.

Table 2
Proposed Coastal Sage Scrub Planting Palette (Approximately 10.4 Acres)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Container Plants						
Artemisia californica	California sagebrush	D40	5	5	659	6,852
Astragalus trichopodus var. *lonchus*	Ocean locoweed	D40	2	7	54	566
Brickellia californica	California bricklebush	D40	5	3	87	906
Corethrogyne filaginifolia	Common sandaster	D40	3	3	24	252
*Cylindropuntia prolifera***	Coastal cholla	1-gallon	4	5	27	283
**Dudleya lanceolata*	Lanceleaf liveforever	1-gallon	2	3	11	113
Elymus condensatus	Giant wildrye	D40	5	3	42	435
Encelia californica	California brittlebush	D40	4	5	350	3,640
Eriogonum cinereum	Coastal buckwheat	D40	5	5	87	906
Eriogonum fasciculatum	California buckwheat	D40	5	5	232	2412
Eriophyllum confertiflorum	Golden yarrow	D40	2	3	54	566
Heteromeles arbutifolia	Toyon	D40	8	1	14	142
Isocoma menziesii	Coast goldenbush	D40	5	3	87	906
Mirabilis laevis var. *crassifolia*	Wishbone bush	D40	4	5	82	849
*Opuntia littoralis/oricola***	Prickly-pear cactus	1-gallon	6	3	12	126
Peritoma arborea	Bladderpod	D40	6	5	36	378

Table 2
Proposed Coastal Sage Scrub Planting Palette (Approximately 10.4 Acres)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Rhus integrifolia	Lemonadeberry	D40	12	1	3	31
Salvia leucophylla	Purple sage	D40	6	5	61	629
Salvia mellifera	Black sage	D40	5	3	87	906
				Total Container Plants	**2,009**	**20,898**
Seed Mix						
Botanical Name	*Common Name*	*Pure Live Seed*	*Lbs. Per Acre*			*Total Lbs.*
Asclepias fascicularis	narrow leaved milkweed	50	1.0			10.4
Castilleja exserta	purple owl's clover	25	0.5			5.2
Clarkia purpurea	winecup clarkia	80	0.5			5.2
Deinandra fasciculata	fascicled tarplant	3	1.0			10.4
Eschscholzia californica var maritima	California poppy	74	2.0			20.8
Lupinus bicolor	pygmy lupine	78	2.0			20.8
Lupinus succulentus	arroyo lupine	81	4.0			41.6
Melica imperfecta	coast melic grass	54	0.5			5.2
Pseudognaphalium californicum	California everlasting	3	0.5			5.2
Stipa lepida	foothill needlegrass	54	2.0			20.8
Stipa pulchra	Purple needlegrass	42	8.0			83.2
		Total Lbs.	**22.0**			**228.8**

* Lanceleaf liveforever (*Dudleya lanceolata*) should be planted in rock outcrops.
** Larger (5 or 10 gallon) container size plants will be installed as available.

3.2.2 Cactus Scrub

The restoration strategy for cactus scrub is comparable to that described for coastal sage scrub, except that the composition of species has been modified to allow coast prickly-pear cactus (*Opuntia littoralis*) and coast cholla (*Cylindropuntia prolifera*) to dominate. The plant palette includes a container plant and seed mix composition (Table 3) that has been designed to replicate the native composition of a healthy cactus scrub plant community, and with the specific intent to provide habitat suitable for occupation by cactus wren.

Table 3
Proposed Cactus Scrub Planting Palette (1.0 Acre)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Container Plants						
Artemisia californica	California sagebrush	D40	5	5	313	313
Astragalus trichopodus var. *lonchus*	Ocean locoweed	D40	3	7	24	24
Baccharis pilularis	Coyote brush	D40	6	5	12	12
Brickellia californica	California bricklebush	D40	5	5	17	17
Corethrogyne filaginifolia	Common sandaster	D40	3	3	24	24
*Cylindropuntia prolifera***	Coastal cholla	1-gallon	4	10	408	408
Encelia californica	California brittlebush	D40	5	3	87	87
Eriogonum fasciculatum	California buckwheat	D40	5	5	174	174
Isocoma menziesii	Coast goldenbush	D40	5	5	17	17
Mirabilis laevis var. crassifolia	Wishbone bush	D40	4	5	27	27
*Opuntia littoralis/oricola***	Coast prickly-pear	1-gallon	6	25	523	523
Peritoma arborea	Bladderpod	D40	6	5	12	12
Rhus integrifolia	Lemonadeberry	D40	15	1	2	2
Salvia mellifera	Black sage	D40	5	3	87	87
			Total Container Plants		**1,727**	**1,727**
Seed Mix						
Botanical Name	*Common Name*	*Pure Live Seed*	*Lbs. Per Acre*			*Total Lbs.*
Eschscholzia californica var. *maritima*	California poppy	74	3.0			3.0
Lupinus bicolor	Miniature lupine	78	2.0			2.0
Phacelia cicutaria	Caterpillar phacelia	80	1.0			1.0
Salvia columbariae	Chia	54	1.0			1.0
Stipa lepida	Foothill needlegrass	54	2.0			2.0
Stipa pulchra	Purple needle-grass	42	8.0			8.0
		Total Lbs. Per Acre	**17.0**			**17.0**

** Larger (5 or 10 gallon) container size plants will be installed as available.

3.2.3 Palos Verdes Blue Butterfly Habitat

The restoration strategy for Palos Verdes blue butterfly habitat is comparable to that described for coastal sage scrub, except that the composition of species was modified to be dominated by locoweed, the Palos Verdes blue butterfly host plant that was historically present at the site (Table 4). This plant species is considered early successional and is often found in the open areas of coastal sage scrub communities.

Historically this host plant species was associated with natural occurrences such as fire, landslides, and animal burrowing. With the introduction of human intervention, this natural cycle of disturbance and growth has changed. Humans have introduced many highly adaptable annual exotic grasses that flourish in these same open areas inhabited by ocean locoweed and out-compete the native species for both water and nutrients. In addition, fire suppression has resulted in the establishment of continuous bands of mature coastal sage scrub communities, whereby not only is species diversity decreased, but open areas required for the establishment and development of species such as ocean locoweed are decreased as well.

To maximize the potential for the continued presence of the two Palos Verdes blue butterfly host plant species, restoration efforts must follow a two-fold approach. First, is the establishment of additional Palos Verdes Blue butterfly habitat to provide the necessary resources to support the blue butterfly. In addition, newly established habitat must be maintained on a continuous basis to ensure the continued existence of gaps which provide the open areas necessary for the host plant to persist. Since fire, in the form of controlled burns, is not an option at the Alta Vicente site, open areas may require regular through mechanical means.

The shrub spacing provided in the planting palette is slightly greater than in the CSS restoration areas and the planting palette is designed for only 50% coverage (including 30% coverage of ocean locoweed and 20% coverage of other shrubs) to allow for more openings in the habitat.

Table 4
Proposed Palos Verdes Blue Butterfly Habitat Planting Palette (1.0 Acre)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Container Plants						
Artemisia californica	California sagebrush	D40	6	5	61	61
Astragalus trichopodus var. *lonchus*	Ocean locoweed	D40	2	7	1,634	1,634
Corethrogyne filaginifolia	Common sandaster	D40	3	3	145	145
**Dudleya lanceolata*	Lanceleaf liveforever	1-gallon	2	3	54	54
Elymus condensatus	Giant wildrye	D40	6	3	6	6
Encelia californica	California brittlebush	D40	6	3	12	12
Eriogonum fasciculatum	California buckwheat	D40	6	5	24	24
Eriogonum parvifolium	Coast buckwheat	D40	6	5	12	12
Eriophyllum confertiflorum	Golden yarrow	D40	3	3	97	97
Mirabilis laevis var. *crassifolia*	Wishbone bush	D40	4	5	54	54
Peritoma arborea	Bladderpod	D40	6	5	12	12
Salvia leucophylla	Purple sage	D40	6	5	12	12
Salvia mellifera	Black sage	D40	6	3	12	12
			Total Container Plants		**2,135**	**2,135**

Table 4
Proposed Palos Verdes Blue Butterfly Habitat Planting Palette (1.0 Acre)

Seed Mix				
Botanical Name	*Common Name*	*Pure Live Seed*	*Lbs. Per Acre*	*Total Lbs.*
Asclepias fascicularis	narrow leaved milkweed	50	1.0	1.0
Castilleja exserta	purple owl clover	25	0.5	0.5
Clarkia purpurea	winecup clarkia	80	0.5	0.5
Deinandra fasciculata	fascicled tarplant	3	1.0	1.0
Eschscholzia californica var. *maritima*	California poppy	74	2.0	2.0
Lasthenia californica	California goldfields	30	1.0	1.0
Layia platyglossa	tidy tips	60	1.0	1.0
Lupinus bicolor	pygmy lupine	78	2.0	2.0
Lupinus succulentus	arroyo lupine	81	4.0	4.0
Stipa lepida	foothill needlegrass	54	2.0	2.0
Stipa pulchra	purple needlegrass	42	8.0	8.0
		Total Lbs.	**23.0**	**23.0**

* Lanceleaf liveforever (*Dudleya lanceolata*) should be planted in rock outcrops.

3.2.4 Wildflower Field

The wildflower field planting is included in the HRP by request of the Palos Verdes Peninsula Land Conservancy. The location for the wildflower field was selected because the high clay content soil creates favorable conditions for the establishment of annual wildflower habitat (Table 5). Showy native wildflower species have been selected for this planting area. Additionally, a few shrubs have been included in the planting palette to develop a patchy structure to the planting, and provide for perimeter perennial plants along the roadway. A few bulb species are also included in the planting palette to be incorporated by PVPLC as available.

Table 5
Proposed wildflower field Planting Palette (Approximately 0.5 Acre)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Container Plants						
Bloomeria crocea[1]	Goldenstar	Bulb	1	1	as available	TBD
Brodiaea jolonensis[1]	Jolon brodiaea	Bulb	1	1	as available	TBD
Calochortus catalinae[1]	Catalina mariposa lily	Bulb	1	1	as available	TBD

Table 5
Proposed wildflower field Planting Palette (Approximately 0.5 Acre)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Dichelostemma capitatum[1]	Blue Dicks	Bulb	1	1	as available	TBD
Dudleya virens	Bright green dudleya	D40	2	3	218	109
Epilobium canum	California fuchsia	D40	3	5	145	73
Eriophyllum confertiflorum	Golden yarrow	D40	2	3	327	163
Eschscholzia californica var. *maritima*	California poppy	D40	2	5	545	272
Mirabilis laevis var. *crassifolia*	Wishbone bush	D40	4	3	163	82
Verbena lasiostachys	Western vervain	D40	4	3	82	41
				Total Container Plants	**1,480**	**740**
Seed Mix						
Botanical Name	*Common Name*	*Pure Live Seed*		*Lbs. Per Acre*		*Total Lbs.*
Amsinckia intermedia	Common Fiddleneck	49		1.0		0.5
Antirrhinum nuttallianum	Purple Snapdragon	10		0.5		0.25
Asclepias fascicularis	Narrowleaf milkweed	50		1.0		0.5
Castilleja exserta	Purple owl's clover	25		0.5		0.25
Clarkia purpurea	Winecup clarkia	80		0.5		0.25
Corethrogyne filaginifolia	California-aster	80		2.0		1.0
Deinandra fasciculata	*fascicled tarplant*	0.1		1.0		0.5
Emmenanthe penduliflora	Whispering Bells	3		0.5		0.25
Eschscholzia californica var. *maritima*	California poppy	50		2.0		1.0
Lasthenia californica	California goldfields	74		0.5		0.25
Layia platyglossa	Tidy tips	30		1.0		0.5
Lupinus bicolor	Miniature lupine	60		2.0		1.0
Lupinus succulentus	Arroyo lupine	78		6.0		3.0
Nemophila menziesii	Baby blue eyes	81		0.5		0.25
Phacelia cicutaria	Caterpillar phacelia	83		0.5		0.25
Phacelia ramosissima	Branching phacelia	80		0.5		0.25
Salvia columbariae	Chia	80		1.0		0.5
Sisyrinchium bellum	Blue-eyed grass	54		3.0		1.5
Stipa lepida	Foothill needlegrass	71		2.0		1.0
Stipa pulchra	Purple needlegrass	54		8.0		4.0
			Total Lbs. Per Acre		**34.0**	**17.0**

[1] The PVPLC has propagated limited numbers of these species
TBD = To be determined

3.3 Revegetation Materials

Plant materials for the restoration planting area will include container stock and seed of coastal scrub and species, as indicated in the plant palettes provided in Tables 2-5. As much as feasible,

the container plant materials will be grown at the PVPLC nursery from native seed collected on the Palos Verdes Peninsula. The nursery will grow the plants in D40 Deepots. Additionally, for the seed mixes, PVPLC will collect available seed from the peninsula for application at the restoration site. If some species cannot be grown as container stock at the PVPLC nursery, or local seed is not available for collection, the planting palettes may be adjusted, or another source may be used for acquiring locally sourced plant materials.

3.4 Target Functions and Values

The primary functional goal of restoring coastal sage scrub, cactus scrub, Palos Verdes blue butterfly habitat, and wildflower field habitat is to restore vegetation that contains a diversity of native coastal scrub plant species and that provides habitat value for sensitive wildlife species, particularly the coastal California gnatcatcher, coastal cactus wren and Palos Verdes blue butterfly. Additionally, a secondary consideration is to create contiguous and intact habitat which can resist the re-establishment of invasive plant species.

3.5 Time Lapse

The length of time to develop high quality habitat depends on a variety of factors including weather, soil conditions, herbivory, weed competition, and maintenance quality. Under optimal conditions, coastal sage scrub may take approximately three years from the application of seed and installation of container plants to develop the appropriate structure to provide the functions and values needed for habitation of wildlife, including suitable nesting habitat for California gnatcatcher and other coastal scrub species. In an unirrigated setting, and with drought conditions, scrub development may take longer than three years to mature enough to be suitable for nesting. As a hedge against drought, the addition of supplemental watering will increase plant survival, improve establishment, and hasten habitat development.

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4 RATIONALE FOR EXPECTING SUCCESS

The identified locations for restoration on the Alta Vicente Reserve are directly adjacent to viable and self-sustaining target habitats, indicating appropriate environmental conditions to support the intended upland habitats. This HRP includes a provision for supplemental watering to promote establishment and survival of native species included in the plant palette. The HRP also includes a 5-year maintenance plan, wherein invasive non-native weeds within the restoration site will be controlled to aid native plant establishment. Additionally, native plant materials will be grown or collected from sources on the Palos Verdes Peninsula, thus preserving genetic integrity and increasing the potential for long-term success.

4.1 Preliminary Schedule

Appropriate timing of planting and seeding will minimize the need for supplemental watering and will increase the survival rate of the installed plants. For unirrigated restoration sites, or sites with limitations on irrigation systems, the best survival rates are achieved when container plants and seed are installed at the onset of the rainy season or soon thereafter (November through January). Planting and seeding at the site should be timed to take advantage of seasonal rainfall patterns and most appropriate growing season temperatures (see Charts 1-2 and Table 6). Seed application will occur only after container plants have had a full year to become established, and will be used to increase species density and diversity as needed.

Table 6
Preliminary Restoration Project Schedule

Task	Date
Site clearing	Fall 2015
Invasive weed species control and grow-kill cycles	Winter and Spring 2016
Installation of supplemental watering system*	Summer 2016
Planting container stock	Fall and Early Winter 2016
Seed application	Fall and Early Winter 2017
Monitoring and maintenance	To begin upon successful installation of container plants

* Supplemental watering system may not be installed if supplemental watering is to be conducted using a watering truck.

Chart 1
Average Monthly Precipitation for the Portuguese Bend Nature Preserve

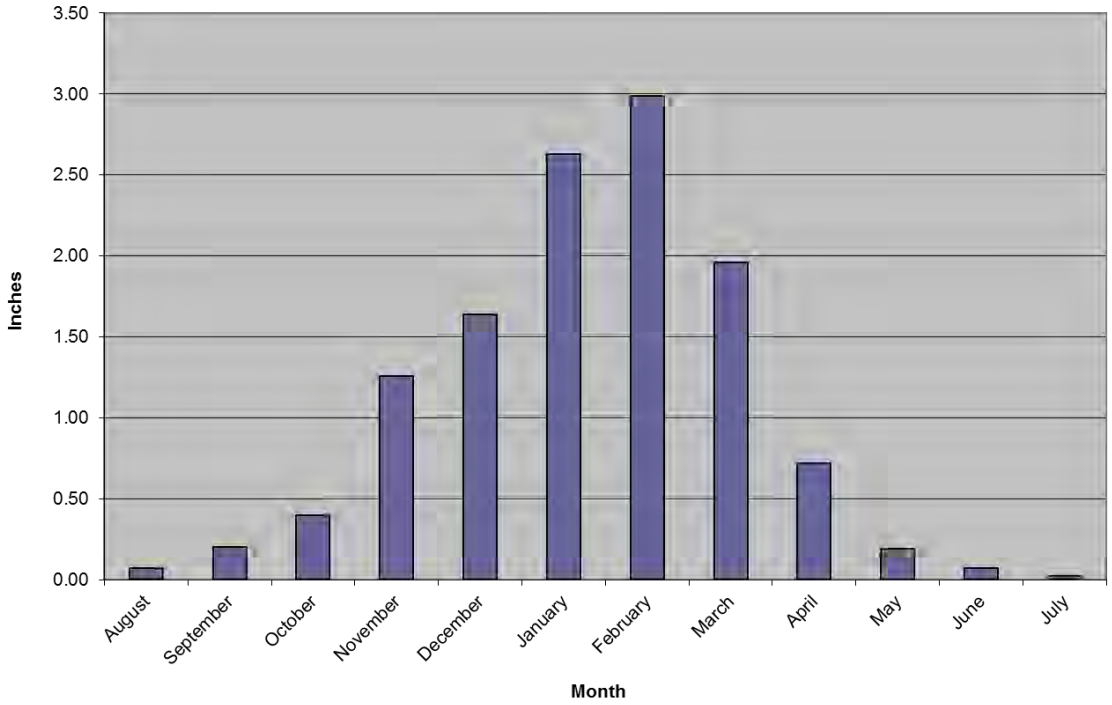
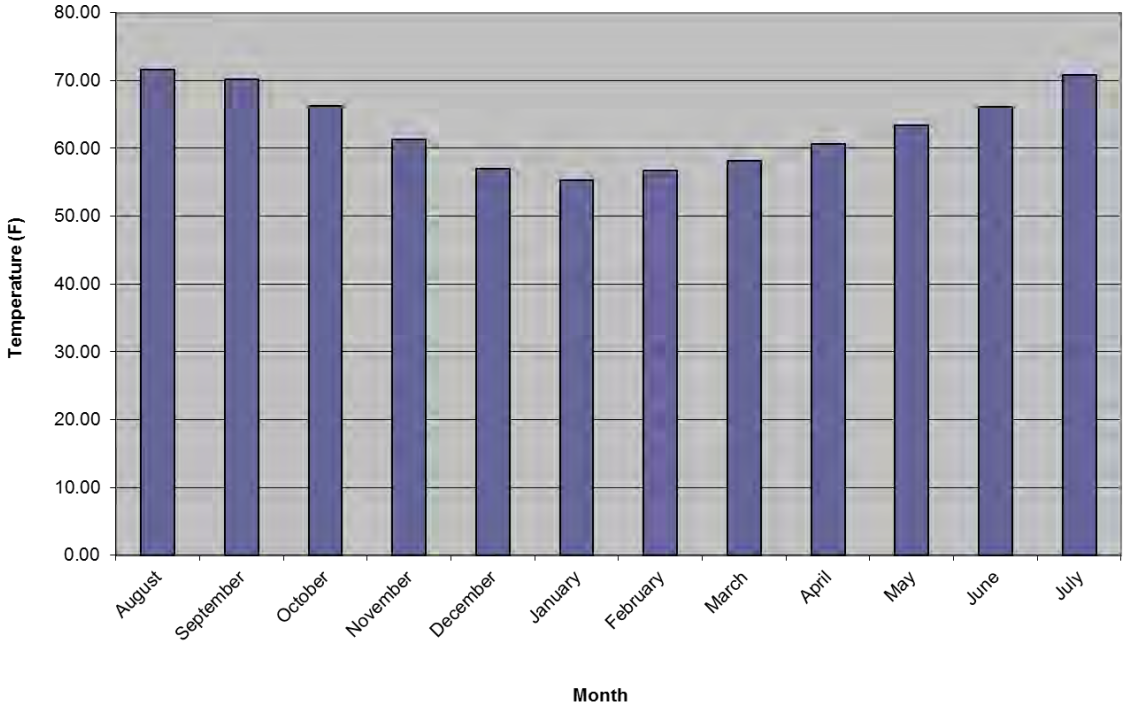


Chart 2
Average Monthly Temperatures for the Portuguese Bend Nature Preserve



4.1.1 Site Preparation

Site preparation includes control of invasive weed species and soil preparation in the restoration area. If any clearing of weeds is planned to be performed during the migratory bird nesting season (February 15–September 15), a nesting bird survey should be conducted by a qualified wildlife biologist within 72 hours prior to vegetation removal in accordance with the Migratory Bird Treaty Act (16 U.S.G. 703-712).

During site preparation, all invasive weed species, particularly non-native annual grasses, black mustard, fennel, and castor bean should be killed and removed from the restoration area. Invasive species control should also include exotic trees and shrubs such as Brazilian pepper, acacia, and palms as directed by PVPLC staff.

The initial weed control effort will involve a combination of chemical and mechanical treatment. Prior to the installation of native plant materials, "grow and kill" weed removal treatments should be conducted by allowing non-native seedling emergence in the winter and spring. When weeds have begun to grow, and before they begin to develop flowers or flowering structures, a foliar application of an appropriate systemic herbicide should be applied to kill target weeds. If adequate rainfall has occurred during this period, multiple grow-kill cycles should be repeated. The restoration ecologist will provide weed control recommendations to the restoration maintenance staff that are specific to the target weed species identified for control. Any use of herbicides shall be in accordance with label instructions, following the recommendations of a licensed Pest Control Advisor, and any application shall be applied under the direction of a state-certified Qualified Applicator.

4.1.2 Supplemental Watering System

The planned method of providing supplemental watering at the proposed restoration area is with a temporary above-ground drip irrigation system. This will help ensure that native container plants and seed installed on site will become adequately established. The supplemental watering system would only be used until the plants are established such that they can survive on their own between periods of rainfall. It is expected that, depending upon the level of plant establishment, the watering system would be removed after two to three years of use. Watering on site will gradually be decreased prior to the removal of the system so the plants can become acclimated to the site's natural conditions.

The PVPLC may establish temporary on-grade mainlines leading from the point of connection at City Hall, which was established for a previous restoration project within the Alta Vicente Reserve. The system should be designed by a landscape architect to ensure that

the system has adequate water pressure and provides good coverage. The supplemental watering system would be installed as an above-ground system, so that irrigation equipment may be removed once the system has been decommissioned, and the container plants planted on site have become established.

4.1.3 Erosion Control

Where needed, erosion control measures, such as the installation of sandbags, fiber rolls, silt fencing, and/or erosion-control matting may be necessary to control erosion until target vegetation is established. At a minimum, silt fencing should be installed at the toe of slopes that are unvegetated after removing non-native species. No erosion control devices should be used that contain seed from non-native plants. The need and location of erosion control will be determined in the field by the project's restoration ecologist.

4.1.4 Plant Installation

Standard planting procedures will be employed for installing container stock. Planting holes shall be approximately twice the width of the rootball, and as deep. If dry soil conditions exist at the time of plant installation, planting holes will be filled with water and allowed to drain immediately prior to planting. A fertilizer packet with controlled-release fertilizer (e.g., Best Paks 20-10-5) will be placed in the bottom of each hole prior to planting.

4.1.5 Seed Application

Seed shall be broadcast throughout the restoration site using hydroseed equipment or other method as recommended by the restoration ecologist.

If the seed is applied through hydroseeding, seed will be mixed uniformly in a slurry composed of water and virgin wood fiber mulch at the following rates:

- Seed mixture at indicated lbs. per acre.
- 100 percent Virgin wood fiber mulch at 2,500 Lbs. per acre.

The seed mix can also be hand broadcast, as the seed mix is primarily a supplemental feature to increase diversity and will not occur until the second year of the Restoration Program. If hand broadcast, the seeding sites should be prepared by removing weedy vegetation to expose the soil surface. The seed should be raked into the soil so there is good seed-soil contact. Seeding should be timed to occur prior to or early in the rainy season.

5 MAINTENANCE PLAN

The purpose of the maintenance plan is to provide guidelines for long-term maintenance of the restoration site during the establishment period. Maintenance activities will be initiated during the weed reduction period (i.e., grow-kill cycles), and will occur at the direction of the project's restoration ecologist on an as-needed basis. The maintenance period will intensify after the installation of the container plants. Maintenance will be necessary until the habitats are fully established, which is estimated to take approximately five years.

Because the goal of this project is to establish a natural system that can support itself with little or no maintenance, the primary focus of the maintenance plan is concentrated in the first few seasons of plant growth following the revegetation effort, at a time when weeds can easily out-compete native plants. The intensity of the maintenance activity is expected to subside each year as the native plants become established, and local competition from non-native plants for resources is minimized through direct removal and treatment of non-native plants.

5.1 Maintenance Activities

Maintenance activities will be primarily related to non-native invasive plant species control. Supplemental watering, supplemental planting, trash removal, and erosion control will also be conducted, as necessary.

- Non-native plant species should be controlled as soon as they begin to establish. Recommended control methods should be tailored to each specific weed species and should include the most effective control measures for the species and time of year. Control methods may include a combination of manual, mechanical, and chemical control.
- Container plants should be watered when natural rainfall is not adequate to sustain the establishing plants. The project's restoration ecologist will be responsible for scheduling the supplemental watering to promote plant establishment. Supplemental watering should be conducted as deep, soaking watering to promote deep rooting.
- Generally, the site will not be fertilized during the maintenance period unless determined to be necessary by the project's restoration ecologist as a remedial measure to correct soil nutrient deficiencies.
- Deadwood and leaf litter of native vegetation should not be removed. Deadwood and leaf litter provide valuable microhabitats for invertebrates, reptiles, small mammals, and birds. Non-organic trash and debris should be removed from the revegetation area on a regular basis.

- Erosion control materials should be maintained in working order until they are deemed no longer necessary by the project's restoration ecologist. Maintenance of erosion control materials may include repairing or replacing dilapidated, damaged, or ineffective materials.

5.2 General Habitat Maintenance Guidelines

5.2.1 Weed Control

Weeds are expected to be the primary pest problem in the restoration area during the first several years of the maintenance period. Weeds should be controlled so they do not prevent the establishment of the native species or invade adjacent areas. A combination of physical removal, mechanical treatments (weed whipping) and appropriate herbicide treatments should be used to control the non-native/invasive plant species. Weeds should be controlled prior to setting seed, and should be removed from the site if they become large enough to block sunlight to developing native plants.

Re-establishment of non-native plants onto the site can be adequately minimized by regular and timely maintenance visits with implementation of effective weed control measures. Weed control will require constant diligence by the maintenance personnel. Invasive plant species, such as those listed in Table 1 should be controlled wherever possible within the restoration area. Mature invasive tree species will be retained at the discretion of the PVPLC and the Wildlife Agencies, though the majority of individuals should considered for removal so the source of weed propagules is diminished.

Removal of weeds by hand where practicable and effective is the most desirable method of control and should be done around individual plantings and native seedlings to avoid inadvertent damage to the native species. However, several of the invasive species may be more effectively controlled with herbicide due to their tenacious and spreading root systems, their size, or their ability to re-sprout from root fragments. All herbicides shall be used in accordance with label instructions, following the recommendations of a licensed Pest Control Advisor, and any application shall be applied under the direction of a state-certified Qualified Applicator. The project's restoration ecologist should monitor control efforts to ensure that the target weed species are being adequately addressed without impacting the native plants.

The non-native Bagrada bug (*Bagrada hilaris*) has been documented on the Palos Verdes Peninsula, and is known to cause substantial damage to plant species from the mustard family (*Brassicaceae*) (County of Los Angeles 2013; University of California, Riverside 2013). As black mustard is one of the predominant species within the proposed restoration site, the Bagrada bug may occur; however, it is expected that the damage caused by this insect would be to non-

native mustard species, and not native plants. However, if this species becomes problematic as a pest species on the native plants, then the restoration ecologist will evaluate whether or not control measures are necessary. Similarly, if other deleterious pests (e.g., beetles on bladderpod) become so problematic as to cause container plant mortality, the restoration ecologist may recommend measures to minimize pests and promote healthy plant establishment.

5.2.2 Supplemental Watering System

Supplemental watering will be provided for two to three years after planting to help the container plants become established. Supplemental watering will likely be provided through a drip irrigation system. Supplemental watering would likely be necessary every 3–4 weeks during the dry season, and more frequently immediately after installation if natural rainfall does not provide adequate moisture. If a temporary, on-grade supplemental watering system is installed, it would need to be maintained and repaired as necessary.

The watering system shall be checked regularly to ensure proper operation and adequate coverage of the restoration areas. Problems with the watering system shall be repaired immediately to reduce potential plant mortality or erosion. The frequency and duration of irrigation applications shall be adjusted seasonally in coordination with the project's restoration ecologist to meet habitat needs.

Supplemental watering will be terminated when the plants are well established, as deemed appropriate by the project's restoration ecologist. All above-ground components of the watering system should be removed from the site at the successful completion of the project. The timing for cessation and removal of the irrigation system shall be determined by the project's restoration ecologist.

5.2.3 Clearing and Trash Removal

Trash consists of all man-made materials, equipment, or debris dumped, thrown, washed into, or left within the restoration area. Pruning or clearing of native vegetation is not anticipated to be necessary within the restoration area, unless extensive growth is causing a maintenance problem for a utility or for an area outside of the restoration area. Any pruning or clearing of native vegetation should be approved by the project's restoration ecologist. Deadwood and leaf litter of native vegetation will be left in place to replenish soil nutrients and organic matter.

5.3 Schedule of Maintenance Inspections

The project's restoration ecologist will perform quarterly maintenance/monitoring inspections during the scheduled maintenance and monitoring period. Recommendations for maintenance

efforts will be based upon these site observation visits. Weed control shall be conducted as needed to ensure adequate control to promote healthy establishment of the target habitat types. It is anticipated that weed control will be necessary on a monthly basis during the winter and early spring when weeds are vigorously growing. Weed control during other times of the year will likely be diminished, but conducted as necessary, and as directed

6 MONITORING PLAN

Monitoring of the restoration site has a two-fold purpose: **(1)** To monitor the progress of the Alta Vicente Reserve restoration area by assessing native habitat establishment relative to the established performance standards; and **(2)** To direct and monitor the maintenance activities and determine remedial actions in a manner that ensures that appropriate maintenance occurs in a timely manner. The monitoring will be performed by the project's restoration ecologist.

The project's restoration ecologist will be responsible for monitoring activities of all the work crews during preparation of the restoration area including site clearing and soil preparation, weed control, container plant and seed application, and quarterly monitoring for the duration of the 5-year maintenance and monitoring period.

Reports will be prepared for the restoration areas for five years after the installation is complete. Each report will include qualitative data, photo documentation, and future recommendations for site maintenance as described below.

6.1 Performance Standards

Performance standards have been established for the habitat restoration area based on the guidelines in the draft NCCP and on expected vegetative development relative to undisturbed habitat of the same type (Table 7). The following performance standards apply to the Alta Vicente restoration site:

1. Soil at the site is stable and shows no significant erosion.
2. After five years, non-native plant cover is less than 25% with less than 15% cover of invasive perennial species. After five years, there will be no presence of species on Cal-IPC List A with the possible exception of Cal-IPC List A non-native annual grasses.
3. Native plant cover after three years in the CSS community should be greater than 40% with at least 30% cover from perennial species. At five years, total native cover should be greater than 50% percent with appropriate species diversity.
4. Native plant cover after three years in the cactus scrub community should be greater than 30% with at least 20% cover from perennial species and 5% cover from cactus species. Native plant cover after five years in the cactus scrub community should be greater than 40% with at least 10% cover from cactus.
5. Native plant cover after three years in Palos Verdes blue butterfly habitat should be greater than 30%, but not more than 70%. The remainder should be bare ground.

Perennial (shrub) species should be maintained at between 10% and 50% cover. Ocean locoweed (*Astragalus trichopodus* var. *lonchus*) should constitute at least 10% cover.

6. Native plant cover after three years in the wildflower field should be greater than 30%. Native plant cover after five years should be greater than 40%.

Table 7
Performance Standards

Year	Percent Cover of Native Species (%)				Non-native Cover (for all habitat types)	
	Coastal Sage Scrub	*Cactus Scrub*	*PV Blue Butterfly Habitat*	*Wildflower*	*Invasive Perennial Species Cover*	*Total Non-native Species Cover*
Year 3	>40% (>30% perennial)	>30% (>20% perennial and >5% cacti)	30%-70% native cover; 10%-50% max. shrub cover; >10% host plant cover	>30%	<15% (0% of Cal-IPC List A)*	<25%
Year 5	>50%	>40% (>10% cacti)	30%-70% native cover; 10%-50% max. shrub cover; >10% host plant cover	>40%	<15% (0% of Cal-IPC List A)*	<25%

* The NCCP success criteria allow an exception to the requirement for 0% Cal-IPC List A for non-native annual grasses. In other words, Cal-IPC List A grass species would not count toward the 0% criteria, but would count toward the 25% criteria for total non-native species cover.

The Year 3 performance standards will be utilized to assess the annual progress of the restoration area, and are regarded as interim project objectives designed to reach the final Year 5 goals. Fulfillment of these standards will indicate that the restoration area on the project site is progressing toward the habitat type and functions that constitute the long-term goals of the plan. If the restoration efforts fail to meet the performance standards in any year, the project's restoration ecologist may recommend remedial action to be implemented the following year with the intent to enhance the vegetation to a level of conformance with the original standard. These remedial actions may include re-seeding, re-planting, applying soil amendments, additional weed control measures, erosion control, or adjustments to the watering and maintenance practices.

6.2 Monitoring Methods and Schedule

Annual qualitative assessments will be conducted through visual analysis of the coastal sage scrub, cactus scrub, butterfly habitat and wildflower field to assess vegetation development, weed presence, and plant establishment. Qualitative monitoring will include reviewing the health and vigor of container plants and seed plantings, assessing survival/mortality, checking for the presence of pests and disease, soil moisture content, and the effectiveness of the supplemental watering, erosion problems, invasion of weeds, and the occurrence of trash

and/or vandalism. Representative photographs of the restoration site from stationary photo points will be taken annually.

Permanent vegetation sampling sites will be established within the coastal sage scrub, cactus scrub and the butterfly habitat restoration areas at randomized representative locations. A minimum of one transect shall be established for each two acres of restoration area, and at least one transect for each habitat type. No transects will be established in the wildflower field. Transect data will be collected in Years 3 and 5 from the restoration sites in the spring and will be used to determine compliance and achievement of the restoration performance standards. Transect data will be collected using the point-intercept method to determine percent target vegetation cover and weed cover. If the restoration project is in compliance with the Year 5 performance standards in an earlier monitoring period, then qualitative assessments may be substituted for the quantitative monitoring until the end of the 5-year restoration program. If the restoration site is performing below the interim performance standards, the project's restoration ecologist will determine if remedial measures are necessary.

Each monitoring visit will be followed by a summary of observations, recommendations, and conclusions. Results from the annual monitoring will be used to evaluate the progress of each habitat toward the ultimate goals of the project, and to recommend appropriate management actions.

6.3 Monitoring Reports

The PVPLC will monitor and report on the restoration work underway in the Alta Vicente Reserve. The restoration area will be monitored for five years, with reports prepared annually. Monitoring reports should provide concise, meaningful summaries of the restoration progress and provide direction and maintenance recommendations for future work.

Annual reports will include the following:

1. A description of the restoration and maintenance activities (e.g., seeding, irrigation, weed control, trash removal) conducted on the site during the previous year including the dates the activities were conducted.
2. A description of existing conditions within the restoration site, including descriptions of vegetation composition, weed species, and erosion problems, if any.
3. Qualitative and quantitative monitoring data related to proposed target goals including a comparative analysis of data over the years the project has been monitored.
4. Recommendations for remedial measures to correct problems or deficiencies, if any.
5. Representative photographs of notable observations on site and from fixed photo viewpoints.

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APPENDIX A

Soil Test Results

WALLACE LABS
365 Coral Circle
El Segundo, CA 90245
(310) 615-0116

SOILS REPORT Print Date July 17, 2015 Receive Date 7/16/15

Location Palos Verdes Peninsula, Job No. 9085

Requester Andy Thomson and Jake Marcon, Dudek

graphic interpretation: * very low, ** low, *** moderate

ammonium bicarbonate/DTPA

* * * * high, * * * * * very high

extractable - mg/kg soil

Interpretation of data

low medium high

	Sample ID Number	15-198-01		15-198-02		15-198-03	
	Sample Description	AV #1		AV #2		AV #3	
	elements		graphic		graphic		graphic
0 - 7 8-15 over 15	**phosphorus**	1.77	*	3.28	**	2.64	*
0-60 60 -120 121-180	**potassium**	154.88	****	111.48	***	139.59	****
0 - 4 4 - 10 over 10	**iron**	2.36	*	2.54	**	2.13	*
0- 0.5 0.6- 1 over 1	**manganese**	1.44	****	2.18	****	1.30	****
0 - 1 1 - 1.5 over 1.5	**zinc**	0.86	**	0.81	**	0.87	**
0- 0.2 0.3- 0.5 over 0.5	**copper**	4.44	*****	2.83	****	3.85	*****
0- 0.2 0.2- 0.5 over 1	**boron**	0.30	***	0.21	***	0.23	***
	calcium	201.11	***	189.13	***	295.01	***
	magnesium	520.68	*****	247.46	*****	393.25	*****
	sodium	536.41	*****	141.94	***	192.61	***
	sulfur	9.32	*	10.83	*	11.04	*
	molybdenum	n d	*	0.03	***	0.05	***
	nickel	0.60	*	1.74	**	1.59	**
The following trace	**aluminum**	n d	*	n d	*	n d	*
elements may be toxic	**arsenic**	0.05	*	n d	*	0.03	*
The degree of toxicity	**barium**	2.62	*	1.86	*	3.41	**
depends upon the pH of	**cadmium**	0.23	*	0.24	*	0.39	*
the soil, soil texture,	**chromium**	n d	*	n d	*	n d	*
organic matter, and the	**cobalt**	0.04	*	0.03	*	0.08	*
concentrations of the	**lead**	1.63	**	0.93	*	2.01	**
individual elements as	**lithium**	0.30	*	0.26	*	0.40	*
well as to their interactions.	**mercury**	0.11	*	n d	*	n d	*
	selenium	n d	*	n d	*	n d	*
The pH optimum depends	**silver**	n d	*	n d	*	n d	*
upon soil organic	**strontium**	0.50	*	0.34	*	0.45	*
matter and clay content-	**tin**	n d	*	n d	*	n d	*
for clay and loam soils:	**vanadium**	1.31	**	0.77	*	1.29	**
under 5.2 is too acidic							
6.5 to 7 is ideal	**Saturation Extract**						
over 8.0 is too alkaline	**pH value**	7.91	****	7.95	****	7.87	****
The ECe is a measure of	**ECe (milli-**	0.55	**	0.47	**	0.40	**
the soil salinity:	**mho/cm)**		millieq/l		millieq/l		millieq/l
1-2 affects a few plants	**calcium**	6.8	0.3	18.6	0.9	18.6	0.9
2-4 affects some plants,	**magnesium**	2.0	0.2	6.3	0.5	6.5	0.5
> 4 affects many plants.	**sodium**	78.5	3.4	47.8	2.1	39.6	1.7
	potassium	-0.9	0.0	0.7	0.0	-0.8	0.0
	cation sum		3.9		3.6		3.2
problems over 150 ppm	**chloride**	70	2.0	50	1.4	26	0.7
good 20 - 30 ppm	**nitrate as N**	3	0.2	2	0.1	5	0.4
	phosphorus as P	0.2	0.0	0.2	0.0	0.0	0.0
toxic over 800	**sulfate as S**	8.7	0.5	7.6	0.5	6.6	0.4
	anion sum		2.7		2.0		1.5
toxic over 1 for many plants	**boron as B**	0.21	**	0.41	***	0.15	*
increasing problems start at 3	**SAR**	6.8	****	2.4	**	2.0	**
est. gypsum requirement-lbs./1000 sq. ft.		181		24		80	
	relative infiltration rate	slow	sand - 9.8%	slow	sand - 16.8%	slow	sand - 16.5%
	soil texture	clay	silt - 29.2%	clay	silt - 35.6%	clay	silt - 37.1%
	lime (calcium carbonate)	yes	clay - 61.0%	high	clay - 47.7%	slight	clay - 46.5%
	organic matter	fair		fair		fair	
	moisture content of soil	12.5%	gravel over 2 mm	10.7%	gravel over 2 mm	12.6%	gravel over 2 mm
	half saturation percentage	44.0%	0.4%	40.7%	12.1%	39.3%	1.7%

Elements are expressed as mg/kg dry soil or mg/l for saturation extract.

pH and ECe are measured in a saturation paste extract. nd means not detected.

Sand, silt, clay and mineral content based on fraction passing a 2 mm screen.

Habitat Restoration Plan for the

Portuguese Bend Ecological Reserve in the Palos Verdes Nature Preserve




FEBRUARY 2016

PREPARED BY:

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Encinitas, CA 92024

HABITAT RESTORATION PLAN
for the
Portuguese Bend Reserve
in the
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FEBRUARY 2016

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Habitat Restoration Plan for the Portuguese Bend Reserve in the Palos Verdes Nature Preserve

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APPENDIX

1 INTRODUCTION

This Habitat Restoration Plan (HRP) was prepared for the Portuguese Bend Reserve within the Palos Verdes Nature Preserve (PVNP) located in the City of Rancho Palos Verdes, California (Figures 1 and 2). The Portuguese Bend Reserve is one of ten ecological reserves within the approximately 1,400-acre PVNP. The PVNP is owned by the City of Rancho Palos Verdes and managed by the Palos Verdes Peninsula Land Conservancy (PVPLC).

This HRP discusses implementing 25.7 acres of habitat restoration, consisting of approximately 21.0 acres of coastal sage scrub, 3.7 acres of cactus scrub, and 1.0 acre of Palos Verdes blue butterfly habitat within a disturbed area of the Portuguese Bend Reserve currently dominated by non-native plant species. The HRP addresses restoration design, planting recommendations, installation procedures, maintenance requirements, monitoring methodology, and performance standards.

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FIGURE 1

Regional Map

Habitat Restoration Plan for the Portuguese Bend Ecological Reserve in the Portuguese Bend Nature Preserve

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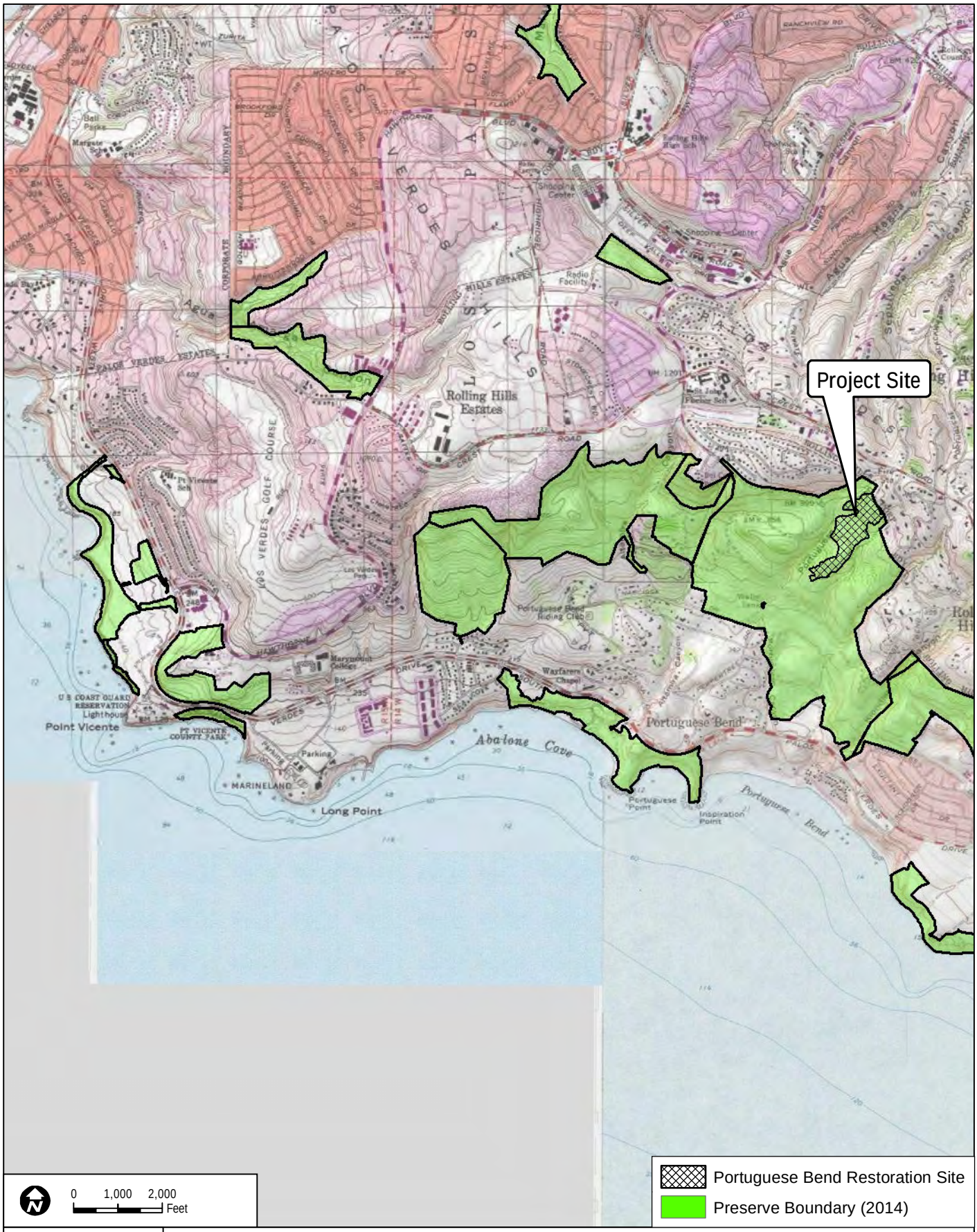

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SOURCE: USGS 7.5-Minute Redondo Beach, San Pedro Series Quadrangles.

FIGURE 2
Vicinity Map

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Habitat Restoration Plan for the Portuguese Bend Ecological Reserve in the Portuguese Bend Nature Preserve

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2 EXISTING CONDITIONS

2.1 Site Description

The Portuguese Bend Reserve is located on the southeastern portion of the Palos Verdes Peninsula near Rancho Del Mar High School. The entire Portuguese Bend Reserve is approximately 399 acres and stretches from Palos Verdes Drive South near the coast, north and upgrade to the terminus of Crenshaw Boulevard. The Reserve is bordered on the north, east, and southwest by developed single family homes, and bordered in the northwest by Filiorum Reserve and the south east by Forrestal Nature Reserve. The proposed restoration area is located along the Ishibashi and Grapevine trails in the northeastern section of Portuguese Bend Reserve.

2.2 Vegetation Communities

Plant communities and land covers within the Portuguese Bend Reserve are typical of plant communities found in this region, exhibiting some level of prior disturbance, but containing elements of the native plant communities. Vegetation mapping of the reserve was prepared by PVPLC and the California Native Plant Society (CNPS) (PVPLC and CNPS 2010). However, a fire burned 165 acres of the reserve on August 27, 2009. A post-fire vegetation survey was conducted in 2011 by PVPLC. According to the vegetation mapping conducted by PVPLC in 2011, the proposed restoration area consists of non-native annual grassland and mixed coastal scrub, comprised of several subtypes (e.g., alliances and associations). The existing vegetation communities present in the restoration area are further described below.

2.2.1 Non-native Grassland

Non-native annual grasses and other annual species dominate the grassland habitat at Portuguese Bend Reserve. PVPLC mapped these areas as fennel stands, and California annual and perennial grassland macrogroup (PVPLC 2012 and CNPS 2010). Annual, non-native grassland generally occurs on fine-textured loam or clay soils that are moist during the winter rainy season and very dry during the summer and fall. This plant community is characterized by dense to sparse cover of annual grasses, often with a combination of native and non-native annual forbs (Holland, 1986). Annual grassland is a disturbance related community that may have replaced native grassland or coastal sage scrub in many localities. On site, areas of annual grassland are heavily dominated by brome grasses (*Bromus* spp.), wild oat (*Avena* spp.), fennel (*Foeniculum vulgare*), tocalote (*Centaurea melitensis*), rattail fescue (*Festuca myuros*), black medic (*Medicago polymorpha*), and black mustard (*Brassica nigra*).

2.2.2 Mixed Coastal Scrub

Mixed Coastal Scrub within the restoration site is composed largely of lemonadeberry (*Rhus integrifolia*), toyon (*Heteromeles arbutifolia*), and California buckwheat (*Eriogonum fasciculatum*). These areas were mapped by PVPLC as *Rhus integrifolia* (disturbed) association, *Rhus integrifolia* (strongly dominant) association, and *Encelia californica-Eriogonum cinereum* association (PVPLC 2012).The understory is dominated by non-native annual species and the shrub canopy is sparse. Within the restoration area, mixed coastal scrub is generally degraded, and the total cover of this plant community is relatively low. Brazilian pepper trees (*Schinus terebinthifolius*) are common in some areas of mixed scrub within the Portuguese Bend restoration area.

2.3 Geology and Soils

The Palos Verdes Peninsula is primarily an old marine terrace with relatively steep eroded canyons which drain southwesterly into the Pacific Ocean. The underlying geologic material consists of marine sedimentary and basaltic rocks. The area is seismically active, with active Palos Verdes and San Pedro fault zones that have caused the peninsula to uplift relative to the adjacent Los Angeles Basin and the offshore bedrock. The Palos Verdes peninsula has a number of active landslide zones, and the restoration area at Portuguese Bend Reserve is located within the Portuguese Bend Landslide Moratorium Area.

The two main soil associations that occur within the Portuguese Bend Reserve are the Altamont-Diablo association and the Diablo-Altamont association (USDA 1969). Soils of the Altamont-Diablo association occur on gently sloping to rolling foothills throughout the Los Angeles basin as far north as Point Dume. Altamont soils are 24–36 inches deep, well drained, and have slow subsoil permeability. Diablo soils are 22–52 inches deep, well drained, and have slow subsoil permeability. They have dark brown, neutral, clay surface layers about 12 inches thick underlain by a brown, calcareous clay subsoil. The Altamont-Diablo association is comprised of approximately 60% Altamont soils and 30% Diablo soils, while the Diablo-Altamont association is composed of approximately 60% Diablo soils and 30% Altamont soils (NRCS 2015).

Three site specific soil samples were collected from the proposed restoration area. The composite soil samples are representative of the general soil conditions at various locations on site. The composite samples were submitted to Wallace Laboratories for analysis of standard soil constituents, agricultural suitability, texture, and cation exchange capacity. Based on the results of the analysis, the soils are classified as clay, with a very slow/slow infiltration rate and low organic matter (Appendix A). The soils on site have a moderate pH, ranging from 6.52 to 7.32, and the salinity is low (ECe = 0.29-0.55). However, major nutrients are lacking as nitrogen is low and phosphorous is very low.

The Portuguese Bend restoration area contains soils that are unlikely to preclude native plant establishment. While nutrients and organic matter are low, native species are adapted to these environments. However, due to the dense, clay-rich soils, plant establishment will likely be slow. Container plants may initially struggle to become established without supplemental watering and will benefit from supplemental nutrient augmentation during planting (e.g., slow-release fertilizer packet).

2.4 Special-Status Species

Three special-status wildlife species have been documented within the Portuguese Bend Reserve, though not in the area identified for restoration. The federally threatened Coastal California gnatcatcher (*Polioptila californica californica*) (CAGN) has been observed to the south and the west of the restoration area, as has the cactus wren (*Campylorhynchus brunneicapillus*) (CAWR) (PVPLC 2012). The federally listed Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*) has also been documented on the Portuguese Bend Reserve but has likely been extirpated from the area,while its host plant, ocean locoweed (*Astragalus trichopodus* var. *lonchus*) is known to occur (Figure 3) (PVPLC 2012).

Additionally, Catalina mariposa lily (*Calochortus catalinae*) and the small-flowered morning glory (*Convolvulus simulans*), which are included on the CNPS Inventory of Rare and Endangered Plants as Rare Plant Rank 4.2 species, have been observed within the restoration area (CNPS 2015; PVPLC 2012) (Figure 3). Restoration crews should receive field training, or be accompanied by a qualified biologist, to avoid impacts to these species. If Catalina mariposa lily bulbs are inadvertently unearthed as part of the restoration activities, they will be reinstalled at the proper depth and orientation in a suitable area nearby. Similarly, restoration activities should be undertaken to avoid impacts to the small flowered morning glory.

2.5 Non-Native Invasive Species

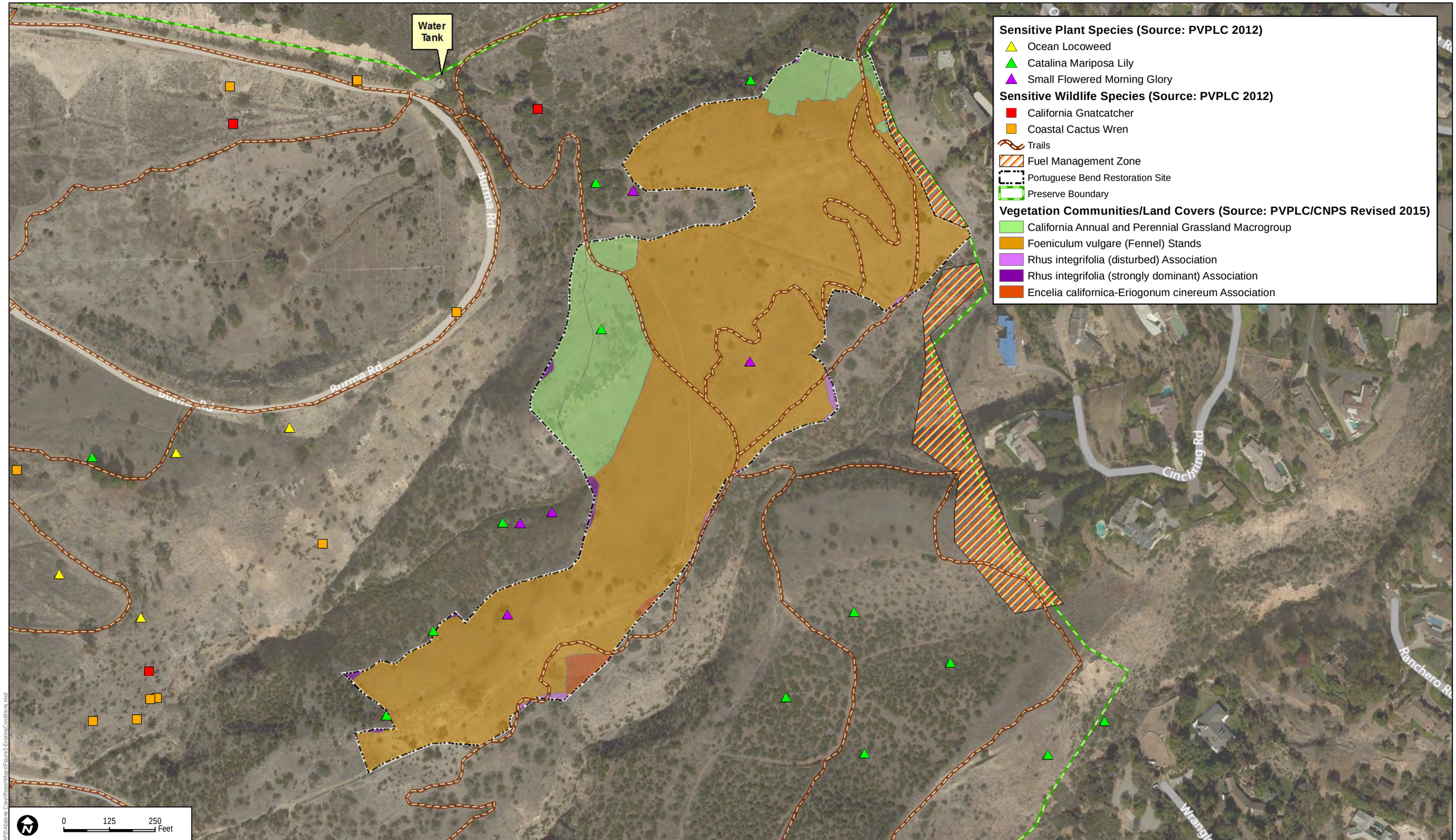
Non-native species are abundant within the areas identified for restoration, and in many areas compose the majority of the existing vegetative cover. Controlling non-native species during the plant establishment phase will present a significant challenge, and should be prioritized as the most critical aspect of the maintenance program. The most predominant non-native species include non-native annual grasses, black mustard, and fennel. These species, as well as additional non-native species observed and expected on site, are provided in Table 1 with their associated rating in the California Invasive Plant Council's (Cal-IPC) Inventory of Invasive Plant Species (2015).

Table 1
Non-Native Plant Species and Associated Cal-IPC Ratings

High
Bromus madritensis ssp. *madritensis*—compact brome
Carpobrotus edulis—hottentot fig
Foeniculum vulgare—fennel
Moderate
Atriplex semibaccata—Australian saltbush
Avena barbata—slender oat
Brachypodium distachyon – false brome
Brassica nigra – black mustard
Bromus diandrus—ripgut brome
Centaurea melitensis—Maltese star-thistle
Euphorbia terracina—Geraldton carnation weed
Festuca myuros – rattail fescue
Glebionis coronaria—crowndaisy
Hordeum murinum—mouse barley
Mesembryanthemum crystallinum—common iceplant
Myoporum laetum—myoporum
Pennisetum setaceum—crimson fountaingrass
Limited
Bromus hordeaceus—soft brome
***Eucalyptus* spp. – red gum, blue gum
Erodium cicutarium—redstem stork's bill
Helminthotheca echioides – bristly ox-tongue
Marrubium vulgare—horehound
Medicago polymorpha—California burclover
Ricinus communis—castorbean
Salsola tragus—prickly Russian thistle
Schinus terebinthifolius—Brazilian peppertree
None
**Acacia cyclops*—coastal wattle
**Malva parviflora*—cheeseweed mallow
**Melilotus indicus*—annual yellow sweetclover

* Note that while there are several species on the list that do not have a Cal-IPC rating for the state of California, that some of these species can be locally invasive. Species with an asterisk are considered to be moderately invasive within the region and should be aggressively controlled. The Targeted Exotic Removal Program for Plants (TERPP) provides additional target invasive species (PVPLC 2013) that may occur on-site

** Note that some mature non-native ornamental trees that are not presenting a significant threat of invasion will be left in place and not removed in order to retain avian habitat and the general character of the site. Seedlings and young saplings less than 5 feet tall will be removed.



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AERIAL SOURCE: Palos Verdes Peninsula Land Conservancy, 2014; Bing Maps, 2015

FIGURE 3

Existing Conditions

Habitat Restoration Plan for the Portuguese Bend Ecological Reserve in the Portuguese Bend Nature Preserve

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3 RESTORATION PROGRAM

This HRP outlines the restoration implementation strategy for upland habitat at the Portuguese Bend Reserve and proposes to provide for the restoration of approximately 25.7 acres of native habitat. The approach to restoration included in this HRP is to assist the recovery of the degraded ecosystem through planting and seeding in order to re-establish or enhance biological functions and services within the restoration area at Portuguese Bend Reserve.

3.1 Restoration Site Goals and Objectives

The disturbed habitat existing in the proposed restoration location currently limits wildlife use and promotes continued dominance of invasive weed species within the Portuguese Bend Reserve. The planting of native coastal sage scrub and cactus scrub species will provide contiguous native habitat that includes a mosaic of shrub cover which is resistant to the invasion of invasive weed species and provides increased nesting, cover, and foraging opportunities for wildlife. In particular, the overarching goal of the restoration program is to provide habitat for Coastal California gnatcatcher, cactus wren and Palos Verdes blue butterfly.

Coastal scrub restoration is also intended to provide improved foraging habitat for resident and migrating wildlife species, and potential nesting and foraging habitat for other sensitive wildlife species. Achievement of the performance standards described herein would create suitable habitat for Coastal California gnatcatcher and cactus wren, however, occupation of the site by these species is not a requirement for successful project completion. Habitat restoration will also help close off unofficial trails which would otherwise be continually maintained by repeated public use.

In addition to these broad goals, the following site-specific objectives for the Portuguese Bend Reserve restoration site have been incorporated into this HRP in the interest of minimizing adverse impacts to biological resources:

- Avoid additional or unplanned disturbance to existing native habitats during implementation of the project construction and long-term maintenance activities;
- Prevent any impacts to sensitive plant or wildlife species during implementation of the project construction and long-term maintenance activities;
- Control non-native invasive weed species considered to be highly or moderately invasive on the Cal-IPC Invasive Plant Inventory (2015), and others identified by PVPLC as locally invasive (PVPLC 2013);

- Utilize erosion control measures in the form of "Best Management Practices" (BMPs) on the site as conditions necessitate;
- Reintroduce special-status plant species as components of the planting plans where feasible and as appropriate.

3.2 Habitat to be Established and Enhanced

The habitat restoration program consists of site preparation (primarily non-native plant species control), native planting, seeding, supplemental watering, maintenance, and monitoring. Proposed planting for coastal sage scrub and cactus scrub will focus primarily on the installation of container plants to achieve the project goals. A native seed mix may also be applied as a supplemental measure to increase cover and diversity of native species.

The habitat restoration area is largely dominated by non-native species. The existing grasslands in the restoration area are composed largely of non-native annual herbs, including fennel, black mustard, and non-native grasses (Figure 4). Some mixed coastal scrub exists within the restoration area but it is currently disturbed to the point that enhancement activities should be undertaken. The non-native perennial species coastal wattle and Brazilian pepper exist currently within the sparse mixed coastal scrub.

Coastal sage scrub, cactus scrub and Palos Verdes blue butterfly habitat will be restored as described below and depicted on Figure 5. It is expected that all planting will be installed to mimic the natural distribution and vegetation mosaic of adjacent, intact habitats. The planting palette provides for planting species in groups to create a natural, random distribution of plant community components.

Photo 1: Representative view of the lower restoration area (facing south-west)

Photo 2: Non-native annual plants in the upper restoration area (fennel, brome grasses, wild oat)

Photo 3: Non-native annual grassland in the upper restoration area

Photo 4: Non-native annual weeds in the cactus scrub planting area

Photo 5: Representative view of the restoration area from the north

Photo 6: Invasive annual weeds in the upper restoration area off Ishibashi Trail

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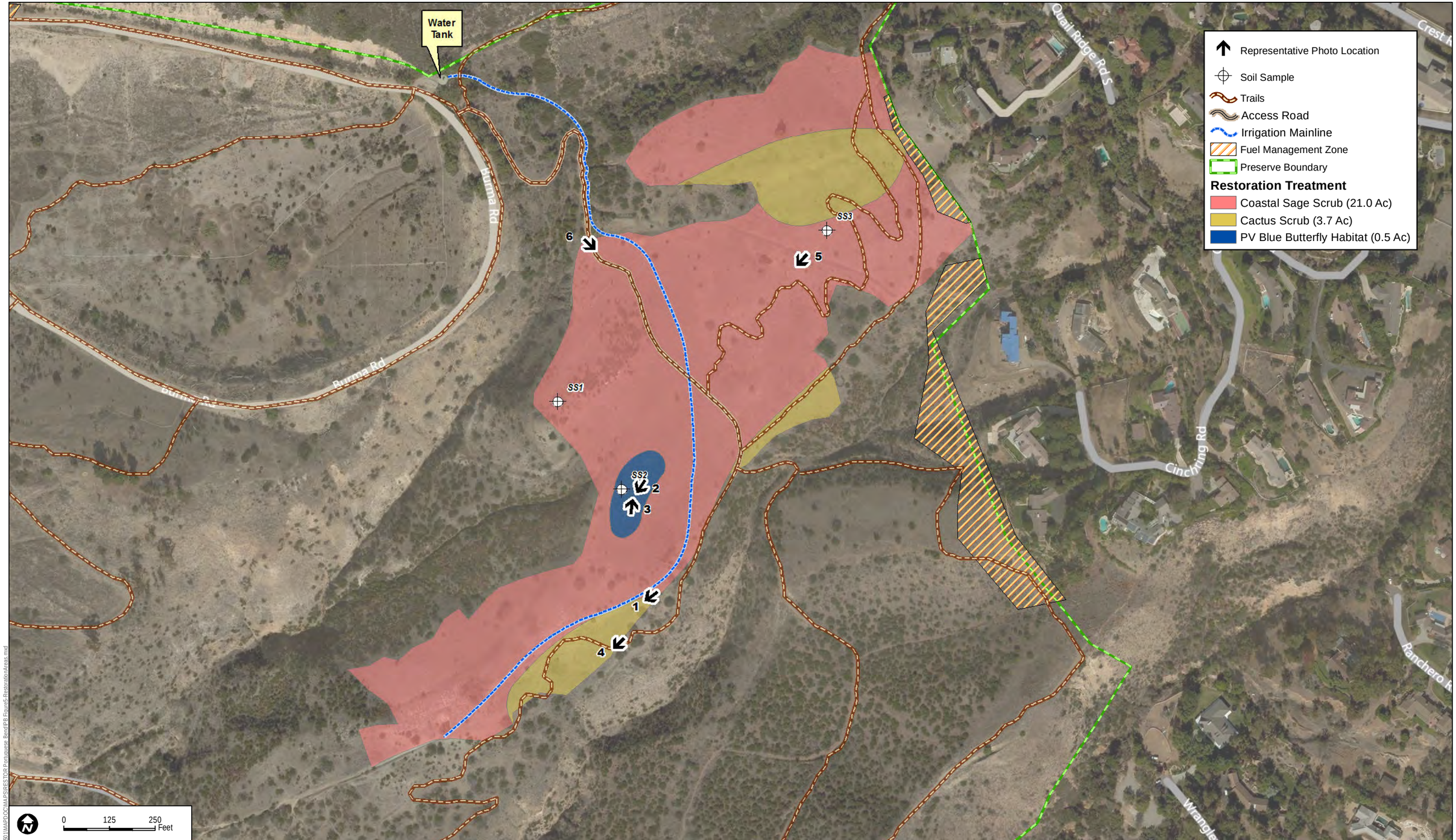

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SOURCE: Palos Verdes Peninsula Land Conservancy, 2014; Bing Maps, 2015

FIGURE 5

Portuguese Bend Restoration Area

Habitat Restoration Plan for the Portuguese Bend Ecological Reserve in the Portuguese Bend Nature Preserve

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3.2.1 Coastal Sage Scrub

The restoration strategy for coastal sage scrub habitat on the Portuguese Bend Reserve restoration site includes reintroducing regionally appropriate native coastal sage scrub species that are currently present in adjacent native habitats. The plant palette includes a container plant and seed mix composition (Table 2) that has been designed to replicate the native composition of a healthy coastal sage scrub plant community similar to existing coastal sage scrub habitat present on the Portuguese Bend Reserve site. Its specific intent is to provide habitat suitable for occupation by coastal California gnatcatcher. The planting palette has thus been designed to contain a composition of shrub species that are dominant in coastal sage scrub habitat occupied by coastal California gnatcatcher (Atwood et al. 1994). On the Palos Verdes Peninsula, the primary coastal sage scrub dominants include California sagebrush, California brittlebush, and coastal buckwheat, with coast goldenbush, lemonadeberry, California buckwheat, sages, bladderpod, and coast prickly-pear as common constituents.

Table 2
Proposed Coastal Sage Scrub Planting Palette (Approximately 21.0 Acres)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Container Plants						
Artemisia californica	California sagebrush	D40	5	5	383	8,065
Astragalus trichopodus var. *lonchus*	Ocean locoweed	D40	3	7	160	3,373
Baccharis pilularis	Coyote brush	D40	5	3	35	733
Brickellia californica	California bricklebush	D40	5	3	87	1,833
Corethrogyne filaginifolia	Common sandaster	D40	3	3	48	1,018
Crossosoma californicum	California rockflower	D40	5	5	52	1,100
Cylindropuntia prolifera	Coastal cholla	1-gallon	4	10	27	573
Elymus condensatus	Giant wildrye	D40	5	3	44	917
Encelia californica	California brittlebush	D40	5	5	314	6,599
Eriogonum cinereum	Coastal buckwheat	D40	5	5	70	1,466
Eriogonum fasciculatum	California buckwheat	D40	5	5	244	5,132
Eriophyllum confertifolium	Golden yarrow	D40	3	3	48	1,018
Heteromeles arbutifolia	Toyon	D40	8	1	14	286
Isocoma menziesii	Coast goldenbush	D40	5	3	52	1,100
Mirabilis laevis var. *crassifolia*	Wishbone bush	D40	3	5	145	3,055
Opuntia littoralis/oricola	Chaparral prickly-pear	1-gallon	4	10	27	573
Peritoma arborea	Bladderpod	D40	5	5	17	367

Table 2
Proposed Coastal Sage Scrub Planting Palette (Approximately 21.0 Acres)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Container Plants						
Rhus integrifolia	Lemonadeberry	D40	15	1	2	41
Salvia leucophylla	Purple sage	D40	5	5	87	1,833
Salvia mellifera	Black sage	D40	5	3	87	1,833
				Total Container Plants	**1,943**	**40,915**
Seed Mix						
Botanical Name	*Common Name*	*Pure Live Seed*	*Lbs. Per Acre*			*Total Lbs.*
Eschscholzia californica var. *maritima*	California poppy	74	3.0			63.1
Lupinus bicolor	Miniature lupine	78	2.0			42.1
Lupinus succulentus	Arroyo lupine	81	4.0			84.2
Melica imperfecta	Smallflower melicgrass	54	0.5			10.5
Stipa lepida	Foothill needlegrass	80	2.0			10.5
Stipa pulchra	Purple needle-grass	54	8.0			42.1
		Total Lbs. Per Acre	**19.5**			**410.3**

3.2.2 Cactus Scrub

The restoration strategy for cactus scrub is comparable to that described for coastal sage scrub, except that the composition of species has been modified to allow coast prickly-pear cactus (*Opuntia littoralis*) to dominate. The plant palette includes a container plant and seed mix composition (Table 3) that has been designed to replicate the native composition of a healthy cactus scrub plant community similar to existing cactus scrub habitat adjacent to the restoration site, and with the specific intent to provide habitat suitable for occupation by cactus wren.

Table 3
Proposed Cactus Scrub Planting Palette (3.7 Acres)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Container Plants						
Artemisia californica	California sagebrush	D40	5	5	261	975
Astragalus trichopodus var. lonchus	Ocean locoweed	D40	3	7	76	285

Table 3
Proposed Cactus Scrub Planting Palette (3.7 Acres)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Container Plants						
Baccharis pilularis	Coyote brush	D40	6	5	12	45
Brickellia californica	California bricklebush	D40	5	5	17	65
Corethrogyne filaginifolia	Common sandaster	D40	3	3	24	90
Cylindropuntia prolifera	Coastal cholla	1-gallon	4	5	408	1,523
Encelia californica	California brittlebush	D40	5	3	87	325
Eriogonum fasciculatum	California buckwheat	D40	5	5	174	650
Isocoma menziesii	Coast goldenbush	D40	5	5	17	65
Mirabilis laevis var. *crassifolia*	Wishbone bush	D40	4	5	27	102
Opuntia littoralis/oricola	Coast prickly-pear	1-gallon	6	5	523	1,950
Peritoma arborea	Bladderpod	D40	6	5	12	45
Rhus integrifolia	Lemonadeberry	D40	15	1	2	7
Salvia mellifera	Black sage	D40	5	3	87	325
			Total Container Plants		**1,727**	**6,452**
Seed Mix						
Botanical Name	*Common Name*	*Pure Live Seed*	*Lbs. Per Acre*			*Total Lbs.*
Eschscholzia californica var. *maritima*	California poppy	74	3.0			11.2
Lupinus bicolor	Miniature lupine	78	2.0			7.5
Phacelia cicutaria	Caterpillar phacelia	80	1.0			3.7
Salvia columbariae	Chia	54	1.0			3.7
Stipa lepida	Foothill needlegrass	54	2.0			7.5
Stipa pulchra	Purple needle-grass	42	8.0			29.8
		Total Lbs. Per Acre	**17.0**			**63.4**

3.2.3 Palos Verdes Blue Butterfly Habitat

The restoration strategy for Palos Verdes blue butterfly habitat is comparable to that described for coastal sage scrub, except that the composition of species was modified to be dominated by one of the Palos Verdes blue butterfly host plants, locoweed (Table 4). Deerweed (*Acmispon glaber*), the other known host plant, was not included in the plant palette because the U.S. Fish and Wildlife Service believes it was not historically found in the area. Both of these plant species are considered early successional and are often found in the open areas of coastal sage scrub communities.

Historically these host plant species were associated with natural occurrences such as fire, landslides, and animal burrowing. With the introduction of human intervention, this natural cycle of disturbance and growth has changed. Humans have introduced many highly adaptable annual exotic grasses that flourish in these same open areas inhabited by both ocean locoweed and out-compete the native species for both water and nutrients. In addition, fire suppression has resulted in the establishment of continuous bands of mature coastal sage scrub communities, whereby not only is species diversity decreased, but open areas required for the establishment and development of species such as ocean locoweed are decreased as well.

To maximize the potential for the continued presence of the two Palos Verdes blue butterfly host plant species, restoration efforts must follow a two-fold approach. First, is the establishment of additional Palos Verdes Blue butterfly habitat to provide the necessary resources to support the blue butterfly. In addition, newly established habitat must be maintained on a continuous basis to ensure the continued existence of gaps within which provide the open areas necessary for both ocean locoweed species to persist. Since fire, in the form of controlled burns, is not an option at the Portuguese Bend site, open areas may require regular on-going maintenance through mechanical means.

The shrub spacing provided in the planting palette is slightly greater than in the CSS restoration areas and the planting palette is designed for only 50% coverage (including 30% ocean locoweed and 20% coverage of other shrubs) to allow for more openings in the habitat.

Table 4
Proposed Palos Verdes Blue Butterfly Habitat Planting Palette (1.0 Acre)

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Total # Plants
Container Plants						
Artemisia californica	California sagebrush	D40	6	5	61	61
Astragalus trichopodus var. *lonchus*	Ocean locoweed	D40	2	7	1,634	1,634
Corethrogyne filaginifolia	Common sandaster	D40	3	3	145	145
Elymus condensatus	Giant wildrye	D40	6	3	12	12
Encelia californica	California brittlebush	D40	6	3	12	12
Eriogonum fasciculatum	California buckwheat	D40	6	5	24	24
Eriogonum parvifolium	Coast buckwheat	D40	6	5	12	12
Eriophyllum confertiflorum	Golden yarrow	D40	3	3	97	97
Mirabilis laevis var. *crassifolia*	Wishbone bush	D40	4	5	54	54
Peritoma arborea	Bladderpod	D40	6	5	12	12
Salvia leucophylla	Purple sage	D40	6	5	12	12
Salvia mellifera	Black sage	D40	6	3	12	12
			Total Container Plants		**2,087**	**2,087**

Table 4
Proposed Palos Verdes Blue Butterfly Habitat Planting Palette (1.0 Acre)

Seed Mix				
Botanical Name	*Common Name*	*Pure Live Seed*	*Lbs. Per Acre*	*Total Lbs.*
Asclepias fascicularis	narrow leaved milkweed	50	1.0	1.0
Castilleja exserta	purple owl clover	25	0.5	0.5
Clarkia purpurea	winecup clarkia	80	0.5	0.5
Deinandra fasciculata	fascicled tarplant	3	1.0	1.0
Eschscholzia californica var. *maritima*	California poppy	74	2.0	2.0
Lasthenia californica	California goldfields	30	1.0	1.0
Layia platyglossa	tidy tips	60	1.0	1.0
Lupinus bicolor	pygmy lupine	78	2.0	2.0
Lupinus succulentus	arroyo lupine	81	4.0	4.0
Stipa lepida	foothill needlegrass	54	2.0	2.0
Stipa pulchra	purple needlegrass	42	8.0	8.0
		Total Lbs.	**23.0**	**23.0**

3.3 Revegetation Materials

Plant materials for the restoration area will include container stock and seed of coastal scrub species, as indicated in the plant palettes provided in Tables 2 and 3. Container plant materials will be grown at the PVPLC nursery from native seed collected on the Palos Verdes Peninsula, as practicable. The nursery will grow the plants in D40 Deepots. Additionally, for the seed mixes, PVPLC will collect available seed from the peninsula for application at the restoration site. If some species cannot be grown as container stock at the PVPLC nursery, or local seed is not available for collection, the planting palettes may be adjusted, or another source may be used for acquiring locally sourced plant materials.

DriWater may also be used to aid plant establishment in portions of the site where supplemental watering is infeasible or insufficient to promote plant establishment. DriWater is a natural cellulose gum gel that retains moisture, which is slowly released into the soil when the gel is broken down by naturally occurring enzymes. The moisture released from the DriWater gel then becomes available for uptake by developing plant roots. DriWater can be applied in cardboard cartons or in plastic tubes with gel packs. DriWater can be costly to utilize on large scale restoration projects, and therefore would only be used in special cases.

3.4 Target Functions and Values

The primary functional goal of the restored coastal sage scrub is to restore vegetation that contains a diversity of native coastal scrub plant species and that provides habitat value for sensitive wildlife species, particularly for coastal California gnatcatcher. Additionally, a secondary consideration is to create contiguous and intact habitat which resists the re-establishment of invasive plant species.

3.5 Time Lapse

The length of time to develop high quality habitat depends on a variety of factors including weather, soil conditions, herbivory, weed competition, and maintenance quality. Under optimal conditions, coastal sage scrub and cactus scrub may take approximately three years from the installation of container plants and seed to develop the appropriate structure to provide the functions and values needed for habitation of wildlife, including suitable nesting habitat for California gnatcatcher and other coastal scrub species. In an unirrigated setting, and with drought conditions, scrub development may take longer than three years to mature enough to be suitable for nesting. As a hedge against drought, the addition of a supplemental watering system would increase plant survival, improve establishment, and hasten habitat development.

4 IMPLEMENTATION PLAN

4.1 Rationale for Expecting Success

The identified locations for restoration on the Portuguese Bend Reserve are directly adjacent to viable and self-sustaining native habitats, indicating appropriate environmental conditions to support the intended coastal sage scrub and cactus scrub habitat. This HRP includes a provision for supplemental watering to promote establishment and survival of native species included in the plant palette. The HRP also includes a 5-year maintenance plan, wherein invasive non-native weeds within the restoration site will be controlled to aid native plant establishment. Additionally, native plant materials will be grown or collected from sources on the Palos Verdes Peninsula, thus preserving genetic integrity and increasing the potential for long-term success.

4.2 Preliminary Schedule

Appropriate timing of planting and seeding will minimize the need for supplemental watering and will increase the survival rate of the installed plants. The best survival rates are achieved when container plants and seed are installed at the onset of the rainy season or soon thereafter (November through February). Planting and seeding at the site should be timed to take advantage of seasonal rainfall patterns and most appropriate growing season temperatures (see Charts 1-2 and Table 5).

Table 5
Preliminary Restoration Project Schedule

Task	Date
Site clearing	Fall 2015
Invasive weed species control and grow-kill cycles	Winter and Spring 2016
Installation of supplemental watering system*	Summer 2016
Planting container stock	Fall and Early Winter 2016
Seed application	Fall and Early Winter 2017
Monitoring and maintenance	To begin upon successful installation of container plants

Chart 1
Average Monthly Precipitation for the Portuguese Bend Nature Preserve

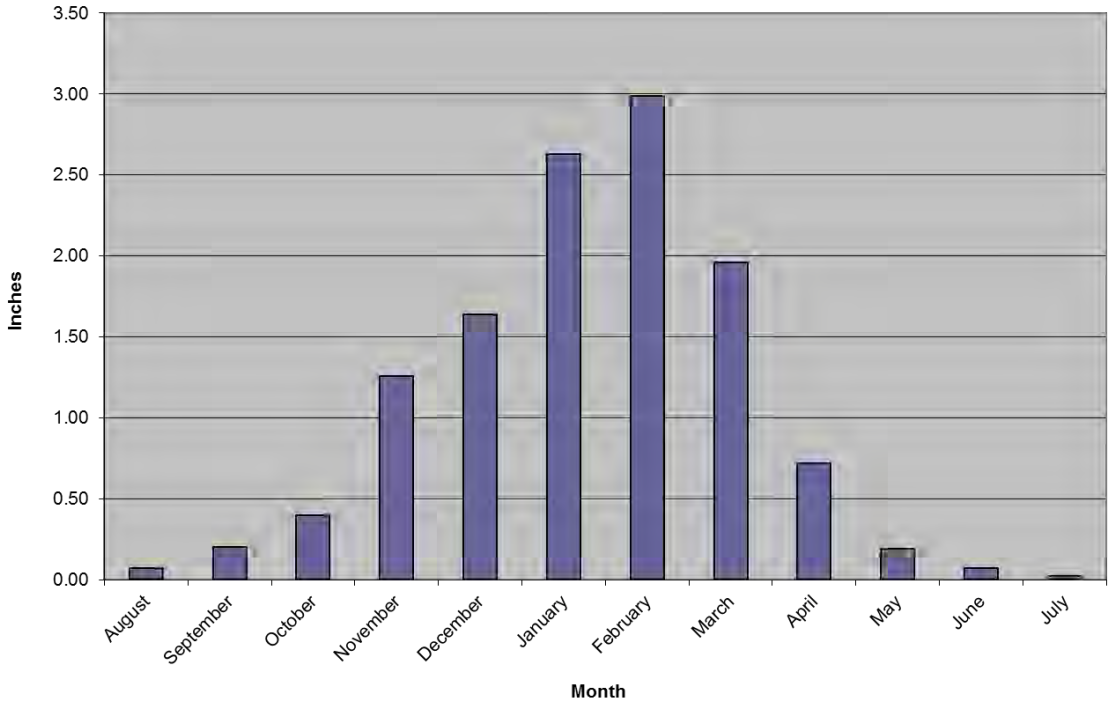
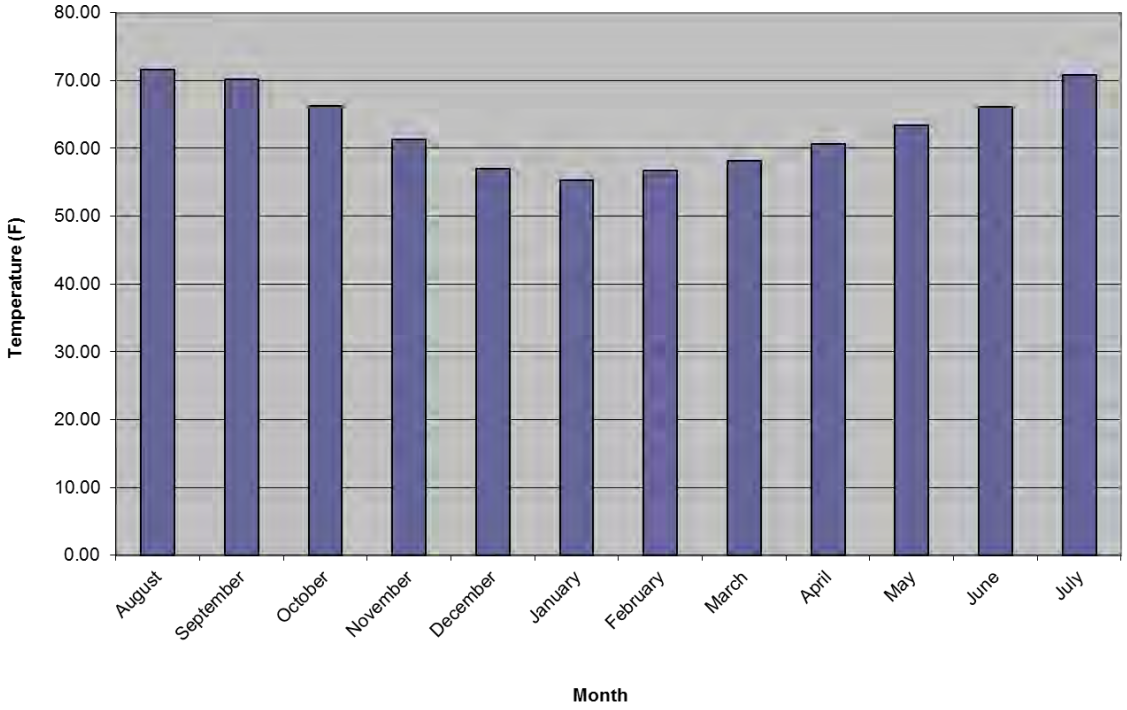


Chart 2
Average Monthly Temperatures for the Portuguese Bend Nature Preserve



4.2.1 Site Preparation

Site preparation includes control of invasive weed species and soil preparation in the restoration area. If clearing of weeds is planned to be performed during the migratory bird nesting season (February 15–September 15), a nesting bird survey should be conducted by a qualified wildlife biologist within 72 hours prior to vegetation removal in accordance with the Migratory Bird Treaty Act (16 U.S.G. 703-712).

During site preparation, all invasive weed species, particularly non-native annual grasses, black mustard, and fennel, should be killed and removed from the restoration area. Invasive species control should also include exotic trees and shrubs such as Brazilian pepper and coastal wattle as directed by PVPLC staff and the Wildlife Agencies.

The initial weed control effort will involve a combination of chemical and mechanical treatment. Prior to the installation of native plant materials, "grow and kill" weed removal treatments should be conducted by allowing non-native seedling emergence in the winter and spring. When weeds have begun to grow, and before they begin to develop flowers or flowering structures, a foliar application of an appropriate systemic herbicide should be applied to kill target weeds. If adequate rainfall has occurred during this period, multiple grow-kill cycles should be repeated. The restoration ecologist will provide weed control recommendations to the restoration maintenance staff that are specific to the target weed species identified for control. Any use of herbicides shall be in accordance with label instructions, following the recommendations of a licensed Pest Control Advisor, and any application shall be applied under the direction of a state-certified Qualified Applicator.

4.2.2 Supplemental Watering System

The planned method of providing supplemental watering at the proposed restoration area is with a temporary above-ground drip irrigation system. This will help ensure that native container plants and seeds installed on site will become adequately established. The supplemental watering system would only be used until the plants are established such that they can survive on their own between periods of rainfall. It is expected that, depending upon the level of plant establishment, the watering system would be removed after two to three years of use. Watering on site will gradually be decreased prior to the removal of the system so the plants can become acclimated to the site's natural conditions.

The proposed restoration area at the Portuguese Bend Reserve is located within the Palos Verdes City Landslide Moratorium Area. The PVPLC must therefore receive approval from

the city to irrigate the restoration area, and the restoration effort may necessarily occur in phases due to permitting restrictions.

The preferred approach for the supplemental watering system is to connect to the existing fire hydrant near the water tank located on Burma Road trail to the west of the project site. The PVPLC currently maintains a mainline that runs through the middle of the restoration site, and a 330 gallon water tank located part way down the slope that can be filled from the mainline. However, the current temporary irrigation system will need to be revamped to accommodate a large-scale planting effort as proposed in this restoration plan. The supplemental watering system should be designed by a landscape architect to ensure that the system has adequate water pressure to reach all planting areas.

Additional options that can be investigated if the preferred option is insufficient include connecting to a water source at the top of the hill near the LA County Fire Station. Alternatively, there is a Palos Verdes Peninsula Transit Authority building to the west of the fire station that may have a tie-in point. Coordination with these organizations and adjacent landowners would be required to arrange for this point of connection, and approval from the City would be necessary.

4.2.3 Erosion Control

Where needed, erosion control measures, such as the installation of sandbags, fiber rolls, silt fencing, and/or erosion-control matting may be necessary to control erosion until target vegetation is established. At a minimum, silt fencing should be installed at the toe of slopes that are unvegetated after removing non-native species. No erosion control devices should be used that contain seed from non-native plants. The need and location of erosion control will be determined in the field by the project's restoration ecologist and special care will be taken due to the City landslide moratorium area.

4.2.4 Plant Installation

Standard planting procedures will be employed for installing container stock. Planting holes shall be approximately twice the width of the rootball, and as deep. If dry soil conditions exist at the time of plant installation, planting holes will be filled with water and allowed to drain immediately prior to planting. A fertilizer packet with controlled-release fertilizer (e.g., Best Paks 20-10-5) will be placed in the bottom of each hole prior to planting. A planting basin shall be created surrounding each container plant to retain water during supplemental watering events.

4.2.5 Seed Application

Due to the difficult access at this site, hydroseeding is probably not feasible. Further, seed application is primarily a supplemental feature to increase diversity and will not occur until the second year of the Restoration Program. Therefore, seed shall be hand broadcast. Prior to seeding, the area should be prepared by removing weedy vegetation to expose the soil surface. The seed should be raked into the soil so there is good seed-soil contact. Seeding should be timed to occur prior to, or early in, the rainy season.

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5 MAINTENANCE PLAN

The purpose of the maintenance plan is to provide guidelines for long-term maintenance of the restoration site during the establishment period. Maintenance activities will be initiated during the weed reduction period (i.e., grow-kill cycles), and will occur at the discretion of the project's restoration ecologist on an as-needed basis. The maintenance period will intensify after the installation of the container plants and will be necessary until the habitats are fully established, which is estimated to take approximately five years.

Because the goal of this project is to establish a natural system that can support itself with little or no maintenance, the primary focus of the maintenance plan is concentrated in the first few seasons of plant growth following the revegetation effort, at a time when weeds can easily out-compete native plants. The intensity of the maintenance activity is expected to subside each year as the native plants become more well established, and local competition from non-native plants for resources is minimized through direct removal and treatment of non-native plants.

5.1 Maintenance Activities

Maintenance activities will be primarily related to non-native invasive plant species control. Supplemental watering, supplemental planting, trash removal, and erosion control will also be conducted, as necessary.

- Non-native plant species should be controlled as soon as they begin to establish. Recommended control methods should be tailored to each specific weed species and should include the most effective control measures for the species and time of year. Control methods may include a combination of manual, mechanical, and chemical control.
- Container plants should be watered when natural rainfall is not adequate to sustain the establishing plants. The project's restoration ecologist will be responsible for scheduling the supplemental watering to promote plant establishment. Supplemental watering should be conducted as deep, soaking watering to promote deep rooting.
- Generally, the site will not be fertilized during the maintenance period unless determined necessary by the project's restoration ecologist as a remedial measure to correct soil nutrient deficiencies.
- Deadwood and leaf litter of native vegetation should not be removed. Deadwood and leaf litter provide valuable microhabitats for invertebrates, reptiles, small mammals, and birds. Non-organic trash and debris should be removed from the revegetation area on a regular basis.

- Erosion control materials should be maintained in working order until they are deemed no longer necessary by the project's restoration ecologist. Maintenance of erosion control materials may include repairing or replacing dilapidated, damaged, or ineffective materials.
- Herbivory protection may be necessary to limit damage to plants and water lines. Herbivory protection may include caging susceptible plants and repairing damage to water lines (see Section 5.2.4 below).

5.2 General Habitat Maintenance Guidelines

5.2.1 Weed Control

Weeds are expected to be the primary pest problem in the restoration area during the first several years of the maintenance period. Weeds should be controlled so they do not prevent the establishment of the native species or invade adjacent areas. A combination of physical removal, mechanical treatments (weed whipping) and appropriate herbicide treatments should be used to control the non-native/invasive plant species. Weeds should be controlled prior to setting seed, and should be removed from the site if they become large enough to block sunlight to developing native plants.

Re-establishment of non-native plants onto the site can be adequately minimized by regular and timely maintenance visits with implementation of effective weed control measures. Weed control will require constant diligence by the maintenance personnel. Invasive plant species, such as those listed in Table 1 should be controlled wherever possible within the restoration area. Mature invasive tree species will be retained at the discretion of the PVPLC, though a majority should be removed to reduce the spread of additional weed propagules.

Removal of weeds by hand, where practicable and effective, should be done around individual plantings and native seedlings to avoid inadvertent damage to the native species. However, several of the invasive species may be more effectively controlled with herbicide due to their tenacious and spreading root systems, their size, or their ability to re-sprout from root fragments. All herbicides shall be used in accordance with label instructions, following the recommendations of a licensed Pest Control Advisor, and any application shall be applied under the direction of a state-certified Qualified Applicator. The project's restoration ecologist should monitor control efforts to ensure that the target weed species are being adequately addressed without impacting the native plants.

The non-native Bagrada bug (*Bagrada hilaris*) has been documented on the Palos Verdes Peninsula, and is known to cause substantial damage to plant species from the mustard family (*Brassicaceae*) (County of Los Angeles 2013; University of California, Riverside 2013). As black mustard is one of the predominant species within the proposed restoration site, the Bagrada bug may occur; however, it

is expected that the damage caused by this insect would be to non-native mustard species, and not native plants. However, if this species becomes problematic as a pest species to the native plants, the restoration ecologist will evaluate whether or not control measures are necessary. Similarly, if other deleterious pests (e.g., beetles on bladderpod) become problematic enough to cause container plant mortality, the restoration ecologist may recommend measures to minimize pests and promote healthy plant establishment.

5.2.2 Supplemental Watering System

Supplemental watering will be provided for a maximum of three years after planting to help the container plants become established. Supplemental watering will likely be provided through a drip irrigation system. Supplemental watering would likely be necessary every 3–4 weeks during the dry season, and more frequently immediately after installation if natural rainfall does not provide adequate moisture. If a temporary, on-grade supplemental watering system is installed as described in Section 4.4, it would need to be maintained and repaired as necessary.

The watering system shall be checked regularly to ensure proper operation and adequate coverage of the restoration areas. Problems with the watering system shall be repaired immediately to reduce potential plant mortality or erosion. The frequency and duration of irrigation applications shall be adjusted seasonally in coordination with the project's restoration ecologist to meet habitat needs.

Supplemental watering will be terminated when deemed appropriate by the project's restoration ecologist. All above-ground components of the watering system should be removed from the site at the successful completion of the project. The timing for cessation and removal of the irrigation system shall be determined by the project's restoration ecologist.

5.2.3 Clearing and Trash Removal

Trash consists of all man-made materials, equipment, or debris dumped, thrown, washed into, or left within the restoration area. Pruning or clearing of native vegetation is not anticipated to be necessary within the restoration area, unless extensive growth is causing a maintenance problem for a utility or for public trail usage. Any pruning or clearing of native vegetation should be approved by the project's restoration ecologist. Deadwood and leaf litter of native vegetation will be left in place to replenish soil nutrients and organic matter.

5.2.4 Herbivory Protection

Some grazing and browsing by native wildlife is expected to occur within the restoration areas. The plant palettes for each vegetation community have been designed to accommodate a moderate level of plant browsing. If browse levels should become elevated (i.e., if significant

plant mortality and cover reduction occurs) as indicated by qualitative or quantitative monitoring of the restoration sites, remedial measures may be recommended. Additional protective cages/browse guards (plastic or wire mesh) may need to be installed around the base of young shrubs in affected areas to reduce plant mortality. Plastic tree shelters shall not be used due to problems associated with excessive heat within the plastic shelters in the summer months causing plant mortality. In addition to plant protection, remedial planting or seeding may be necessary depending upon the stage of the restoration effort and overall vegetative cover.

Damage to the supplemental watering system by animals may also become problematic. The restoration ecologist and restoration crew should carefully monitor any damage to the system and address issues immediately before plant loss or erosion issues are exacerbated. Repairs in problematic areas may include converting drip line to hard line, caging, or burial of sections subject to repeated damage.

5.3 Schedule of Maintenance Inspections

The project's restoration ecologist will perform quarterly maintenance/monitoring inspections during the scheduled maintenance and monitoring period. Recommendations for maintenance efforts will be based upon these site observation visits. Weed control shall be conducted as needed to ensure adequate control to promote healthy establishment of the target habitat types. It is anticipated that weed control will be necessary on a monthly basis during the winter and early spring when weeds are vigorously growing. Weed control during other times of the year would likely be diminished, but conducted as necessary, and as directed by the project's restoration ecologist.

6 MONITORING PLAN

Monitoring of the restoration site has a two-fold purpose: **(1)** To monitor the progress of the Portuguese Bend Reserve restoration area by assessing native habitat establishment relative to the established performance standards; and **(2)** To direct and monitor the maintenance activities and determine remedial actions in a manner that ensures appropriate maintenance occurs in a timely manner. The monitoring will be performed or directed by the project's restoration ecologist.

The project's restoration ecologist will be responsible for monitoring activities of all the work crews during preparation of the restoration area including site clearing and soil preparation, weed control, container plant and seed application, and quarterly monitoring for the duration of the 5-year maintenance and monitoring period.

Reports will be prepared for the restoration areas after installation is complete in Years 1-3 and Year 5. Each report will include qualitative data, photo documentation, and future recommendations for site maintenance as described below.

6.1 Performance Standards

Performance standards have been established for the habitat restoration area based on the guidelines in the draft NCCP and on expected vegetative development relative to undisturbed habitat of the same type (Table 6). The following performance standards apply to the Portuguese Bend restoration site:

1. Soil at the site is stable and shows no significant erosion.
2. After five years, non-native plant cover is less than 25% with less than 15% cover of invasive perennial species. After five years, there will be no presence of species on Cal-IPC List A with the possible exception of Cal-IPC List A non-native annual grasses.
3. Native plant cover after three years in the CSS community should be greater than 40% with at least 30% cover from perennial species. At five years, total native cover should be greater than 50% with appropriate species diversity.
4. Native plant cover after three years in the cactus scrub community should be greater than 30% with at least 20% cover from perennial species and 5% cover from cactus species. Native plant cover after five years in the cactus scrub community should be greater than 40% with at least 10% cover from cactus.
5. Native plant cover after three years in Palos Verdes blue butterfly habitat should be greater than 30%, but not more than 70%. The remainder should be bare ground.

Perennial (shrub) species should be maintained at between 10% and 50% cover. Ocean locoweed (*Astragalus trichopodus* var. *lonchus*) should constitute at least 10% cover.

Table 6
Performance Standards

Year	Percent Cover of Native Species (%)			Non-native Cover (for all habitat types)	
	Coastal Sage Scrub	*Cactus Scrub*	*PV Blue Butterfly Habitat*	*Invasive Perennial Species Cover*	*Total Non-native Species Cover*
Year 3	>40% (>30% perennial)	>30% (>20% perennial and >5% cacti)	30%-70% native cover; 10%-50% max. shrub cover; >10% host plant cover	<15% (0% of Cal-IPC List A)*	<25%
Year 5	>50%	>40% (>10% cacti)	30%-70% native cover; 10%-50% max. shrub cover; >10% host plant cover	<15% (0% of Cal-IPC List A)*	<25%

* The NCCP success criteria allow an exception to the requirement for 0% Cal-IPC List A for non-native annual grasses. In other words, Cal-IPC List A grass species would not count toward the 0% criteria, but would count toward the 25% criteria for total non-native species cover.

The Year 3 performance standards will be utilized to assess the annual progress of the restoration area, and are regarded as interim project objectives designed to reach the final Year 5 goals. Fulfillment of these standards will indicate that the restoration area on the project site is progressing toward the habitat type and functions that constitute the long-term goals of the plan. If the restoration efforts fail to meet the performance standards in any year, the project's restoration ecologist may recommend remedial action to be implemented the following year with the intent to enhance the vegetation to a level of conformance with the original standard. These remedial actions may include re-seeding, re-planting, applying soil amendments, additional weed control measures, erosion control, or adjustments to the watering and maintenance practices.

6.2 Monitoring Methods and Schedule

Annual qualitative assessments will be conducted through visual analysis of the restoration area to assess vegetation development, weed presence, and plant establishment. Qualitative monitoring will include reviewing the health and vigor of container plants and seed plantings, assessing survival/mortality, checking for the presence of pests and disease, soil moisture content, and the effectiveness of the supplemental watering, erosion problems, invasion of weeds, and the occurrence of trash and/or vandalism. Representative photographs of the restoration site from stationary photo points will be taken annually.

Permanent vegetation sampling sites will be established within the coastal sage scrub, and cactus scrub restoration areas at randomized representative locations. A minimum of one transect shall be established for each two acres of restoration area, and at least two transects for each habitat type. Transect data will be collected in Years 3 and 5 from the restoration sites in the spring and will be used to determine compliance and achievement of the restoration performance standards. Transect data will be collected using the point-intercept method to determine percent target vegetation cover and weed cover. If the restoration project is in compliance with the Year 5 performance standards in an earlier monitoring period, then qualitative assessments may be substituted for the quantitative monitoring until the end of the 5-year restoration program. If the restoration site is performing below the interim performance standards, the project's restoration ecologist will determine if remedial measures are necessary.

Each monitoring visit will be followed by a summary of observations, recommendations, and conclusions. Results from the annual monitoring will be used to evaluate the progress of each habitat toward the ultimate goals of the project, and to recommend appropriate management actions.

6.3 Monitoring Reports

The designated restoration ecologist will monitor and report on the restoration work underway in the Portuguese Bend Reserve. The restoration area will be monitored for five years, with reports prepared annually. Monitoring reports should provide concise, meaningful summaries of the restoration progress and provide direction and maintenance recommendations for future work.

Annual reports will include the following:

1. A description of the restoration and maintenance activities (e.g., seeding, irrigation, weed control, trash removal) conducted on the site during the previous year including the dates the activities were conducted.
2. A description of existing conditions within the restoration site, including descriptions of vegetation composition, weed species, and erosion problems, if any.
3. Qualitative and quantitative monitoring data related to proposed target goals including a comparative analysis of data over the years the project has been monitored.
4. Recommendations for remedial measures to correct problems or deficiencies, if any.
5. Representative photographs of notable observations on site and from fixed photo viewpoints.

6.4 Project Conclusion

At the end of the 5-year monitoring period, a final report will be prepared by the restoration ecologist for submittal to PVPLC. The final report will summarize the project relative to project goals. Upon completion, the site will be managed along with other reserve lands in the Palos Verdes Nature Preserve by the PVPLC.

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APPENDIX A

Soil Test Results

WALLACE LABS
365 Coral Circle
El Segundo, CA 90245
(310) 615-0116

SOILS REPORT

Print Date July 17, 2015 Receive Date 7/16/15

Location Palos Verdes Peninsula, Job No. 9085

Requester Andy Thomson and Jake Marcon, Dudek

graphic interpretation: * very low, ** low, *** moderate

* * * * high, * * * * * very high

ammonium bicarbonate/DTPA

extractable - mg/kg soil

Interpretation of data

low	medium	high
0 - 7	8-15	over 15
0-60	60 -120	121-180
0 - 4	4 - 10	over 10
0- 0.5	0.6- 1	over 1
0 - 1	1 - 1.5	over 1.5
0- 0.2	0.3- 0.5	over 0.5
0- 0.2	0.2- 0.5	over 1

The following trace elements may be toxic The degree of toxicity depends upon the pH of the soil, soil texture, organic matter, and the concentrations of the individual elements as well as to their interactions.

The pH optimum depends upon soil organic matter and clay content- for clay and loam soils: under 5.2 is too acidic 6.5 to 7 is ideal over 8.0 is too alkaline

The ECe is a measure of the soil salinity:
1-2 affects a few plants
2-4 affects some plants,
> 4 affects many plants.

problems over 150 ppm
good 20 - 30 ppm
toxic over 800
toxic over 1 for many plants
increasing problems start at 3
est. gypsum requirement-lbs./1000 sq. ft.

Sample ID Number	15-198-04		15-198-05		15-198-06	
Sample Description	PB #1		PB #2		PB #3	
elements		graphic		graphic		graphic
phosphorus	2.53	*	2.11	*	5.14	**
potassium	235.05	*****	176.22	****	279.59	*****
iron	2.32	*	2.08	*	0.63	*
manganese	7.93	****	5.16	****	8.65	****
zinc	0.64	**	0.85	**	0.98	**
copper	4.59	*****	3.97	*****	2.71	****
boron	0.25	***	0.28	***	0.09	*
calcium	347.27	***	327.32	***	333.32	***
magnesium	1,012.60	*****	1,182.70	*****	944.95	*****
sodium	258.24	****	378.89	*****	182.11	***
sulfur	14.63	*	10.84	*	15.98	*
molybdenum	0.29	****	0.24	****	0.17	****
nickel	5.18	***	4.59	**	2.57	**
aluminum	n d	*	n d	*	n d	*
arsenic	0.03	*	0.02	*	n d	*
barium	1.83	*	1.86	*	0.81	*
cadmium	1.24	**	0.72	*	0.71	*
chromium	n d	*	n d	*	n d	*
cobalt	0.14	*	0.12	*	0.18	*
lead	0.91	*	1.20	**	1.08	**
lithium	0.48	*	0.55	*	0.45	*
mercury	n d	*	n d	*	n d	*
selenium	n d	*	n d	*	n d	*
silver	n d	*	n d	*	n d	*
strontium	0.92	*	1.19	*	0.49	*
tin	n d	*	n d	*	n d	*
vanadium	0.65	*	1.06	**	0.61	*
Saturation Extract						
pH value	6.91	***	6.52	***	7.32	***
ECe (milli-mho/cm)	0.51	**	0.29	*	0.55	**
		millieq/l		millieq/l		millieq/l
calcium	24.5	1.2	13.1	0.7	44.4	2.2
magnesium	11.9	1.0	6.1	0.5	18.3	1.5
sodium	45.1	2.0	33.9	1.5	33.1	1.4
potassium	0.4	0.0	0.4	0.0	4.2	0.1
cation sum		4.2		2.6		5.3
chloride	56	1.6	32	0.9	37	1.1
nitrate as N	10	0.7	4	0.3	11	0.8
phosphorus as P	0.1	0.0	0.3	0.0	0.2	0.0
sulfate as S	13.7	0.9	8.1	0.5	10.1	0.6
anion sum		3.1		1.7		2.5
boron as B	0.10	*	0.20	*	0.05	*
SAR	1.9	**	1.9	**	1.1	*
	296		372		260	
relative infiltration rate	very slow	sand - 16.7%	very slow	sand - 18.6%	slow	and - 20.4%
soil texture	clay	silt - 34.5%	clay	silt - 26.2%	clay	silt - 29.3%
lime (calcium carbonate)	no	clay - 48.8%	no	clay - 55.3%	slight	lay - 50.4%
organic matter	low		low		fair/low	
moisture content of soil	10.2%	gravel over 2 mm	13.1%	avel over 2 n	12.8%	vel over 2 mm
half saturation percentage	34.7%	0.0%	45.0%	1.3%	43.6%	5.9%

Elements are expressed as mg/kg dry soil or mg/l for saturation extract.
pH and ECe are measured in a saturation paste extract. nd means not detected.
Sand, silt, clay and mineral content based on fraction passing a 2 mm screen.

SECTION 4

PREDATOR CONTROL PLAN

PREDATOR CONTROL PLAN

Prepared By

Danielle LeFer

PALOS VERDES PENINSULA

LAND CONSERVANCY

January 2016

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APPENDICES

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4.1 INTRODUCTION

This 2015 Predator Control Plan for the Palos Verdes Peninsula Land Conservancy outlines appropriate provisions and measures to adequately comply with the Preserve Management requirements of the NCCP/HCP. The Draft NCCP/HCP requires a Predator Control Plan to be drafted and revised every three years after the results from the comprehensive surveys. This PCP has been written based on the results of surveys taking place from 2013 through 2015, and recommends specific actions to be taken to reduce predation of covered species within the PVNP for the following 3 years.

This PCP provides the framework for the pet/feral animal education program and the native predator education program, and establishes the need for monitoring for feral or domestic animals, native large predators, and mesopredators.

4.2 NON-NATIVE ANIMAL SPECIES MANAGEMENT PLANS

Native species are often at a disadvantage after invasive predators are introduced, so special management measures may be needed to control these invading species. Non-native animal species have few natural predators or other ecological controls on their population sizes, and they thrive under conditions created by humans. These species may aggressively out-compete native species or otherwise harm sensitive species. When top predators are absent, intermediate predators can multiply and increase predation on native wildlife species and their nests. Feral and domestic animals, particularly cats, also prey on small native wildlife species. Stables may provide resources for increased populations of parasitic cowbirds, which adversely affect native songbird breeding populations.

4.3 FERAL AND DOMESTIC ANIMALS

Monitoring

Through its Stewardship Program, the PVPLC and associated volunteers conducts monthly monitoring walks of all properties under management and completes a "Stewardship Review Sheet." A sample of this form is provided as Appendix A. This form includes an area to document evidence of feral or domestic animal use in the PVNP. Feral cats are defined as cats that have reverted to a wild state and avoid human beings. The conditions of domestication, including contact with human beings, must be duplicated in each generation for domestic behavior to occur.

Observations of a feral or domestic animal are recorded during surveys. This monitoring will allow the PVPLC to document evidence of use and become more informed about which areas have the highest occurrences of feral and/or domestic animal use. Areas determined to be the highest in use may be targeted for specific control measures in the future.

The monthly monitoring program includes scanning areas in the PVNP that are in proximity to houses, parks and other developed areas. It is recommended that edge effects be monitored over the long term to determine if they become problematic and if so, to document where the problems are occurring.

Pet/Feral Animal Education Program

PVPLC may establish an education program for homeowners regarding responsible pet ownership if deemed necessary. The program could consist of information distributed via the PVPLC's webpage, signage on the PVPNP, informational handouts, and information disseminated during monthly public nature walks and through local cities. This program will encourage:

1. Keeping pets indoors, especially at night;
2. Having pets neutered or spayed to reduce unwanted reproduction and long-range wanderings;
3. Belling of cats to reduce their effectiveness as predators;
4. Keeping dogs on leashes when walking them on trails in Preserves;
5. Discouraging release of unwanted pets into the wild;
6. Prohibiting the feeding of feral animals.

Feral Animal Control Program

Few feral animals have been observed in the PVNP over the last three years, except at Vicente Bluffs, in the area adjacent to the Palos Verdes Interpretive Center. Evidence of cats in the Reserve, was in the form of what appeared to be "cat trails" through the vegetation. Feral cat activity was due to a long-established feral cat feeding station near the Reserve. In collaboration with City of RPV staff, most of the feral cats were removed, and the cat feeding station was moved a greater distance from the Reserve.

PVPLC will continue to monitor throughout the Preserve, and if a significant impact is determined, PVPLC will consult with the agencies about actions to be taken. A feral animal removal program could be established. This program could consist of trapping and removal at regular intervals throughout the year. It would be based on the latest scientific data to ensure its success.

4.4 COWBIRD MONITORING AND TRAPPING PROGRAM

Observations of cowbird presence and numbers within the Preserve will be provided every three years during the gnatcatcher and cactus wren surveys. Additionally, all incidental sightings

will be reported in the annual reports. No cowbirds were observed during gnatcatcher and cactus wren surveys conducted in 2015, and no incidental cowbird sightings occurred.

If there are incidental observations of cowbird parasitism on a gnatcatcher nest, consultation with Wildlife Agencies and experts will occur to determine if cowbirds are a likely cause of gnatcatcher population decline. If cowbirds are determined a threat to gnatcatcher populations, a cowbird trapping program may be initiated.

4.5 NATIVE LARGE PREDATORS

Monitoring

The monthly monitoring of the Stewardship Program offers a mechanism to monitor various attributes of the Preserve. The "Property Review Form" includes a section for fauna, in which observations of large predators are recorded. A monitoring program using wildlife cameras as well as track and scat analysis has been in place since 2007. Results of the 2013 -2015 survey indicate that wild canid (coyote and fox) observations have modestly declined across previously surveyed reserves (Portuguese Bend and Forrestal) in comparison to 2009-2012 survey findings. Detailed results can be found in Section 2.4.

Native Predator Education Program

The PVPLC will continue to educate the general public regarding the role of native predators. This program could consist of information via the PVPLC's webpage, signage on the Preserves, informational handouts, and information disseminated during monthly public nature walks. This program will explain the role and necessity of large native predators, such as coyotes, within the ecosystem, and the need to protect them from disturbance.

4.6 MESOPREDATOR MONITORING AND CONTROL

Mesopredators are smaller carnivores that are principle predators of birds and other small vertebrates. Declines in larger mammalian carnivores due to habitat fragmentation often leads to an increase in mesopredators. This increase in mesopredators has been implicated in the decline and extinction of prey species.

Monitoring

The monthly monitoring of the Stewardship Program offers a mechanism to monitor various attributes of the Preserve. The "Property Review Form" includes a section for fauna, in which observations of mesopredators are recorded. A monitoring program using wildlife cameras and scat analysis has been in place since 2007. Detailed results can be found in Section 2.4.

Control

If key native predator species are extirpated from the Preserve and studies indicate that these specific mesopredators are adversely affecting sensitive native wildlife, PVPLC will consult with the agencies about further actions, which may include initiating a program to control mesopredators.

4.7 CONCLUSION

The PVPLC will plan for predator control as follows:

- Note observations and impacts of potential predators within the PVNP as a part of its regular monitoring schedule
- Provide education programs regarding the impacts of predators on natural open spaces and habitat;
- Consult with agencies or establish a trapping program for brown-headed cowbirds if necessary;
- Consult with agencies or control predators such as feral cats and mesopredators if necessary.

Management of the PVNP for predator control would benefit from research on the presence or absence of predators and the impacts they generate. As funding or relevant student research permits, the PVPLC will endeavor to provide more focused monitoring of predators.

APPENDIX A

STEWARDSHIP REVIEW SHEET

Preserve:

For the month of:			**Date Surveyed:**
KEEPER Name:			**Start Time:** **End Time:**
Property Condition	Drainage or Erosion	☐ None ☐ Limited ☐ Moderate ☐ Heavy ☐ No significant change	
	Authorized Trails	☐ No change ☐ Good ☐ Fair ☐ Poor ☐ Impassible	
	Encroachments	☐ None ☐ Limited ☐ Moderate ☐ Heavy	
	Hazards	☐ None ☐ Bee hive ☐ Obstruction ☐ Trail ☐ Excessive fuels ☐ Other	
	Signage	☐ Good ☐ Missing ☐ Damaged ☐ Unauthorized	
	Unauthorized Uses	☐ None ☐ Trails ☐ Construction ☐ Other uses	
	Trash or Dumping	☐ None ☐ Limited ☐ Moderate ☐ Heavy	
	Vandalism	☐ None ☐ Fence ☐ Graffiti ☐ Facilities ☐ Cutting/Clearing of Vegetation ☐ Other	
	Trail Markers	Number replaced and trail:	
Habitat	Vegetation	☐ Healthy ☐ Healthy/dormant/dry ☐ Moderate non-natives ☐ Dominated by non-natives	
	Irrigation *(contact PVPLC immediately if visible water is running)*	☐ No change ☐ Damaged PVC ☐ Damaged sprinkler head ☐ Damaged mainline ☐ Other	
	Seed availability	☐ No ☐ Yes	
	Insects	Birds	
	Reptiles	Mammals	
	Predators	Cowbird #____ Fox #____ Coyote #____ Cat #____	
Community	Dogs	Present on leash #_____ Present off leash #_____	
	Bicycles	Present on authorized trails# ____ On unauthorized trails #_____ Present in habitat #_____	
	Hikers	Present on authorized trails #____ On unauthorized trails #_____ Present in habitat #_____	
	Equestrian	Present on authorized trails #____ On unauthorized trails #_____ Present in habitat #_____	
	Community comments		

Ranger Emergency Hotline: 310-491-5775

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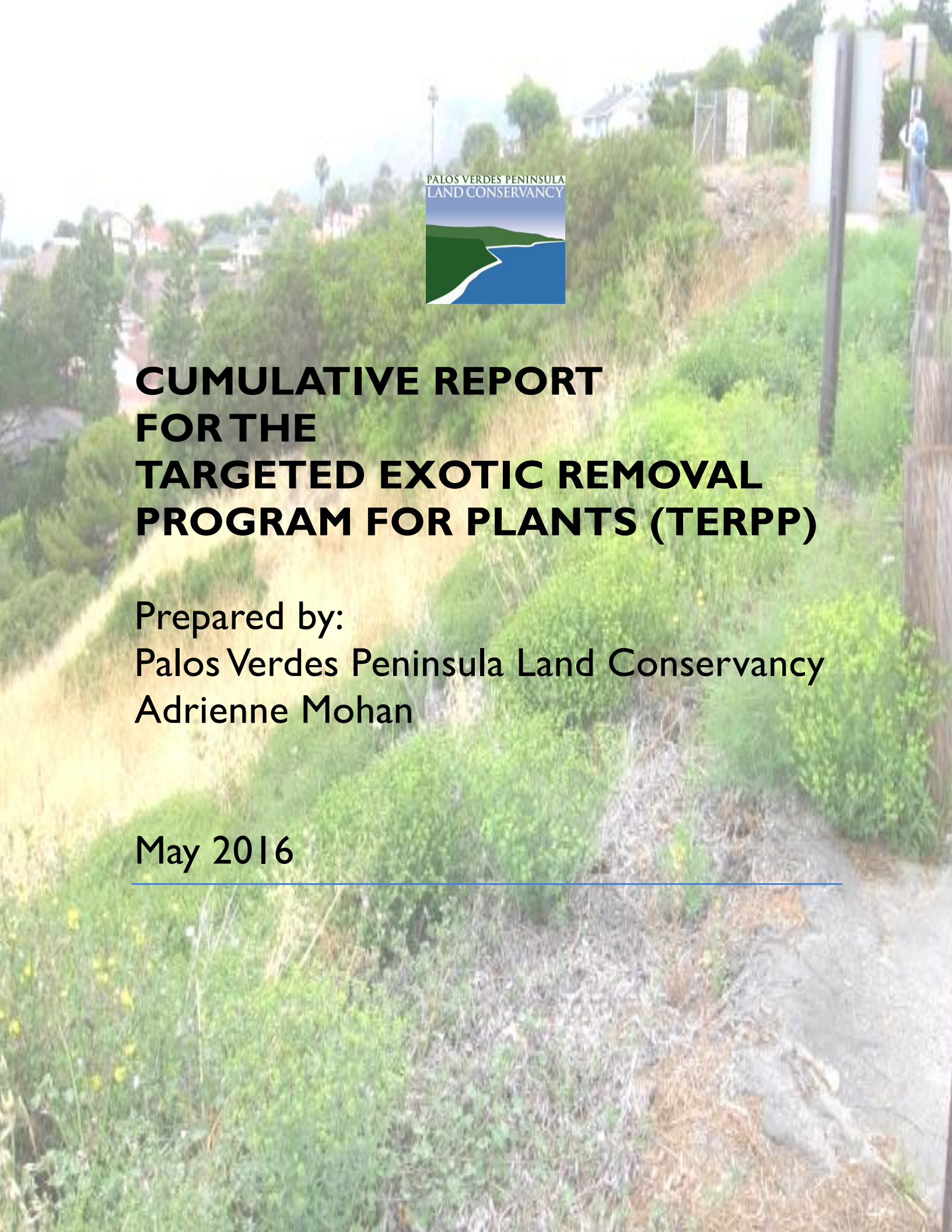
SECTION 5

TARGETED EXOTIC REMOVAL PROGRAM FOR PLANTS (TERPP)



CUMULATIVE REPORT FOR THE TARGETED EXOTIC REMOVAL PROGRAM FOR PLANTS (TERPP)

Prepared by:
Palos Verdes Peninsula Land Conservancy
Adrienne Mohan

May 2016

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APPENDIX

1.0 INTRODUCTION

The Palos Verdes Peninsula Land Conservancy (PVPLC), as habitat manager of the Palos Verdes Nature Preserve (PVNP), conducts strategic weed control activities throughout the year as part of the Targeted Exotic Plant Removal Plan for Plants (TERPP). As directed in the draft Rancho Palos Verdes Natural Communities Conservation Plan (NCCP), PVPLC selects five acres or 20 small sites of exotic plants for removal each year. The overall goal of this program is to systematically target invasive species throughout the PVNP to increase the success of native plant growth, protected threatened species covered by the NCCP, and create greater habitat opportunities for wildlife.

The TERPP is an element of the NCCP that includes a specific protocol for ranking exotic species populations and strategically removing those species over time. This TERPP Report documents PVPLC's effort from 2013 to 2015 to remove exotic plant species that threaten native vegetation in the PVNP. It details the methods of assessing the threat of individual exotic species to native vegetation, documents sites selected for eradication, and field methods for removal.

As of the writing of this report, the NCCP is still in draft format and the regulatory agencies have not yet signed the final plan. However, the City of Rancho Palos Verdes and PVPLC currently perform the responsibilities outlined in the draft NCCP, including fulfillment of the TERPP requirements.

Each TERPP site is tracked via GIS, a tool that aids planning and monitoring efforts. Since 2006, PVPLC has treated 104 TERPP sites, and the program is ongoing. Every year, tracking, documenting and planning for the following year becomes more complex as more sites are added if targeted populations are not entirely eradicated through weed control efforts. Use of GIS allows staff not only to look at the land within the NCCP boundaries, but to view the Palos Verdes Peninsula at a landscape level. In 2012, staff began developing a TERPP mapping system to track weed populations (baseline) and TERPP treatments over time, and this system was implemented during this reporting period. The invasive weed baseline has assisted in determining priority populations to target for treatment.

2.0 SITE ASSESSMENT

Invasive species control is included in PVPLC's annual conservation planning strategy where Stewardship staff prioritize potential TERPP sites and assess best practice methods for removal. Guided by the NCCP, which ranks known exotic species with potential to be found around the PVNP based on State and Federal guidelines, PVPLC staff locate TERPP sites to

target for the calendar year, assess the best method for eradication, photograph and map the population/s, and conduct weed removal accordingly (Appendix B-G).

The PVPLC weighs potential areas for exotic species control based on several criteria:

1. Threat to native vegetation, particularly populations of NCCP-covered species;
2. Feasibility of eradication, which includes limiting disturbance to native habitat and ease of access, and;
3. Invasiveness of exotic species, using a synthesized rating system drawn from plant invasiveness rankings from both the California Invasive Plant Council (Cal-IPC) and the California Department of Food and Agriculture (CDFA).

Through regular property reviews and viewing fine scale imagery through the Geographic Information System (GIS), ArcGIS, PVPLC plans for exotic species control across the entire NCCP area.

For several years, PVPLC has focused extra attention on erradiacating the highly-invasive weed, *Euphorbia terracinia.* Euphorbia grows rapidly in disturbed areas, is a prolific seeder and is rapidly expanding its distribution in southern California. Invaded areas show reduced ecological quality and inferior habitat quality compared to un-invaded areas. Continued spread of this species throughout California seems possible and even likely if action is not taken immediately. Euphorbia shows a broad habitat tolerance in southern California, invading both cool coastal areas and hot, dry, interior areas. Most of the populations of Euphorbia have been treated for several years, in attempts to keep it from spreading further into the Preserve.

3.0 FIELD METHODS

PVPLC staff uses best practice, the most effective and least intrusive, methods at all times when conducting TERPP-related activities. High priority areas may occur near rare or endangered biological populations. Care is taken to minimize soil erosion, fire risk, disturbance to surrounding native vegetation and further dispersal of the exotic species. PVPLC utilizes a combination of methods to conduct exotic species removal, generally limited to the following:

- Mechanical removal - staff may use tools with motorized blades to fell larger species;
- Hand removal - staff conduct most removals by hand pulling and/or with small hand tools for pruning and cutting;
- Chemical control - trained staff applies herbicides at the appropriate phase of vegetative

- Growth and seed maturation, and;
- Disposal - City of Rancho Palos Verdes staff coordinate with waste companies to supply green waste and trash containers.

Qualified Licensed Applicator(s) develop all recommendations for chemical pest control and senior staff supervises field staff and contractors in sensitive areas. Additionally, field staff has an integral role in the TERPP and often have crucial, site-specific knowledge related to the sites. A sample reporting form is located in Appendix A.

4.0 SUMMARY OF ACTIVITIES FROM 2013 TO 2015

4.1 2013 TERPP

In 2013, PVPLC treated 28 populations of invasive plants (Appendix H). PVPLC treated 17 populations of *Euphorbia terracina*.

PVPLC treated three populations of *Coronilla valentina* ssp. *glauca.* This is a range expansion for this species, and has the potential to cause major infestations in the area. There will need to be follow-up treatments to control seeds germinating from the seed bank as evidenced by the subsequent TERPP treatments in 2014 and 2015.

PVPLC treated a large *Schinus molle* tree at Abalone Cove.

PVPLC treated one population of *Pistacia chinensis* at Portuguese Bend Reserve.

PVPLC treated three populations of *Acacia cyclops.* In particular, acacia that was competing with cactus habitat was removed at Portuguese Bend. The second acacia population was located at Three Sisters Reserve, at the bottom of a canyon. The third was at Vicente Bluffs, as part of the invasive plant removal described below.

At Vicente Bluffs, a 0.5-acre site was cleared of the following invasive species: *Cortaderia selloana, Foeniculum vulgare, Acacia cyclops* and *Schinus molle.* This site was on the edge of a healthy coastal sage scrub restoration area.

4.2 2014 TERPP

In 2014, PVPLC treated 28 populations of invasive plants (Appendix I). PVPLC treated 24 populations of *Euphorbia terracina*.

PVPLC treated two populations of *Acacia cyclops.* At Portuguese Bend, acacia that was encroaching into cactus scrub were removed. At Vicente Bluffs, an acacia population adjacent to coastal sage scrub was removed.

At Vicente bluffs, a population of *Cortaderia selloana* located along the edge of coastal sage scrub was removed.

At Portuguese Bend, staff is controlling new shoots in a *Eucalyptus globulus* population damaged by the 2009 fire.

4.3 2015 TERPP

In 2015, PVPLC treated 30 populations of invasive plants (Appendix J). Of the 30 TERPP treatments, four were new sites, and one (VB_AcCy_03) was a site where we expanded the area of acacia removed. Of the retreated sites, 20 were *Euphorbia terracina* populations that were treated in previous years, two were *Coronilla valentina* populations treated in 2013, two were previously treated *Cortaderia sellonoa* populations that reseeded, one was a previously treated *Arundo donax*.

PVPLC treated two populations of *Acacia cyclops.* At Portuguese Bend, acacia that was encroaching into cactus scrub were removed. At Vicente Bluffs, acacia growing near El Segundo blue host plants were cleared to increase potential habitat. At Alta Vicente, acacia growing in cactus habitat were cleared.

A large palm growing in cactus habitat was removed at Alta Vicente.

At Vicente bluffs, two previously treated populations of *Cortaderia selloana* with new plants were retreated.

At Abalone Cove, an Arundo donax that had previously been treated was retreated. Some ice plant (*Cephalophyllum alstonii*) surrounding a population of *Aphanisma* was cleared.

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State of California 2007. Department of Food and Agriculture Division of Plant Health & Prevention Services Noxious Weed Ratings. Retrieved September 2007, from: <http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/pdfs/noxiousweed_ratings.pdf>.

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Habitat Conservation Plan. June 9.

APPENDIX A: SAMPLE TERPP FORM

Invasive Weed Mapping Field Datasheet

Survey Type New Infestation Assesment Treatment	**Surveyor's Name**
Date	**Location Description:**
Species	
Preserve	
Stand ID	**Surrounding Vegetation Type:** cactus scrub coastal sage scrub riparian bluff grassland non-native plants trail non-native annual grass (NNAG) Other
Stand Size 1 ft^2 - 10 ft^2 10 ft^2 - 100 ft^2 100 ft^2 -300ft^2 300 ft^2 - 600 ft^2 600 ft^2 - 1000 ft^2 > 1000 ft^2	**Stand Comments:**
No. Individuals 1-10 10-50 50-100 100-200 200-500 500-1000 >1000	
Percent Canopy Cover 1-5% 5-10% 10-25% 25-50% 50-75% +75%	
Plant Phenology Flowering Non-Flowering Fruiting	
Plant Age Seedling Juvenile Mature Dead	
Treatment Type Hand pull Herbicide Hand-pull/Herbicide Weed-whip Mulch Tree removal Other	**Treatment Comments:**
Area Treated 1 ft^2 - 10 ft^2 10 ft^2 - 100 ft^2 100 ft^2 - 300 ft^2 300 ft^2 - 600 ft^2 600 ft^2 - 1000 ft^2 > 1000 ft^2	
Percent of Infestation Treated 0-25% 25-50% 50-75% 75-100%	
Photo Image Numbers:	**Additional Comments:**

Stand ID Example: AC_EuTe_01_yyyy.mm.dd.jpg

Preserve abbreviations:

AA - Agua Amarga	AC - Abalone Cove	AV - Alta Vicente	CP - Chandler Preserve	DF - DFSP	GF - George F
FI - Filiorum	FO - Forrestal	OT - Ocean Trails	PB - Portugeuese Bend	SR - San Ramon	
TS - Three Sisters	VB - Vicente Bluffs	VN - Vista del Norte	WP - White Point	OR - Other	

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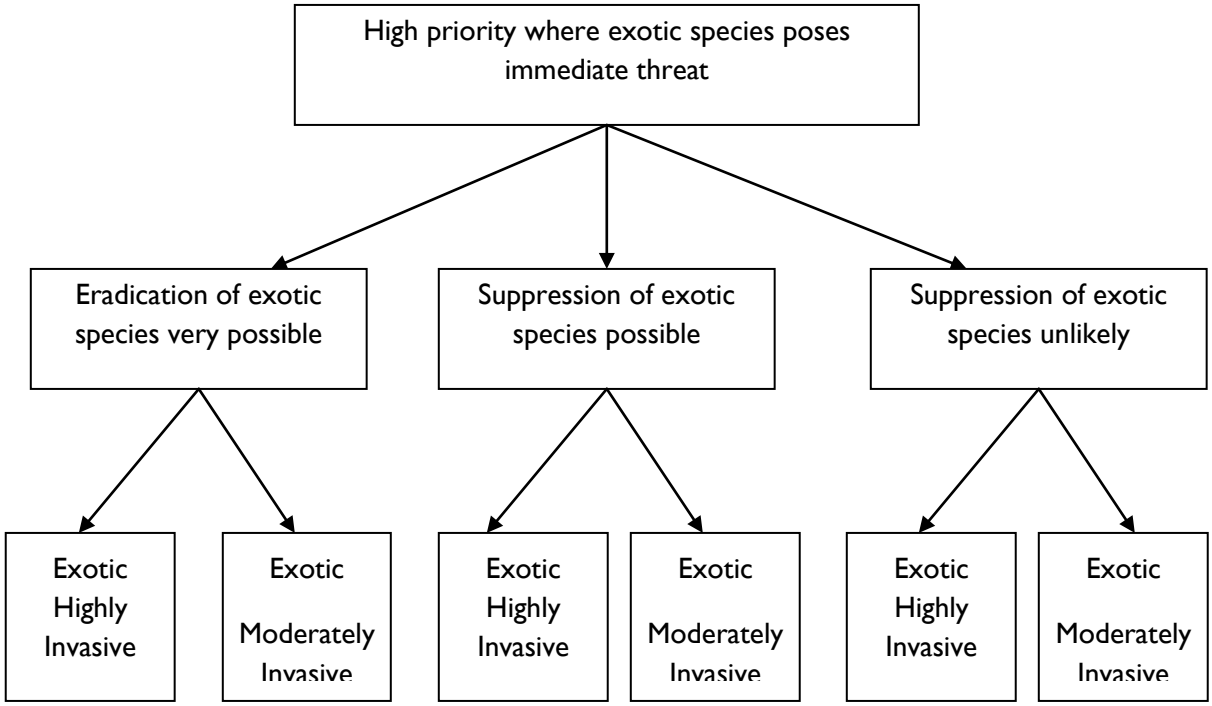
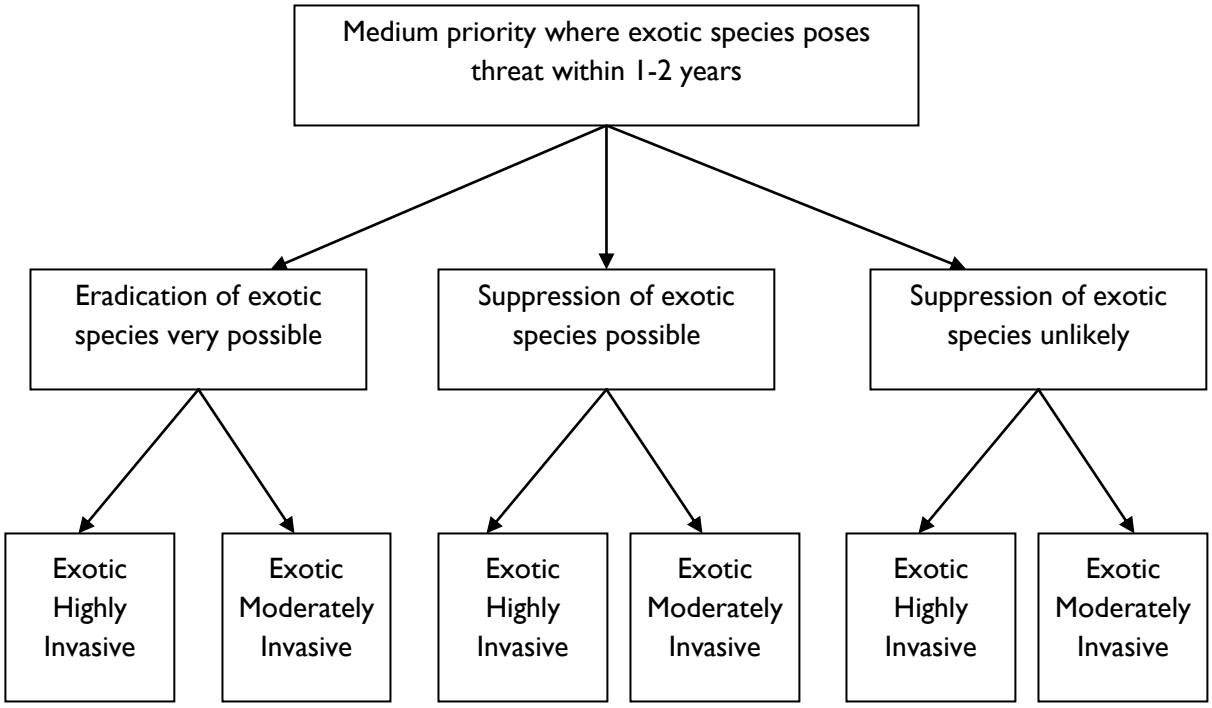
APPENDIX B: FLOWCHART FOR HIGH PRIORITY THREAT TO NATIVE VEGETATION



Priority Ranking For Control of Exotic Species

1-3= Low priority 4-7= Medium priority 8-10= High priority

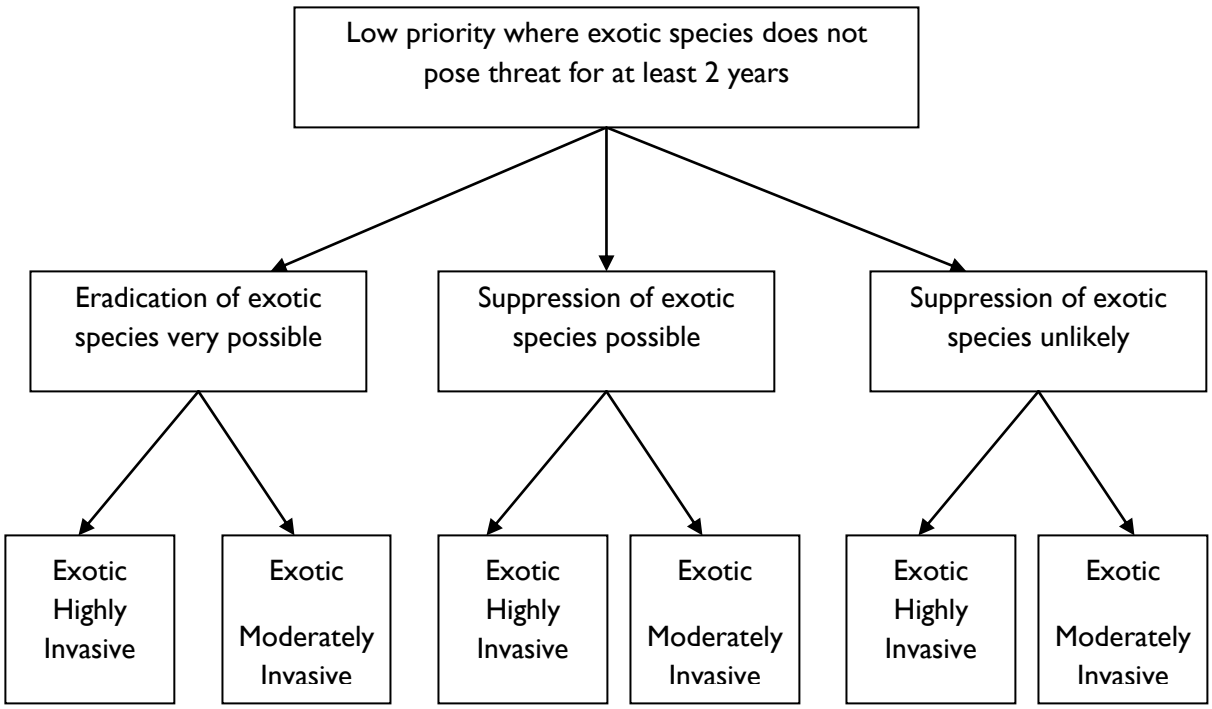
APPENDIX C: FLOWCHART FOR MEDIUM PRIORITY DEGREE OF THREAT TO NATIVE VEGETATION



Priority Ranking For Control of Exotic Species

1-3= Low priority 4-7= Medium priority 8-10= High priority

APPENDIX D: FLOWCHART FOR LOW PRIORITY DEGREE OF THREAT TO NATIVE VEGETATION



Priority Ranking For Control of Exotic Species

1-3= Low priority 4-7= Medium priority 8-10= High priority

APPENDIX E: HIGHLY INVASIVE SPECIES

Genus species	**Common name**
Arundo donax	Giant reed
Asparagus asparaagoides	Bridal creeper
Avena barbata	Slender oat
Avena fatua	Wild oat
Brachypodium distachyon	False brome
Brassica nigra	Black mustard
Bromus diandrus	Ripgut grass
Bromus madritensis ssp. rubens	Red brome
Carpobrotus edulis	Hottentot fig
Caesalpinia spinosa	Spiny holdback
Centaurea melitensis	Tocalote
Chrysanthemum coronarium	Garland chrysanthemum
Cortaderia selloana	Pampas grass
Cynodon dactylon	Bermuda grass
Euphorbia terracina	Spurge
Foeniculum vulgare	Fennel
Malva nicaeensis	Bull mallow
Malva parviflora	Cheeseweed
Malva sylvestris	Mallow
Mesembryanthemum crystallinum	Annual iceplant
Nicotiana glauca	Tree tobacco
Pennisetum clandestinum	Kikuyu grass
Pennisetum setaceum	Fountain grass
Picris echioides	Bristly ox-tongue
Pistacia atlantica	Pistachio
Pittosporum undulatum	Pittosporum
Raphanus sativus	Wild radish
Ricinus communis	Castor bean
Salsola tragus	Russian thistle
Silybum marianum	Milk thistle
Sonchus asper	Prickly sow thistle
Sonchus oleraceus	Sow thistle
Spartium junceum	Spanish broom
Tamarix species	Tamarisk
Tropaeolum majus	Garden nasturtium

APPENDIX F: MODERATELY INVASIVE SPECIES

Genus species	Common Name	Genus species	Common Name
Acacia cyclops	Acacia	*Lolium perenne*	Perennial ryegrass
Acacia species	Acacia	*Marrubium vulgare*	Horehound
Aegilops cylindrica	Jointed goat grass	*Medicago polymorpha*	Bur clover
Ageratina adenophorum	Eupatory	*Medicago sativa*	Alfalfa
Atriplex semibaccata	Australian saltbush	*Melilotus albus*	White sweet clover
Bassia hyssopifolia	Five-Hook bassia	*Melilotus indicus*	Yellow sweet clover
Bromus hordeaceus (mollis)	Soft brome	*Myoporum laetum*	Myoporum
Bromus catharticus	Rescue grass	*Olea europea*	Olive
Cakiel maritime	Sea rocket	*Oxalis pes-caprae*	Bermuda buttercup
Carduus pycnocephalus	Italian thistle	*Pelargonium zonale*	Zonal geranium
Carpobrotus aequilaterus	Sea Fig	*Phalaris minor*	Phalaris
Carpobrotus chilensis	Fig-Marigold iceplant	*Phoenix canariensis*	Phoenix palm
Conium maculatum	Poison hemlock	*Piptatherum miliacea*	Smilo grass
Convolvulus arvensis	Bindweed	*Pittosporum undulatum*	Pittosporum
Erodium cicutarium	Red stem filaree	*Plantago lanceolata*	English plantain
Eucalyptus camaldulensis	Red gum tree	*Polygonum aviculare*	Knotweed
Eucalyptus globulus	Blue gum tree	*Polypogon monspessulensis*	Rabbitsfoot
Eucalyptus species	Gum tree	*Pyracantha sp.*	Firethorn
Hirschfeldia incana	Annual mustard	*Rumex crispus*	Curly dock
Hordeum murinum leporinum	Foxtail barley	*Schinus molle*	Mexican pepper
Hordeum vulgare	Common barley	*Schinus terebinthifolius*	Brasilian pepper
Lactuca serriola	Compass plant	*Sisymbrium irio*	London rocket
Lathyrus tangianus	Tangier pea	*Trifolium hirtum*	Rose clover
Limonium perezii	Sea lavender	*Washington robusta*	Mexican fan palm
Limonium sinuatum	Sea lavender	*Vicia sativa*	Spring vetch
Lobularia maritima	Sweet alyssum	*Vulpia myuros varhirsuta*	Annual fescue
Lolium multiflorum	Italian rye	*Vulpia myuros var myuros*	Rattail fescue

APPENDIX G: EXOTIC, NON-INVASIVE SPECIES

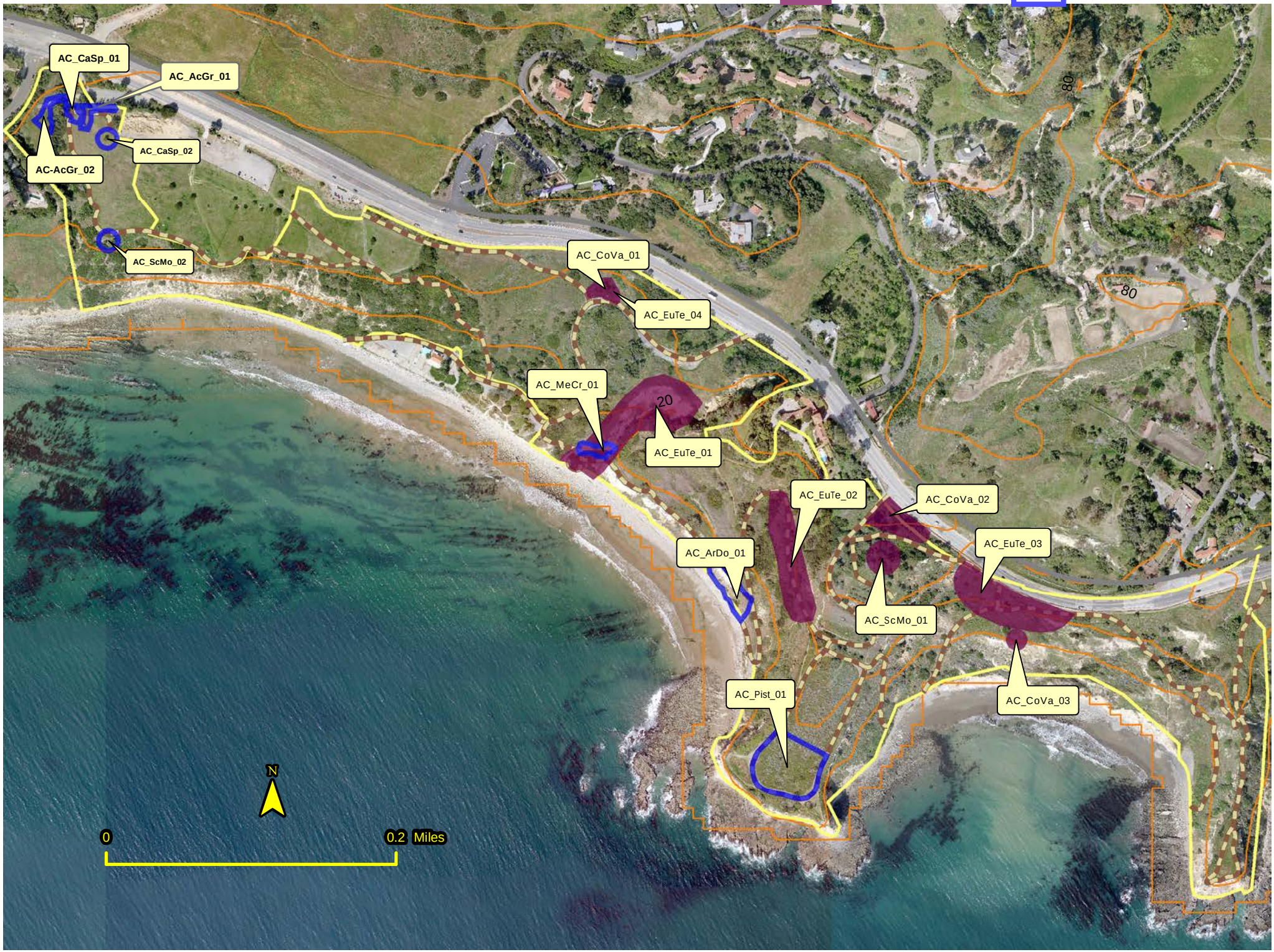
Scientific Name	**Common Name**	**Genus species**	**Common Name**
Amaranthus albus	Tumbleweed	*Geranium carolinianum*	Geranium
Anagallis arvensis	Pimpernel	*Gnaphalium luteo-album*	White cudweed
Apium graveolens	Celery	*Koehlreuteria species*	Koehlreuteria
Aptenia cordifolia	Baby sun-rose	*Lamarckia aurea*	Goldentop
Atriplex glauca	Saltbush	*Lantana montevidensis*	Lantana
Bidnes pilosa	Common beggar-ticks	*Lathyrus odoratus*	Sweet pea
Capsella bursa-pastoris	Shepherd's purse	*Lycium species*	Lycium
Centranthus rubber	Red valerian	*Lycopersicon esculentum*	Garden tomato
Ceratonia siliqua	Locust bean tree	*Malephora crocea*	Mesemb
Chamaesyce maculata	Spotted spurge	*Melaleuca species*	Melaleuca
Chenopodium album	Lamb's quarters	*Mesembryanthemum nodiflorum*	Iceplant
Chenopodium ambrosioides	Mexican tea	*Osteoapermu fruticosum*	African daisy
Chenopodium murale	Nettleleaf goosefoot	*Oxalis corniculata*	Woodsorrel
Conyza canariensis	Horseweed	*Paspalum dilatatum*	Dallis grass
Coronilla valentina	Coronilla	*Pinus halepensis*	Alepppo pine
Cyperus involucratus	Umbrella plant	*Plantago major*	Plantain
Digitaria sanguinalis	Hairy crabgrass	*Poa annua*	Bluegrass
Echium fastuosum	Pride of madeira	*Polygonum arenastrum*	Knotweed
Erodium botrys	Long-beaked filaree	*Senecio vulgaris*	Groundsel
Euphorbia lathyris	Gopher plant	*Silenle gallica*	Common catchfly
Euphorbia peplus	Petty spurge	*Triticum aestivum*	Cultivated wheat
Filago gallica	Narrow-leaf filago	*Urtica urens*	Dwarf nettle
Fraxinus uhdei	Shamel ash	*Veronica anagallis-aquatica*	Water speedwell
Gazania species	Gazania	*Yucca species*	Spanish bayonet

APPENDIX H

2013 TERPP MAPS

TERPP Sites: *ABALONE COVE*

2013 TERPP Sites | Previous TERPP Sites



TERPP Sites: ***AGUA AMARGA***

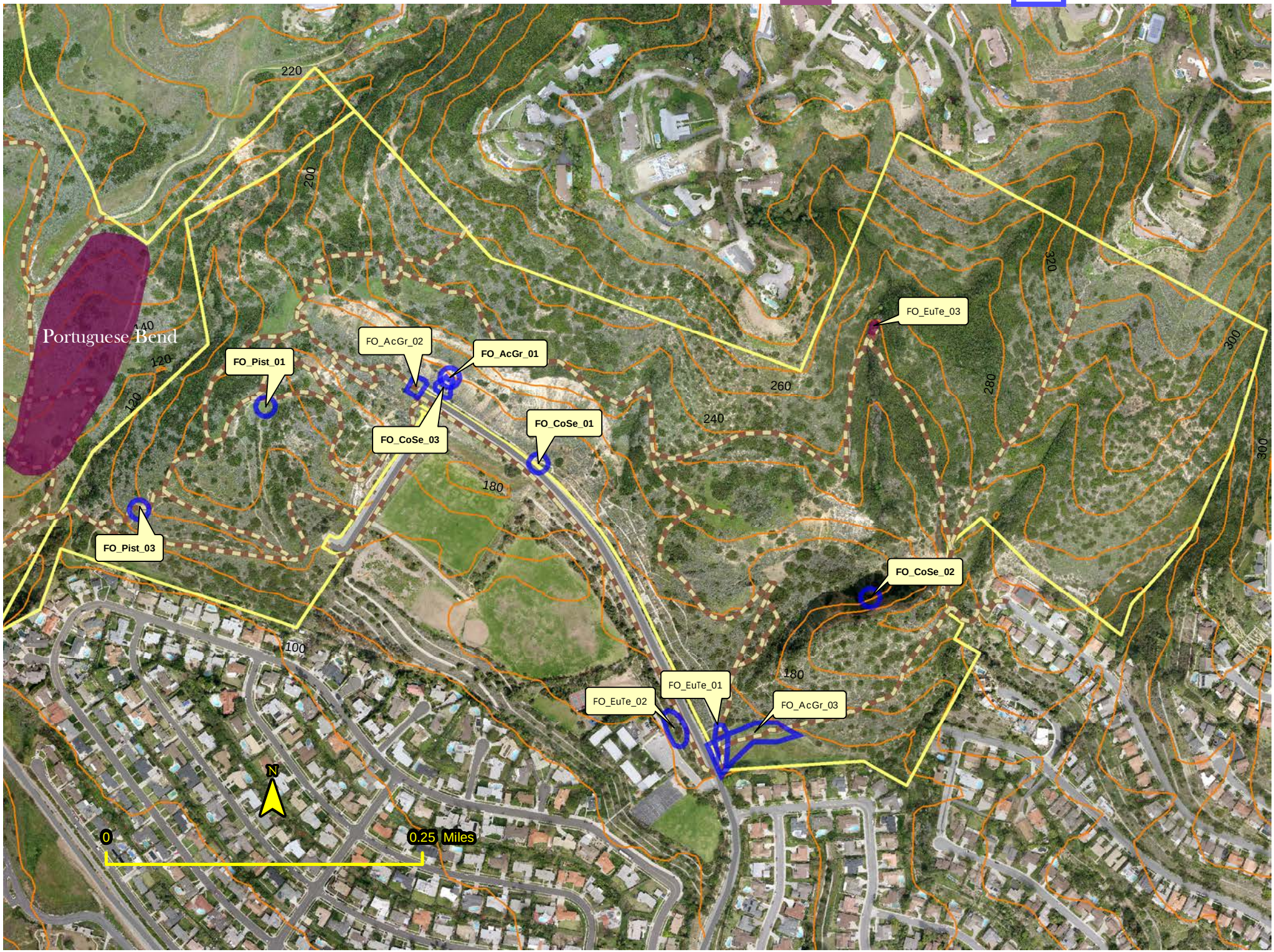
2013 TERPP Sites | Previous TERPP Sites

TERPP Sites: ***ALTA VICENTE***

2013 TERPP Sites | Previous TERPP Sites

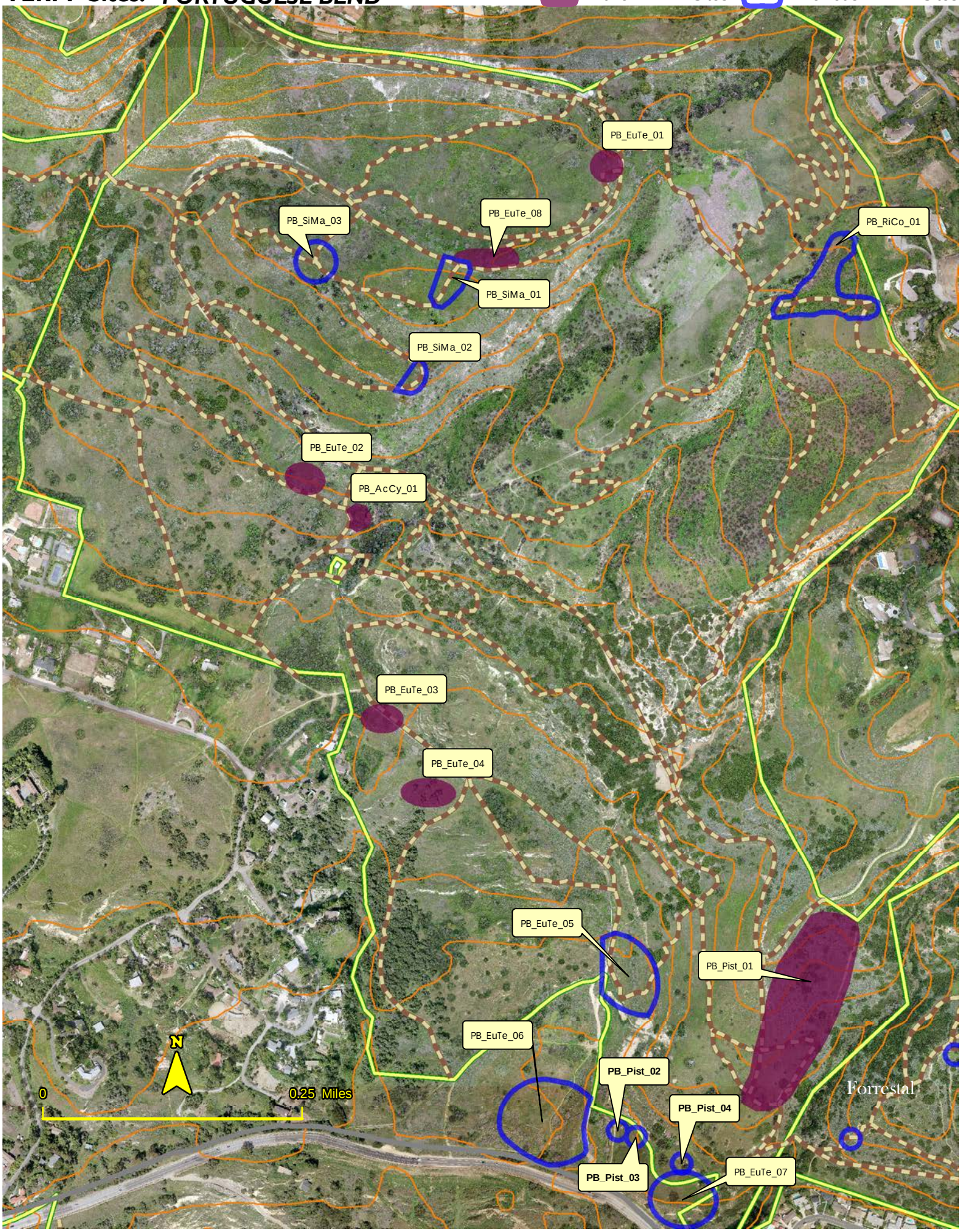
TERPP Sites: ***FORRESTAL***

2013 TERPP Sites | Previous TERPP Sites



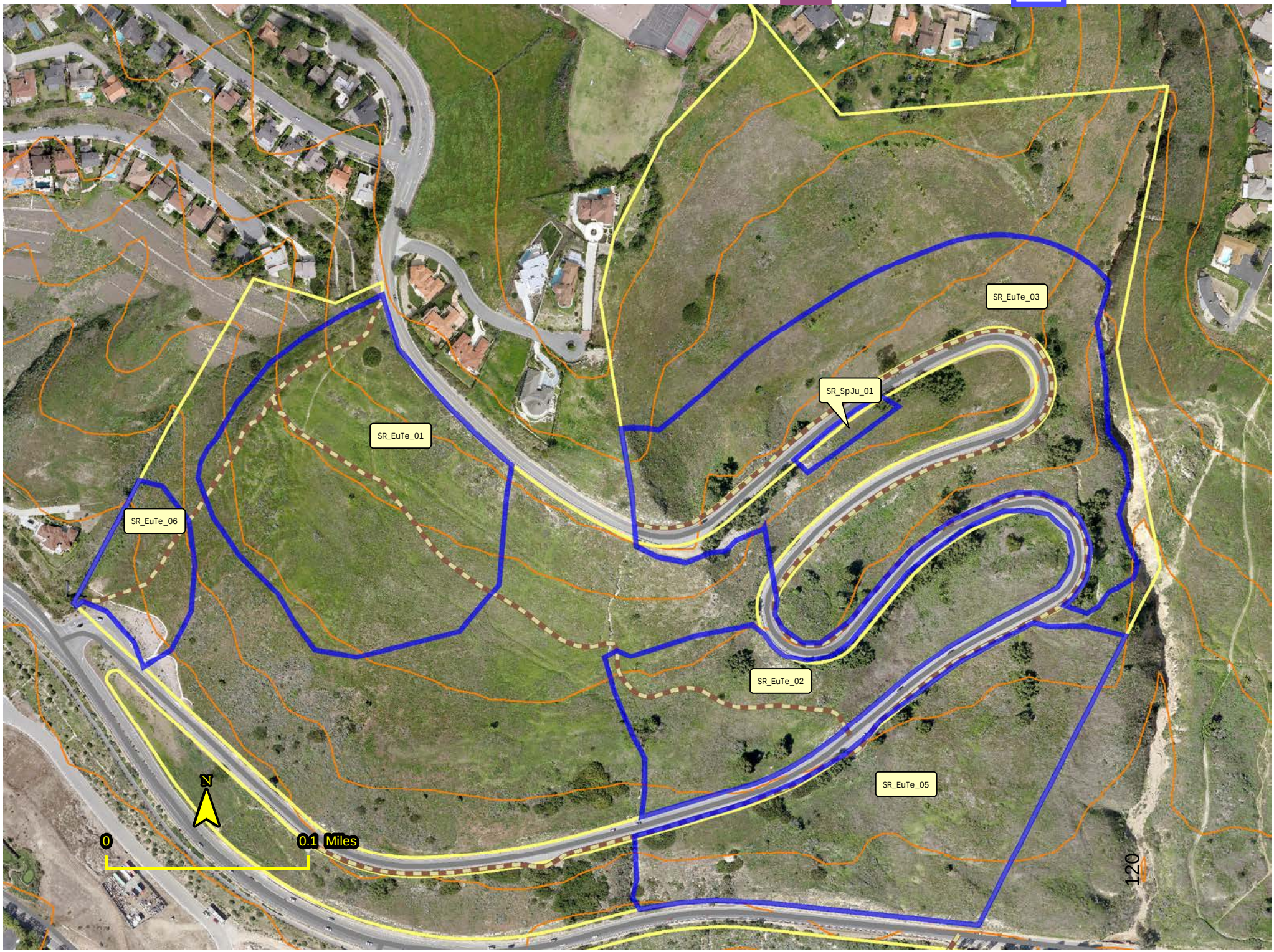
TERPP Sites: *PORTUGUESE BEND*

2013 TERPP Sites | Previous TERPP Sites



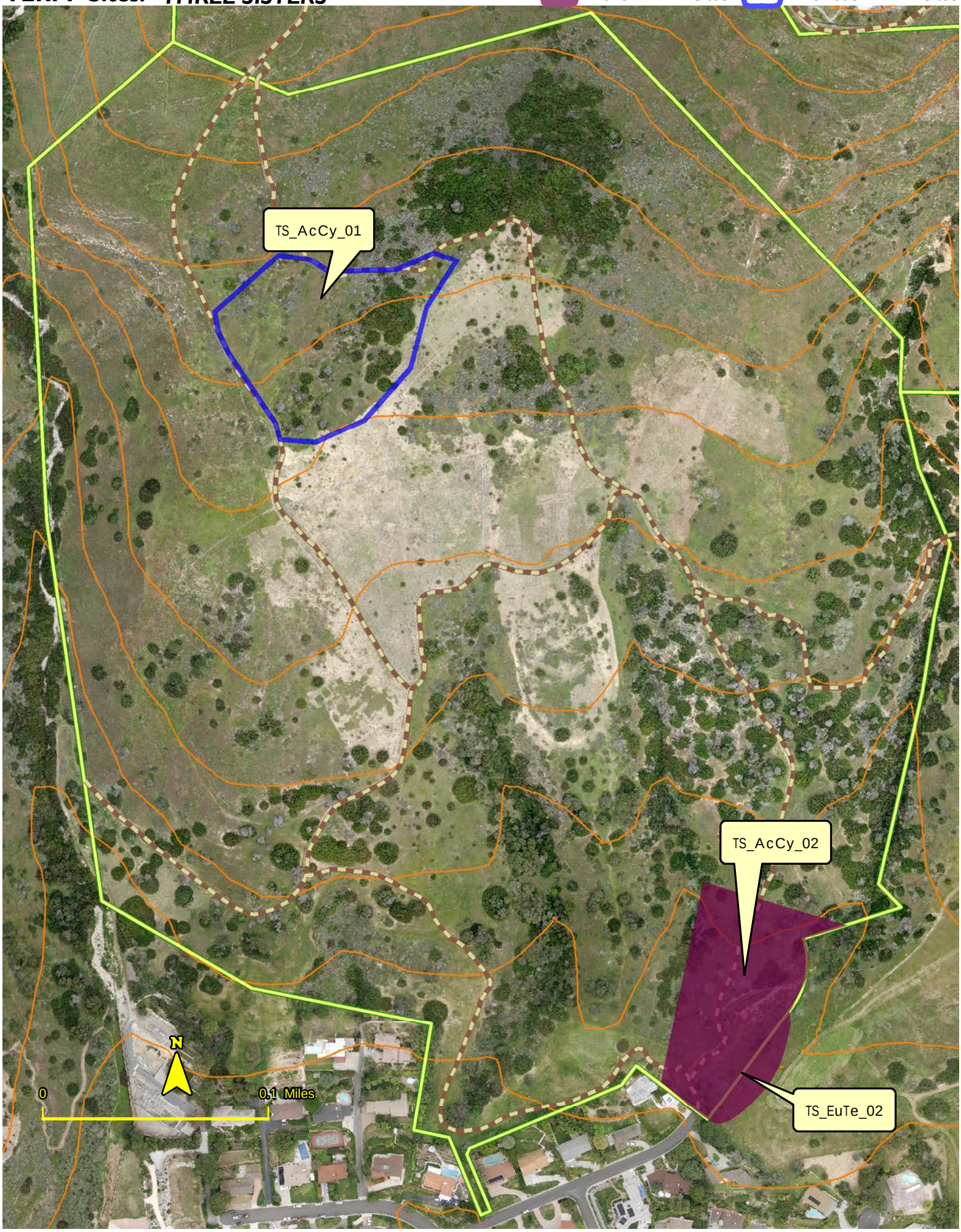
TERPP Sites: *SAN RAMON*

2013 TERPP Sites | Previous TERPP Sites



TERPP Sites: ***THREE SISTERS***

2013 TERPP Sites Previous TERPP Sites



TERPP Sites: *VICENTE BLUFFS*

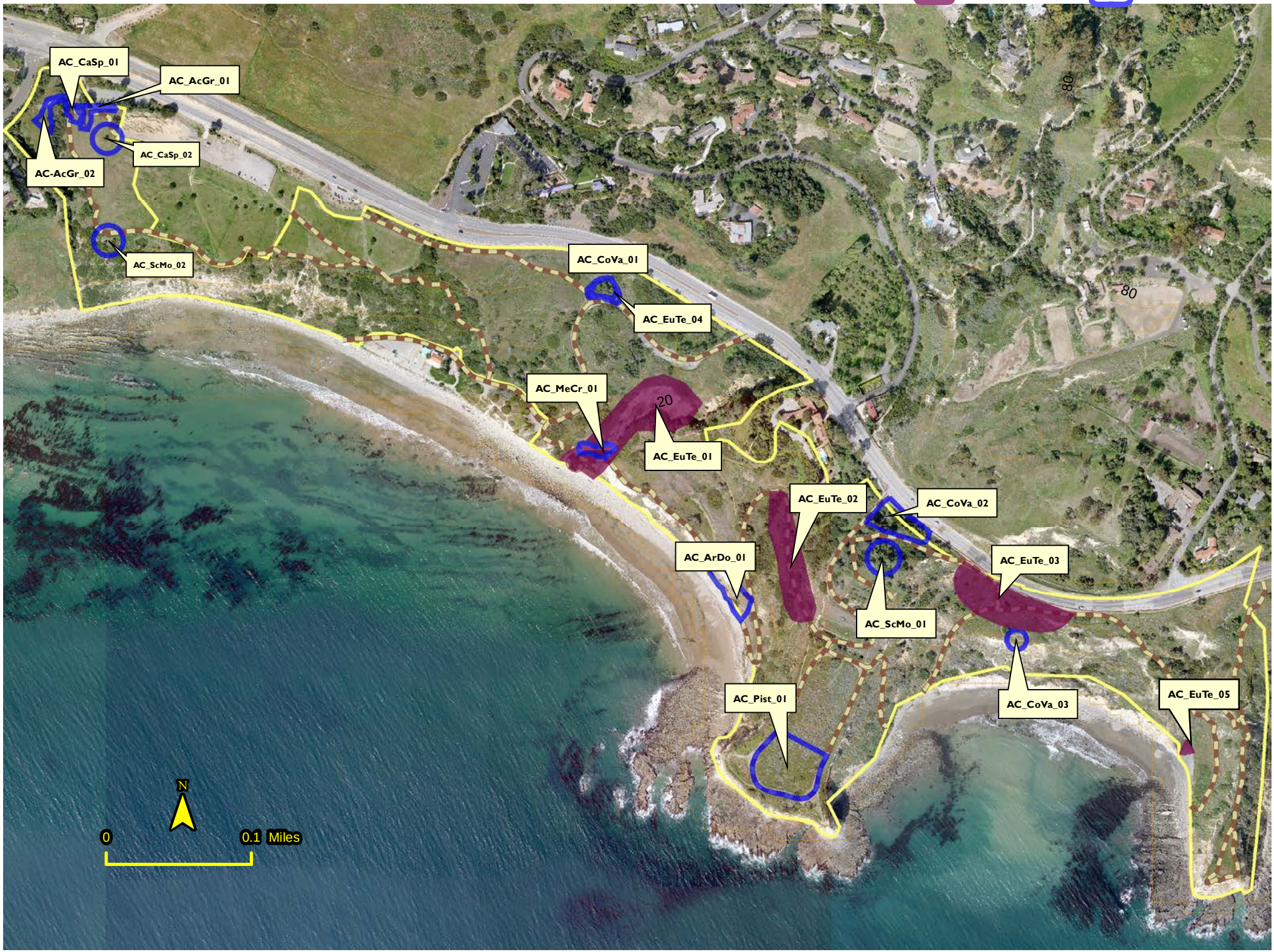
2013 TERPP Sites | Previous TERPP Sites

APPENDIX I

2014 TERPP MAPS

TERPP Sites: *ABALONE COVE*

2014 TERPP | Former TERPP

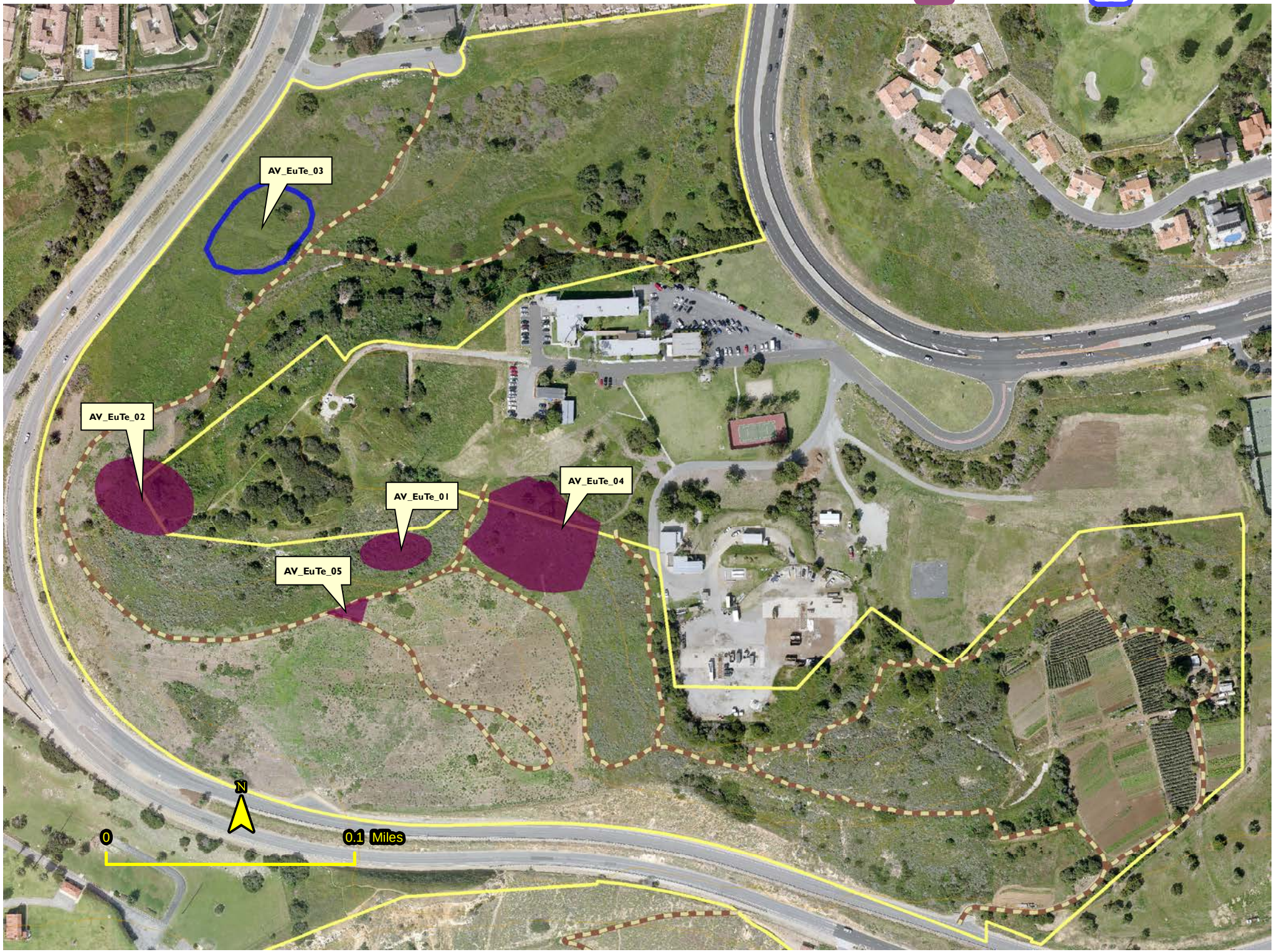


TERPP Sites: *AGUA AMARGA*

2014 TERPP Former TERPP

TERPP Sites: ***ALTA VICENTE***

2014 TERPP Former TERPP



TERPP Sites: ***FILIORUM***

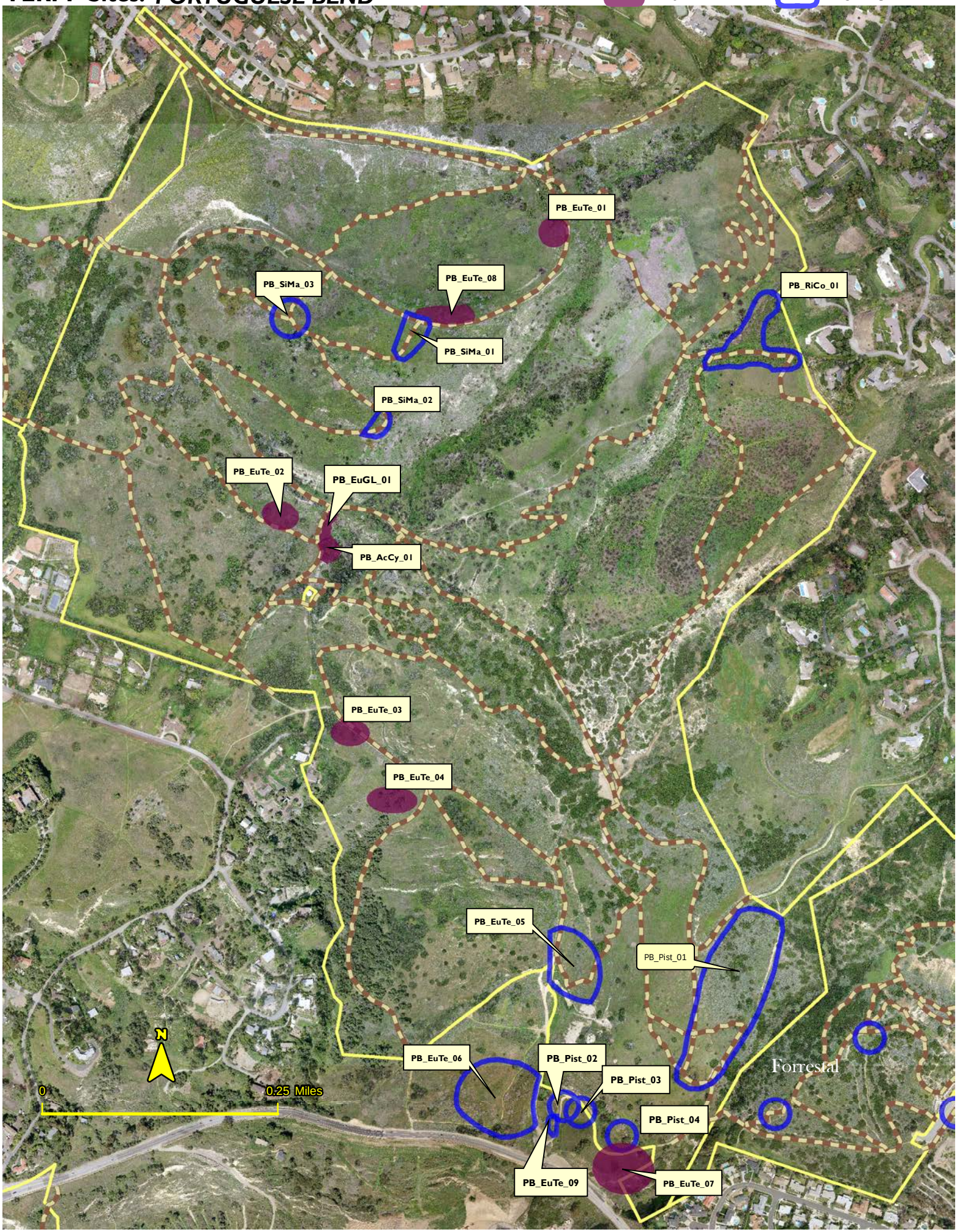
2014 TERPP Former TERPP

TERPP Sites: ***FORRESTAL***

2014 TERPP Former TERPP

TERPP Sites: *PORTUGUESE BEND*

2014 TERPP Former TERPP

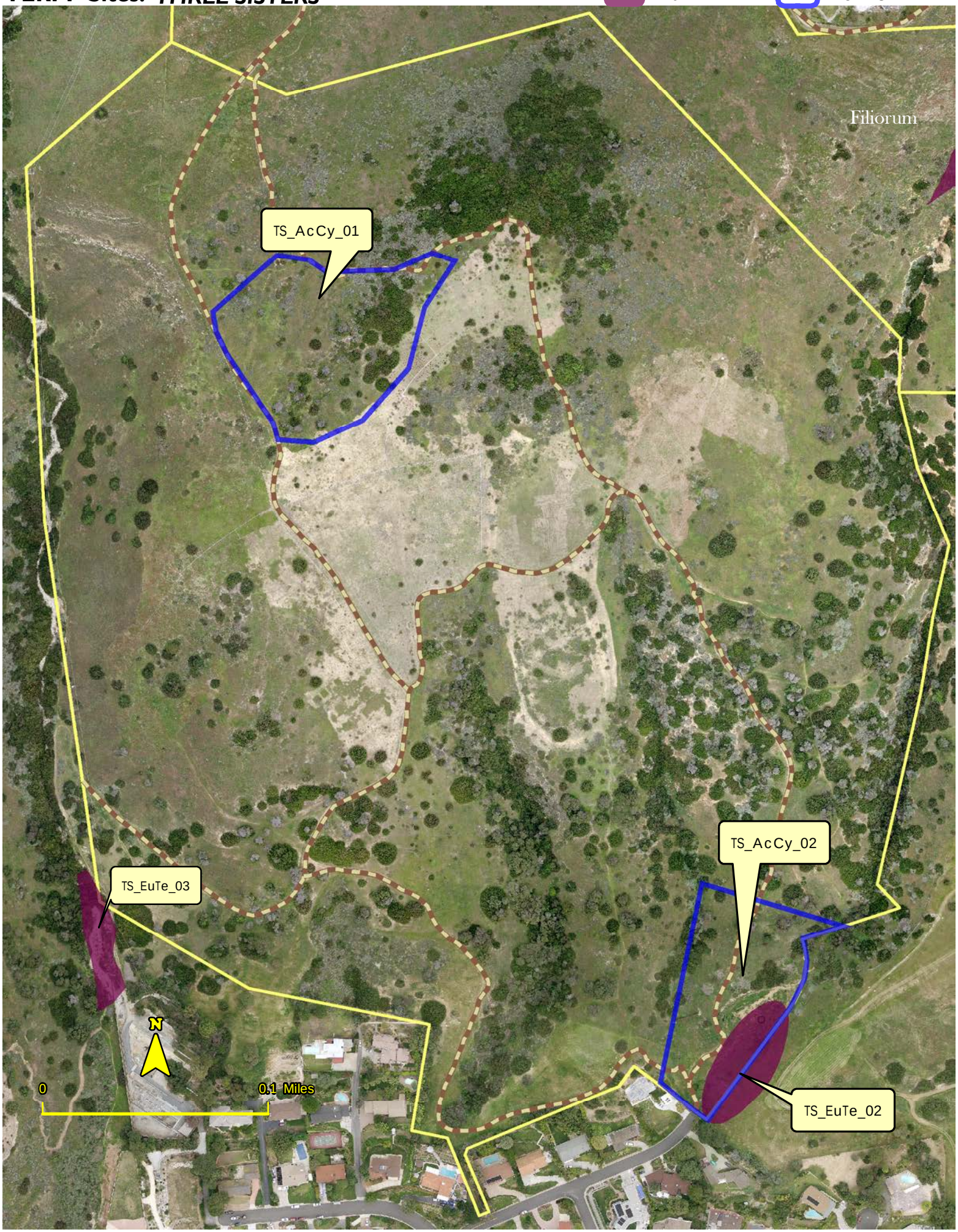


TERPP Sites: ***SAN RAMON***

2014 TERPP | Former TERPP

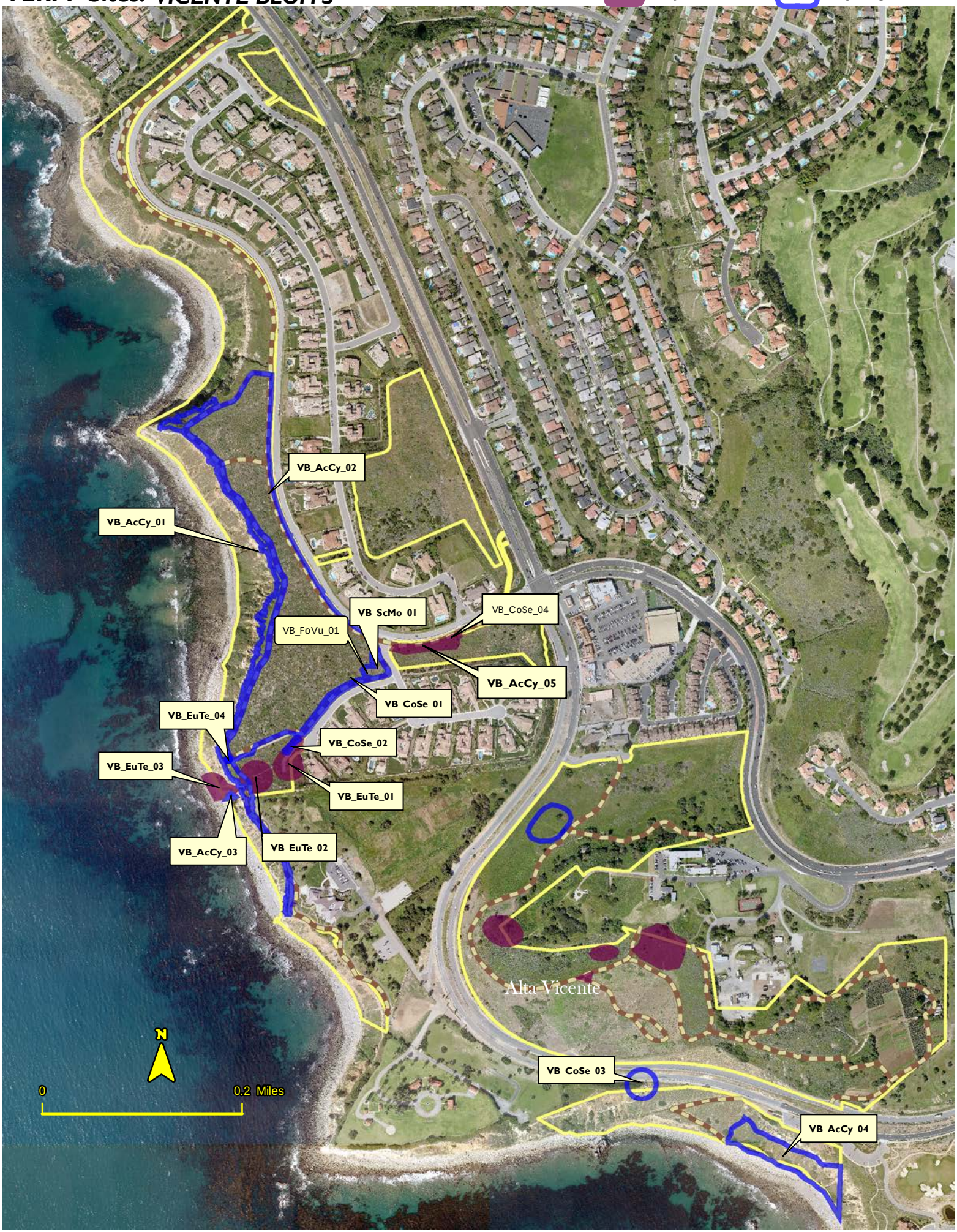
TERPP Sites: ***THREE SISTERS***

2014 TERPP Former TERPP



TERPP Sites: ***VICENTE BLUFFS***

2014 TERPP Former TERPP

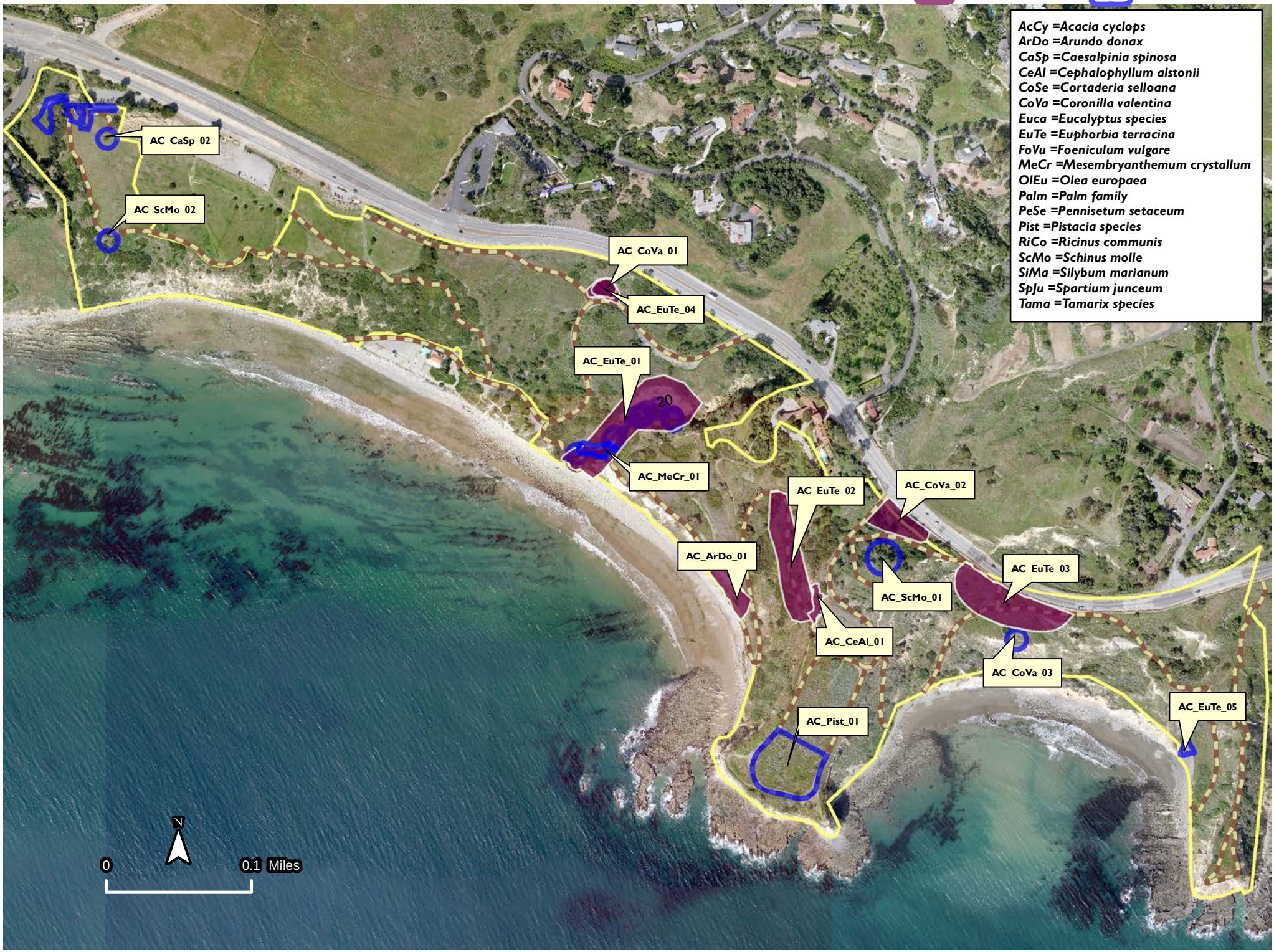


APPENDIX J

2015 TERPP MAPS

TERPP Sites: *ABALONE COVE*

2015 TERPP Former TERPP

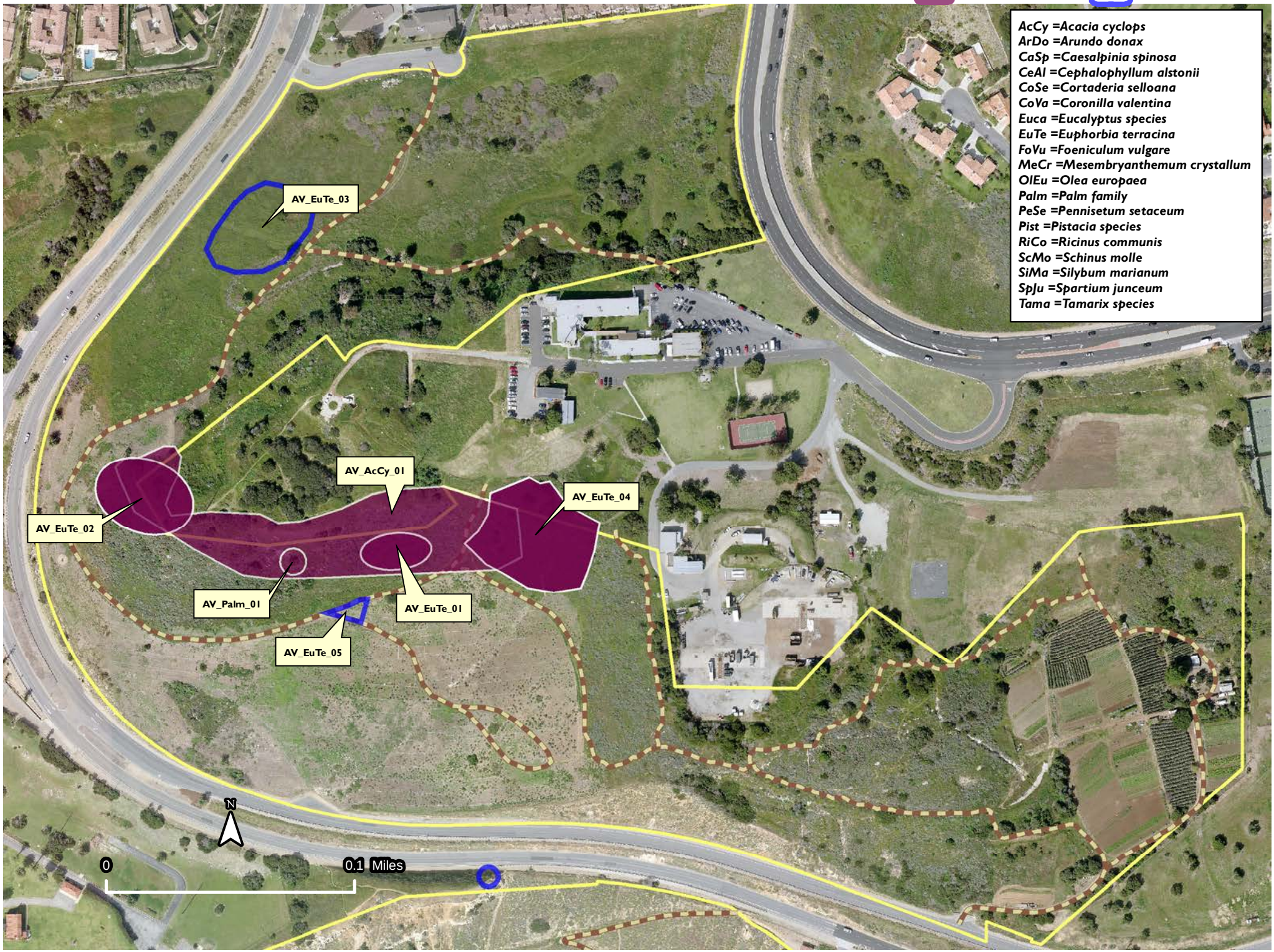


TERPP Sites: ***AGUA AMARGA***

2015 TERPP Former TERPP

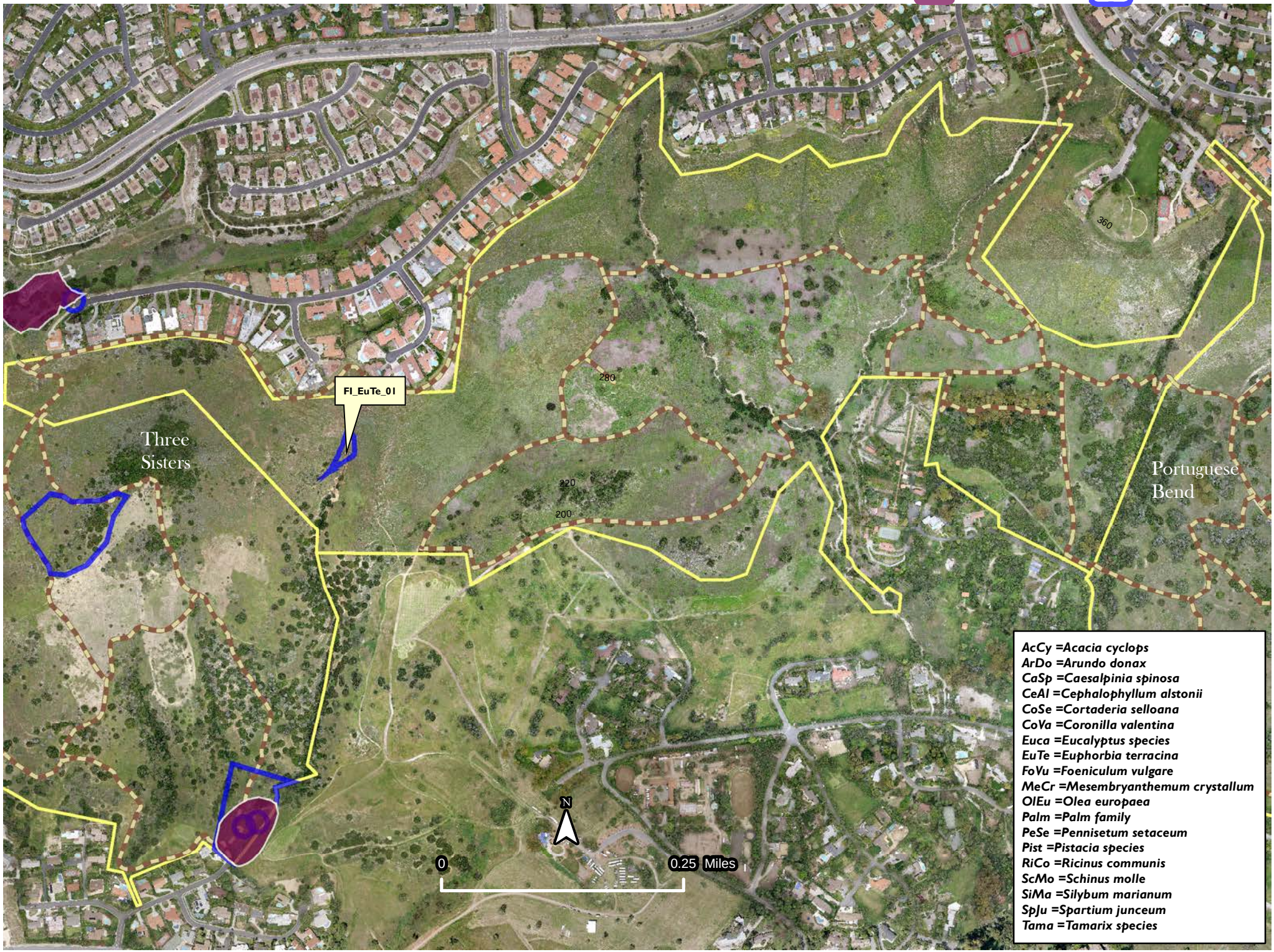
TERPP Sites: ***ALTA VICENTE***

2015 TERPP Former TERPP



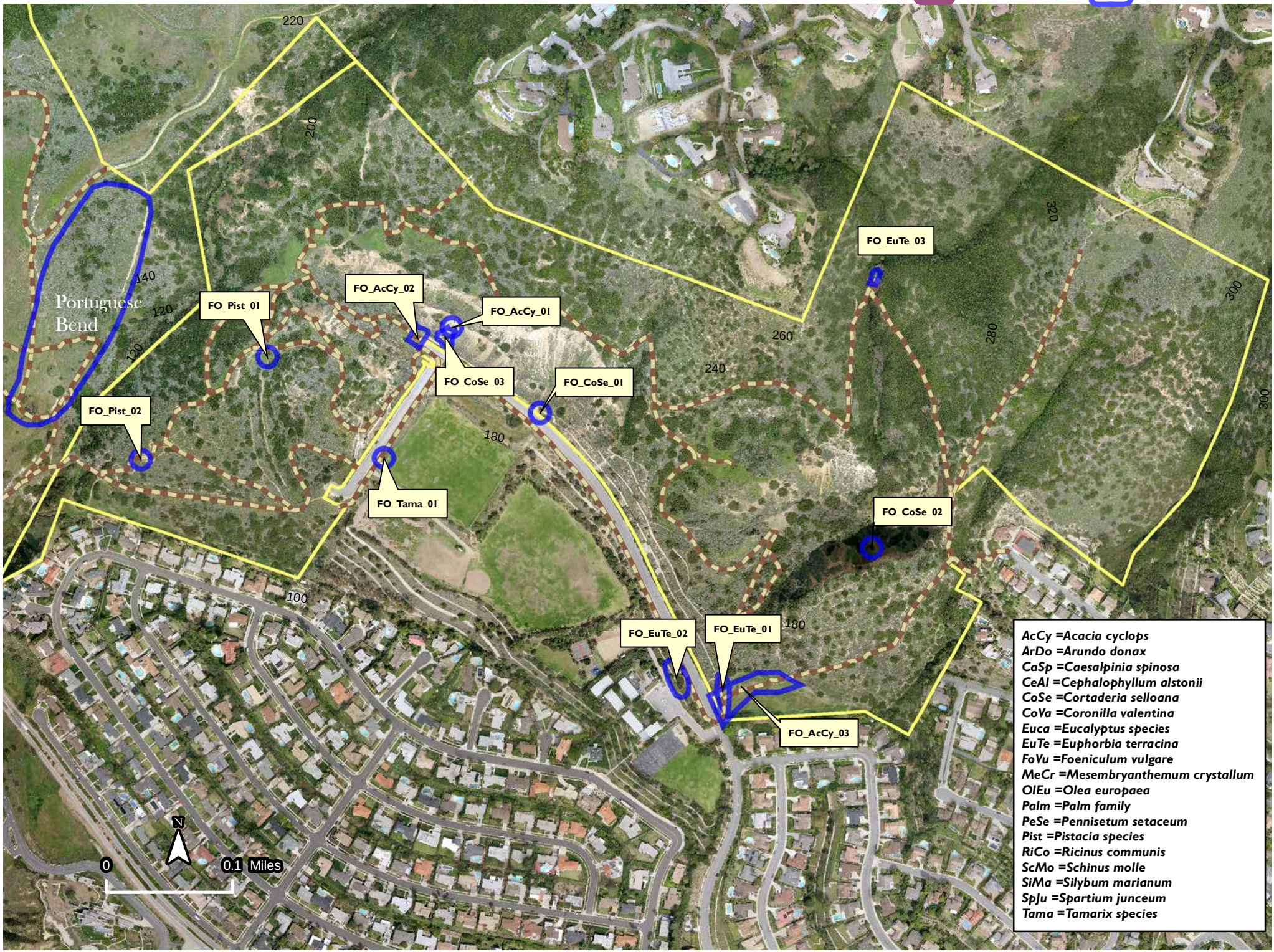
TERPP Sites: *FILIORUM*

2015 TERPP Former TERPP



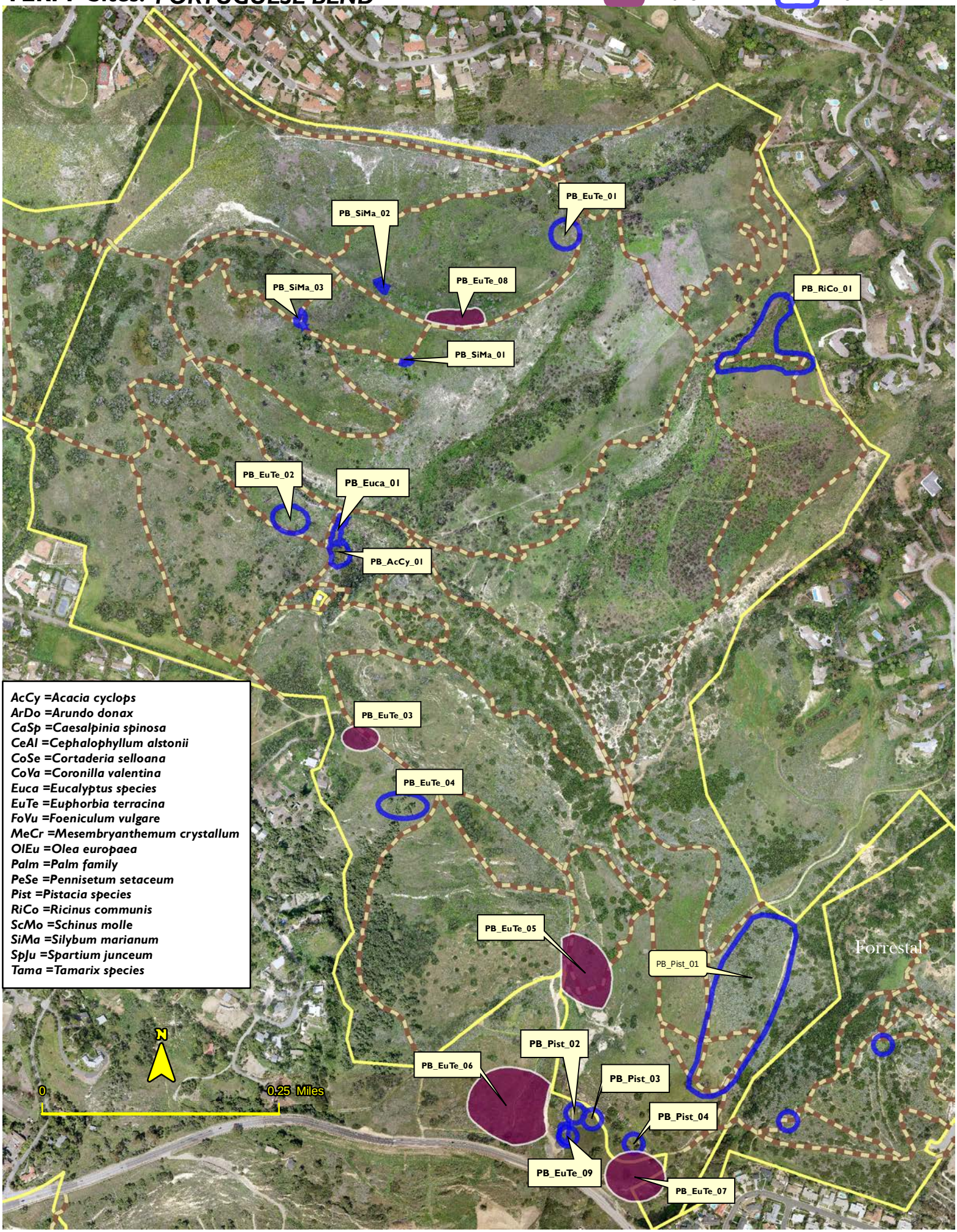
TERPP Sites: ***FORRESTAL***

2015 TERPP Former TERPP



TERPP Sites: *PORTUGUESE BEND*

2015 TERPP Former TERPP



AcCy =Acacia cyclops
ArDo =Arundo donax
CaSp =Caesalpinia spinosa
CeAl =Cephalophyllum alstonii
CoSe =Cortaderia selloana
CoVa =Coronilla valentina
Euca =Eucalyptus species
EuTe =Euphorbia terracina
FoVu =Foeniculum vulgare
MeCr =Mesembryanthemum crystallum
OlEu =Olea europaea
Palm =Palm family
PeSe =Pennisetum setaceum
Pist =Pistacia species
RiCo =Ricinus communis
ScMo =Schinus molle
SiMa =Silybum marianum
SpJu =Spartium junceum
Tama =Tamarix species

TERPP Sites: *SAN RAMON*

2015 TERPP Former TERPP

AcCy =Acacia cyclops
ArDo =Arundo donax
CaSp =Caesalpinia spinosa
CeAl =Cephalophyllum alstonii
CoSe =Cortaderia selloana
CoVa =Coronilla valentina
Euca =Eucalyptus species
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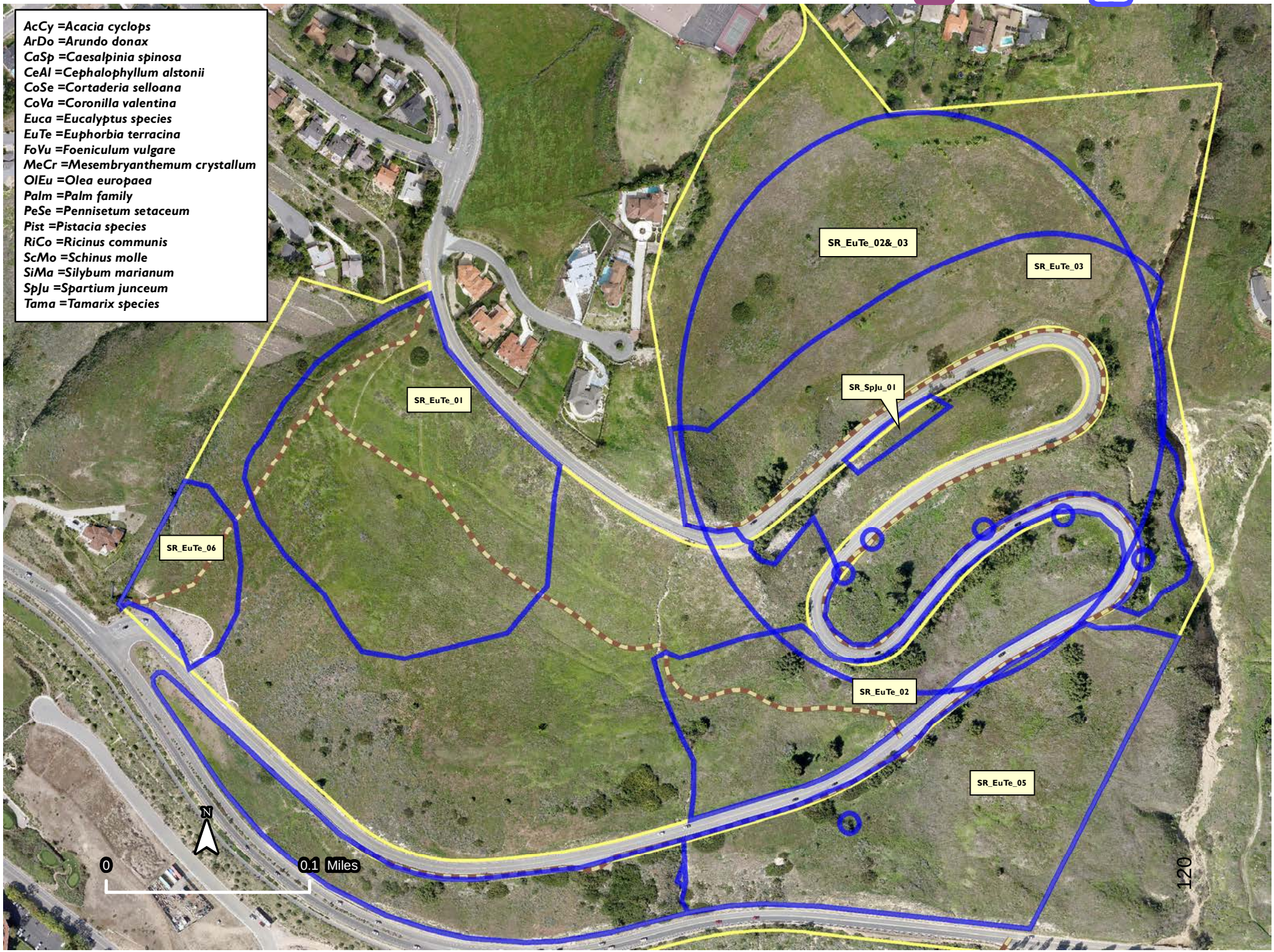
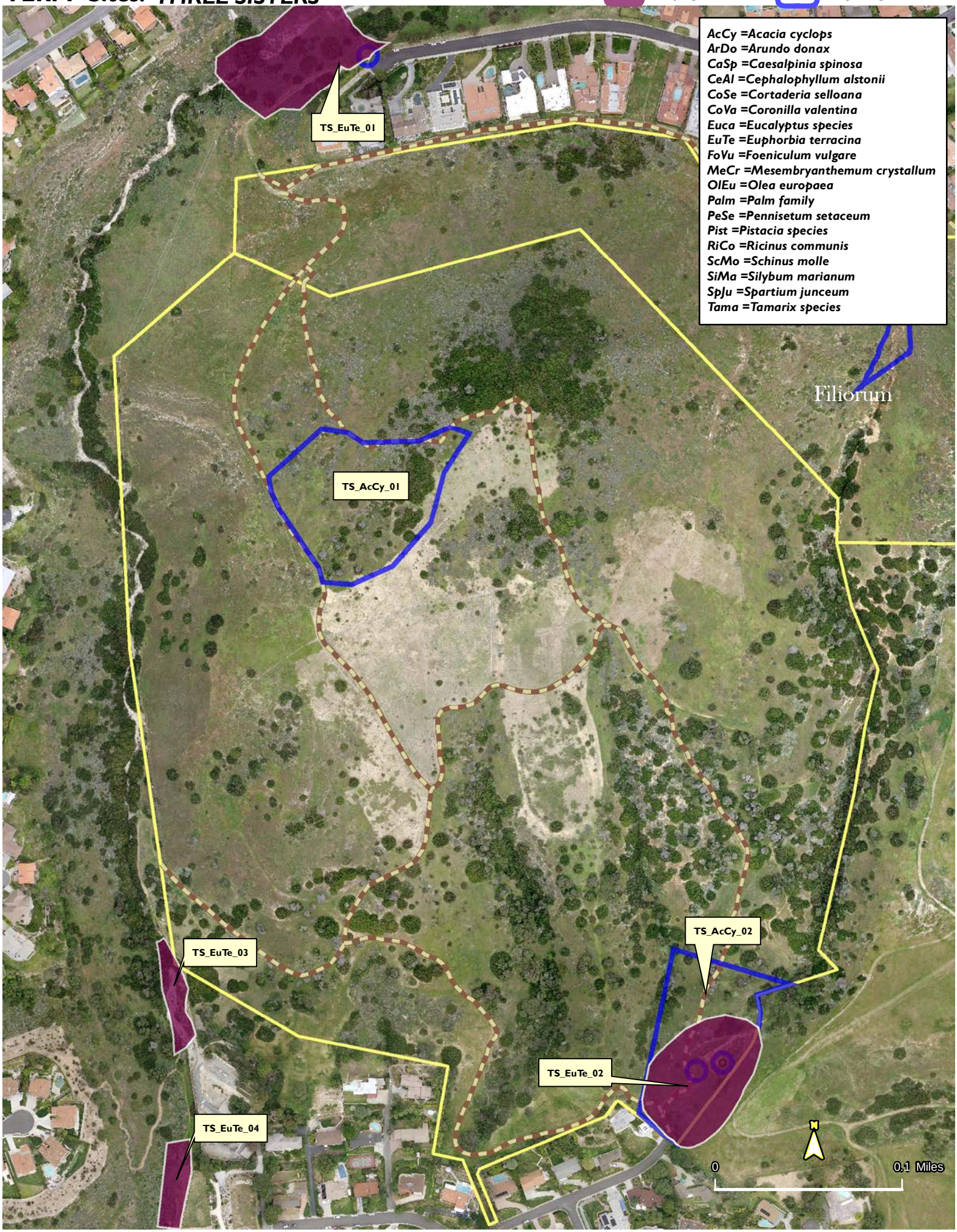


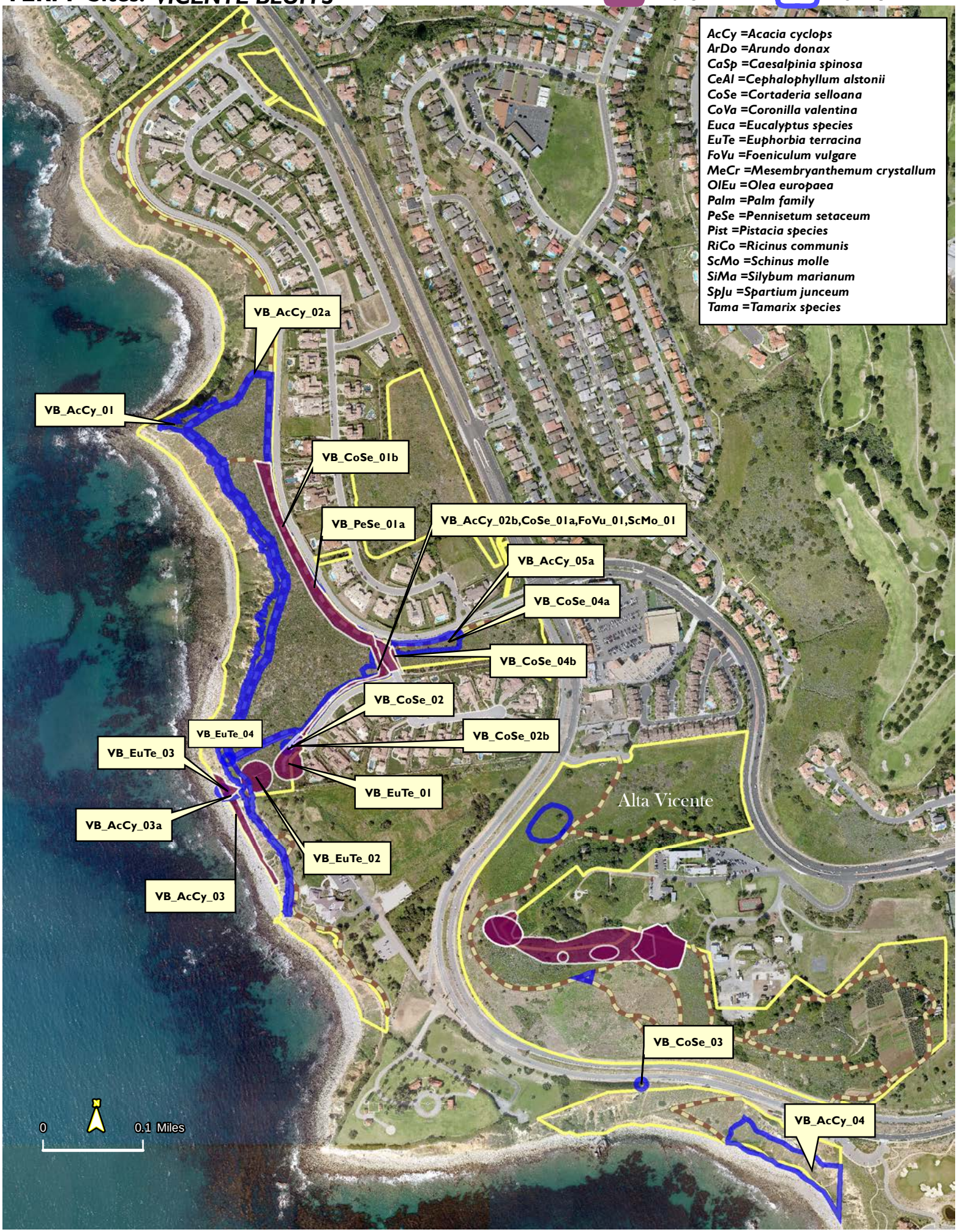
TERPP Sites: *THREE SISTERS*

2015 TERPP Former TERPP



TERPP Sites: *VICENTE BLUFFS*

2015 TERPP Former TERPP



SECTION 6

DISCUSSION AND MANAGEMENT RECOMMENDATIONS

SECTION 6 DISCUSSION AND MANAGEMENT RECOMMENDATIONS

6.1 INTRODUCTION

This section discusses management recommendations based on the results of the 2013-2015 covered species surveys, 15-acre habitat restoration plan, TERPP report, and predator management report. Because the covered species surveys, habitat restoration plan, predator report, and TERPP reports were authored as stand-alone documents and each clearly states management recommendations independently, this section will attempt to summarize all aspects of management of the PVNP, including topics not covered in the above sections, such as trails and public use. Recommendations are based on analysis of successful techniques as well as areas that can be improved.

6.2 HABITAT RESTORATION

Habitat monitoring of restoration areas show that seed germination has been low, perhaps due to several years of low rainfall, seed predation, or competition by weeds. To meet success criteria, fill-in planting was necessary in parts of Alta Vicente and Portuguese Bend. Based on this, future restoration plans will incorporate higher numbers of container plants, and rely less on seed germination for meeting success criteria. Seeding will nonetheless be an important component for developing a native seed bank. Additionally, PVPLC has implemented the use of drip line irrigation systems to replace overhead sprinklers, which has shown an increase in plant vitality and reduction in plant mortality, and will be the preferred method of irrigation in all future planting projects.

6.3 MANAGEMENT RECOMMENDATIONS

Trails

The Preserve trails fall under the City's Public Use Master Plan (PUMP), which is an NCCP-covered activity, and must therefore follow certain avoidance and minimization measures and guidelines to protect covered species, including closing trails that were previously in use and no longer authorized.

Visitors have been creating new unauthorized trails on the Preserve, and tampering with PVPLC's trail closures. With the addition of full-time Field Operations Specialist in 2014, whose main task is to close unauthorized trails and replace closures after vandalism, PVPLC staff and volunteers have closed off spur trails using cactus and physical barriers at Vicente Bluffs

(Pelican Cove), Alta Vicente, Abalone Cove, Forrestal, Filiorum and Portuguese Bend. PVPLC recommends the continued coordination with volunteers of the Rapid Response team to monitor closures and assist with the replacement of removed closures.

PVPLC, with City of RPV coordination, created a Volunteer Trail Watch program to educate the public and improve trail etiquette, protect the natural resources of the Palos Verdes Nature Preserve, enhance the safety of, and promote an enjoyable experience for all Preserve visitors. Trail Watch volunteers observe activities on the Preserve, communicate the importance of following Preserve Rules to the public, and inform enforcement about times and locations of problematic activities. The VTW program has collected lots of data about visitor impacts, trail issues, and trends in violations of the rules to support enforcement.

PVPLC recommends that future enforcement efforts target individuals who are causing vandalism to trail closures and signage as well as other rules violations, and utilize VTW reports of observations and trends to help focus enforcement efforts. Additionally, PVPLC recommends enhanced distribution of the "Sharing Trails Safely" brochure to enhance efforts to protect natural resources and promote safety.

Covered Species

Covered Plant Species

During this triennial monitoring period, the PVPLC conducted covered plant species monitoring during 2015. Based on recommendations from the 2012 Cumulative Report, populations were mapped with GPS and GIS maps were created to accurately show the populations distributions. In spite of the extended period of low rainfall, large numbers of *Atriplex* and *Aphanisma* were observed. A revised approach to better quantify the *Crossosoma californicum* population resulted in an increase of observed individuals from of 776 plants in 2011 to over 900 plants in 2015. Higher *Dudleya* counts were obtained in 2015 than 2010, because the counts extended beyond previously mapped boundaries. Additionally, the lack of harmful invasive weeds due to sustained drought conditions made the dudleya clumps easier to see. The remaining two species' populations (*Lycium* and *Saueda*) were relatively unchanged from those observed during the initial 2006 survey.Threats to all species include invasive non-native species, cliff erosion, long-term drought, and trampling.

PVPLC is collecting seed of these covered plants for propagation and out-planting at restoration sites. In 2013, as part of a restoration funded by two grants (National Fish and Wildlife Foundation and Santa Monica Bay Restoration Commission/Coastal Conservancy grant), invasive plants were removed and covered species (*Atriplex, Aphanisma, Dudleya, Lycium*) were installed along the coastal bluffs at Abalone Cove.

PVPLC recommendations are to:

- Continue to remap stands to determine how and where boundaries change, especially for the annuals *Aphanisma* and *Atriplex* and for the perennial *Suaeda*.
- Install covered plant species in restoration efforts as feasible and where appropriate.
- Remove threatening invasive species in priority areas.
- Continue to seek restoration funding directed toward enhancing populations of these six species.

Covered Wildlife Species

El Segundo Blue Butterfly

Surveys for the El Segundo blue butterfly (ESB) were conducted in 2014. Within the Palos Verdes Nature Preserve, ESB inhabit the steep ocean bluffs around Point Vicente. The NCCP mandates triennial surveys for long-term population trending.

The 2014 survey was conducted at 15 sites with host plants. Weekly surveys were conducted from July 1 through August 4 – slightly later than the last survey in order to observe host plants in peak bloom. Two ESB were observed in the survey areas: one male at Pelican Cove and one male at Vicente Bluffs. In some areas, host plant health and distribution appear affected by prolonged drought conditions and is most likely the reason for the paucity of observed ESB. However, other sites at Abalone Cove and Vicente Bluffs experienced a large increase in host plant populations due to restoration efforts since the last survey.

PVPLC will continue to remove invasive plants that compete with the ESB host plant and seek funding to enhance butterfly habitat.

California Gnatcatcher and Cactus Wren

Surveys for California gnatcatcher and cactus wren were conducted in 2015. In 2012 the protocol was modified from earlier protocols to complete two passes versus three.

The California gnatcatcher was present at 9 reserves, but absent at Vista del Norte. The estimate of California gnatcatcher territories for 2015 (33) was remarkably the same as observed in 2012, but lower than that of both 2006 (65) and 2009 (40). However, the CAGN population documented in 2015 is within the range of the annual counts of 26–56 CAGN breeding pairs reported by Atwood et al. (1996).

Lower numbers in 2015 (as in 2012) may be cause for some concern in the reserves where gnatcatchers are now very rare or absent after being more numerous on prior years' surveys (i.e. Agua Amarga, Three Sisters, and San Ramon). It is however possible that surveys did not detect the birds. PVPLC recommends monitoring the CAGN populations in the Palos Verdes Nature Preserve every three years, according to current plans. If funding allows, directed searches in the Preserve over the next three years could help to better understand population changes in the Preserve.

Cactus wrens were present at 5 reserves. They were not detected in surveys at Forrestal, Filiorum, San Ramon, or Vicente Bluffs or Vista del Norte. Counts of cactus wren were much lower than in 2012 in all sites, and they were detected only at half the reserves in 2015. Compared with previous surveys, the estimates of numbers of cactus wren territories (19-25) were reduced from 2012 (38-48). Eastern Abalone Cove was not monitored. Lower numbers at Abalone Cove, Forrestal, and San Ramon could be due to variation in detectability, or to lower habitat quality due to increases in invasive plants and prolonged drought conditions. PVPLC will continue to restore habitat for CACW in the preserves and will identify cactus stands that can be expanded by removing invasive plants, as part of TERPP activities (such as the Acacia at Alta Vicente). PVPLC will continue to participate in the Coastal Cactus Wren Working Group to develop a coordinated approach to conserving cactus wren populations. PVPLC formed a Citizen Science Cactus Wren Monitoring group in 2015, and is developing methods to monitor populations throughout the Reserves and better understand their behavior in relation to habitat quality.

Threats

Invasive Plants

Invasive species are a ubiquitous problem in wild lands, and pose a substantial threat to the integrity of native vegetation communities in the PVNP. Aggressive non-native plant control is a highly recommended priority for the long-term preservation of established and future recruitment of native vegetation stands in the PVNP. Management priorities are based on the highly invasive species as listed by the California Invasive Plant Council (Cal-IPC). Of particular concern are highly invasive species such as *Euphorbia terracina* (Geraldton carnation spurge), located in Portuguese Bend Reserve and San Ramon, *Ricinus communis* (castor bean) located in Agua Amarga and Abalone Cove, and *Acacia cyclops* (acacia) found throughout the PVNP. PVPLC conducted invasive weed surveys to produce a baseline map for invasive plants. These maps can be compared to results of future invasive plant surveys to determine whether a population is spreading. Along with the vegetation map produced in 2000, this map will allow PVNP staff to prioritize and target areas for TERPP and restoration. TERPP activities can be focused to:

1. Reduce invasive plant expansion into otherwise high quality habitat.

2. Control invasive plants in areas where clearing invasive plants will create higher quality habitat.

Wildfires

Because fire is a natural feature of the region, under normal circumstances natural re-growth of habitat is expected. However, extensive fires or repeated fires in the same location of the Preserve may adversely affect the Covered Species conserved by the Permit Area plan because habitat type conversion from existing habitat(s) to invasive or non-native weeds can occur.

PVPLC will monitor burned areas within the PVNP to determine if the habitat is recovering, and for negative impacts on Covered Species. Measures developed by consensus between the City and the Wildlife Agencies will be implemented if deemed necessary. These measures could include erosion control, noxious species control, reseeding, or other measures identified during the analysis.

In June 2014, a fire burned approximately 6.7 acres of the 14-acre Vista del Norte Reserve, affecting both native and non-native vegetation. No known nesting sites of the threatened coastal California gnatcatcher (*Polioptila californica californica*) and the special status cactus wren (*Campylorhynchus brunneicapillus*) were identified at the Reserve in recent surveys. PVPLC created a Fire Recovery Plan which included hydroseeding and monitoring the habitat recovery (PVPLC 2015 Annual Report).

Erosion, Compaction, Habitat Loss

Coastal bluff erosion was observed in all survey areas within the PVNP that occur on the coastline. In addition to coastal bluff erosion, canyon erosion was documented in Lower Altamira canyon where the population of *Coreopsis* occurs. Canyon erosion also occurs in several other canyons on the peninsula within the PVNP. Plant species that occur on the coastal bluffs (such as *Dudleya, Aphanisma, Suaeda* and *Lycium*), or on the side slopes of eroding canyons, are threatened by potential erosion. Additionally, wildlife species which rely on the habitat on the coastal bluffs and in eroding canyons, are threatened by the loss or degradation of their habitat. The majority of coastal bluff erosion threatening coastal bluff plant and wildlife species is naturally occurring and little can be done to prevent it from happening. The soils on the peninsula are highly erosive and the area is highly geologically active. However, some erosion problems that were noted within the PVNP (e.g., Fishing Access) were a consequence of unauthorized, unstable coastal bluff trails, which PVPLC has since closed and restored.

Some additional erosion problems on the coastal bluffs are related to disturbed vegetation and presence of invasive annual species. Restoration of degraded coastal bluffs would help to minimize soil erosion and improve native coastal bluff scrub habitat.

PVPLC will continue to maintain established trails, and close and revegetate unauthorized trails. The trail improvements and restoration project completed at Pelican Cove and Vicente Bluffs will reduce cliff erosion at this site. PVPLC has obtained funding for habitat restoration at Abalone Cove Reserve, including closing and replanting unauthorized trails. PVPLC will continue to monitor for erosion and develop erosion control plans when necessary.

In 2014 PVPLC and the City of RPV outreached to the utilities that access the Preserve to educate them about avoiding habitat impacts due to their activities. In spite of the efforts to educate utility companies and their field staff, impacts occur on occasion. One instance occurred in 2014 when a City's contractor accidently graded Peppertree Trail and Toyon Trail in Portuguese Bend Reserve, widening the trail and impacting trail-side habitat. Although plans were made to repair the damages, it will take many years for the areas to recover.

PVPLC recommends that the City develop a protocol for utility company access and fuel modification that can be closely followed by staff to ensure that habitat impacts and erosion do not occur.

Predator Control

Feral Cats and Red Fox

Few feral animals have been observed in the PVNP over the last three years, except at Vicente Bluffs, in the area adjacent to the Palos Verdes Interpretive Center. Evidence of cats in the Reserve, was in the form of what appeared to be "cat trails" through the vegetation. Feral cat activity was due to a long-established feral cat feeding station near the Reserve. In collaboration with City of RPV staff, most of the feral cats were removed, and the cat feeding station was moved a greater distance from the Reserve. PVPLC will monitor to ensure that there is no longer evidence of cats in the Preserve.

PVPLC will continue to monitor throughout the Preserve, and if a significant impact is determined, will consult with agencies on follow-up actions. Options may include a feral animal removal program will be established. This program could consist of trapping and removal at regular intervals throughout the year. It would be based on the latest scientific data to ensure its success.

Brown-headed Cowbirds

The Predator Control Plan addresses monitoring and control of brown-headed cowbirds. The brown-headed cowbird is a nest parasite that lays its eggs in other bird species' nests, including the nests of California gnatcatcher. This behavior negatively affects native bird species, and can reduce reproductive success. Brown-headed cowbirds have not been observed during California gnatcatcher and cactus wren surveys, and there were no incidental observations on the Preserve. If brown-headed cowbirds become a threat, a cowbird trapping program may be implemented.

Climate Change

Climate change poses a significant threat through reduced precipitation and more episodic rain storms, sea-level rise, and increased wildfires in the southwestern US (Global Change Project 2009). Higher temperatures, changes in rainfall, and fire regime, would lead to changes in the distribution and composition of vegetation communities (CCCC 2006). In particular, an increased frequency of wildfires would result in a change in vegetation types from shrubs to grassland (CCCC 2006).

Climate change scenarios for California predict a decrease in shrub communities, including CSS, due to the increase in the frequency of wildfires (CCCC 2006). The predicted loss of shrub land is associated with increased frequency of wildfires, and not with changes in temperature or precipitation (CCCC 2006). CSS restoration in the PVNP is an important long-term goal based on this scenario. A diverse plant community, created with a diverse seed mix and plant palette, will facilitate regeneration after fire disturbance, and prevent habitat type conversion to a grassland community. In addition, an adaptive management model will allow for adjustments as techniques and outcomes are evaluated.

Long-term drought from reduced precipitation has the potential to impact the survivorship of the more drought-sensitive species, such as Crossosoma and the annuals Aphanisma and Atriplex. Sea-level rise will accelerate cliff erosion (Global Change Project 2009), leading to an additional threat to those species. Species such as *Dudleya, Eriogonum, Lycium*, and *Suaeda*, with remnant populations along the steep ocean bluffs, may be subject to habitat loss and may need assistance in recolonizing new bluff areas.

Adaptive Management

An adaptive management framework will be used to modify restoration and management activities as success is assessed, new information becomes available, or changes occur in weather conditions. Adaptive management is a key element of implementing effective conservation programs which takes into account data from monitoring species and natural systems as well as new information from management and targeted studies to continually assess and adjust the effectiveness of conservation actions.

Adaptive management may include re-prioritizing monitoring efforts, as indicated by monitoring results and the resultant degree of management required for a given resource. For example, if a specific population proves stable over a period (e.g., 10–20 years), the frequency of monitoring may be reduced, particularly if a species' habitat and physical site characteristics remain unchanged. Conversely, another species may require more intensive monitoring because of declining trends. The remediation and adaptive management program will achieve the objectives of providing corrective actions where (1) resources are threatened by land uses in and adjacent

to the Preserve, (2) current management activities are not adequate or effective, or (3) enforcement difficulties are identified.

The highest priority monitoring tasks will be those (1) that provide direct evidence of changes in key biological resources and (2) for which corrective or remedial management actions are possible.

6.4 LITERATURE CITED

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SECTION 7

2015 ANNUAL REPORT

Palos Verdes Peninsula Land Conservancy

January -- December 2015

PALOS VERDES NATURE PRESERVE

ANNUAL REPORT

FOR THE

RANCHO PALOS VERDES NATURAL COMMUNITY CONSERVATION PLAN

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Restoration

In 2015, Palos Verdes Peninsula Land Conservancy (PVPLC) installed plants on 5 acres (Phase 5) at Portuguese Bend Reserve NCCP site, in accordance with the Portuguese Bend Habitat Restoration Plan. In addition, PVPLC maintained, weeded and irrigated as necessary 20 acres at Portuguese Bend and 10 acres at Alta Vicente Reserve as part of the NCCP restoration sites. PVPLC also maintained 5 acres of restoration at Abalone Cove, funded by the National Fish and Wildlife Foundation, Santa Monica Restoration Commission, Coastal Conservancy, and U.S. Fish and Wildlife Service Coastal Program grants.

Monitoring

At Alta Vicente, Phase 1 (Year 6), native plant cover in coastal sage scrub (CSS) was 38%, not yet meeting the goal of 50%; Palos Verdes Blue butterfly (PVB) habitat was 38%, but host plants did not appear in the survey, not meeting the goal of 10%, most likely due to low rainfall. PVPLC will continue to observe and control weeds in Phase 1 in the fall to observe the rate of restoration.

At Alta Vicente, Phase 2 (Year 5) native plant cover in CSS was 42%, not yet meeting the goal of 50% by Year 5. Native plant cover in the PVB habitat was 33%, with 4% host plant cover, not yet meeting the goal of 10% host plant cover. PVPLC will continue to observe and control weeds in Phase 1 in the fall to observe the rate of restoration. The restoration site will require more time for plants to fill in and for native plants to germinate and fill in the gaps. In 2016 staff will focus on controlling weeds on a regular basis to decrease competition and increase bare ground for seed germination. In the cactus scrub habitat, both native plant cover (43%) and cactus plant cover (8%) achieved the three-year goal for success criteria.

At Portuguese Bend, Phase 1 and 2 were installed the same year (2012), to allow for an additional year of weed control at the site prior to planting. Therefore, they both represent Year 3 after plant installation. The native cover in the CSS ranged from 17% to 37% over three transects. Native plant cover in the cactus scrub was 21%. Plants were healthy, and recruitment from seed was observed at the site. The site is on track for meeting success criteria. At Portuguese Bend in Phase 3 (Year 2) native plant cover was between 30% and 47%, and some recruitment from seed was observed, which has achieved success criteria. Phase 4 (Year 1) has an estimated plant cover of 30%, which is on track to meet success criteria.

Targeted Exotic Removal Program for Plants (TERPP)

In 2015, PVPLC met the objectives for the TERPP program by treating 30 populations of invasive plants. PVPLC treated 20 populations of the highly invasive *Euphorbia terracina.*

Euphorbia seeds can persist in the soil for 3 to 5 years, and treatment needs to be repeated for several years to successfully control this species on the Preserve. Euphorbia is a very serious invasive, and PVPLC believes its expansion in the Preserve must be controlled. Therefore, many of the TERPP sites are the same as in the previous years.

PVPLC treated two populations of *Acacia cyclops.* At Portuguese Bend, acacia that was encroaching into cactus scrub were removed. At Vicente Bluffs, acacia growing near El Segundo blue host plants were cleared to increase potential habitat. At Alta Vicente, acacia growing in cactus habitat were cleared.

A large palm growing in cactus habitat was removed at Alta Vicente.

At Vicente bluffs, two previously treated populations of *Cortaderia selloana* with new plants were retreated.

At Abalone Cove, an Arundo donax that had previously been treated was retreated. Some ice plant (*Cephalophyllum alstonii*) surrounding a population of *Aphanisma* was cleared.

Trail Management and Monitoring

PVPLC continues to update maps and place maps at major trailheads, and post them on PVPLC's website. PVPLC has placed QR codes at major trailheads for people to access maps via smart phones. Additionally, PVPLC collaborated with the City of RPV and Volunteer Trail Watch members to create the "Sharing Trails Safely" brochure to promote trail safety and resource protection in the preserve (Appendix G).

In March 2014 PVPLC hired a part-time field operations technician, and in October this position was increased to full-time. The technician focuses on unauthorized trail closure, trail delineation and graffiti removal. PVPLC continued to work on closing unauthorized trails throughout the Preserve. Many unauthorized trails represent trails that were used for many years but were not included in the Preserve Trails Plan. PVPLC's primary focus is to close newly created unauthorized trails before they become established and damage habitat. This is very intensive work, that requires continuously closing down the trail as signage, branches, and plants are removed. Rapid Response Team volunteers assist in maintaining closures by reclosing sections on a regular basis. However, new unauthorized trails have also developed. PVPLC prioritizes closure of newly developed unauthorized trails. In 2015, focal areas were Filiorum (Jack's Hat Trail, Ford Trail, Rattlesnake Trail, Eucalyptus Trail and Kelvin Canyon Trail); Portuguese Bend (Ishibashi Trail, Toyon Trail, Rim Trail, Sandbox Trail, Barn Owl Trail and Ishibashi Farm Trail); Forrestal (Flying Mane Trail, Quarry Trail, Vista Trail, and Exultant Trail); and Abalone Cove Reserves (Sea Dahlia Trail, Smuggler's Trail and Olmsted Trail) (Appendix G).

In 2015 PVPLC installed 22 “Area closed” signs, 350 trail decals, 36 carsonite signs for trail delineation, and 140 post and cable closures (a 7-fold increase from 2014).

The PVPLC and City initiated the Volunteer Trail Watch Program in 2013 to help educate trail users about appropriate trail use and monitor preserve misuse. The mission of the Palos Verdes Nature Preserve Volunteer Trail Watch Program is to serve as eyes and ears of the City and the Palos Verdes Peninsula Land Conservancy with a view to 1) protect the natural resources of the Palos Verdes Nature Preserve, including the flora and fauna as well as the geology, topography and scenic landscape, and 2) enhance the safety of, and promote an enjoyable experience for all Preserve visitors. Volunteers educate the public about Preserve rules and etiquette; and enter observations of infractions into a web portal (i.e. dogs off leash, off-trail activity, user on non-designated trail, etc.) to allow rangers and Preserve managers to track time and location of these activities. Eleven new volunteers completed the third training workshop for the Volunteer Trail Watch, which took place in February. In 2015, 32 volunteers spent a total of 1418 hours in the Preserve, observing and educating visitors.

Ability to Accomplish Resource Management Goals

PVPLC has been successful at completing restoration under the NCCP, and meeting the goals for targeted invasive plant removal. However, because *Euphorbia terracina* has been difficult to eradicate, and has required treatment over several years, many of the same areas have been treated since 2009.

Concerns about habitat management in the future include the ability to successfully close unauthorized trails, and to prevent new trails from being created. Closing unauthorized trails is time consuming and expensive because of continuous vandalism. PVPLC has been collaborating with the City-provided rangers to help determine which areas need more ranger attention.

There is also a need to ensure that utilities and contractors accessing the Preserve follow guidelines to remain on permitted trails and avoid damaging the habitat. In 2014 a contractor hired by the City incorrectly graded and widened a portion of Toyon and Peppertree Trails in Portuguese Bend, in violation of the conservation easement on the property. The City is creating a restoration plan for this site. Since then, PVPLC and the City have created a protocol for ensuring oversight of projects within the Preserve.

Funding Needs

PVPLC would benefit from continued funding to control highly invasive species on the Preserve and continually battle back against the creation of unauthorized trails that damage habitat. PVPLC continues to apply for funding to increase the amount of acreage restored for the species listed under the plan. Preserve habitat and trails could also benefit from additional funding for on-the-ground enforcement.

1.0 INTRODUCTION

The 2015 Palos Verdes Nature Preserve Report for the Rancho Palos Verdes Natural Community Conservation Plan provides annual submittal requirements by the Palos Verdes Peninsula Land Conservancy (PVPLC) on the status of the Palos Verdes Nature Preserve (Preserve). Additionally this report details stewardship activities, research, funding, and community involvement in the Preserve during the period January 1, 2015 through December 31, 2015.

PVPLC provides habitat management for the Palos Verdes Nature Preserve (Preserve) for the City of Rancho Palos Verdes (RPV). The Preserve encompasses approximately 1,400 acres and is located on the southern side of the Palos Verdes Peninsula in the City of Rancho Palos Verdes, California. The Preserve was formed under a Draft Natural Community Conservation Plan (NCCP) to "maximize benefits to wildlife and vegetation communities while accommodating appropriate economic development within the City and region pursuant to the requirements of the NCCP Act and Section 10(a) of the ESA (URS 2004a)." As a primary component of the NCCP, a Preserve design was proposed to conserve regionally important habitat areas and provide habitat linkages in order to benefit sensitive plants and wildlife. PVPLC manages the habitat in the Preserve under a management agreement with the City.

The primary focus of management for the Preserve is to maintain or restore habitat for the covered plant and animal species listed in the draft NCCP. A Habitat Management Plan was adopted in 2007 that outlines the restoration of 5 acres per year for a total of 15 acres over a 3-year period. This plan also outlined the methodology for removal of exotic plant species, a predator control plan, and the monitoring of covered plant and animal species. The plan outlined restoration of 15 acres at Alta Vicente Reserve. However, after the 2009 fire at Portuguese Bend, restoration shifted focused to this reserve, and a restoration plan was developed for 15 acres at Portuguese Bend Reserve. PVPLC seeks additional funding when possible, to perform restoration on more than the minimum 5 acres per year required in the NCCP. Several opportunities of this nature occurred during the reporting period that enabled PVPLC to conduct additional restoration.

PVPLC also facilitates scientific research and trail maintenance projects in the Preserve. Volunteers make up a large component of the management strategies for the Preserve. They assist in monitoring the properties, wildlife, and habitat as well as help restore habitat and maintain trails. Partnering with regional high schools and colleges allows for scientific research that expands our understanding of the Preserve.

The Management Agreement with RPV requires that PVPLC submit an annual report to the RPV City Council describing management activities with respect to habitat enhancement and restoration, property maintenance and monitoring, vegetation and wildlife monitoring, and

efforts on targeted exotic plant removals. This report provides annual submittal requirements on the status of the Preserve for the period of January 1, 2015-December 31, 2015. It is accompanied by a status report for the Targeted Exotic Removal Program for Plants (TERPP). Volunteer involvement and support and student-based scientific research are also described in this report.

The NCCP Implementing Agreement has not been signed by the regulatory agencies, and therefore, the NCCP is technically not officially executed. However, because it is anticipated that this agreement and federal/state permits will be signed in the near future, this annual report is intended function as the framework management and monitoring plan for the upcoming federal/state NCCP and has been provided to satisfy the requirements the Management Agreement between PVPLC and the City. Annual reporting requirements for the Draft NCCP are detailed below and will be updated once the final NCCP is approved. Additionally, once every three years, a Comprehensive Report is required under the NCCP. To date, two Comprehensive Reports have been completed, covering the periods 2007 through 2009, and 2010 through 2012. The enclosed Comprehensive Report details activities from 2013 through 2015.

Annual Submittals (Included in This Report)

1. A monitoring report on habitat restoration areas using standard monitoring protocol as detailed in the Preserve Habitat Restoration Plan
2. Report on Targeted Exotic Removal Program for Plants (TERPP)
3. Report on trail maintenance activities

Site Description

The Preserve is located on the southern side of the Palos Verdes Peninsula in the City of Rancho Palos Verdes, California (Figure 1). The approximately 1,400-acre Preserve has been divided into ten areas referred to as Reserves.

The topography of the Preserve is diverse, ranging from relatively flat lowland areas above steep coastal bluffs in the south, to very steep slopes, ridgelines and gullies on the slopes to the north. Elevations range from approximately sea level along the coastal edges of Vicente Bluffs, Abalone Cove, and Ocean Trails to approximately 1,300 feet above mean sea level at the northern most parcel, vista del Norte. Adjacent land uses include single-family residences on most sides, open space associated with neutral lands on the Peninsula, the Pacific Ocean to the south and west, and the Los Verdes and Trump National golf courses near the western and eastern ends of the Preserve area.

Table 1
Reserve Names of the Palos Verdes Nature Preserve. See Figure 1 for locations.

Abalone Cove Reserve	Portuguese Bend Reserve
Agua Amarga Reserve	San Ramon Reserve
Alta Vicente Reserve	Three Sisters Reserve
Filiorum Reserve	Vicente Bluffs Reserve
Forrestal Reserve	Vista del Norte Reserve
Ocean Trails Reserve*	
*Not managed by PVPLC	

2.0 FIRES IN THE PRESERVE

2012 Three Sisters Fire Status

On January 9, 2012, the Crest Fire burned approximately 12.7 acres of the 99-acre Three Sisters Reserve, as well as some habitat in McCarrell's canyon, outside of the Preserve. The wildfire burned native and non-native vegetation and known habitat of the threatened coastal California gnatcatcher (*Polioptila californica californica*) and the special status cactus wren (*Campylorhynchus brunneicapillus*). PVPLC wrote a Fire Report and Restoration Plan for the site. The report recommends cactus planting in key areas, weed control and monitoring. The burn area was weeded and large cactus were planted in 2012. The 2015 monitoring survey, the final required survey, showed that burned cactus and other native vegetation were recovering. Non-native plant cover was less than 30% in both the coastal sage scrub and cactus scrub, and bare ground was high, mostly due to several years of drought. The native plant cover in both the coastal sage scrub and the cactus scrub is met success criteria of 40% and 30% native plant cover, respectively. Monitoring photos from 2015 are located in Appendix A3.

2014 Vista del Norte Fire Status

On June 17, 2014, the Vista del Norte fire burned approximately 6.7 acres of the 14-acre Vista del Norte Reserve. The wildfire burned native and non-native vegetation. No coastal California gnatcatchers or cactus wrens were identified at the Reserve in recent surveys. PVPLC wrote a Fire Report and Restoration Plan for the site. The report recommends targeted invasive species removal, erosion control and native seeding of the burned area. In the fall following the fire,

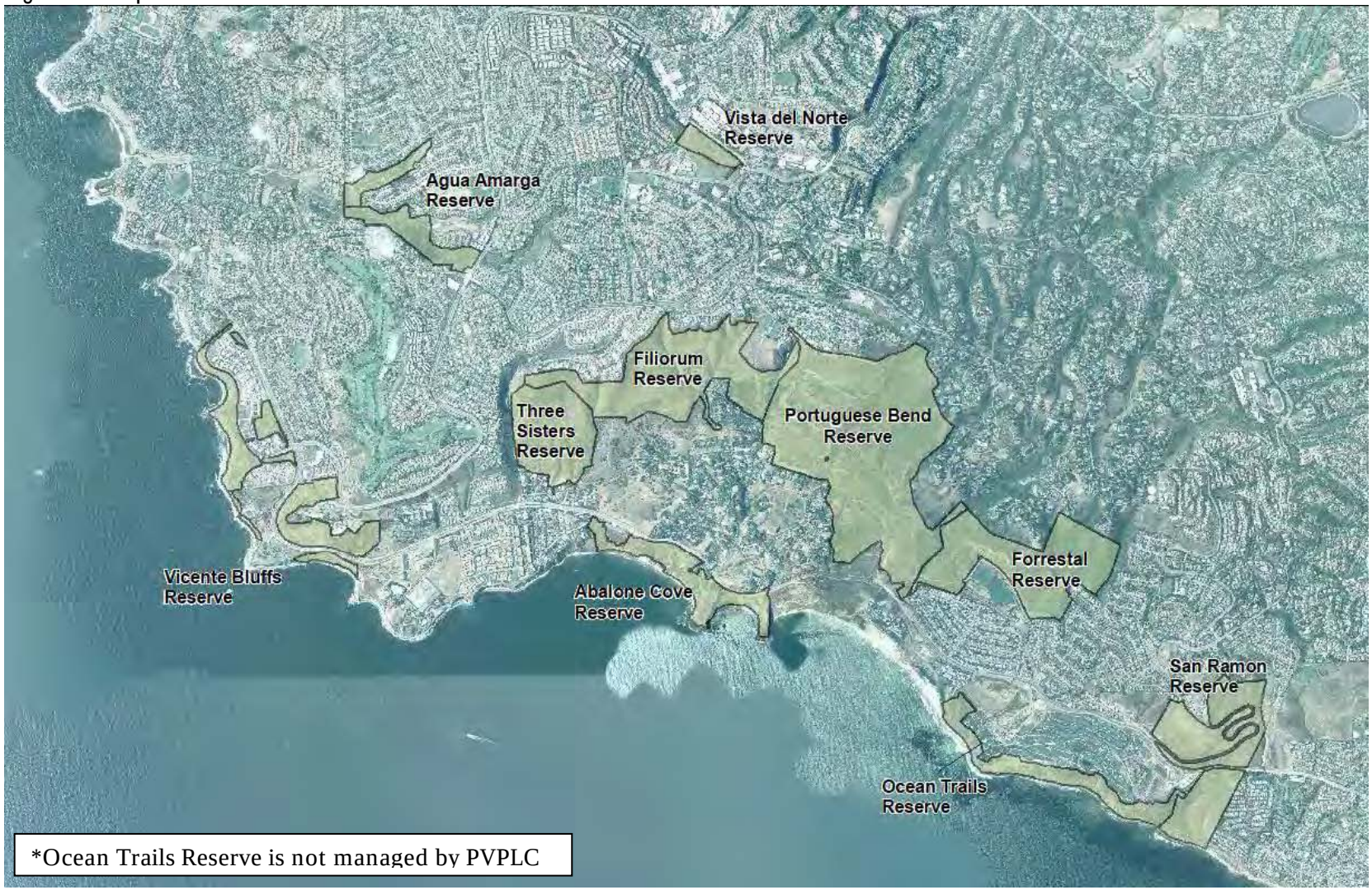
large amounts of *Asclepias fascicularis* (narrowleaf milkweed) germinated. PVPLC hydroseeded a 0.25 acre area within the pre-fire coyote bush vegetation and mustard vegetation in January 2015. Monitoring photos from 2015 are located in Appendix A4.

3.0 HABITAT RESTORATION PLAN

The initial Preserve Habitat Management Plan (PHMP) for the Draft NCCP was created in 2007. A component of the PHMP was the Habitat Restoration Plan for 5 acres per year for a total of 15 acres over the first three-year period. This plan was completed in April 2007 and concluded that Alta Vicente Reserve in the Preserve ranked the highest in terms of site suitability for an immediate restoration project. The Habitat Restoration Plan for Alta Vicente Reserve outlines appropriate revegetation locations and methodology to adequately comply with the Preserve Management requirements of the Rancho Palos Verdes NCCP. The Habitat Restoration Plan for Alta Vicente Reserve provides guidelines for the establishment of coastal sage scrub (CSS), coastal cactus scrub (CCS), and PVB butterfly habitat on a total of 15 acres during 3 consecutive years at the Alta Vicente Reserve. However, since a fire occurred at Portuguese Bend Reserve in August 2009, plans were adapted to focus immediate restoration at Portuguese Bend, and only Phase 1 and 2 (10 acres) were implemented at Alta Vicente. In 2015, PVPLC developed new restoration plans to execute the final phases of the restoration, and are included in the Comprehensive Report. Phase 3 is scheduled to initiate in 2016.

The Restoration Plan for Portuguese Bend covers restoration of 25 acres over 5 years (2010 to 2015). The following provides a brief description of work done to fulfill the NCCP during the reporting period. Table 2 provides the implementation schedule for Phases 1 and 2 at Alta Vicente and Phase 1 through 5 at Portuguese Bend.

Figure 1. Map of the Palos Verdes Nature Preserve with associated Reserves locations.



3.1 ALTA VICENTE RESERVE RESTORATION

The habitat restoration conducted at the Alta Vicente Reserve consists of two 5-acre phases, with one phase initiated each year. The first 5 acres of restoration (Phase 1) began with site preparation during the fall of 2007 and 2008 to minimize weeds after planting (as per the timeline in the Alta Vicente Restoration Plan, Table 2). Phase 1 plants were installed and hydroseeded during the winter of 2009/2010. Site preparation for Phase 2 began in Fall 2008. In December 2010, staff removed *Acacia cyclops* and completed planting and seeding in the Phase 2 area. Staff weeded and maintained Phase 1 and 2. Additional container plants were installed from 2012 to 2014 to fill in areas with low native plant cover.

Draft NCCP annual reporting requirements include a monitoring report on habitat restoration areas using a standard monitoring protocol for years 1, 2, 3 and 5 during the 5-year maintenance and monitoring period that follows plant installation. Monitoring at Alta Vicente began in 2010.

Table 2
Restoration Project Schedule for Alta Vicente Reserve Phases 1 and 2. This table has been modified from its original content in the 2007 Habitat Restoration Plan to reflect activities only in Phase 1 and 2.

	Task	Date
PHASE 1	Site clearing and soil preparation	Fall 2007, Fall 2008
	Installation of temporary irrigation system	Fall 2008
	Weed/exotic removal and grow-kill cycles	Fall 2008-Spring 2009
	Planting container stock	Early Winter 2009/2010
	Hydroseed application	Winter 2009/2010 (following planting)
	Completion of installation/assessment of site installation	Following completion of installation and seeding and 120 day maintenance period
	5-year biological monitoring and maintenance	Spring 2010-Spring 2014
	Phase one completion	2014, end of Year 5
PHASE 2	Site clearing and soil preparation	Fall 2008, Fall 2009
	Installation of temporary irrigation system	Fall 2008, Fall 2009
	Weed/exotic removal and grow-kill cycles	Fall 2008, Fall 2009,-Spring 2010
	Planting container stock	Winter 2010/2011
	Seed application	Winter 2010/2011 (following planting)
	Completion of installation/assessment of site installation	Following completion of installation and seeding and 120 day maintenance period
	5-year biological monitoring and maintenance	Spring 2011-Spring 2015
	Phase two completion	2015, end of Year 5

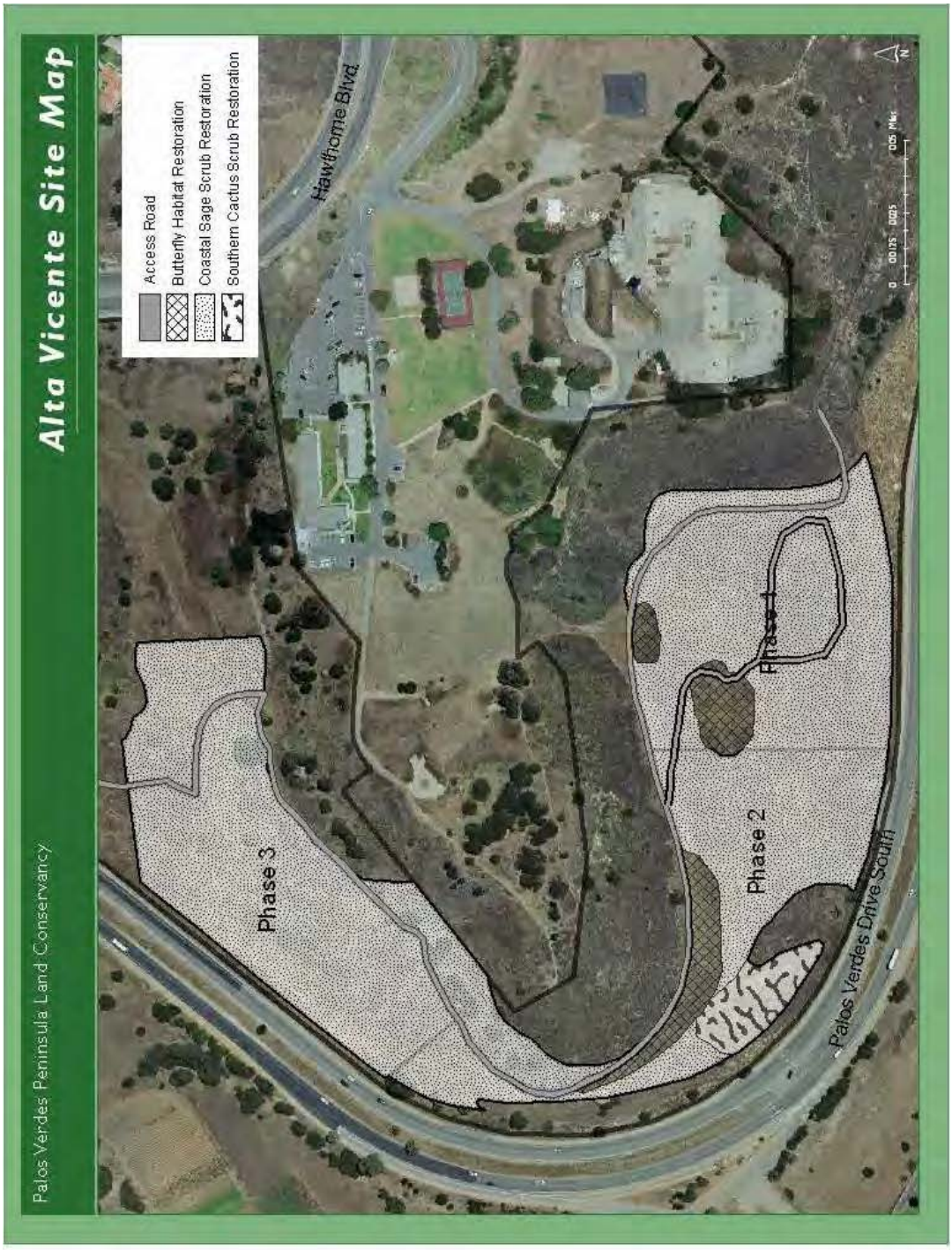


Figure 2: Map of Restoration Areas at Alta Vicente Reserve. Phase 3 has been postponed until 2016 to implement burn recovery at Portuguese Bend.

3.2 PORTUGUESE BEND RESERVE RESTORATION

The restoration plan for Portuguese Bend is to complete 25 acres in five phases (Figure 3, Table 3). Site preparation at Portuguese Bend began in February 2010. Field staff weeded (hand/herbicide) the burn area in 2010. In February, 2011, goats were deployed to clear vegetation. Due to the high density of weeds, an additional year of weeding was implemented, and plants were installed on 10 acres in fall 2012 (Phase 1 and Phase 2).

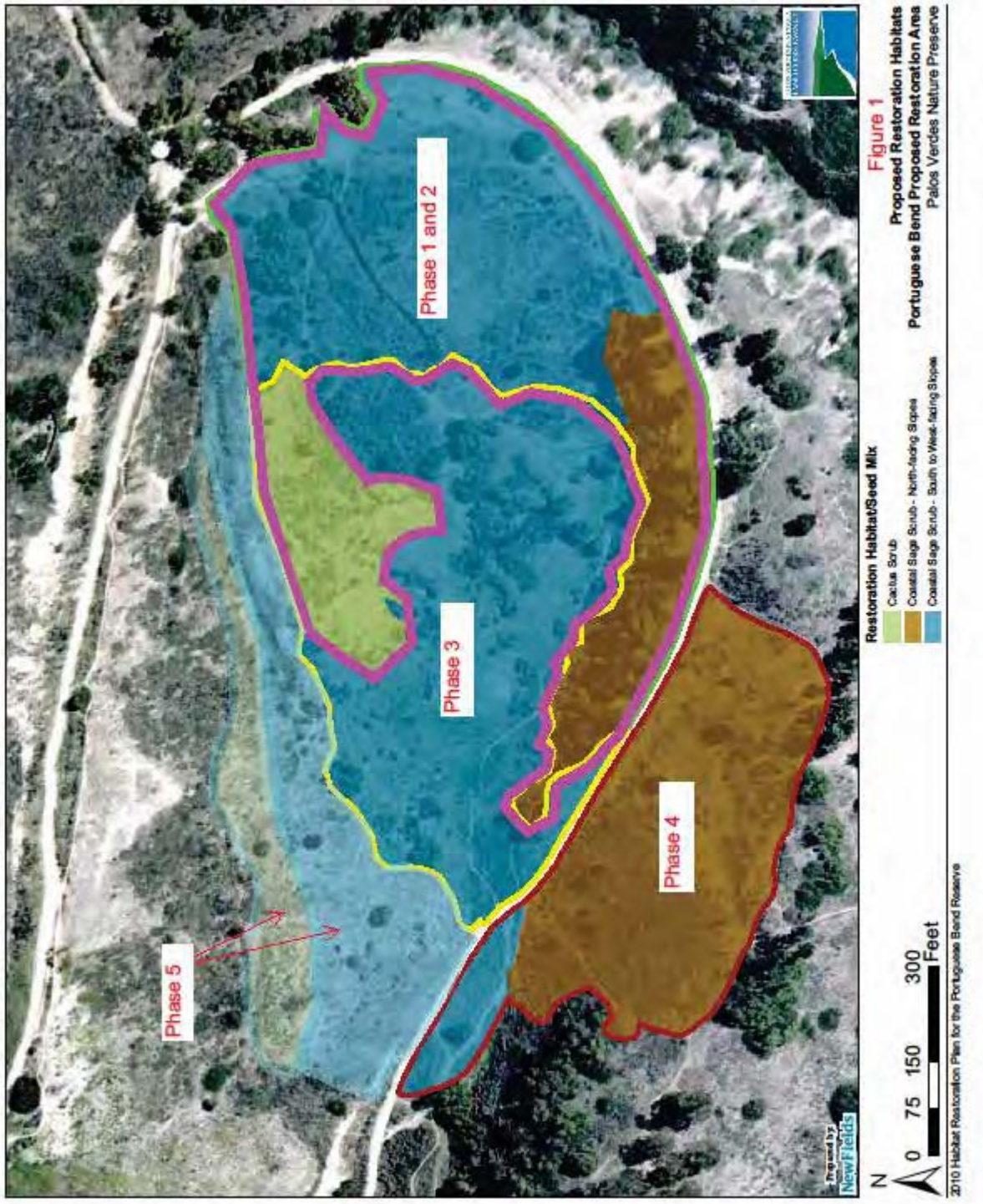
PVPLC obtained permission from the City to irrigate to enable "grow and kill" prior to plant installation, and improve seed and plant survival after planting. Phases 1, 2 and 3 were irrigated with overhead sprinklers. Drip irrigation was installed for Phases 4 in fall 2014 and for Phase 5 in fall 2015, coinciding with the plant installation for those phases.

Weed control is implemented in all phases for 5 years minimum after they are initiated.

Table 3
Restoration Project Schedule for Portuguese Bend Reserve Phases 1, 2, 3, 4 and 5, based on the Portuguese Bend Reserve Habitat Restoration Plan.

	Task	Date
PHASE1 and PHASE 2	Begin site preparation, weed removal	Fall 2010
	Install irrigation	Winter 2012
	Final site preparation: weed and thatch removal	Fall 2012
	Installation: Seeding and planting	Fall 2012-Early Winter 2013
	Maintenance weeding	Winter 2013-Spring 2014
	Fill-in planting, as needed	Fall 2013-Fall 2014
	5-year biological monitoring and maintenance	Spring 2013-Spring 2017
	Phase one and two completion	2017, end of Year 5
PHASE 3	Site preparation, weed removal	Fall 2012-Fall 2013
	Final site preparation: weed and thatch removal	Fall 2013
	Installation: Seeding and planting	Fall 2013-Early Winter 2014
	Maintenance weeding	Winter 2014-Spring 2015
	Remedial seeding, as needed	Fall 2014-Fall 2015
	5-year biological monitoring and maintenance	Spring 2014-Spring 2018
	Phase three completion	2018, end of Year 5
PHASE 4	Site preparation, weed removal	Fall 2013-Fall 2014
	Final site preparation: weed and thatch removal	Fall 2014
	Installation: Seeding and planting	Fall 2014-Early Winter 2015
	Maintenance weeding	Winter 2015-Spring 2016
	Remedial seeding, as needed	Fall 2015-Fall 2016
	5-year biological monitoring and maintenance	Spring 2015-Spring 2019
	Phase 4 completion	2019, end of Year 5
PHASE 5	Site preparation, weed removal	Fall 2014-Fall 2015
	Final site preparation: weed and thatch removal	Fall 2015
	Installation: Seeding and planting	Fall 2015-Early Winter 2016
	Maintenance weeding	Winter 2016-Spring 2017
	Remedial seeding, as needed	Fall 2016-Fall 2017
	5-year biological monitoring and maintenance	Spring 2016-Spring 2020
	Phase 5 completion	2020, end of Year 5

Figure 3. Map of restoration areas at Portuguese Bend Reserve.



4.0 ADDITIONAL RESTORATION IN 2015

PVPLC seeks additional funding, to perform restoration on more than the minimum five acres per year required in the NCCP. Several opportunities of this nature occurred during the reporting period. Table 4 shows the timeline for each additional restoration project. Figure 4 provides a site map for each restoration project active in 2015, including the restoration at Alta Vicente and Portuguese Bend Reserves that fulfills the requirements of the NCCP Habitat Restoration Plan.

4.1 ABALONE COVE

Funding from the National Fish and Wildlife Foundation (NFWF), the Santa Monica Bay Restoration Commission, the Coastal Conservancy, the U.S. Fish and Wildlife Service Coastal Program, and the California Trails and Greenways Foundation provided funding to restore and enhance five acres of coastal sage scrub and coastal bluff scrub at Abalone Cove Reserve. Three acres were planted in 2013, and an additional two acres were restored and enhanced in 2014 and 2015.

4.2 AGUA AMARGA

In September 2011, Los Angeles County Sanitation Districts (LACSD) provided funding to conduct 0.25 acre of riparian scrub restoration at the Lunada Canyon portion of the Agua Amarga Reserve as part of mitigation for one of their projects. A restoration plan was completed in 2011. In 2012, the PVPLC implemented weed and invasive plant removal (castor bean, ice plant, fennel). In Fall 2012, 362 container plants were installed. In Fall 2013, 2014 and 2015 additional plants were installed and maintained by volunteers.

In 2012, an additional mitigation project (D&M Eight LTD) funded the planting of 147 riparian plants at Lunada Canyon. The plants were installed in January 2014 and irrigated with a drip irrigation system. Severe rains in 2014 caused torrential stream flows that removed some of the installed plants. PVPLC installed replacement plants in January 2015.

4.3 VICENTE BLUFFS

In June 2008, a grant agreement was signed with the State Coastal Conservancy to provide habitat restoration at Vicente Bluffs Reserve. PVPLC restored three acres of coastal bluff scrub and El Segundo blue butterfly habitat by removing acacia, pampas grass and ice plant, and

installing container plants with coastal bluff scrub and El Segundo blue butterfly host plants. PVPLC added plants to this site in 2013, 2014 and 2015.

4.5 PORTUGUESE BEND

In 2012, PVPLC received funding from the Habitat Conservation Fund to create 0.55 acres of trail-side habitat consisting of coastal sage scrub and cactus scrub to close unauthorized trails.

Figure 4. Site map for ongoing 2015 restoration projects in the Palos Verdes Nature Preserve.

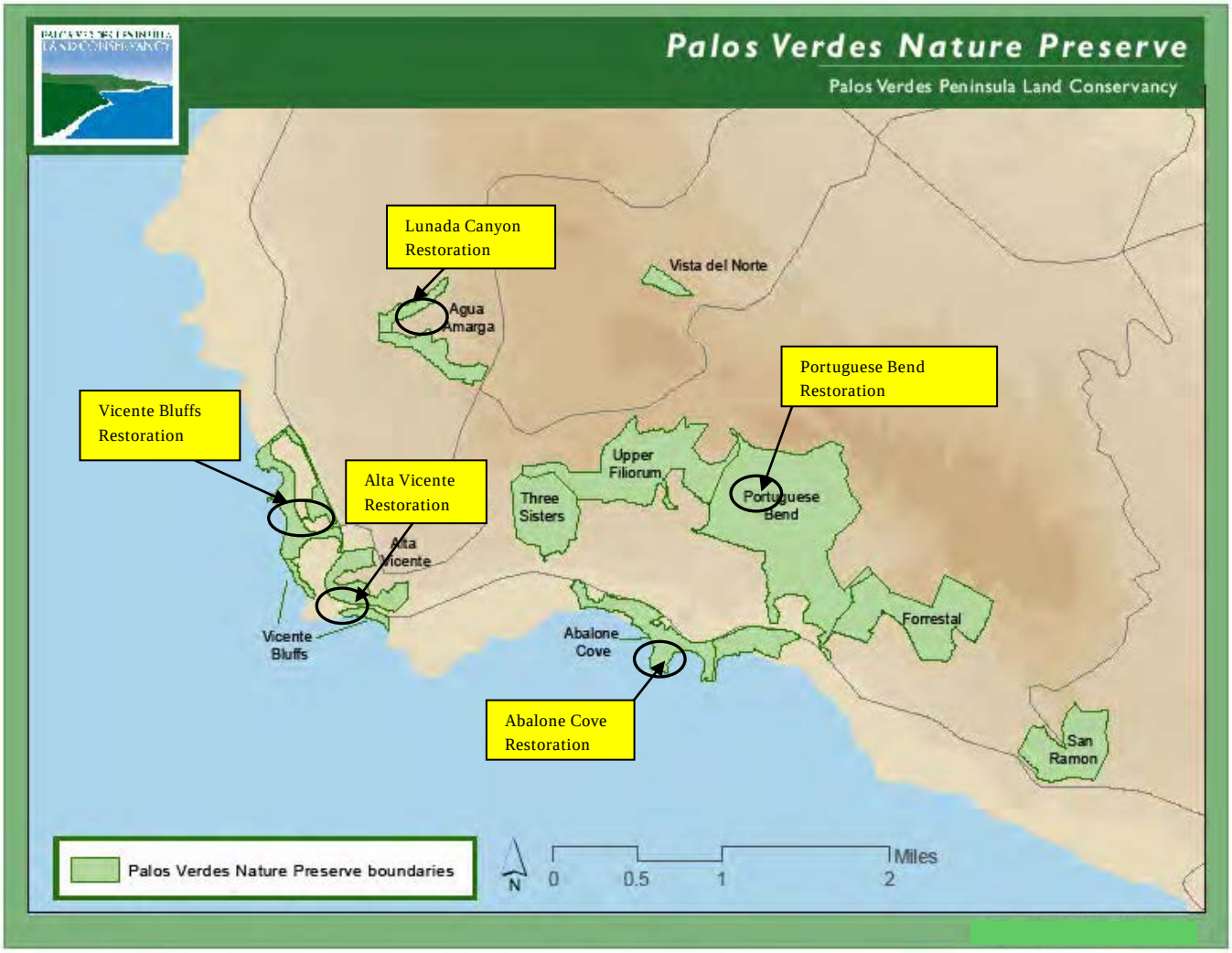


Table 4
Restoration Project Schedule for Additional Restoration in Palos Verdes Nature Preserve.

	Task	Date
Abalone Cove Grants (5 acres)	Remove invasive plants	Spring 2013-Fall 2013
	Install native plants	Fall 2013, 2014, 2015
	Weed and maintain site	Through August 2018
Agua Amarga Grants (0.55 acres)	Remove invasive plants	Spring – Fall 2011
	Install native plants	Fall 2011 – Fall 2015
	Weed, maintenance and monitoring	Through spring 2017
Portuguese Bend Grants (0.75 acres)	Remove invasive plants	Spring – Fall 2012
	Install native plants	Fall 2012
	Weed and maintain site	Through 2015

4.6 COMPLETE LIST OF RESTORATION PROJECTS

A complete summary of all restoration work completed in the Preserve, along with maps of restoration sites, can be found in Appendix C.

5.0 MONITORING

5.1 RESTORATION MONITORING

PVPLC's stewardship staff conducted surveys at the restoration sites throughout the preserves, including photo point monitoring and vegetation transects. Vegetation transect surveys were conducted using standardized methods (line intercept, CNPS Rapid Vegetation Assessment) that provide data on the cover of native and non-native plants in the habitat in order to evaluate success against criteria as determined by the NCCP. In 2015, restoration monitoring as per NCCP requirements was conducted at Alta Vicente and Portuguese Bend Reserves. At Alta Vicente, the plants in the restoration area are healthy and growing. The cactus scrub has met success criteria. The coastal sage scrub has not yet met the success criteria of 50% native plant cover. There remain gaps in native vegetation due to low seed germination, likely a result of prolonged drought conditions. The Palos Verdes blue butterfly habitat has not met the success criteria, due to low numbers of host plants. Future management activities at Alta Vicente will focus on seeding and weed control. At Portuguese Bend Phase 1 and 2, the performance criteria for year 3 have not been met, but with additional rainfall the shrubs will increase in size and the performance criteria will be met in the near future. The Phase 3 restoration at Portuguese Bend is meeting performance criteria for year 2. Detailed results are in Appendix A.

5.2 COVERED SPECIES MONITORING

The NCCP/HCP requires updated surveys for covered plants and animals on the Preserve every three years. The Comprehensive Management and Monitoring Report for 2013-2015 is included with this Annual Report. Prior surveys conducted for the 2007-2009 and 2010-2012 triennial periods are located in the Comprehensive Management and Monitoring reports.

The draft NCCP/HCP includes a total of six covered plant species. They are aphanisma (*Aphanisma blitoides*), south coast saltscale (*Atriplex pacifica*), Catalina crossosoma (*Crossosoma californicum*), island green dudleya (*Dudleya virens* ssp. *insularis*), Santa Catalina Island desertthorn (*Lycium brevipes* var. *hassei*) and woolly seablite (*Suaeda taxifolia*).

6.0 TARGETED EXOTIC REMOVAL PROGRAM FOR PLANTS

The Targeted Exotic Removal Program for Plants (TERPP) is an element of the Preserve Habitat Management Plan for the Draft NCCP that requires the annual removal of exotic plant species of twenty individual populations or five acres in the Preserve. The TERPP provides a protocol for ranking the degree of threat to native vegetation, the feasibility of eradication, and the invasiveness of each exotic species found in the Preserve. Populations of exotic plant species are then targeted for removal based on the results of the ranking outcome. The 2015 TERPP Report documents PVPLC's effort during the reporting period to fulfill the requirements of the TERPP plan. It details the methods of assessing the threat of individual exotic species to native vegetation, field methods for removal, and provides site-specific documentation related to every completed removal. The complete 2015 TERPP Report can be found in Appendix D of this report.

7.0 BRUSH CLEARANCE

Brush clearance is the clearing or minimizing of vegetation in areas that occur immediately adjacent to residential structures and roads. RPV is responsible for brush clearance within the Preserve, to provide an appropriate level of fire protection, emphasizing the protection of life, public safety, and property values in the urban-wildlife interface areas while minimizing environmental impacts of fire suppression and control. PVPLC has collaborated with RPV to develop clear protocols to ensure that all Best Management Practices associated with fuel modification activities are consistently followed. In 2015, RPV staff successfully collaborated with PVPLC to ensure that bird surveys were completed prior to fuel modification activities.

A portion of the Agua Amarga Reserve is owned by PVPLC and falls under our responsibilities to maintain brush clearance requirements. All of these requirements were met in May and June 2015. No other fuel modification areas within the Preserve fall under the responsibility of PVPLC.

8.0 SCIENTIFIC RESEARCH AND WILDLIFE MONITORING

The Preserve is an ideal setting for an outdoor laboratory, because it provides scientists and students with access to a variety of habitat and wildlife. Student research topics are often chosen to answer questions informing improved restoration practices and to better understand the local ecology. A report of 2015 research is located in Appendix E.

The Comprehensive Report for 2012-2015, per the NCCP requirements, includes monitoring of covered plant species (6 species), and wildlife species (El Segundo blue butterfly, California gnatcatcher and cactus wren) including mesopreditors (coyote, grey fox and red fox) the Comprehensive Reports.

9.0 UTILITY AND CONTRACTOR ACCESS

Although some protocols are currently in place to ensure that utilities and contractors accessing the Preserve follow guidelines to remain on permitted trails and avoid damaging the habitat, PVPLC is collaborating with the City to create more effective protocols and outreach techniques. PVPLC and the City have created a protocol for ensuring oversight of projects within the Preserve and are developing a protocol for utilities to follow when they access the Preserve.

10.0 TRAIL MANAGEMENT AND MONITORING

10.1 PRESERVE TRAILS PLAN

The Preserve Trails Plan fall under the City's Public Use Master Plan (PUMP), which is a NCCP-covered activity, and must follow certain avoidance measures and guidelines to protect covered species. The RPV City Council approved the PUMP which includes the Preserve Trails Plan in March 2013.

10.2 TRAIL MANAGEMENT

PVPLC continues to update trail maps, print and place map brochures at major trailheads, and post them on PVPLC's website. PVPLC regularly revises carsonite sign locations and replaces decals on carsonite signs in the Preserve to better delineate trails. A full-time field operations technician focuses on unauthorized trail closure, trail delineation and graffiti removal. The City and PVPLC coordinated to create a "Share the Trail" brochure to educate users about behavior on the trails (Appendix G).

10.3 UNAUTHORIZED TRAIL CLOSURES

Implementing the Preserve Trails Plan involves closing many trails that were previously in use and are no longer authorized. PVPLC's priorities are to close newly created unauthorized trails before they become established and damage habitat. PVPLC has also developed techniques to reduce trail widening, particularly at trail intersections. In 2015, PVPLC focused its attention at Portuguese Bend, Filiorum, Forrestal and Abalone Cove Reserves (Appendix G). Maintaining trail closures is intensive work, which requires continuously reinforcing and replacing trail closures when signage, branches, and plants are removed. Rapid Response Team volunteers assist in maintaining closures by reclosing sections on a regular basis. Unauthorized trail closures were assisted by funds from the Habitat Conservation Fund, the Los Angeles County Grants, the National Fish and Wildlife Foundation, Coastal Conservancy and Santa Monica Bay Restoration Commission. In 2015 PVPLC installed 22 "Area closed" signs, 350 decals, 36 carsonite signs for trail delineation, and 140 post and cable closures.

10.4 TRAIL MONITORING

PVPLC stewardship staff or volunteers from the Keeping an Extra Eye on the Preserve for Environmental Review and Stewardship (Keepers) Program conducted all trail monitoring during the reporting period. The Keepers program is described in detail in the Volunteer Involvement section of the report (Appendix F). Monitoring was typically limited to overall trail conditions such as erosion, hazards, and vegetation overgrowth.

10.5 TRAIL REPAIR

A PVPLC volunteer trail crew assists in much of the trail work on the Preserve. A complete summary of the PVPLC Volunteer Trail Crew Program can be found in the Community Involvement section of the report (Appendix F). PVPLC staff or RPV Public Works department were also involved in trail enhancements.

The following lists the trail projects that Volunteer Trail Crew conducted in 2015.

Abalone Cove

- Repaired rock stairs at Sea Dahlia Trail and
- Installed rock stairs and removed unneeded check dam at Cave Trail

Alta Vicente

- Installed rock stairs, cleared overgrown branches and closed unauthorized trails on the North Spur Trail

Filiorum

- Worked on Vanderlip Canyon and Zotes Cutacross Trails

Forrestal

- Repaired 5 grade dips and 4 check dams on Pirate Trail
- Installed grade dips and rock retaining wall at Flying Mane Trail overlook

Portuguese Bend

- Conducted trail delineation and unauthorized trail closure on Rim Trail
- Conducted a trail assessment of Rim trail to better delineate it and close unauthorized trails

Three Sisters

- Assisted scout troop to install switchback on the Sunshine Trail

Future Trail Projects

Trail projects that may be completed in the future, based on funding, are listed in Appendix H.

Ranger Program

The PVPLC coordinated with the City on focal areas for Mountains Recreation and Conservation Authority (MRCA) rangers on the Preserve.

10.6 VOLUNTEER TRAIL WATCH

The PVPLC and City initiated the Volunteer Trail Watch Program in 2013 to help educate trail users about appropriate trail use and monitor preserve misuse. The mission of the Palos Verdes Nature Preserve Volunteer Trail Watch Program is to serve as eyes and ears of the City and the Palos Verdes Peninsula Land Conservancy with a view to 1) protect the natural resources of the Palos Verdes Nature Preserve, including the flora and fauna as well as the geology, topography and scenic landscape, and 2) enhance the safety of, and promote an enjoyable experience for all Preserve visitors. Volunteers educate the public about Preserve rules and etiquette; and enter observations of infractions into a web portal (i.e. dogs off leash, off-trail activity, user on non-designated trail, etc.) to allow rangers and Preserve managers to track time and location of these activities. In 2015, 33 volunteers spent a total of 1418 hours in the Preserve, observing and educating visitors.

11.0 VOLUNTEER INVOLVEMENT

PVPLC is a non-profit organization that relies heavily on the support of community involvement to perform many of the tasks necessary to manage the Preserve. The Volunteer Annual Report for January 1, 2015 through December 31, 2015 is located in Appendix F.

12 OFFICERS AND STAFF

2015 Officers

William Swank, President
Cassie Jones, Exec. Vice President
Grace Wallace, Secretary
John Spielman, Treasurer

2015 Board of Directors

Bill Ailor, President Emeritus
Scott Ammons
Bruce Biesman-Simons
Bob Ford
Allen Franz
Amy Friend
Rob Kautz
Mike Kilroy
Susan McKenna
Joe Platnick
Ken Swenson

2015 Staff

Executive Director

Andrea Vona

Office Administration

Jill Wittman, Administrative Assistant

Sue Cody, Accountant

Land Stewardship

Danielle LeFer, Conservation Director

Cristian Sarabia, Stewardship Manager

Adrienne Mohan, Stewardship Associate

Ann Dalkey, Stewardship Associate (Research)

Brittany Goldsmith, Volunteer Program Manager

Damian Morando, Field Operations Technician

Hugo Morales, Stewardship Technician

Humberto Calderon, Stewardship Technician

Trent Quinston, Stewardship Technician

Johnny Perez, Stewardship Technician

Felicia Bader, Stewardship Technician

Ismael Munoz, Stewardship Technician

Ricardo Medina, Stewardship Technician

Neli Gonzalez, Nursery Technician

Education Program

Siegrun Storer, Education Director

John Nieto, Education Manager

Development

Susan Wilcox, Development Director

Louise Olfarnes, Communications Manager

Mary Lopes, Donor Relations

Claire Moss, Development Associate

APPENDIX A

2015 RESTORATION MONITORING REPORT

Palos Verdes Peninsula Land Conservancy

In 2015 vegetation surveys were conducted at the restoration sites at Alta Vicente and Portuguese Bend to estimate percent cover of native and nonnative plants, litter and bare ground. These data are used to measure the success of the restoration, based on the goals determined in the NCCP. PVPLC also monitored the site of the 2012 fire at Three Sisters and the 2014 fire at Vista del Norte Reserves to track site recovery.

1.0 ALTA VICENTE SURVEY METHODS

Transect monitoring was conducted in Phase I (Year 6; AV1 and AV2) and Phase 2 restoration sites (Year 5; AV3, AV5, and AV6). PVPLC collected vegetation data along 50 m transects within the restored areas at AVI, AV2, AV3, AV5 and AV6 (Appendix A1). The height and length of each plant was measured at 1m intervals on the transect line. Photographs were taken at the beginning and end of each transect to provide a visual record of general conditions of the sampling area (Appendix A1). Vegetation assessments of the overall species coverage were conducted at the permanent transects in Phase 1 and Phase 2 (AV1, AV2, AV3, AV5, and AV6), using a modified version of the California Native Plant Society (CNPS) standardized methodology (CNPS 2009). Surveys were conducted on March 24, 26, and April 2, 2015.

Locations of transects and photo points are on Figure 1 (Appendix A1). Results of the Alta Vicente surveys are provided below.

1.1 ALTA VICENTE PHASE 1 SURVEY RESULTS (YEAR 6)

Coastal Sage Scrub (CSS)

The number of individual native plants counted at the Phase 1 coastal sage scrub transect (AV1) in 2015 was 11 (Table 1). Native plant cover at AV1 was 30%, and consisted of six species: *Artemisia californica* (6%), *Eriogonum cinereum* (6%), *Eriogonum parvifolium* (2%), *Rhus integrifolia* (2%) and *Salvia mellifera* (10%) (Table 2). Percent non-native cover was 0%, and bare ground/litter 70% (Table 2). Shrub height ranged from 5 to 32 inches (Table 3). Overall native cover in the CSS based on the CNPS Rapid Vegetation Assessment protocol was 38% (Table 4).

Photopoints indicate that many plants have grown and are healthy. Increases in plant growth have resulted in more native cover and less space or gaps between planted native species (Figure 2, AV1). Recruitment from seed was very low. Lack of rain may have impacted plant recruitment from seed.

The site is approaching CSS success criteria for native plant cover (50%) but has not yet achieved the goal.

Palos Verdes Blue Butterfly Habitat (PVB)

The number of individual native plants counted at the Phase 1 Palos Verdes Blue Butterfly habitat transect (AV2) in 2015 was 11 (Table 1). Native plant cover at the AV2 was 26%, and consisted of 5 species, but no Palos Verdes Blue Butterfly host plants (*Astragalus trichopodus* and *Acmispon glaber*) were found. The plant with the highest percent cover was *Artemisia californica* (12%). Bare ground cover was 2%, and litter cover was 56% (Table 2). Shrub height ranged from 5 to 39 inches (Table 3). High litter cover was a result of weeding prior to surveys.

According to the CNPS Rapid Vegetation Assessment, native plant cover in the Palos Verdes Blue Butterfly habitat (AV2) in 2015 was 37%, but no host plants were present (Table 4). Lack of rain may have impacted host plant recruitment from seed. Native plant cover is within the range for Year 4 goals, but host plants did not appear in the survey.

1.2 ALTA VICENTE PHASE 2 (YEAR 5)

Cactus Scrub

The number of individual native plants counted at the Phase 2 cactus scrub transect (AV3) in 2015 was 22 (Table 1). Native plant cover at AV3 was 48%, and the species with the highest percent cover were *Encelia californica* (18%), *Eriogonum cinereum* (12%), and *Opuntia littoralis (6%)* (Table 2, Table 3). Non-native plant cover was 22%, and bare ground/litter cover was 44% (Table 2). Shrub height ranged from 4 to 20 inches (Table 3).

According to the CNPS Rapid Vegetation Assessment, native plant cover at AV3 was 43%, and cactus cover was 6% (Table 4).

Photo points indicate that cactus is growing, with 3 to 5 pads on each individual. (Figure 2, AV3).

These results describe Phase 2 cactus scrub habitat as meeting success criteria for native cover and for cactus cover in Year 5 (Table 9.)

Palos Verdes Blue Butterfly Habitat (PVB)

The number of native plants counted in the Palos Verdes Blue Butterfly habitat transect (AV5) was 3. Native cover at AV5 was 6%, with 4% cover by *Astragalus tricopodus*, a host plant of the

Palos Verdes Blue Butterfly (Table 2). Non-native plant cover was 26%, and bare ground/litter 76% (bare alone =10%) (Table 2). Shrub height ranged from 11 to 15 inches (Table 3).

According to the CNPS Rapid Vegetation Assessment, native plant cover at AV5 was 33% (4% host plant cover), and 29% bare ground (Table 5).

Photo points show that native plants are present, but remain cover remains small (Figure 2, AV5). *Acmispon glaber* or deerweed, one of two host plants for the Palos Verdes Blue Butterfly, was included in the seed mix but did not germinate at the site.

These results describe host plant and bare ground cover measures as below success criteria goals for Phase 2 Palos Verdes Blue Butterfly habitat in Year 5 (Table 9).

Coastal Sage Scrub (CSS)

The number of individual native plants counted at the Phase 2 coastal sage scrub habitat transect (AV6) in 2015 was 19 (Table 1). Native plant cover at AV6 was 38%, and consisted of four species: *Artemisia californica* (2%), *Encelia californica* (20%) and *Eriogonum cinereum* (14%) and *Opuntia littoralis (2%)* (Table 2). Non-native plant cover was 18%, and bare ground/litter 56% (Table 2). Shrub height ranged from 8 to 24 inches (Table 3).

According to the CNPS Rapid Vegetation Assessment, native plant cover at AV6 was 41% (Table 4).

These results describe Phase 2 coastal sage scrub habitat as meeting success criteria goals of native cover >40% in Year 5 (Table 9)

1.3 ALTA VICENTE PLANT INVENTORY

During the 2015 surveys in Phase I and Phase 2, 18 native species were observed (Table 4).

1.4 ALTA VICENTE CONCLUSIONS AND RECOMMENDATIONS

Phase 1 coastal sage scrub restoration will require more time for plants to grow and increase canopy cover in order to achieve the 50% native plant cover success criteria from its current 38%. Palos Verdes blue butterfly habitat has met the native plant cover success criteria of 30-60%, but host plant cover is very low. In 2016 staff will focus on controlling weeds on a regular basis to decrease competition and increase bare ground for seed germination.

The Phase 2 coastal sage scrub restoration percent cover (41%) is below the 50% success criteria, but is close to reaching that goal. The cactus scrub has reached the goal of 43% native cover, and cactus cover will increase as the cactus grows. The Palos Verdes blue butterfly habitat has reached the success criteria for native cover, but host plant cover needs to be increased from 4% to 10%. In 2016 staff will focus on controlling weeds on a regular basis to decrease competition and increase bare ground for seed germination.

2.0 PORTUGUESE BEND SURVEY METHODS (PHASE 1, 2, 3, 4)

Phase 1 and 2 are in Year 3 of restoration monitoring, and were monitored along permanent transects (PB1, PB2, PB3, PB6). Phase 3 is in Year 2 of monitoring, was monitored using photo point monitoring along its permanent transects (PB4 and PB5). Vegetation assessments of the overall species coverage were conducted at the permanent transects using a modified version of the California Native Plant Society (CNPS) standardized methodology (CNPS 2009). Surveys were conducted on May 21 and May 26 2015. Photopoints for Phase 4 were taken in December 2015.

Locations of transects and photo points are depicted in Figure 3. Results of the Portuguese Bend surveys are provided below.

2.1 PORTUGUESE BEND SURVEY RESULTS (PHASE 1 AND 2) YEAR 3

South-facing Coastal Sage Scrub

The number of individual native plants counted at south-facing coastal sage scrub habitat transect PB1 was 7 and 8 native plants were counted at PB2 (Table 5). Native plant cover at PB1 was 20% and 18% at PB2. Two species contributing to the majority of native plant cover were *Artemisia californica* and *Encelia californica* (Table 6). Percent non-native cover at PB1 was 18% and 6% at PB2. Bare ground and litter cover was 78% at PB1 and 82% at PB2 (Table 2). Shrub height ranged from 3 to 99 inches (Table 7).

According to the CNPS Rapid Vegetation Assessment, native plant cover was 27% at PB1 and 37% at PB2 (Table 8).

In 2015, native plant cover at the south-facing coastal scrub habitat transects (PB1 and PB2) was below Year 3 success criteria (>40%), but we expect that with additional rainfall, native plant cover will increase to performance standards in the near future.

North-facing Coastal Sage Scrub

The number of individual native plants counted at the north-facing coastal sage scrub habitat transect (PB3) in 2015 was 13 (Table 5). Native plant cover at PB3 was 26%. The most

abundant native species was *Melica imperfecta* (Table 6). Percent non-native cover was 26%, and bare ground/litter cover was 50% (Table 2). Shrub height ranged from 4 to 13 inches (Table 7).

According to the CNPS Rapid Vegetation Assessment, native plant cover at PB3 was 17% (Table 8).

In 2015, the native plant cover at PB3 was below the Year 3 goal (>40%), but we expect that with additional rainfall the shrubs will increase in size and the performance standards will be reached in the near future.

Cactus Scrub

The number of individual native plants counted in the cactus scrub habitat (PB6) in 2015 was 4 (Table 5). Native plant cover at PB6 was 8%, and the only species present was *Opuntia littoralis* (Table 6). Percent non-native cover was 2%, and bare ground/litter cover was 96% (Table 2). Cactus height was 9 inches (Table 7).

According to the CNPS Rapid Vegetation Assessment, native plant cover was found to be 21% (Table 8).

In 2015, native plant cover at PB6 was below the Year 3 success criteria goal (>30%). Additional plants will be installed in fall 2015 to increase native plant cover in hopes of reaching performance standards in the future.

2.2 PORTUGUESE BEND SURVEY RESULTS (PHASE 3) YEAR 2

South-facing Coastal Sage Scrub (CSS)

Native plant cover at the south-facing coastal sage scrub habitat transects (PB4, PB5) in 2015 was 47% at PB4 and 30% at PB5 (Figure 4, Table 8). The most common shrubs were *Artemisia californica*, *Baccharis pilularis, Encelia californica, Eriogonum fasciculatum, Heteromeles arbutifolia, Isocoma menziesii, Salvia mellifera* and *Salvia leucophylla*. Non-native plant cover was 5% at PB4 and 8% at PB5.

In 2015, native plant cover at transects PB4 and PB5 met success criteria goals for Year 2 (Table 9).

2.3 PORTUGUESE BEND RESULTS (PHASE 4) YEAR 1

In 2015 native plant cover in the coastal sage scrub transect (PB7) was approximately 30%.

Phase 4, planted in 2014 as coastal sage scrub on a north-facing slope. Photopoints were taken of the site. Transect and vegetation monitoring will begin in 2016. Based on the visual estimate, this site is on track to meet success criteria.

2.4 PORTUGUESE BEND PLANT INVENTORY

During the 2015 surveys 27 native plant species were identified in monitoring transects within restoration phases 1,2, and 3 (Table 8).

2.5 CONCLUSIONS AND RECOMMENDATIONS

In 2015, the coastal sage scrub native plant cover was below the Year 3 goal of more than 40%, but we expect that with additional rainfall the shrubs will increase in size and the performance standards will be reached in the near future. The cactus scrub was below the Year 3 goal of more than 30% plant cover, and the planned in-fill planting in 2015 will increase future native plant cover.

Native plant cover at Portuguese Bend in Year 2 is above the performance goal of 20% for Year 2.

Table 1: ALTA VICENTE
Number of plants per 50 m transect with line intercept method, 1 m intervals.

Species	Year 6 CSS: AV1	Year 6 PVB: AV2	Year 5 Cactus Scrub: AV3	Year 5 PVB: AV5	Year 5 CSS: AV6
Artemisia californica	2	4	5	1	1
Astragalus trichopodus				2	
Elymus condensatus		2			
Encelia californica			8		10
Eriogonum cinereum	2	1	5		7
Eriogonum parvifolium	1	1			
Malosma laurina	2				
Opuntia littoralis		1	3		1
Rhus integrifolia	1		1		
Salvia mellifera	3	2			
Total Native Plants	**11**	**11**	**22**	**3**	**19**
NNAG		1	9	9	7
NNP		2	2	4	2
Total Non-native Plants	**0**	**3**	**11**	**13**	**9**
Bare	6	10	12	5	10
Litter	29	28	10	33	18
Total Bare and Litter	**35**	**38**	**22**	**38**	**28**
Total Plant Cover	**11**	**14**	**33**	**16**	**28**

Table 2: ALTA VICENTE
Percent cover along 50 m line transects with line intercept method, 1 m intervals.

Species	Year 6 CSS: AV1	Year 6 PVB: AV2	Year 5 Cactus Scrub: AV3	Year 5 PVB: AV5	Year 5 CSS: AV6
Artemisia californica	6	12	1	2	2
Astragalus trichopodus				4	
Elymus condensatus		4			
Encelia californica			18		20
Eriogonum cinereum	6	2	12		14
Eriogonum parvifolium	2	2			
Malosma laurina	4	0			
Opuntia littoralis		2	6		2
Rhus integrifolia	2		2		
Salvia mellifera	10	4			
Total Native Plants	**30**	**26**	**48**	**6**	**38**
NNAG		2	18	18	14
NNP		4	4	8	4
Total Non-native Plants	**0**	**6**	**22**	**26**	**18**
Bare	12	2	24	10	20
Litter	58	56	20	66	36
Total Bare and Litter	**70**	**76**	**44**	**76**	**56**

Table 3: ALTA VICENTE
Average plant height (inches) at each transect.

Species	**Year 6 CSS: AV1**	**Year 6 PVB: AV2**	**Year 5 Cactus Scrub AV3**	**Year 5 PVB AV5**	**Year 5 CSS: AV6**
Artemisia californica	30	39	20	11	24
Astragalus trichopodus				15	
Elymus condensatus		21			
Encelia californica			17		19
Eriogonum cinereum	9	5	18		13
Eriogonum parvifolium	5	9			
Malosma laurina	32				
Opuntia littoralis		16	9		8
Rhus integrifolia	13		4		
Salvia mellifera	24	19			

Table 4 ALTA VICENTE
Vegetation percent cover based on CNPS Rapid Vegetation Assessment protocol.

Species	Year 6 CSS: AV1	Year 6 PVB: AV2	Year 5 Cactus Scrub AV3	Year 5 PVB AV5	Year 5 CSS: AV6
Artemisia californica	9	12	11	7	5
Astragalus trichopodus		<1		4	1
Corethrogyne filaginifolia		<1			
Cylindropuntia prolifera	<1	<1	2	<1	
Descurainia pinnata				<1	
Elymus condensatus	<1	1			
Encelia californica	1		15	9	22
Eriogonum cinereum	5	5	5	3	3
Eriogonum parvifolium	4	1	1		2
Heteromeles arbutifolia	1	1			<1
Isocoma menziesii var. sedoides	1		1		
Malosma laurina	4	1			
Mirabilis californica	<1				
Opuntia littoralis	2	3	6		4
Peritoma arborea	2	1		2	1
Rhus integrifolia	3	3	1	5	2
Salvia leucophylla	2	5	1	3	1
Salvia mellifera	4	4			<1
Total Native Cover	**38**	**38**	**43**	**34**	**42**
NNAG	3	2	26	12	7
NNP	2	2	2	5	4
Total Non-native Cover	**5**	**4**	**28**	**17**	**11**
Bare	31	24	22	29	17
Litter	26	34	7	20	30
Total Bare and Litter	**57**	**59**	**29**	**49**	**47**
Total Plant Cover	**43**	**41**	**71**	**51**	**53**

Table 5 PORTUGUESE BEND
Number of plants per 50 m transect with line intercept method, 1m intervals.

Species	Year 3 CSS South PB1	Year 3 CSS South PB2	Year 3 CSS North PB3	Year 3 Cactus Scrub PB6
Acmispon glaber		1		
Artemisia californica	4	1		
Baccharis pilularis			1	
Encelia californica		3		
Eriogonum fasciculatum	2	2		
Heteromeles arbutifolia	1			
Melica imperfecta			10	
Opuntia littoralis				4
Solanum douglasii			1	
Stipa lepida			1	
Stipa pulchra		1		
Total Native Plants	**7**	**8**	**13**	**4**
NNAG		1	10	
NNP	9	2	3	1
Total Non-native Plants	**9**	**3**	**13**	**1**
Bare	14	18	4	19
Litter	25	23	21	29
Total Bare and Litter	**39**	**41**	**25**	**48**
Total Plant Cover	**16**	**11**	**26**	**5**

Table 6 PORTUGUESE BEND
Percent cover along 50 m transect with line intercept method, 1m intervals.

Species	Year 3 CSS South PB1	Year 3 CSS South PB2	Year 3 CSS North PB3	Year 3 Cactus Scrub PB6
Acmispon glaber		2		
Artemisia californica	10	2		
Baccharis pilularis			2	
Encelia californica		8		
Eriogonum fasciculatum	4	4		
Heteromeles arbutifolia	6			
Melica imperfecta			20	
Opuntia littoralis				8
Solanum douglasii			2	
Stipa lepida			2	
Stipa pulchra		2		
Total Native Plants	**20**	**18**	**26**	**8**
NNAG		2	20	
NNP	18	4	6	2
Total Non-native Plants	**18**	**6**	**26**	**2**
Total Plant Cover	**38**	**24**	**52**	**10**
Bare	28	36	8	38
Litter	50	46	42	58
Total Bare and Litter	**78**	**82**	**50**	**96**

Table 7 PORTUGUESE BEND
Average plant height (inches) at each transect.

Species	**Year 3 CSS South PB1**	**Year 3 CSS South PB2**	**Year 3 CSS North PB3**	**Year 3 Cactus Scrub PB6**
Acmispon glaber		3		
Artemisia californica	19	3		
Baccharis pilularis			4	
Encelia californica		20		
Eriogonum fasciculatum	4	10		
Heteromeles arbutifolia	99			
Melica imperfecta			13	
Opuntia littoralis				9
Solanum douglasii			4	
Stipa lepida			11	
Stipa pulchra		24		

Table 8 PORTUGUESE BEND
Vegetation percent cover based on CNPS Rapid Vegetation Assessment protocol.

Species	Year 3 CSS South PB1	Year 3 CSS South PB2	Year 3 CSS North PB3	Year 3 Cactus Scrub PB6	Year 2 CSS South PB4	Year 2 CSS South PB5
Acmispon glaber	1	1			1	3
Artemisia californica	8	8		2	4	5
Asclepias fascicularis		1				
Baccharis pilularis	1	2	7		6	1
Calystegia macrostegia						<1
Cylindropuntia prolifera				2		
Deinandra fasciculata		<1				
Elymus condensatus			1			
Encelia californica	3	3		6	4	4
Eriogonum cinereum		1				
Eriogonum fasciculatum	6	6			4	5
Eschscholzia californica					1	
Euphorbia albomarginata		<1				
Hazardia squarrosa		1				
Heteromeles arbutifolia	2	1	3	3	5	2
Isocoma menziesii var. *sedoides*	1		1		4	2
Malacothrix saxatilis			2			
Melica imperfecta		<1			6	2
Muhlenbergia rigens			1			
Opuntia littoralis				5		
Plantago ovata var. *fastigiata*					3	
Pseudognaphalium beneolens		4				
Rhus integrifolia	2	1		2	2	
Salvia leucophylla	1	2		1	4	1
Salvia mellifera	2	2			3	4
Solanum douglasii			1			
Stipa lepida			1			
Stipa spp		<1			8	
Total Native Plant	**27**	**35**	**17**	**21**	**55**	**29**
NNAG	<1	<1	22	<1	2	5
NNP	7	11	16	1	3	3
Total Non-native Plant	**7**	**11**	**38**	**1**	**5**	**8**
Bare	41	39	9	33	15	41
Litter	25	15	36	45	25	22
Total Bare and Litter	**66**	**54**	**45**	**78**	**40**	**63**
Total Plant Cover	**34**	**46**	**55**	**22**	**60**	**37**

Table 9. NCCP success criteria for habitat restoration at Alta Vicente.

		Percent Cover of Native Species			Percent Cover Non-native Species	
Reserve	**Year**	**CSS**	**Cactus Scrub[1]**	**PVB Habitat[2]**	**CSS**	**Cactus Scrub**
Alta Vicente (Phase 1 and 2)	Year 1*	10%	10%	10%		
	Year 2*	10%	20%	20%		
	Year 3	>40%	>30%	30-60% max		
	Year 5*	>50%	>40%	30-60% max		
Portuguese Bend	Year 3	>40% (w/ at least 30% cover by perennials)	>30% (w/ at least 20% cover by perennials and >5% cactus cover)			
	Year 5	>50%	>40 (w/ at least 10% cactus cover		<25% (<5% of invasive perennials w/ no Cal-IPC List A**)	<25% (<5% of invasive perennials w/ no Cal-IPC List A**)

*Based on visual estimates.

** The NCCP success criteria allow an exception to the requirement for 0% for non-native annual grasses.

1 For Phase 1 Alta Vicente: percent coverage of cactus species should be at least 1% for Year I, 3% for Year 2, 5% for Year 3, and 10% for Year 5.

2 For Phase 1 Alta Vicente: from Year 3 on, there should be at least 10% coverage from *Acmispon glaber* and/or *Astragalus trichopodus* and the woody shrubs maintained at 10-20%

3.0 FIRE RESPONSE

3.1 THREE SISTERS 2012 FIRE

On January 9, 2012, the Crest Fire burned approximately 12.7 acres of the 99-acre Three Sisters Reserve, as well as some habitat in McCarrell's canyon, outside of the Preserve. The wildfire burned native and non-native vegetation and known habitat of the threatened coastal California gnatcatcher and cactus wren. The Fire Report and Restoration Plan for the site recommends cactus planting in key areas, weed control and monitoring for three years post-fire. The burn area was weeded and planted with large cactus in 2012. Surveys in 2015 showed that burned cactus and other native vegetation were recovering, and weed cover was low. There remains a high amount of bare ground due to the lack of rain in 2013/14 (Appendix A3).

3.2 VISTA DEL NORTE 2014 FIRE

On June 17, 2014, the Vista del Norte fire burned 6.7 acres of the 14-acre Vista del Norte Reserve. The wildfire burned native and non-native vegetation: 6.5 acre of black mustard (*Brassica nigra*) vegetation type and 0.2 acre of coyote bush (*Baccharis pilularis*) vegetation type. Recovery actions include erosion control and native seeding and photo monitoring is required for 3 years post fire to monitor recover. Milkweed (*Asclepias fascicularis*) was observed germinating post-fire (Appendix A4).

Appendix A1 – Alta Vicente Transect Map and Images

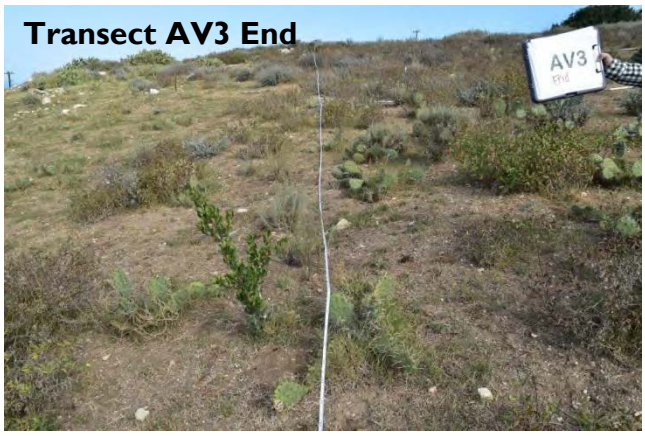
Photopoint AV1

Transect AV2 Begin

Transect AV2 Middle

Transect AV3 Begin

Transect AV3 End



Transect AV5 Begin

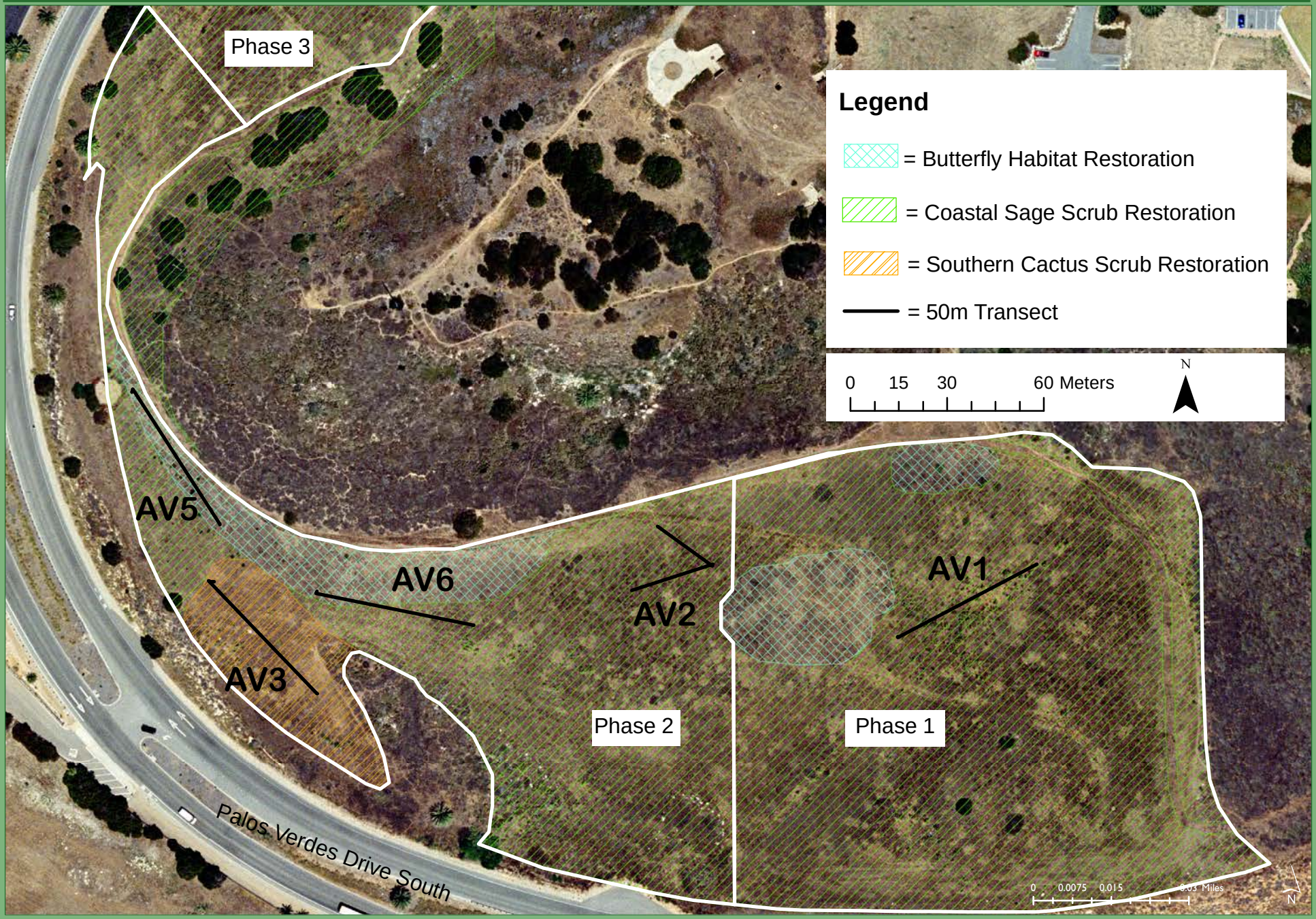
Transect AV5 End

Transect AV6 Begin

Transect AV6 End

Palos Verdes Peninsula Land Conservancy

Alta Vicente Monitoring Transects



Appendix A2 – Portuguese Bend Transect Map, Images and Photo Points

The following pages show the beginning and end points for each of the six transects in the Portuguese Bend restoration area as well as photo points for Phase 4

Transect PB1 Begin

Transect PB1 End

Transect PB2 Begin

Transect PB2 End

Transect PB3 Begin

Transect PB3 End

Transect PB4 Begin

Transect PB4 End

Transect PB5 Begin

Transect PB5 End

Transect PB6 Begin

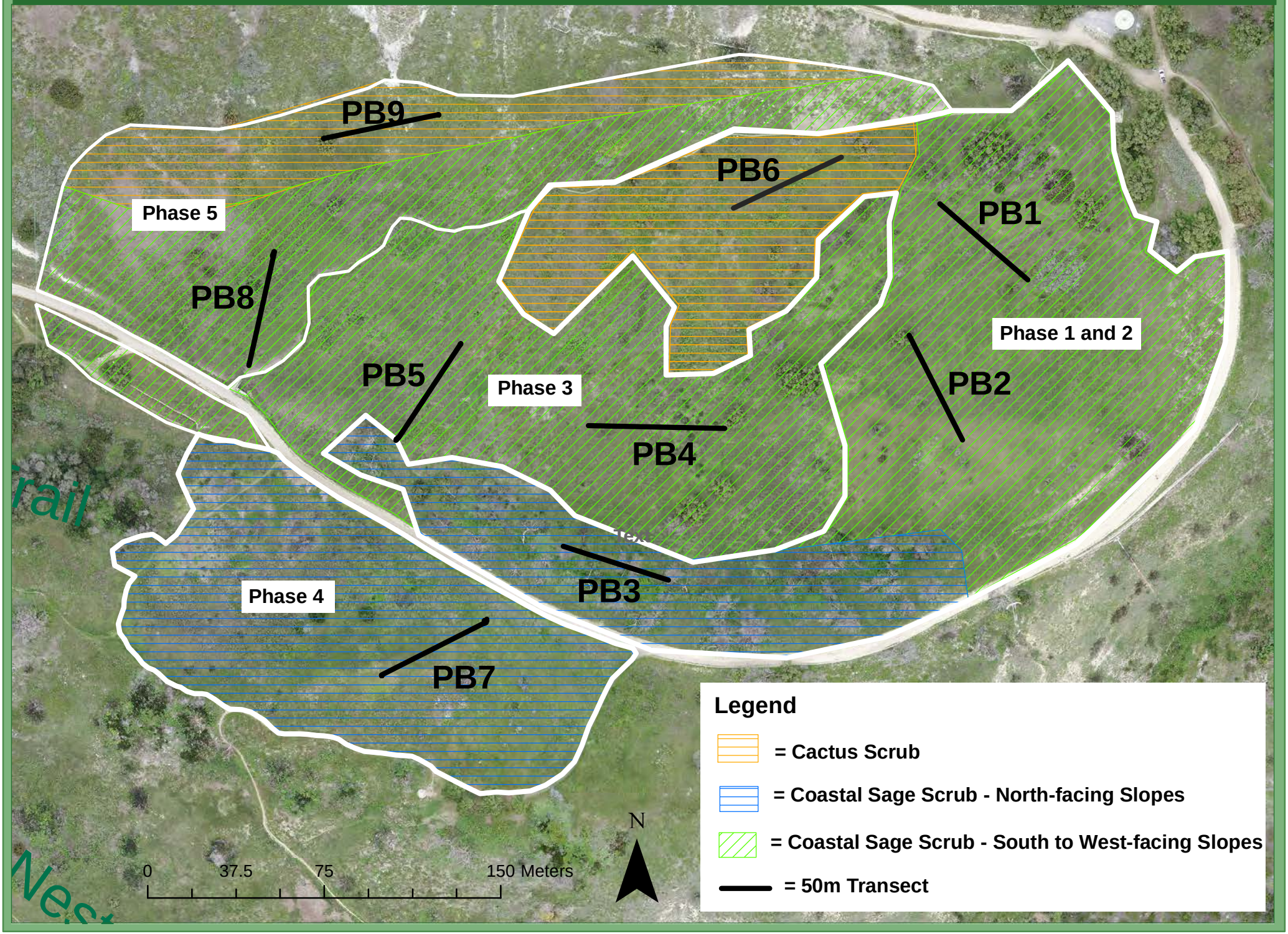
Transect PB6 End


Phase 4 photo point 1a


Phase 4 photo point 1b

Portuguese Bend Reserve

NCCP Restoration Transects

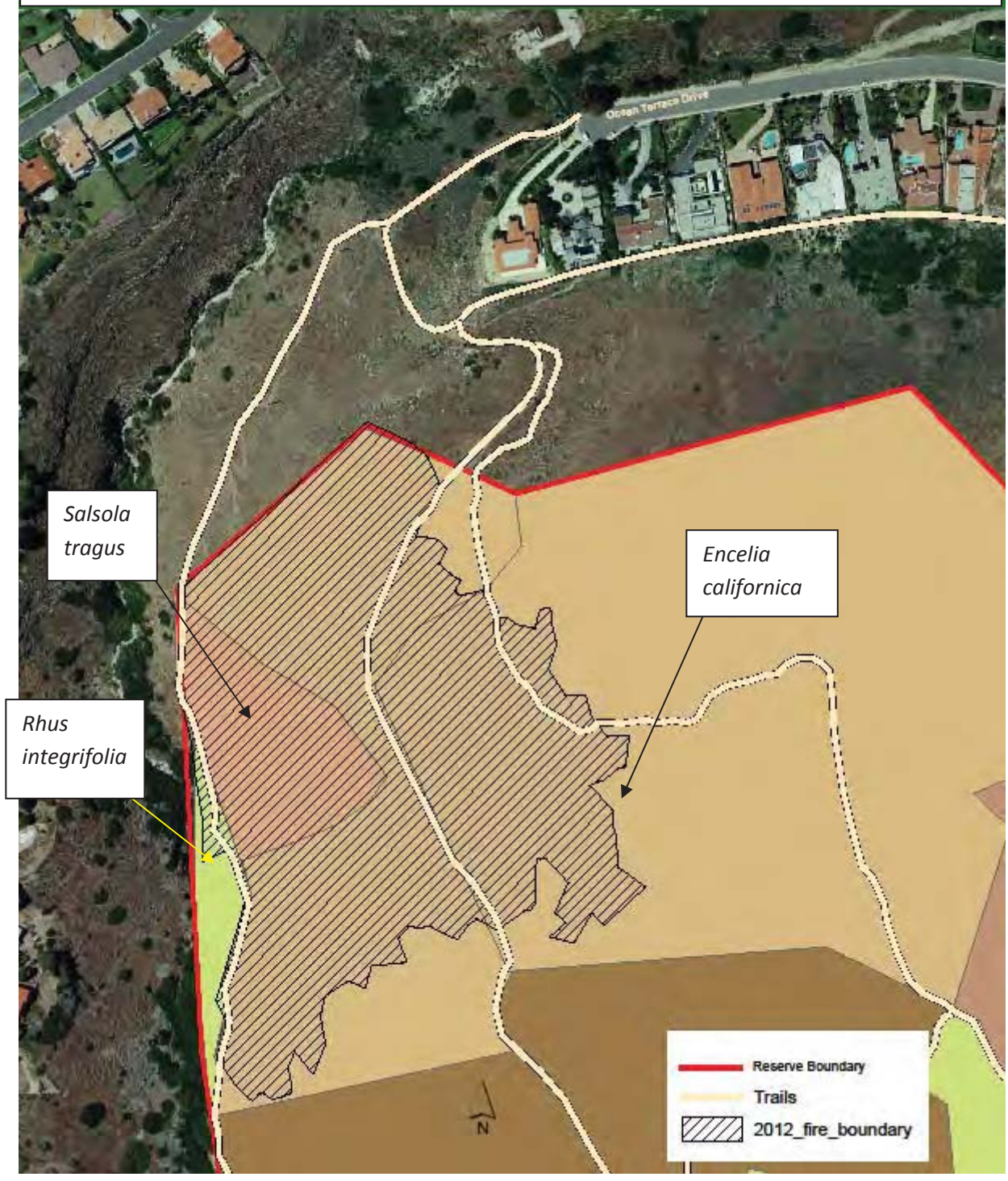


Appendix A3 – Three Sisters Fire

2015 Monitoring Photo Points and Map


MCCARREL CANYON TRAIL
BARKENTINE TRAIL

Figure 1. Three Sisters 2012 Fire Boundary and Pre-Fire Vegetation.



Appendix A4 – Vista del Norte Fire

2015 Monitoring Photo Points and Map

Photo Point 1

Photo Point 2

Photo Point 3

Photo Point 4

Photo Point 5

Vista Del Norte Reserve
Palos Verdes Nature Preserve

APPENDIX B

Portuguese Bend NCCP

Restoration Plan

APPENDIX B. PORTUGUESE BEND NCCP SITE PROPOSED REVISED RESTORATION PLAN FOR PHASE 4 AND 5

3.5 SEEDING AND PLANTING SPECIFICATIONS

The following methods will be used to seed and plant during the restoration of coastal sage scrub and cactus scrub habitats within the Portuguese Bend Reserve. Seeding and planting should be implemented in October 2012 to take advantage of the entire rain season.

3.5.1 Seeding

Seed shall be applied by hand with a belly grinder in the areas between container plant groupings as well as in between the plants among the container plant groups in all restoration areas. The seed will be mixed together as specified for the seed mix. Specified VAM will be spread by hand with a belly grinder over the seeding area prior to seeding. The seed shall be broadcast and raked, where practical, into the ground to no more than a quarter of an inch to incorporate the seed into the soil to increase germination success. The seed palettes are the same as in the 2010 Restoration Plan (see Table 2, 4, 6).

3.5.2 Planting

Container plant palettes were based on the seed palette in the 2010 Restoration plan (Tables 1, 3, 5).

Container plants consist of dominant shrubs and 40 to 60 plants will be planted in groups of mixed species throughout the restoration area. However, cactus species will be planted in the 2 acre restoration area with no other species planted within the group. The layout for container plants will be determined for each area based on micro topographic features and planting sites will be marked on the site using different colored pin flags under the supervision of the restoration ecologist or PVPLC biologist. Spacing of plants within the groups will follow the specifications presented in the tables for container plant palettes. Groups of container plants will be spaced in a natural looking mosaic in each area.

All container plants are to be planted to the following specifications:

- Planting holes shall be made with the minimum disturbance to accommodate the containers.
- Prior to planting, the planting hole shall be filled with water, and allowed to drain.

- Plants shall be set in the planting hole so that the crown of the root ball is approximately 0.25 inch above finish grade. Under no circumstance should the plant crown be buried.
- A watering basin shall be provided around each plant from 18 – 24 inches in diameter.
- Watering basins shall be filled with water after planting, at least twice.
- The irrigation system should be tested to ensure that all emitters are functioning.

3.6 IRRIGATION SYSTEM

A temporary above ground irrigation system is specified for the groups of container plants within the coastal sage scrub restoration areas. The irrigation system will be used, as necessary to supplement the annual rainfall during the establishment period. The temporary irrigation system will be installed in summer prior to planting to permit "grow and kill" weed treatments.

The temporary above ground irrigation system will be used in the early fall and late spring seasons. The irrigation system will slightly lengthen the growing season to maximize the development of the habitat. Depending on rainfall, irrigation likely will be required for the first two growing seasons for establishment.

3.7 SITE MAINTENANCE

One of the goals for the restoration is to provide self-sustaining habitats. However, initially, maintenance of the restoration area will be necessary to establish the newly planted and seeded areas. Maintenance will include any activities required to meet the performance standards set forth in this plan, in the estimation of the restoration specialist or PVPLC biologist. For the Three Sisters Reserve, these include the following:

- Weed control, at a minimum for fennel, acacia, mustards, wild oats and purple false brome;
- Irrigation for the container plants;
- Replacement hand seeding in areas of more than 200 sq. ft where target seed germination failed after one good season of rainfall;
- Replacement of container plants in areas with less than 80 percent survival in years two and three, based on visual observations of substantial mortality; and
- Pest and disease control, if necessary.

The establishment maintenance period is generally three years duration with the most intense maintenance in the first and second year, and only seasonal weeding activities in the third year. The amount of maintenance each year will depend on weather conditions and how well the site develops. The following specifications for maintenance may require adjustments as determined by the restoration specialist or PVPLC biologist over the three-year maintenance period.

3.7.1 Weed Control

During the active maintenance period, the target cover from exotic weed species will be generally 10 percent or less. Control of the wild oats and purple false brome is especially important because annual grasses have been shown to compete with shrub species in restoration (Eliason and Allen 1997; Corbin and D'Antonio 2004). Purple false brome is a relatively recent invader to southern California, and the habitat of this species is relative dense growth.

Weeds will be controlled during late winter through early summer, as necessary, before they set seed and/or before they reach approximately 12 inches in height. Three weeding events should be estimated for a normal rainfall season, with more or less as dictated by rainfall. Weeds, such as purple false brome will be removed from the site if seeds have set prior to weeding. Since removal of weeded material is expensive, weeded material may be left on site as organic mulch material if seeds have not yet set. Removal of herbicide treated material is not an issue.

Weed control will mainly employ hand pulling, mechanical methods, and spot spraying of herbicides for certain species such as fennel and acacia as described in Section 3.2.1.

3.7.2 Irrigation of Container Plants

Temporary irrigation will only be used in the areas where groups of container plants are to be planted. Irrigation will be used in the first two seasons from planting to extend the rainy season and establish the shrubs, as necessary. The timing of irrigation events will depend on evapo-transpiration between irrigation events and soil moisture. The following management scheme is anticipated as a guideline for water management of native trees and shrubs:

- Irrigate soil to full field capacity to the desired depth (approximately 18 inches after planting; and 18–24 inches during plant establishment).
- Allow soil to dry down to approximately 50-60 percent of field capacity in the top 6-12 inches before the next irrigation cycle. Depth of soil dry down between irrigation events will depend on development of container plants.

Wetting of the full root zone and drying of the soil between irrigation events is essential to the maintenance of the plants and the promotion of a deep root zone that will support the vegetation in the years after establishment. A soil probe or shovel should be used to examine soil moisture and rooting depth directly.

3.7.3 Seeding and Plant Replacement

Target values for relative cover of the native vegetation, including nurse and erosion control species, will be as follows with at least 20 percent cover in Year 1, 30 percent in Year 2, and 40

percent in Year 3. Actual cover values will depend mainly on weather conditions (seasonal rainfall and temperature) during the establishment period.

Areas of significant erosion shall be repaired and re-seeded in the first fall season after damage. Re-seeding will occur in areas if coverage is less than 20 percent of native species over any contiguous area of 200 sq ft.

Survival of the container plants within the first growing season should be 80 percent. Plants shall be replaced if survivorship falls below 80 percent in the first season. Replacements will be planted as previously specified and maintained for one growing season, as necessary. As sites develop, it is impractical to implement direct counts of all the container plants. Replacement planting after the first season shall only be specified if the visual estimate indicates substantial mortality and the function of these species has not been replaced by seeded material and natural recruitment.

Table 1
Northerly Facing Slope Coastal Sage Scrub Container Plant Palette

Species	Spacing	# of plants per acre
Artemisia californica	5’	148
Encelia californica	4’	111
Eriogonum cinereum	4’	148
Eriogonum fasciculatum	4’	222
Hazardia squarrosa	4’	37
Heteromeles arbutifolia	5’	7
Leymus condensatus	5’	74
Isocoma menziessi	5’	111
Lotus scoparius	4’	74
Malosma laurina	15’	7
Melica imperfecta	4’	148
Rhus integrifolia	15’	7
Salvia leucophylla	5’	111

Table 2
Northerly Facing Slope Coastal Sage Scrub Seed Mix

Species	Lbs. Per Acre
Artemisia californica	2
Castilleja exserta	0.5
Deinandra fasciculata	1.5
Encelia californica	1.5
Eriogonum cinereum	2
Eriogonum fasciculatum	3
Eschscholzia californica var. maritima	1.5
Hazardia squarrosa	0.5
Gnaphalium californicum	0.5
Heteromeles arbutifolia	0.1
Leymus condensatus	1
Isocoma menziessi	1.5
Lotus strigosus	1
Lotus scoparius	1
Lupinus succulentus	1
Lupinus bicolor	1
Malosma laurina	0.1
Melica imperfecta	2
Nassella lepida	1
N. pulchra	1
Phacelia cicutaria	0.4
Plantago insularis	20
Rhus integrifolia	0.1
Salvia leucophylla	1.5
Vulpia microstachys	1
Bloomeria crocea	as available
Dichelostemma capitatum	as available
Calochortus catalinae	as available
Total Lbs./Grams per Acre	**46.7**

Table 3
Southerly and Westerly Facing Slope Coastal Sage Scrub Plant Palette

Species	Spacing	# of plants per acre
Artemisia californica	5’	125
Encelia californica	4’	125
Eriogonum cinereum	4’	125
Eriogonum fasciculata	4’	375
Heteromeles arbutifolia	5’	19
Isocoma menziessi	5’	94
Lotus scoparius	4’	94
Malosma laurina	15’	6
Melica imperfecta	5’	63
Rhus integrifolia	15’	6
Salvia mellifera	5’	94

Table 4
Southerly and Westerly Facing Slope Coastal Sage Scrub Seed Mix

Species	Lbs. Per Acre
Artemisia californica	2
Castilleja exserta	0.5
Deinandra fasciculata	1.5
Encelia californica	2
Eriogonum cinereum	2
Eriogonum fasciculata	6
Eschscholzia californica var. maritima	1.5
Gnaphalium californicum	0.5
Heteromeles arbutifolia	0.3
Isocoma menziessi	1.5
Lotus strigosus	1.5
Lotus scoparius	1.5
Lupinus succulentus	1
Lupinus bicolor	1.5
Malosma laurina	0.1
Melica imperfecta	1
Nassella lepida	3.5
N. pulchra	1.5
Phacelia cicutaria	0.4
Plantago insularis	20
Rhus integrifolia	0.1
Salvia mellifera	1.5
Sisyrinchium bellum	0.5
Vulpia microstachys	2
Bloomeria crocea	as available
Dichelostemma capitatum	as available
Calochortus catalinae	as available
Total Lbs./Grams per Acre	**53.9**

Table 5
Cactus Scrub Container Plant Palette

Scientific Name	Common Name	Container Size[1]	Container Plant Spacing[2]	Plants per Acre[3]
Cylindropuntia prolifera	coastal cholla	1-gallon	3'	40
Opuntia littoralis	coast prickly pear	1-gallon	3'	120
			TOTAL	160

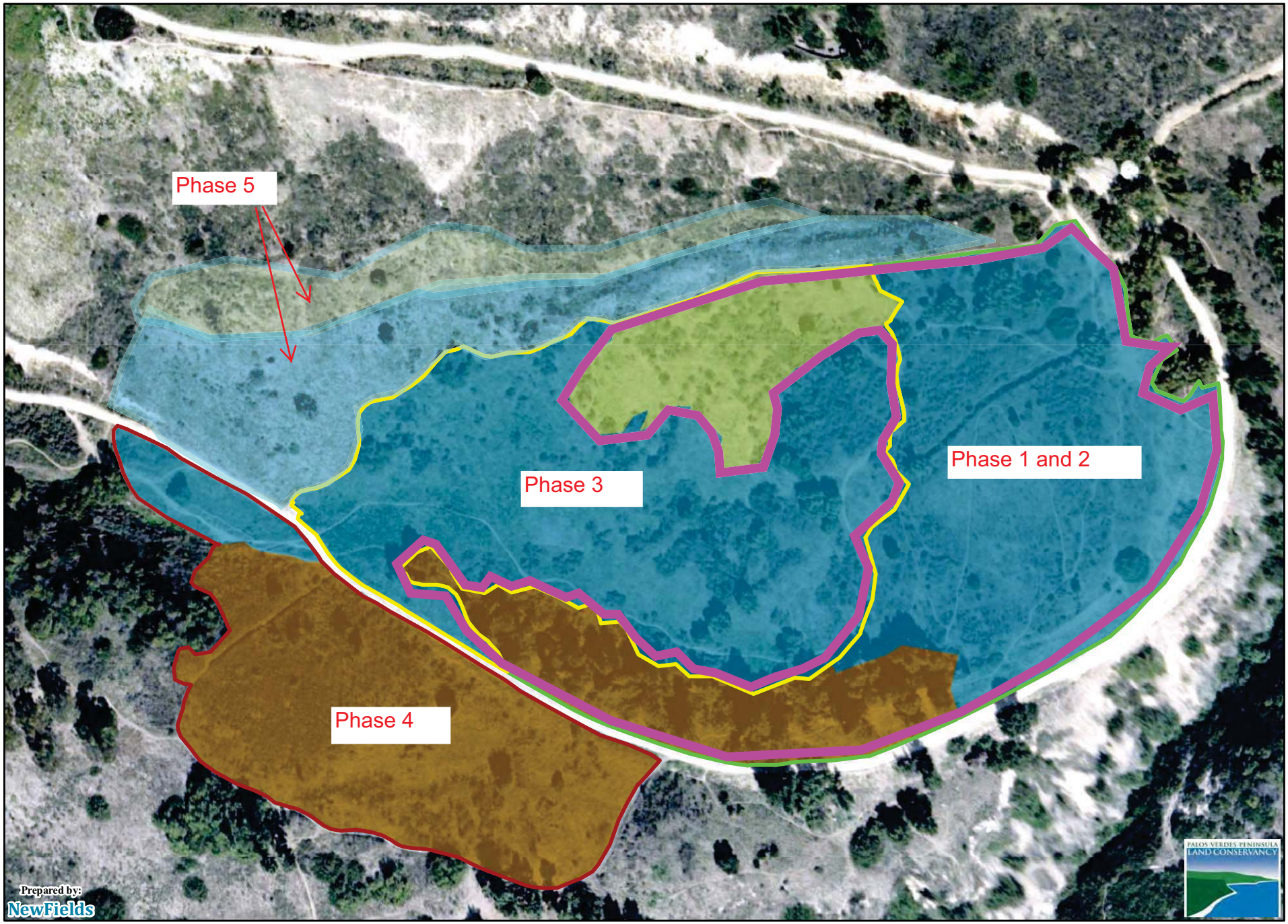
[1] A combination of pads, 1-gallon, and 5-gallon cactus can be used.

[2] Spacing = feet on-center distance from other cactus within planting groups. Spacing of 5-gallon cactus should be 6' from next closest cactus.

[3] Cactus should be planted in groups of 30. Planting groups can consist of a combination of cactus pads, 1-gallon, and 5-gallon plants at the specified number of plants per acre.

Table 6
Cactus Scrub Seed Mix

Scientific Name	Common Name	Pounds of bulk seed per acre
Artemisia californica	California sagebrush	2.0
Deinandra fasciculata	fascicled tarweed	1.5
Encelia californica	California encelia	1.5
Eriogonum cinereum	ashyleaf buckwheat	2.0
Eriogonum fasciculatum	California buckwheat	6.0
Gnaphalium californicum	California everlasting	0.5
Isocoma menziesii	coast goldenbush	1.5
Lotus scoparius	deerweed	6.0
Lotus strigosus	strigose lotus	1.5
Lupinus bicolor	miniature lupine	3.0
Lupinus succulentus	arroyo lupine	1.0
Melica imperfecta	melic grass	2.0
Nassella lepida[3]	foothill needlegrass	2.5
Phacelia ramosissima	branching phacelia	0.4
Plantago insularis[4]	wooly plantain	20.0
Rhus integrifolia	lemonadeberry	0.1
Salvia mellifera	black sage	0.5
Sambucus Mexicana	Mexican elderberry	0.5
Sisyrinchium bellum	blue-eyed grass	0.5
Vulpia microstachys[4]	small fescue	6.0



N

0 75 150 300 Feet

Restoration Habitat/Seed Mix

- Cactus Scrub
- Coastal Sage Scrub - North-facing Slopes
- Coastal Sage Scrub - South to West-facing Slopes

Figure 1

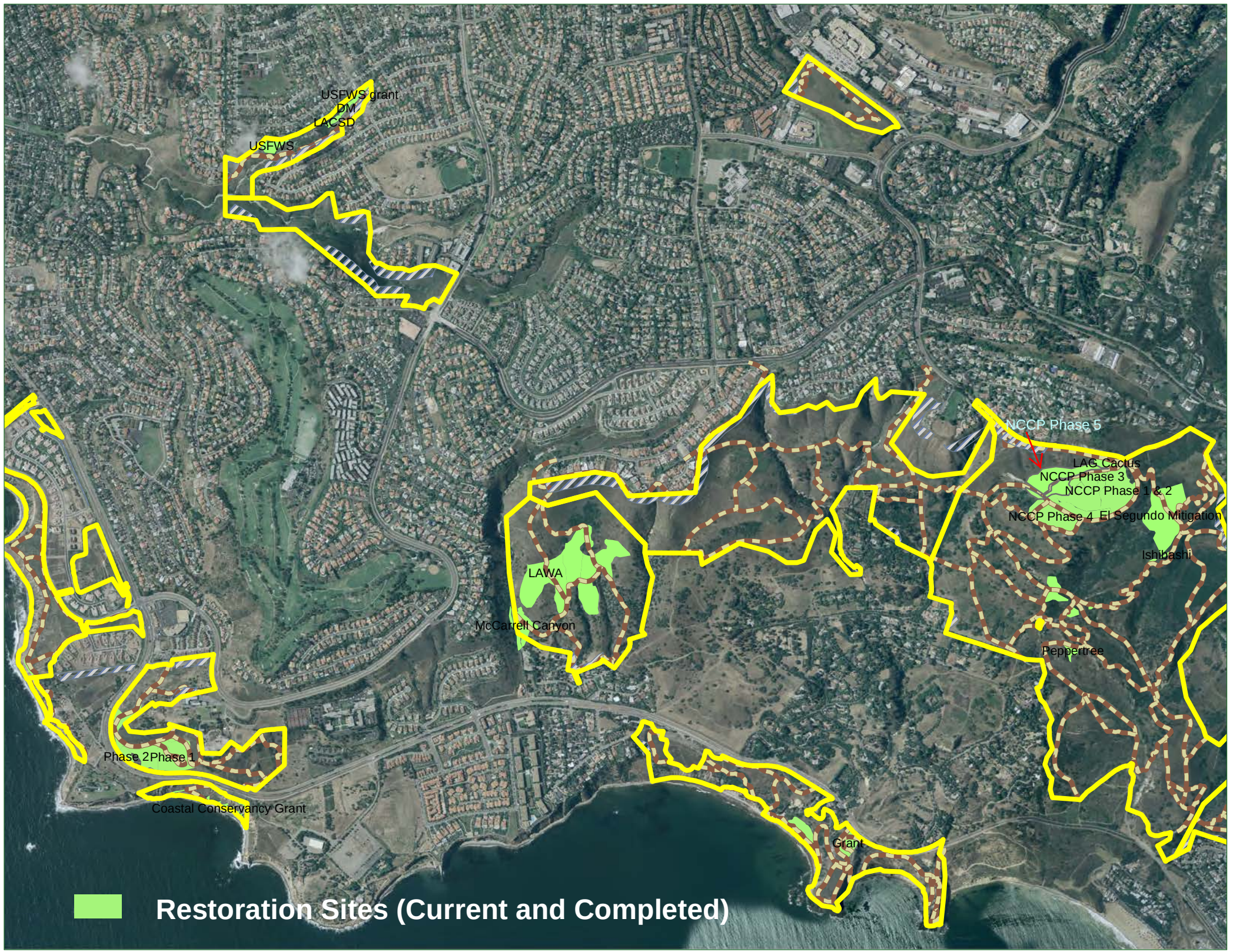
Portuguese Bend Proposed Restoration Area
Palos Verdes Nature Preserve

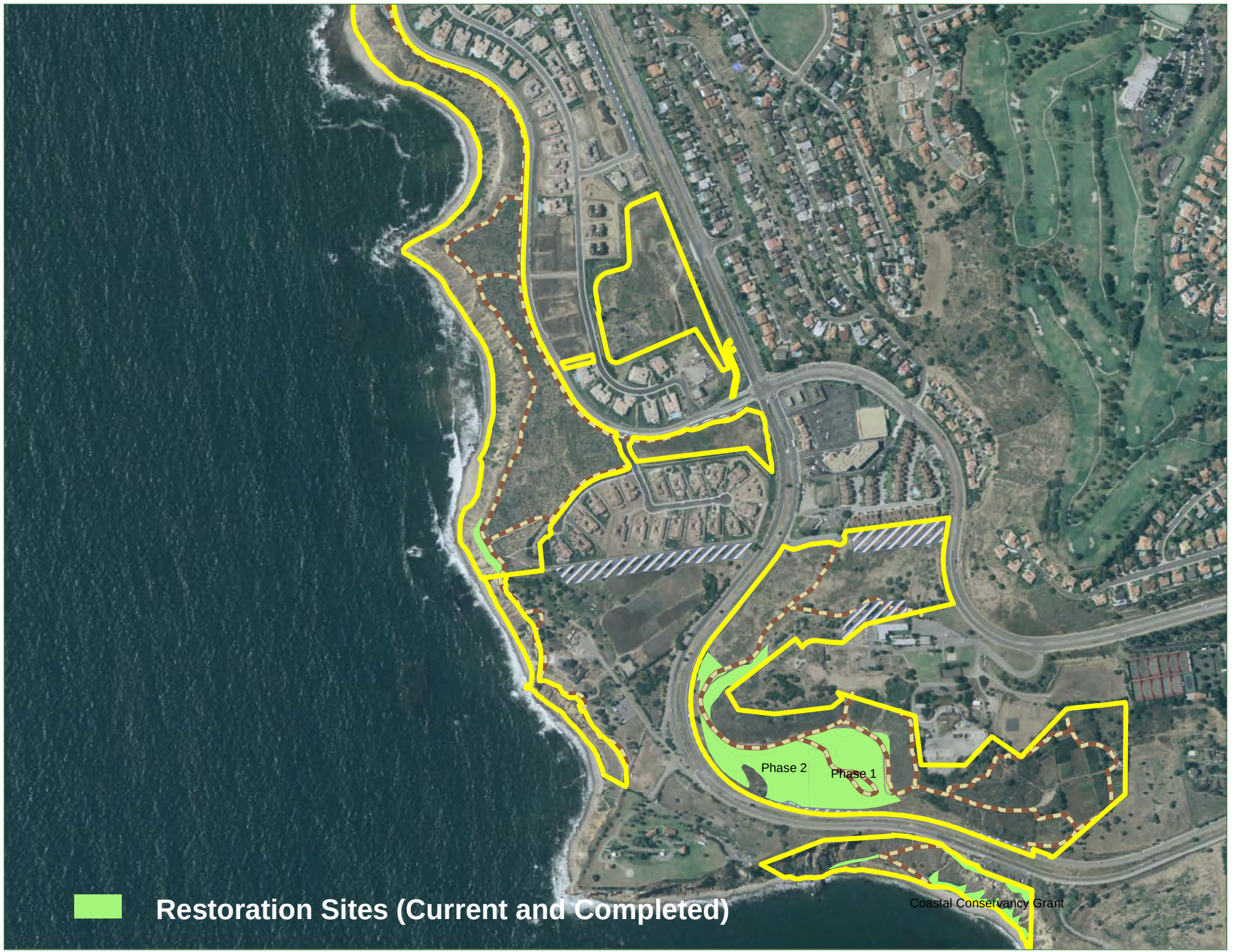
APPENDIX C

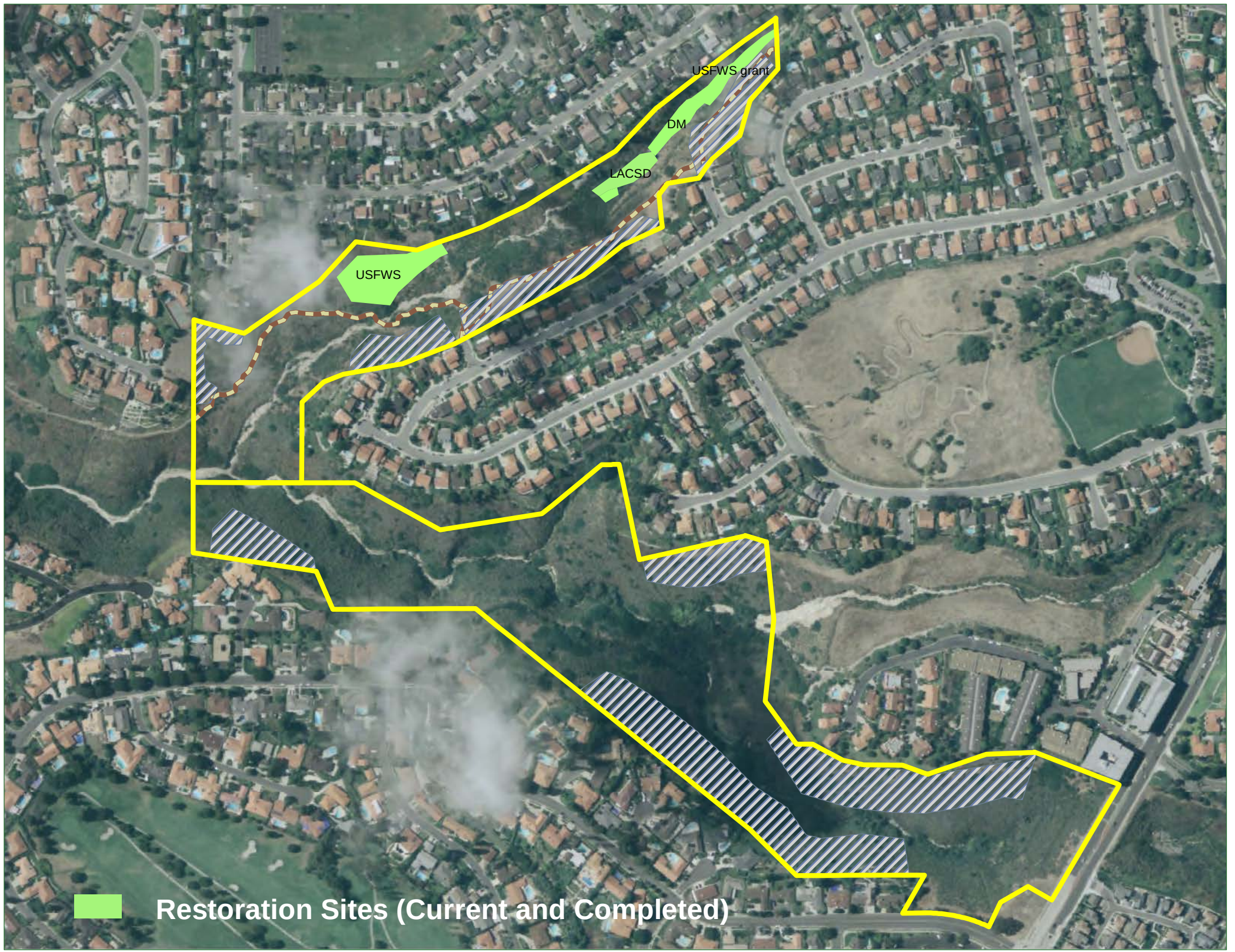
ALL RESTORATION PROJECTS

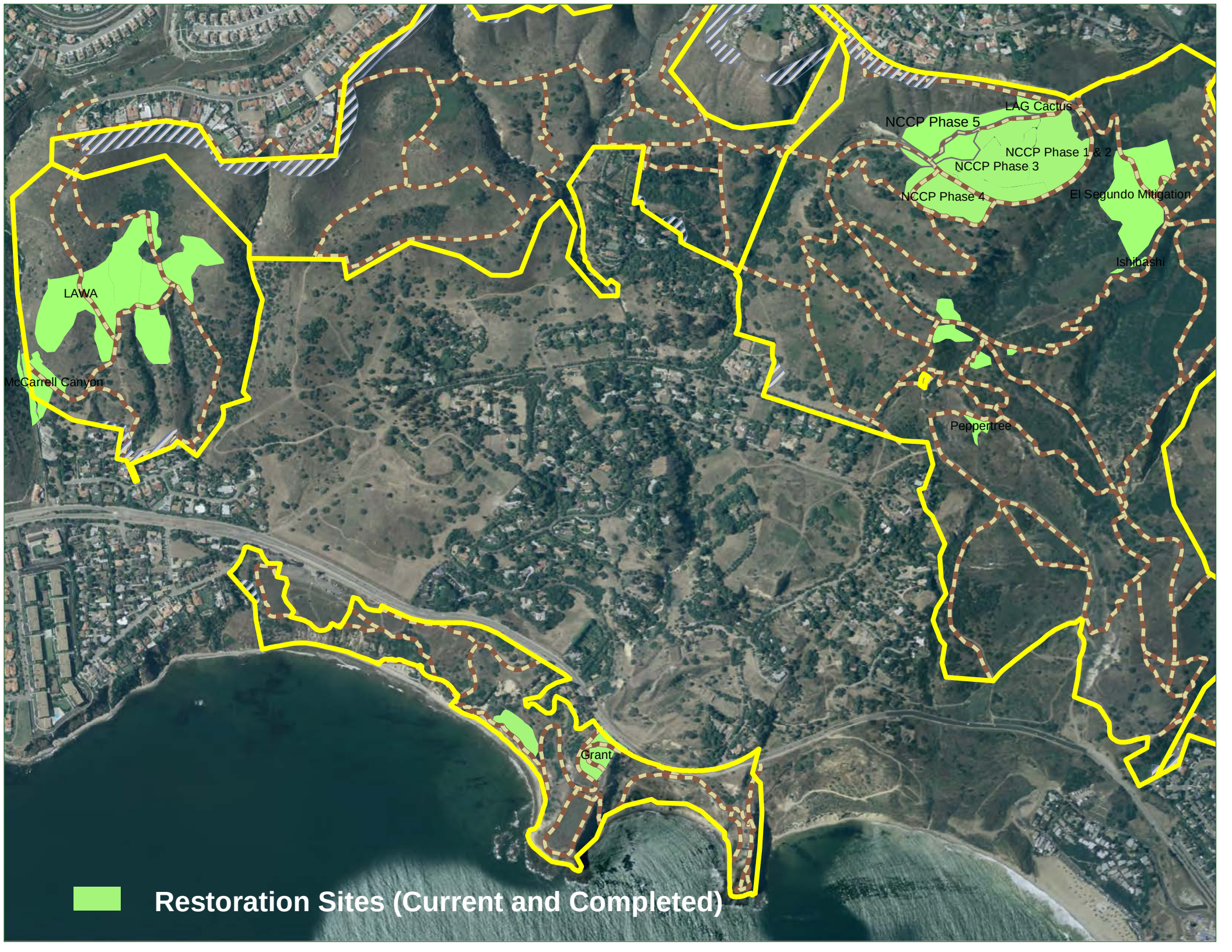
APPENDIX C. PALOS VERDES NATURE PRESERVE RESTORATION PROJECTS THROUGH 2015

	Funding source	Location	Habitat Type	Acres	Status	Start Date	End Date
NCCP							
Alta Vicente	NCCP	Phase 1	CSS	4.5	ongoing	2007	2014
Alta Vicente	NCCP	Phase 1	PVB habitat	0.5	ongoing	2007	2014
Alta Vicente	NCCP	Phase 2	CSS	4	ongoing	2008	2015
Alta Vicente	NCCP	Phase 2	cactus scrub	0.5	ongoing	2008	2015
Alta Vicente	NCCP	Phase 2	PVB habitat	0.5	ongoing	2008	2015
Portuguese Bend	NCCP	Phase 1 and 2	CSS	8	ongoing	2010	2017
Portuguese Bend	NCCP	Phase 1 and 2	cactus scrub	2	ongoing	2010	2017
Portuguese Bend	NCCP	Phase 3	CSS	5	ongoing	2012	2018
Portuguese Bend	NCCP	Phase 4	CSS	5	ongoing	2013	2019
Portuguese Bend	NCCP	Phase 5	CSS	4	ongoing	2014	2020
Portuguese Bend	NCCP	Phase 5	cactus scrub	1	ongoing	2014	2020
Additional Projects							
Abalone Cove	Coastal Conservancy, NFWF, SMBRC, USFWS		CSS	5	ongoing	2013	2016
Agua Amarga	USFWS		CSS	2	completed	2001	2003
Agua Amarga	USFWS		riparian	0.5	completed	2004	2005
Agua Amarga	LACSD		riparian	0.25	ongoing	2011	2016
Agua Amarga	D&M		riparian	0.2	ongoing	2012	2017
Portuguese Bend	El Segundo Mitigation	Ishibashi	CSS and grassland	9.5	completed	2010	2015
Portuguese Bend	HCF grant	Ishibashi	CSS	0.25	ongoing	2012	2015
Portuguese Bend	HCF grant	Peppertree	CSS	0.5	ongoing	2012	2015
Portuguese Bend	Local Assistance Grant		cactus scrub	3	completed	2010	2011
Three Sisters	LAWA		CSS	13.3	completed	2007	2013
Three Sisters	LAWA		grassland	7.7	completed	2007	2013
Three Sisters/McCarrell's Ca	Coastal Conservancy		riparian	0.5	completed	2009	2012
Three Sisters/McCarrell's Ca	Coastal Conservancy		CSS	2	completed	2009	2012
Vicente Bluffs	Coastal Conservancy		coastal scrub	2	completed	2009	2014


USFWS grant
DM
LACSD
USFWS
NCCP Phase 5
LAC Cactus
NCCP Phase 3
NCCP Phase 1 & 2
NCCP Phase 4 El Segundo Mitigation
Ishibashi
LAWA
McCarrell Canyon
Peppertree
Phase 2Phase 1
Coastal Conservancy Grant
Grant
Restoration Sites (Current and Completed)


Phase 2
Phase 1
Restoration Sites (Current and Completed)
Coastal Conservancy Grant


USFWS grant
DM
LACSD
USFWS
Restoration Sites (Current and Completed)


LAG Cactus
NCCP Phase 5
NCCP Phase 1 & 2
NCCP Phase 3
NCCP Phase 4
El Segundo Mitigation
Ishibashi
LAWA
McCarrell Canyon
Peppertree
Grant
Restoration Sites (Current and Completed)

APPENDIX D

2015 ANNUAL REPORT FOR THE TARGETED EXOTIC REMOVAL PROGRAM FOR PLANTS (TERPP)

1.0 INTRODUCTION

The Palos Verdes Peninsula Land Conservancy (PVPLC), as manager of the Palos Verdes Nature Preserve (PVNP), conducts strategic weed control activities throughout the year as part of the Targeted Exotic Plant Removal Plan for Plants (TERPP). As directed in the draft Rancho Palos Verdes Natural Communities Conservation Plan (NCCP), PVPLC selects five acres or 20 small sites of exotic plants for removal each year. The overall goal of this program is to systematically target invasive species throughout the PVNP to increase the success of native plant growth and create greater habitat opportunities for wildlife.

The TERPP is an element of the NCCP that includes a specific protocol for ranking exotic species populations and strategically removing those species over time (Appendix D1-D7). The 2015 TERPP Report documents PVPLC's effort over the past year to remove exotic plant species that threaten native vegetation in the PVNP. It details the methods of assessing the threat of individual exotic species to native vegetation, field methods for removal and provides site-specific documentation related to every completed removal site.

As of the writing of this report, the NCCP is still in draft format and the regulatory agencies have not yet signed the final plan. However, the City of Rancho Palos Verdes and PVPLC currently perform the responsibilities outlined in the draft NCCP, including fulfillment of the TERPP requirements.

2.0 SITE ASSESSMENT

Invasive species control is included in PVPLC's annual conservation planning strategy where Stewardship staff prioritize potential TERPP sites and assess best practice methods for removal. Guided by the NCCP, which ranks known PVNP exotic species based on State and Federal guidelines, PVPLC staff locate TERPP sites to target for the calendar year, assess the best method for eradication, photo document and map the population/s, and conduct weed removal accordingly.

The PVPLC weighs potential areas for exotic species control based on several criteria:

1. Threat to native vegetation, particularly populations of NCCP-covered species;
2. Feasibility of eradication, which includes limiting disturbance to native habitat and ease of access, and;
3. Invasiveness of exotic species, using a synthesized rating system drawn from plant invasiveness rankings from both the California Invasive Plant Council (Cal-IPC) and the California Department of Food and Agriculture (CDFA).

Through regular property reviews and viewing fine scale imagery through the Geographic Information System (GIS), ArcGIS, PVPLC plans for exotic species control across the entire NCCP area.

To more effectively collect baseline data and track invasive species within the Preserve, PVPLC is currently developing a new methodology for collecting TERPP information. A new TERPP form is in Appendix D1. The forms provide basic information about the species targeted, including site identification number and property, approximate location, removal methods used, and general comments related to the removal activities. PVPLC also includes photo documentation: staff photographs the sites before work takes place and after the removal of the individual or population of exotic species. Photo documentation not only confirms completion of the work, but also provides a snapshot of the surrounding environment at the time of the TERPP-related activities. This record helps to create a historical record of the presence of non-native plant species on the sites, which may inform future restoration efforts.

Each TERPP site is tracked via GIS, a tool that aids planning and monitoring efforts. Since 2006, PVPLC has treated 104 individual TERPP sites. Since *Euphorbia terracina* is a high priority invasive and may take multiple treatments to control, these populations are treated every year. In 2015, of the 30 TERPP treatments, four were new sites, and one (VB_AcCy_03) was a site where we expanded the area of acacia removed. Of the retreated sites, 20 were *Euphorbia terracina* populations that were treated in previous years, two were *Coronilla valentina* populations treated in 2013, 2 were previously treated *Cortaderia sellonoa* populations that reseeded, one was a previously treated *Arundo donax*. In addition to the TERPP sites treated in 2014, this report maps all previous TERPP treatments (Appendix D9 of TERPP report). In 2012, interns started mapping invasive species locations in the Preserve, but the project has not been completed due to lack of funding. These maps will assist in selecting sites for invasive species eradication. While the most common approach to managing invasions of exotic species may be to target individual species, a more comprehensive approach is to identify major pathways for invasion that will influence more efficient and economic management of the exotic species.

3.0 FIELD METHODS

PVPLC staff uses best practice, the most effective and least intrusive, methods at all times when conducting TERPP-related activities. High priority areas may occur near rare or endangered biological populations. Care is taken to minimize soil erosion, fire risk, disturbance to surrounding native vegetation and further dispersal of the exotic species. PVPLC utilizes a combination of methods to conduct exotic species removal, generally limited to the following:

- Mechanical removal - staff may use tools with motorized blades to fell larger species;

- Hand removal - staff conduct most removals by hand pulling and/or with small hand tools for pruning and cutting;
- Chemical control - trained staff applies herbicides at the appropriate phase of vegetative growth;
- Growth and seed maturation, and;
- Disposal - City of Rancho Palos Verdes staff coordinate with waste companies to supply green waste and trash containers.

Qualified Licensed Applicator(s) develop all recommendations for chemical pest control and senior staff supervises field staff and contractors in sensitive areas. Additionally, field staff has an integral role in the TERPP and often have crucial, site-specific knowledge related to the sites.

4.0 2015 TERPP

In 2015, PVPLC treated 30 populations of invasive plants (Table 1, photopoints in Appendix D8). PVPLC treated 20 populations of *Euphorbia terracina* (Geraldton spurge, Euphorbia). Euphorbia grows rapidly in disturbed areas, is a prolific seeder and is rapidly expanding its distribution in southern California. Invaded areas show reduced ecological quality and inferior habitat quality compared to un-invaded areas. Continued spread of this species throughout California seems possible and even likely if action is not taken immediately. Euphorbia shows a broad habitat tolerance in southern California, invading both cool coastal areas and hot, dry, interior areas. Most of the populations of Euphorbia have been treated for several years, in attempts to keep it from spreading further into the Preserve.

PVPLC treated two populations of *Acacia cyclops.* At Portuguese Bend, acacia that was encroaching into cactus scrub were removed. At Vicente Bluffs, acacia growing near El Segundo blue host plants were cleared to increase potential habitat. At Alta Vicente, acacia growing in cactus habitat were cleared.

A large palm growing in cactus habitat was removed at Alta Vicente.

At Vicente bluffs, two previously treated populations of *Cortaderia selloana* with new plants were retreated.

At Abalone Cove, an Arundo donax that had previously been treated was retreated. Some ice plant (*Cephalophyllum alstonii*) surrounding a population of *Aphanisma* was cleared.

Table 1: 2015 TERPP treatments

Stand ID	Reserve	Species	Area Treated	Number of Individuals Treated	Treatment	Percent Treated	Outcome
AA_EuTe_02	Agua Amarga	Euphorbia terracina	1-10sq ft	10-50	Herbicide, hand pull	100%	Ongoing
AC_ArDo_01	Abalone Cove	*Arundo donax*	1-10sq ft	1-10	Hand pull	100%	Successful
AC_CeAl_01	Abalone Cove	*Cephalophyllum alstonii*	10-100sq ft	NA	Herbicide	100%	Larger area can be treated in future
AC_CoVa_01	Abalone Cove	*Coronilla valentina*	600-1000sq ft	500-1000	Herbicide	100%	Ongoing
AC_CoVa_02	Abalone Cove	*Coronilla valentina*	10-100sq ft	>1000	Herbicide	100%	Ongoing
AC_EuTe_01	Abalone Cove	*Euphorbia terracina*	100-300sq ft	200-500	Herbicide	100%	Ongoing
AC_EuTe_02	Abalone Cove	*Euphorbia terracina*	10-100sq ft	1-10	Hand pull	100%	Ongoing
AC_EuTe_03	Abalone Cove	*Euphorbia terracina*	100-300sq ft	50-100	Herbicide	100%	Ongoing
AC_EuTe_04	Abalone Cove	*Euphorbia terracina*	300-600sq ft	200-500	Herbicide	100%	Ongoing
AV_AcCy_01	Alta Vicente	*Acacia cyclops*	>1000 sqft	20	Cut then stump herbicide	100%	Successful
AV_EuTe_01	Alta Vicente	*Euphorbia terracina*	100-300sq ft	10-50	Herbicide	100%	Ongoing
AV_EuTe_02	Alta Vicente	*Euphorbia terracina*	100-300sq ft	100-200	Herbicide	100%	Ongoing
AV_EuTe_04	Alta Vicente	*Euphorbia terracina*	>1000sq ft	500-1000	Herbicide	100%	Ongoing
AV_Palm_01	Alta Vicente	*Phoenix canriensis*	100-300sq ft	3	Cut then stump herbicide	100%	Successful
PB_EuTe_03	Portuguese Bend	*Euphorbia terracina*	10-100sq ft	10-50	Herbicide	100%	Ongoing
PB_EuTe_05	Portuguese Bend	*Euphorbia terracina*	10-100sq ft	10-50	Herbicide	100%	Ongoing
PB_EuTe_06	Portuguese Bend	*Euphorbia terracina*	10-100sq ft	200-500	Herbicide	100%	Ongoing
PB_EuTe_07	Portuguese Bend	*Euphorbia terracina*	10-100sq ft	10-50	Herbicide	100%	Ongoing
PB_EuTe_08	Portuguese Bend	*Euphorbia terracina*	100-300sq ft	500-1000	Hand pull	100%	Ongoing

TS_EuTe_01	Three Sisters	*Euphorbia terracina*	600-1000sq ft	500-1000	Herbicide	100%	Ongoing
TS_EuTe_02	Three Sisters	*Euphorbia terracina*	100-300sq ft	100-200	Herbicide	100%	Ongoing
TS_EuTe_03	Three Sisters	*Euphorbia terracina*	100-300sq ft	200-500	Herbicide	100%	Ongoing
TS_EuTe_04	Three Sisters	*Euphorbia terracina*	100-300sq ft	200-500	Herbicide	100%	Ongoing
VB_AcCy_03	Vicente Bluffs	*Acacia cyclops*	>1000sq ft	~40	Herbicide	100%	Successful
VB_CoSe_01	Vicente Bluffs	*Cortaderia selloana*	>1000sq ft	10-50	Hand pull	100%	Successful
VB_CoSe_02	Vicente Bluffs	*Cortaderia selloana*	10-100sq ft	1-10	Hand pull	100%	Successful
VB_EuTe_01	Vicente Bluffs	*Euphorbia terracina*	1-10sq ft	1-10	Hand pull	100%	Ongoing
VB_EuTe_02	Vicente Bluffs	*Euphorbia terracina*	1-10sq ft	1-10	Hand pull	100%	Ongoing
VB_EuTe_03	Vicente Bluffs	*Euphorbia terracina*	1-10sq ft	1-10	Hand pull	100%	Ongoing
VB_PeSe_01	Vicente Bluffs	*Pennisetum setaceum*	1-10sq ft	1-10	Hand pull	100%	Ongoing; seed bank may be present

5.0 REFERENCES

California Invasive Plant Council 2006. California Invasive Plant Inventory. February. California Invasive Plant Council: Berkley, CA.

Palos Verdes Peninsula Land Conservancy 2007a. 2007 Targeted Exotic Removal Plan for Plants for the Portuguese Bend Nature Preserve For the Rancho Palos Verdes Draft Natural Community Conservation Plan and Habitat Conservation Plan. April.

Palos Verdes Peninsula Land Conservancy 2008. 2008 Annual Report for the Targeted Exotic Removal Program for Plants for the Portuguese Bend Nature Preserve For the Rancho Palos Verdes Draft Natural Community Conservation Plan and Habitat Conservation Plan. September.

State of California 2007. Department of Food and Agriculture Division of Plant Health & Prevention Services Noxious Weed Ratings. Retrieved September 2007, from: <http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/pdfs/noxiousweed_ratings.pdf>.

URS 2006. City of Rancho Palos Verdes Draft Natural Community Conservation Plan and Habitat Conservation Plan. June 9.

APPENDIX D1: SAMPLE TERPP FORM

Invasive Weed Mapping Field Datasheet

Survey Type New Infestation Assesment Treatment	**Surveyor's Name**
Date	**Location Description:**
Species	
Preserve	
Stand ID	**Surrounding Vegetation Type:** cactus scrub coastal sage scrub riparian bluff grassland non-native plants trail non-native annual grass (NNAG) Other
Stand Size 1 ft^2 - 10 ft^2 10 ft^2 - 100 ft^2 100 ft^2 -300ft^2 300 ft^2 - 600 ft^2 600 ft^2 - 1000 ft^2 > 1000 ft^2	
No. Individuals 1-10 10-50 50-100 100-200 200-500 500-1000 >1000	**Stand Comments:**
Percent Canopy Cover 1-5% 5-10% 10-25% 25-50% 50-75% +75%	
Plant Phenology Flowering Non-Flowering Fruiting	
Plant Age Seedling Juvenile Mature Dead	
Treatment Type Hand pull Herbicide Hand-pull/Herbicide Weed-whip Mulch Tree removal Other	**Treatment Comments:**
Area Treated 1 ft^2 - 10 ft^2 10 ft^2 - 100 ft^2 100 ft^2 - 300 ft^2 300 ft^2 - 600 ft^2 600 ft^2 - 1000 ft^2 > 1000 ft^2	
Percent of Infestation Treated 0-25% 25-50% 50-75% 75-100%	
Photo Image Numbers:	**Additional Comments:**

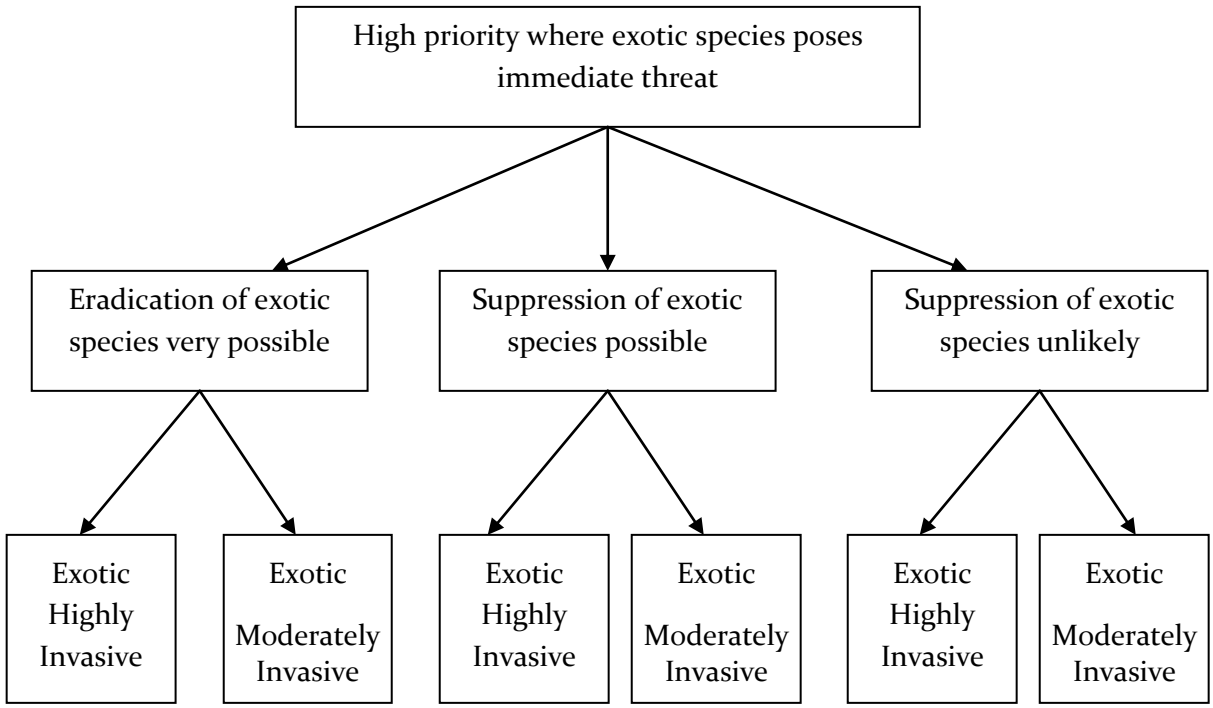
Stand ID Example: AC_EuTe_01_yyyy.mm.dd.jpg

Preserve abbreviations:

AA - Agua Amarga	AC - Abalone Cove	AV - Alta Vicente	CP - Chandler Preserve	DF - DFSP	GF - George F
FI - Filiorum	FO - Forrestal	OT - Ocean Trails	PB - Portugeuese Bend	SR - San Ramon	
TS - Three Sisters	VB - Vicente Bluffs	VN - Vista del Norte	WP - White Point	OR - Other	

Rev 3/13

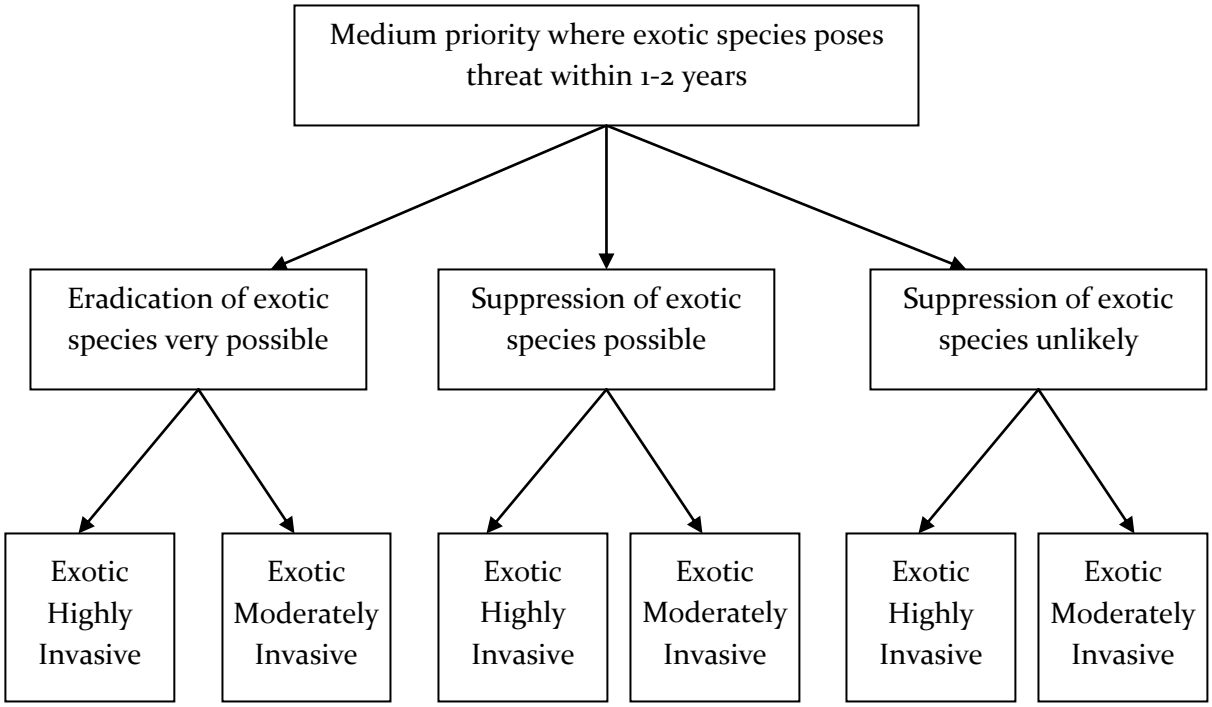
APPENDIX D2: FLOWCHART FOR HIGH PRIORITY THREAT TO NATIVE VEGETATION



Priority Ranking For Control of Exotic Species

1-3= Low priority 4-7= Medium priority 8-10= High priority

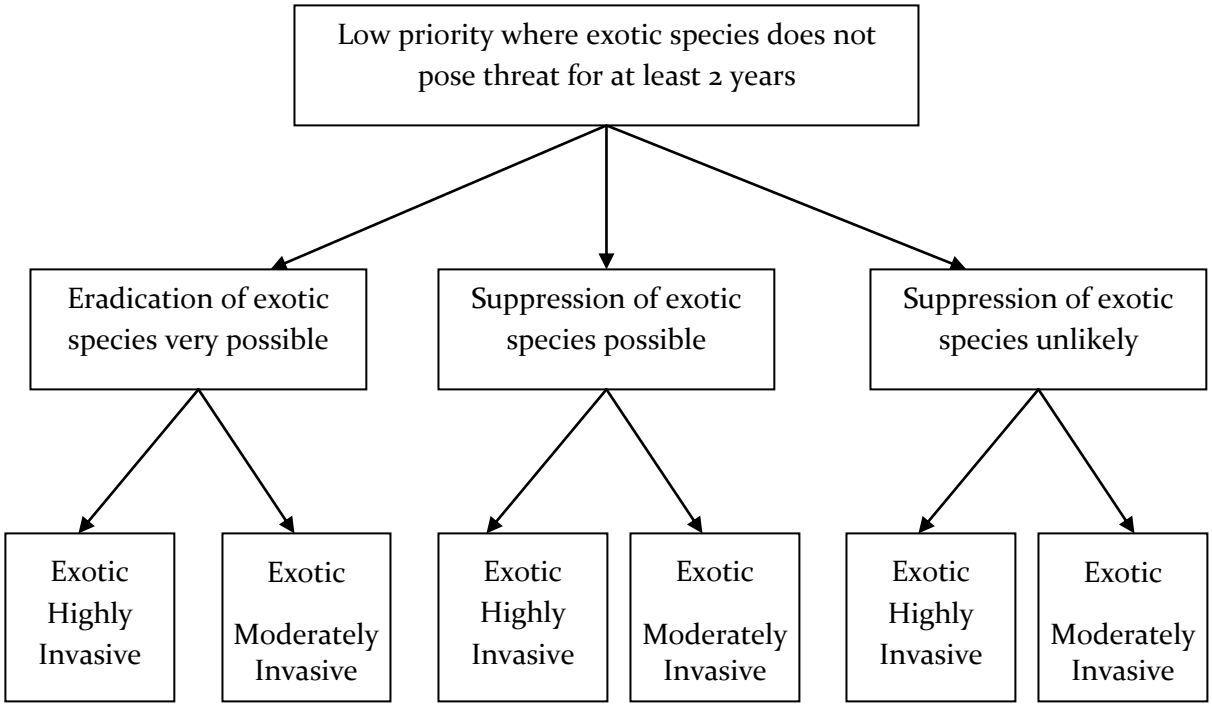
APPENDIX D3: FLOWCHART FOR MEDIUM PRIORITY DEGREE OF THREAT TO NATIVE VEGETATION



Priority Ranking For Control of Exotic Species

1-3= Low priority 4-7= Medium priority 8-10= High priority

APPENDIX D4: FLOWCHART FOR LOW PRIORITY DEGREE OF THREAT TO NATIVE VEGETATION



Priority Ranking For Control of Exotic Species

1-3= Low priority 4-7= Medium priority 8-10= High priority

APPENDIX D5: HIGHLY INVASIVE SPECIES

Genus species	Common name	Genus species	Common name
Arundo donax	Giant reed	*Malva sylvestris*	Mallow
Asparagus asparaagoides	Bridal creeper	*Mesembryanthemum crystallinum*	Annual iceplant
Avena barbata	Slender oat	*Nicotiana glauca*	Tree tobacco
Avena fatua	Wild oat	*Pennisetum clandestinum*	Kikuyu grass
Brachypodium distachyon	False brome	*Pennisetum setaceum*	Fountain grass
Brassica nigra	Black mustard	*Picris echioides*	Bristly ox-tongue
Bromus diandrus	Ripgut grass	*Pistacia atlantica*	Pistachio
Bromus madritensis ssp. rubens	Red brome	*Pittosporum undulatum*	Pittosporum
Carpobrotus edulis	Hottentot fig	*Raphanus sativus*	Wild radish
Caesalpinia spinosa	Spiny holdback	*Ricinus communis*	Castor bean
Centaurea melitensis	Tocalote	*Salsola tragus*	Russian thistle
Chrysanthemum coronarium	Garland chrysanthemum	*Silybum marianum*	Milk thistle
Cortaderia selloana	Pampas grass	*Sonchus asper*	Prickly sow thistle
Cynodon dactylon	Bermuda grass	*Sonchus oleraceus*	Sow thistle
Euphorbia terracina	Spurge	*Spartium junceum*	Spanish broom
Foeniculum vulgare	Fennel	*Tamarix species*	Tamarisk
Malva nicaeensis	Bull mallow	*Tropaeolum majus*	Garden nasturtium
Malva parviflora	Cheeseweed		

APPENDIX D6: MODERATELY INVASIVE SPECIES

Genus species	Common Name	Genus species	Common Name
Acacia cyclops	Acacia	*Limonium perezii*	Sea lavender
Acacia species	Acacia	*Limonium sinuatum*	Sea lavender
Aegilops cylindrica	Jointed goat grass	*Lobularia maritima*	Sweet alyssum
Ageratina adenophorum	Eupatory	*Lolium multiflorum*	Italian rye
Atriplex semibaccata	Australian saltbush	*Lolium perenne*	Perennial ryegrass
Bassia hyssopifolia	Five-Hook bassia	*Marrubium vulgare*	Horehound
Bromus hordeaceus (mollis)	Soft brome	*Medicago polymorpha*	Bur clover
Bromus catharticus	Rescue grass	*Medicago sativa*	Alfalfa
Cakiel maritime	Sea rocket	*Melilotus albus*	White sweet clover
Carduus pycnocephalus	Italian thistle	*Melilotus indicus*	Yellow sweet clover
Carpobrotus aequilaterus	Sea Fig	*Myoporum laetum*	Myoporum
Carpobrotus chilensis iceplant	Fig-Marigold	*Olea europea*	Olive
Conium maculatum	Poison hemlock	*Oxalis pes-caprae*	Bermuda buttercup
Convolvulus arvensis	Bindweed	*Pelargonium zonale*	Zonal geranium
Erodium cicutarium	Red stem filaree	*Phalaris minor*	Phalaris
Eucalyptus camaldulensis	Red gum tree	*Phoenix canariensis*	Phoenix palm
Eucalyptus globulus	Blue gum tree	*Piptatherum miliacea*	Smilo grass
Eucalyptus species	Gum tree	*Pittosporum undulatum*	Pittosporum
Hirschfeldia incana	Annual mustard	*Plantago lanceolata*	English plantain
Hordeum murinum leporinum	Foxtail barley	*Polygonum aviculare*	Knotweed
Hordeum vulgare	Common barley	*Polypogon monspessulensis*	Rabbitsfoot
Lactuca serriola	Compass plant	*Pyracantha sp.*	Firethorn
Lathyrus tangianus	Tangier pea	*Rumex crispus*	Curly dock
		Schinus molle	Mexican pepper

Schinus terebinthifolius	Brasilian pepper	*Vicia sativa*	Spring vetch
Sisymbrium irio	London rocket	*Vulpia myuros varhirsuta*	Annual fescue
Trifolium hirtum	Rose clover	*Vulpia myuros var myuros*	Rattail fescue
Washington robusta	Mexican fan palm		

APPENDIX D7: EXOTIC, NON-INVASIVE SPECIES

Scientific Name	Common Name	Genus species	Common Name
Amaranthus albus	Tumbleweed	*Geranium carolinianum*	Geranium
Anagallis arvensis	Pimpernel	*Gnaphalium luteo-album*	White cudweed
Apium graveolens	Celery	*Koehlreuteria species*	Koehlreuteria
Aptenia cordifolia	Baby sun-rose	*Lamarckia aurea*	Goldentop
Atriplex glauca	Saltbush	*Lantana montevidensis*	Lantana
Bidnes pilosa	Common beggar-ticks	*Lathyrus odoratus*	Sweet pea
Capsella bursa-pastoris	Shepherd's purse	*Lycium species*	Lycium
Centranthus rubber	Red valerian	*Lycopersicon esculentum*	Garden tomato
Ceratonia siliqua	Locust bean tree	*Malephora crocea*	Mesemb
Chamaesyce maculata	Spotted spurge	*Melaleuca species*	Melaleuca
Chenopodium album	Lamb's quarters	*Mesembryanthemum nodiflorum*	Iceplant
Chenopodium ambrosioides	Mexican tea	*Osteoapermu fruticosum*	African daisy
Chenopodium murale	Nettleleaf goosefoot	*Oxalis corniculata*	Woodsorrel
Conyza canariensis	Horseweed	*Paspalum dilatatum*	Dallis grass
Coronilla valentina	Coronilla	*Pinus halepensis*	Alepppo pine
Cyperus involucratus	Umbrella plant	*Plantago major*	Plantain
Digitaria sanguinalis	Hairy crabgrass	*Poa annua*	Bluegrass
Echium fastuosum	Pride of madeira	*Polygonum arenastrum*	Knotweed
Erodium botrys	Long-beaked filaree	*Senecio vulgaris*	Groundsel
Euphorbia lathyris	Gopher plant	*Silene gallica*	Common catchfly
Euphorbia peplus	Petty spurge	*Triticum aestivum*	Cultivated wheat
Filago gallica	Narrow-leaf filago	*Urtica urens*	Dwarf nettle
Fraxinus uhdei	Shamel ash	*Veronica anagallis-aquatica*	Water speedwell
Gazania species	Gazania	*Yucca species*	Spanish bayonet

APPENDIX D
2015 TARGETED EXOTIC REMOVAL PROGRAM FOR PLANTS (TERPP) PHOTOS

AA_EuTe_02

AC_ArDo_01 Post treatment

AC_CeAl_01

Control of ice plant encroaching on *Aphanisma*

AC_CoVa_01

AC_CoVa_02

AC_EuTe_01

AC_EuTe_03

AC_EuTe_04

AV_AcCy_01

AV_AcCy_01

AV_AcCy_01

AV_AcCy_01

AV_AcCy_01

AV_AcCy_01

AV_AcCy_01

AV_EuTe_01

AV_EuTe_02

AV_EuTe_04

AV_Palm_01

PB_EuTe_03

PB_EuTe_05

PB_EuTe_06

PB_EuTe_07

PB_EuTe_08

TS_EuTe_01

TS_EuTe_02

TS_EuTe_03

TS_EuTe_04

VB_CoSe_01

VB_CoSe_01

VB_CoSe_02 and VB_PeSe_01

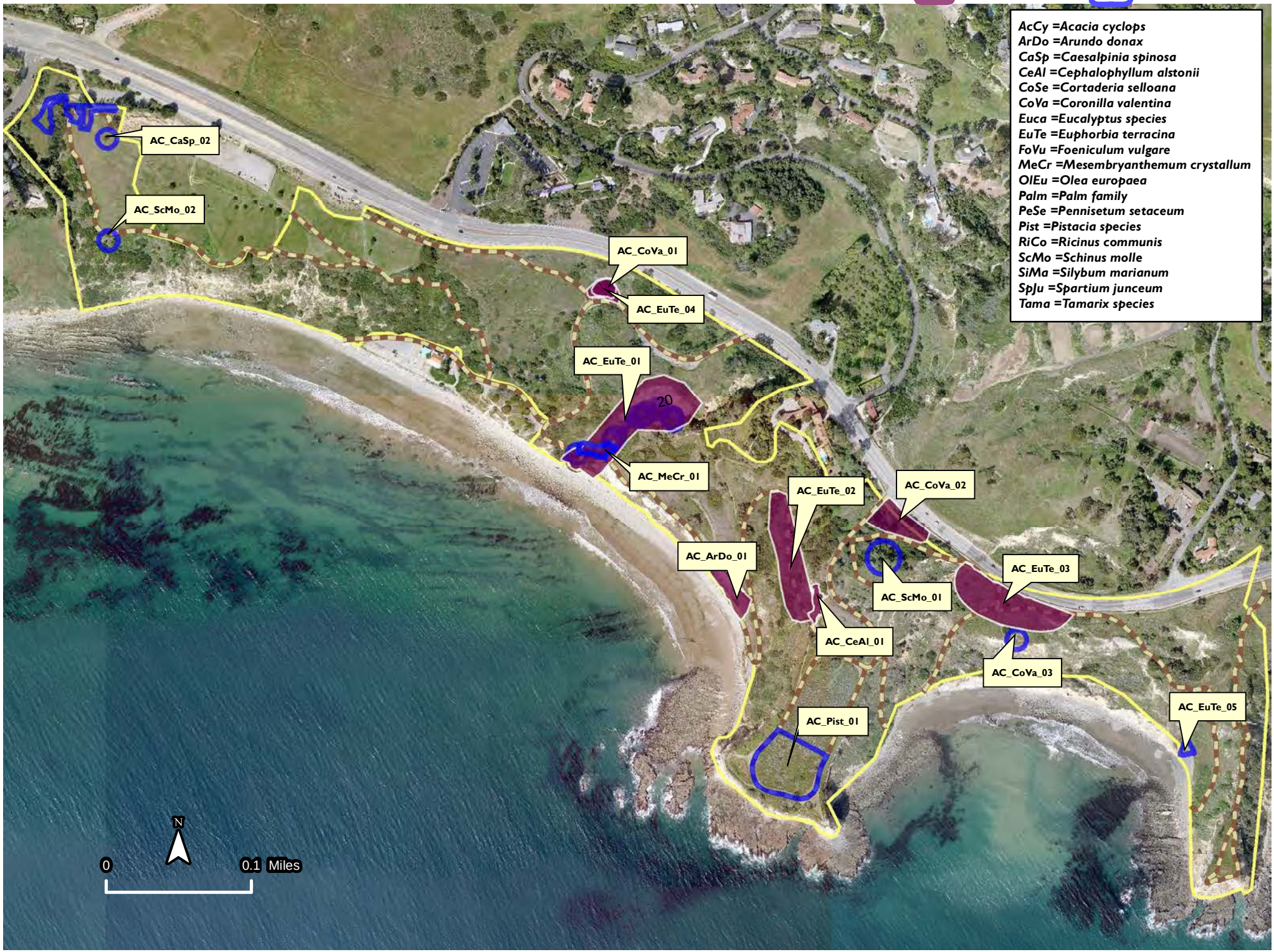
VB_EuTe_01

VB_EuTe_02

VB_EuTe_03

TERPP Sites: *ABALONE COVE*

2015 TERPP Former TERPP

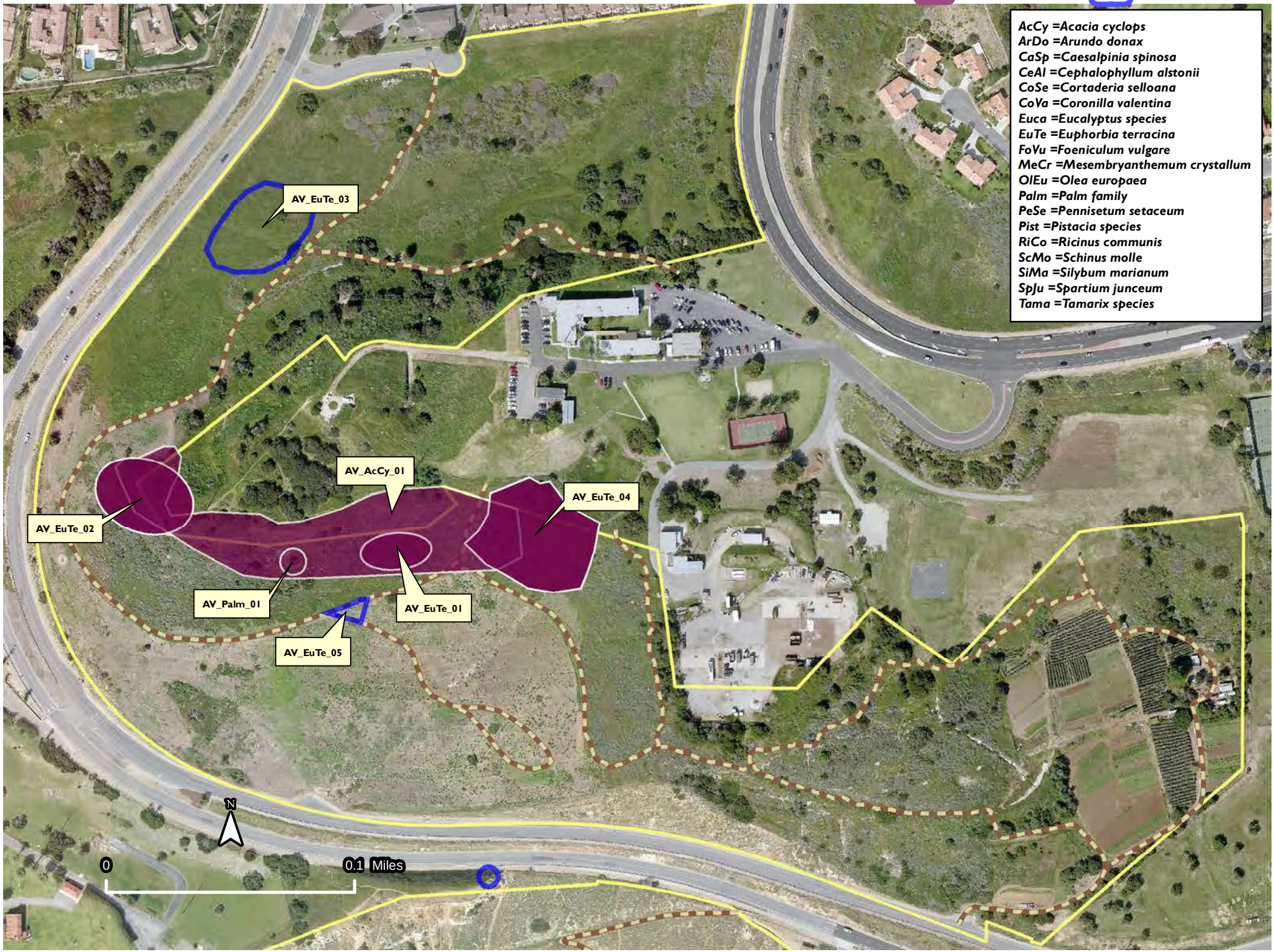


TERPP Sites: *AGUA AMARGA*

2015 TERPP Former TERPP

TERPP Sites: ***ALTA VICENTE***

2015 TERPP Former TERPP



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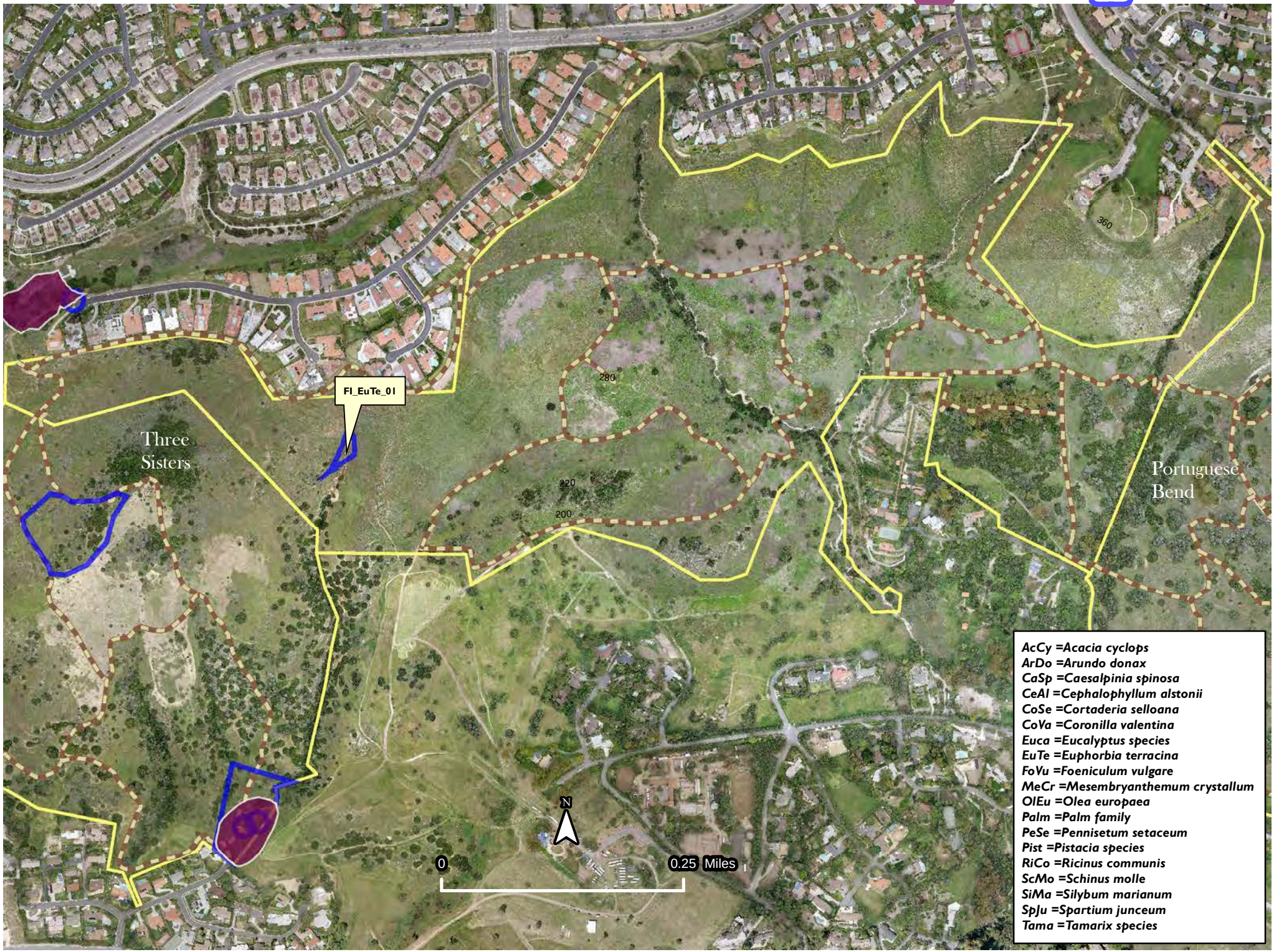
2015 TERPP Former TERPP



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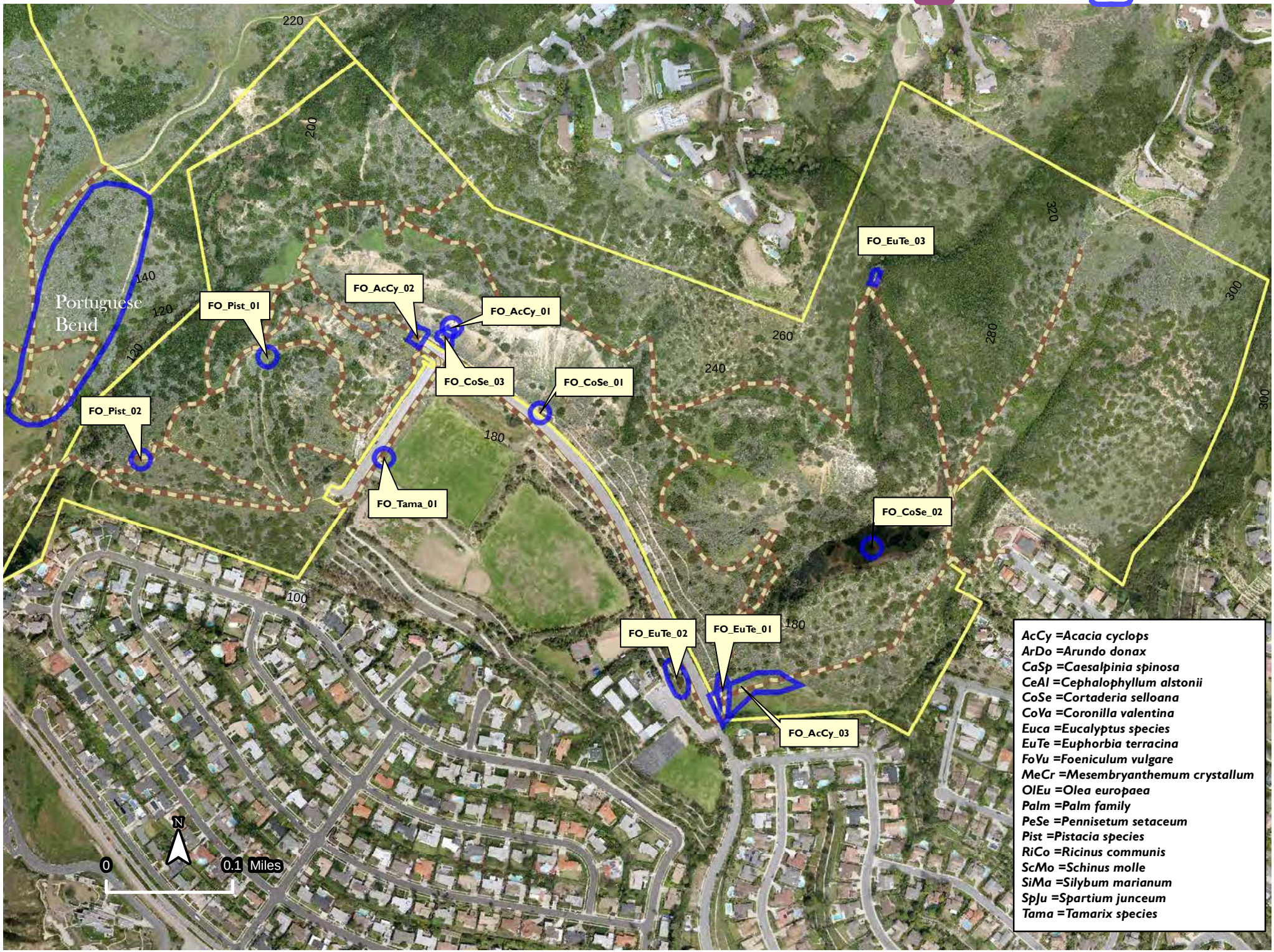
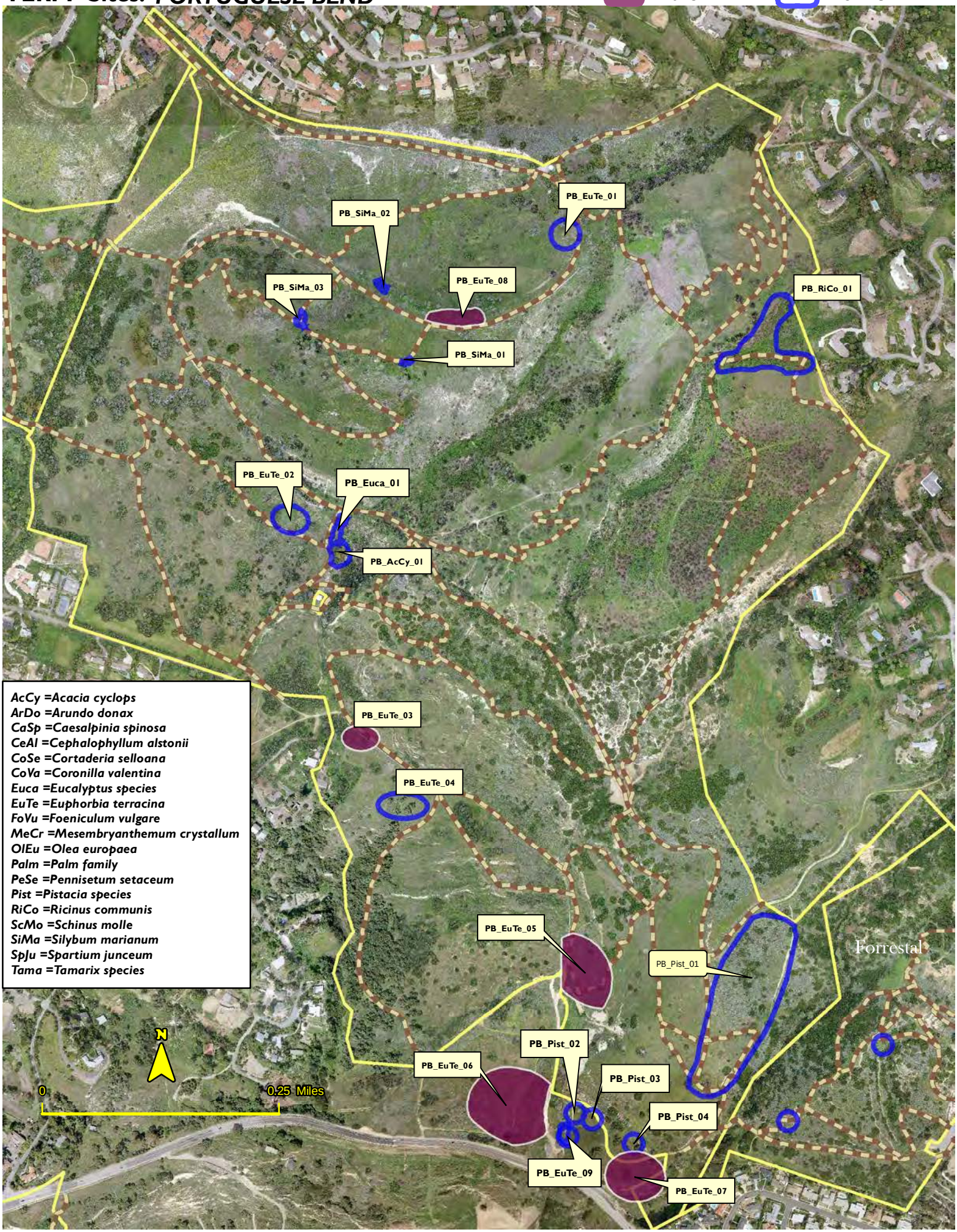


AcCy =Acacia cyclops
ArDo =Arundo donax
CaSp =Caesalpinia spinosa
CeAl =Cephalophyllum alstonii
CoSe =Cortaderia selloana
CoVa =Coronilla valentina
Euca =Eucalyptus species
EuTe =Euphorbia terracina
FoVu =Foeniculum vulgare
MeCr =Mesembryanthemum crystallum
OlEu =Olea europaea
Palm =Palm family
PeSe =Pennisetum setaceum
Pist =Pistacia species
RiCo =Ricinus communis
ScMo =Schinus molle
SiMa =Silybum marianum
SpJu =Spartium junceum
Tama =Tamarix species

TERPP Sites: *PORTUGUESE BEND*

2015 TERPP Former TERPP



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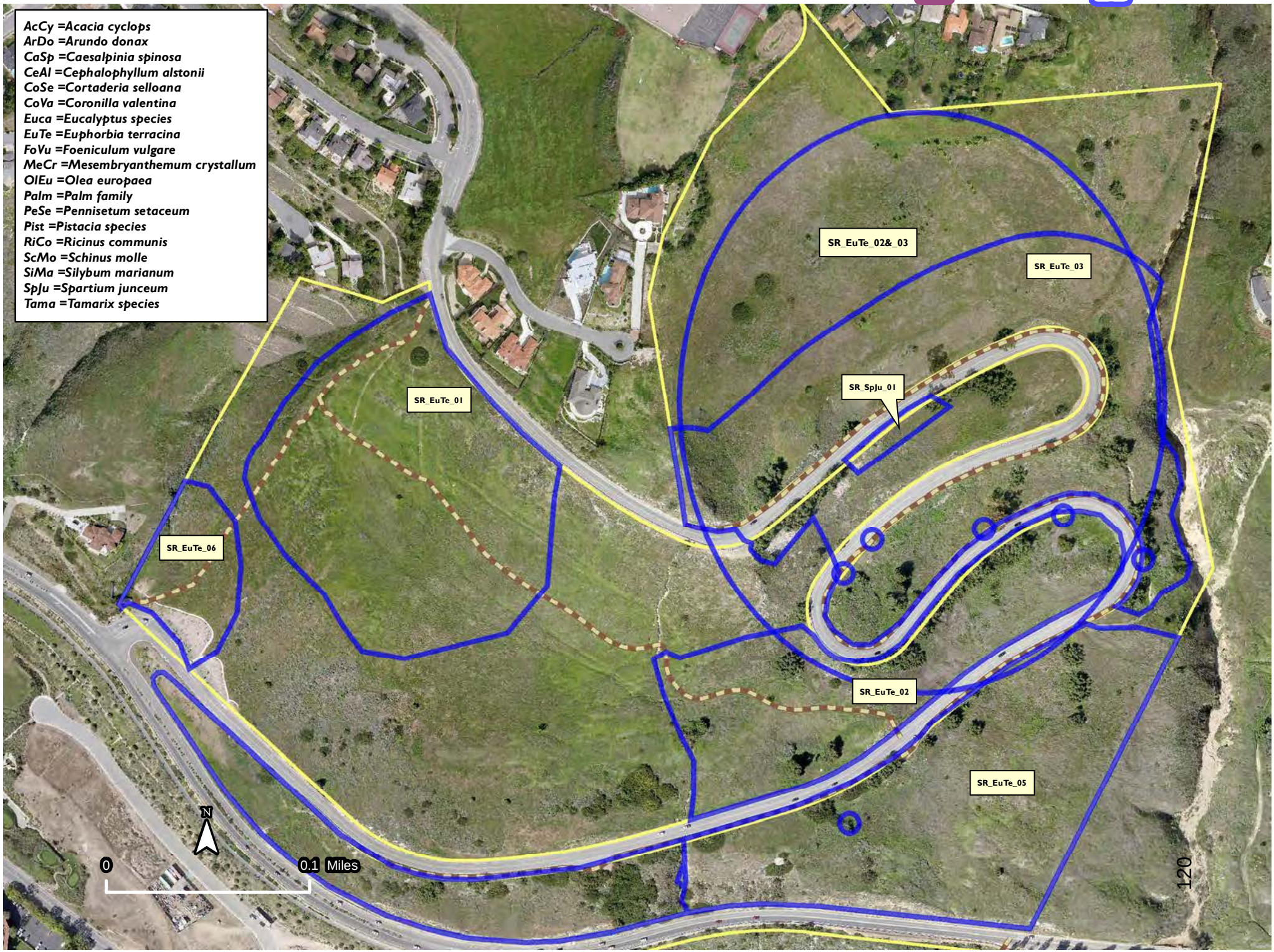
ScMo =Schinus molle
SiMa =Silybum marianum
SpJu =Spartium junceum
Tama =Tamarix species

TERPP Sites: *SAN RAMON*

2015 TERPP Former TERPP



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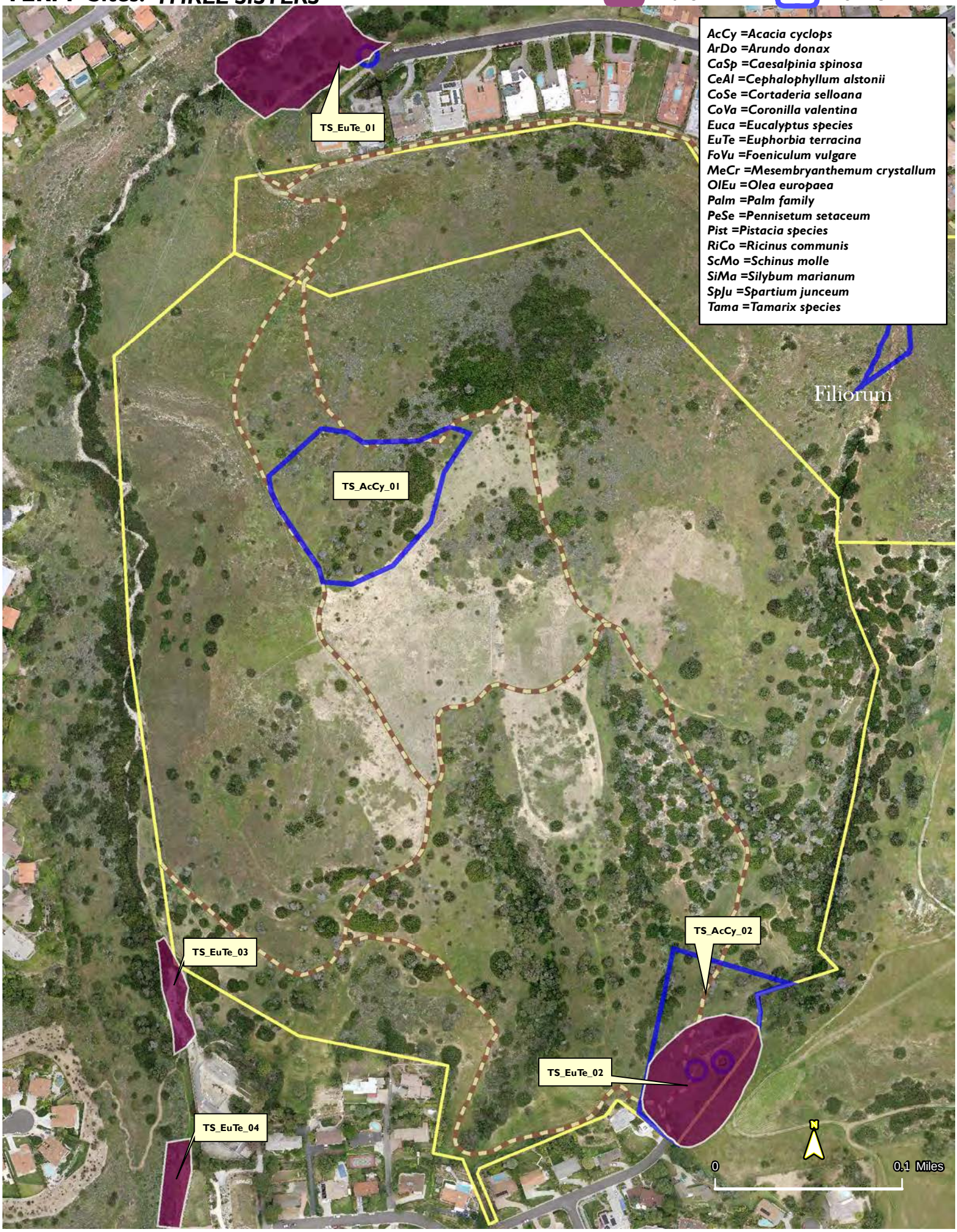
2015 TERPP Former TERPP



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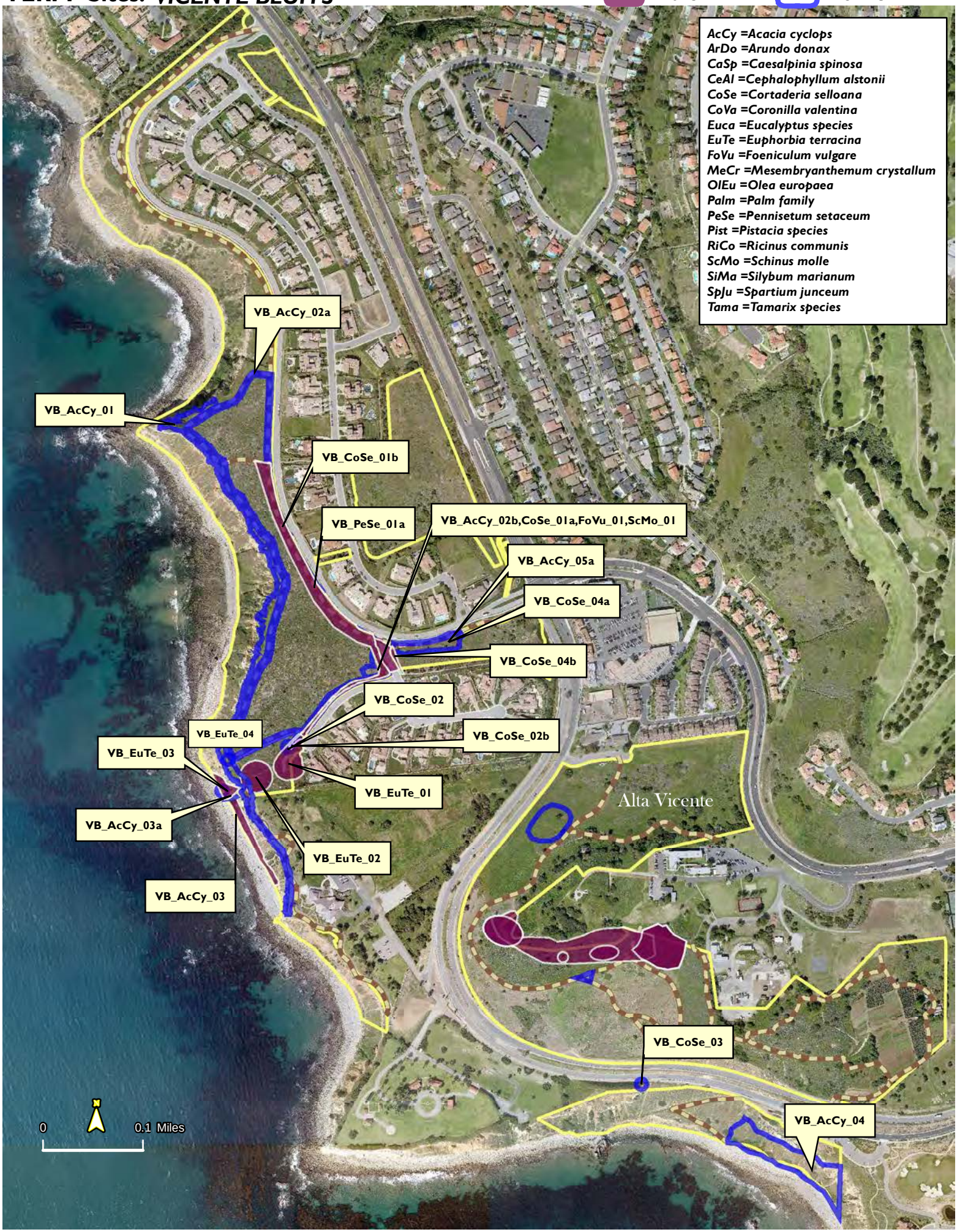


APPENDIX E

2015 RESEARCH PROGRAM

1.0 INTRODUCTION

The Conservancy uses multiple approaches for conducting research in the Palos Verdes Nature Preserve. Both high school and university students engage in research projects targeting specific questions regarding improving restoration techniques. High school students conduct their research to fulfill research requirements for school credit. University students may conduct research to enhance their experience base for future employment, but typically conduct their research as their master's project.

The Conservancy benefitted from scholarships through the Long Family Foundation Conservation Research Scholar program for the purposes of promoting inspire young individuals to contribute to environmental conservation through scholarly research related to the priorities of the Conservancy. The recipients conducted research projects directed by the Conservancy and leveraged for their graduate programs.

University professors are crucial for the success of research, because they provide expertise and technical guidance, including managing several research projects. Land Conservancy staff provides access to the preserves as well as technical support to participants. Over 30 scientists participate in PVPLC's Science Advisory Panel which supports the research by providing their expertise as needed for research projects on the preserves. The Science Advisory Panel meets annually to offer feedback on restoration projects and covered plant and animal questions in the Preserve.

This report covers the Research and Education Program's activities via the major categories:

- High School Research
- University Research, and
- Citizen Science Researchers.

2.0 HIGH SCHOOL RESEARCH

A total of four high school students conducted research in the preserves during the 2014-05 academic year (Table 1). Dustin Hartuv compared the response of birds to habitat quality with his results indicating bird presence was related to the quality of the available habitat. Stephanie Yong culminated a two-year project investigating the effectiveness of a soil additive TerraSorb on the viability of the plants (Figure 1). This was a highly informative project, for their results showed that the additive promoted canopy growth but root development was limited in the soil proximal to the location of the additive. Maddi Westergaard and Sarina Liu conducted a quantitative survey of trail users at the Portuguese Bend Reserve to investigate the difference in users between non-holiday weekends and normal weekends.

Table 1. High school research projects for years in 2014-2015.

Student	Project
Dustin Hartuv Palos Verdes High School	Correlation between habitat quality, abundance and diversity of California birds in coastal sage scrub
Maddi Westergaard and Sarina Liu Peninsula HighSchool	Differences in impacts on PVPLC trails by users during holiday weekends versus non-holiday weekends
Stephanie Yong Peninsula High School	Observing the effects of TerraSorb on *Astragalus trichopodus* Year II

Conservancy students often win top honors in science fairs and are able to leverage their experience for gaining entrance into top universities. An excellent example is Stephanie Yong, who placed first in Botany at the Palos Verdes Science Fair, and participated in the Los Angeles County Science Fair. Stephanie also received an Association of Women Geoscientists Award and Dustin Hartuv received an award from the Department of the Air Force.

Figure 1. Stephanie Yong measuring canopy height during her 2-year experiment studying the effects of the soil amendment TerraSorb at a restoration site.

3.0 UNIVERSITY STUDENTS

College students from local universities often participate in research under the umbrella of the Conservancy's Intern program, while others conduct independent research for advanced degrees. During 2015, two of the Conservancy's staff conducted research for their masters degrees. During this reporting period, university participation in research included:

- Juan Julian Baraja and Alex Lepicier, California State University Dominguez Hills, participated in the Citizen Science Wildlife Tracking for 2014-15 and worked as Conservancy Interns in 2015. They assessed the wildlife tracking data, investigating the influence on coyotes that reside within the urban-wildland interface has on their prey. They presented their poster at the Southern California Academy of Sciences 2015 Annual Meeting where they received Honorable Mention and shared a $250 cash award for their work.

- Holly Scheifelbein, California State University Long Beach, investigated the influence of skunk scent on predators' approach and consumption prey. She conducted her field work using bait models dosed with and without skunk oil in several areas within the Portuguese Bend Reserve during the 2015 year.

- Siegrun Storer, California State University Long Beach and the Conservancy's Education Director. Siegrun researched the community's perceptions on the local environment at the White Point Nature Preserve, finding that both casual and regular visitors to the preserve have an appreciation for the native landscape as well as an understanding of the local ecosystem and carries value for their health and well being.

- Neil Ullman, California State University Dominguez Hills and a Conservancy Naturalist. Neil initiated his research in 2015 where he is studying the biological soil crust, which is bryophytes that inhabit the soil crust between shrubs and around the bases of shrubs. His work is being conducted at the Forrestal, Portuguese Bend, and Three Sisters Reserves.

4.0 CITIZEN SCIENCE RESEARCH

The Conservancy developed two Citizen Science programs to enable volunteers to help the Conservancy conduct long-term research in the preserves along with shorter term programs. These programs are designed to answer question about the wildlife within the Preserve that the Conservancy needs. Currently the Conservancy is running two Citizen Science programs: Wildlife Tracking and Cactus Wren Monitoring.

- Wildlife Tracking Citizen Science - Volunteers participate from October through March to track coyotes, gray fox, and red fox. The volunteers hike throughout the Preserve to

collect data on where the animals are observed and what they prey on. These data are summarized and assessed for the Conservancy's Comprehensive Reports. Often university students participate in the program, such as Juan Julian Baraja and Alex Lepicier (see Section 3.0 University Students above).

- Cactus Wren Citizen Science – Volunteers monitored cactus wrens in the Alta Vicente and Three Sisters Reserves to investigate how the wrens used their habitat (Figures 2 and 3). The resulting data informs the Conservancy on how to improve their restoration efforts for this special status bird. The 2015 results revealed two pairs successfully fledged their chicks and that they moved around the habitat, rarely venturing outside the habitat. The wrens spent 92% of their time hidden within the cactus habitat, generally only visible when taking short flights from one place to another within the habitat (2.4% of the time). High school student Dustin Hartuv conducted the surveys in the Three Sisters Reserve for his high school research project (see Section 2.0 High School Students above). Additionally, two-year participant Evi Meyer wrote a book about a 2014 pair, accompanied with her exquisite photographs, that was published by the Conservancy with the title "A Bravo for Charlie".

Figure 2. Citizen Science 2015 Wildlife Tracking team learning how to recognize coyote and fox scat and identify the prey items.

Figure 3. Citizen Science 2015 Cactus Wren Monitoring team practicing their bird watching skills in prep for the 2015 season.

APPENDIX F

VOLUNTEER PROGRAMS

1 INTRODUCTION AND SUMMARY

1.1 Volunteer Programs

This Annual Report describes the components included within the larger Volunteer Program that serviced the Palos Verdes Nature Preserve. Specific activities are detailed for the reporting period January 1, 2015 to December 31, 2015. The PVPLC continues to work to implement grants geared toward improving this program.

Since 1988, volunteers have played an essential role in fulfilling the Palos Verdes Peninsula Land Conservancy's (PVPLC) mission to preserve land and restore habitat for the education and enjoyment of all. PVPLC is a non-profit organization that relies heavily on the support of community involvement to perform many of the tasks necessary to manage the Nature Preserves. Volunteers donate thousands of hours each year to help with office assistance, event planning, community education, habitat restoration, trail maintenance, and much more. This report divides the various volunteer programs into two categories: Community Involvement Volunteers and Stewardship Volunteers.

The first category, Community Involvement Volunteers, supports volunteer activities that focus on friend making, fundraising, and recommendations to staff on a variety of topics. This category is further divided into four sections which are detailed within the report:

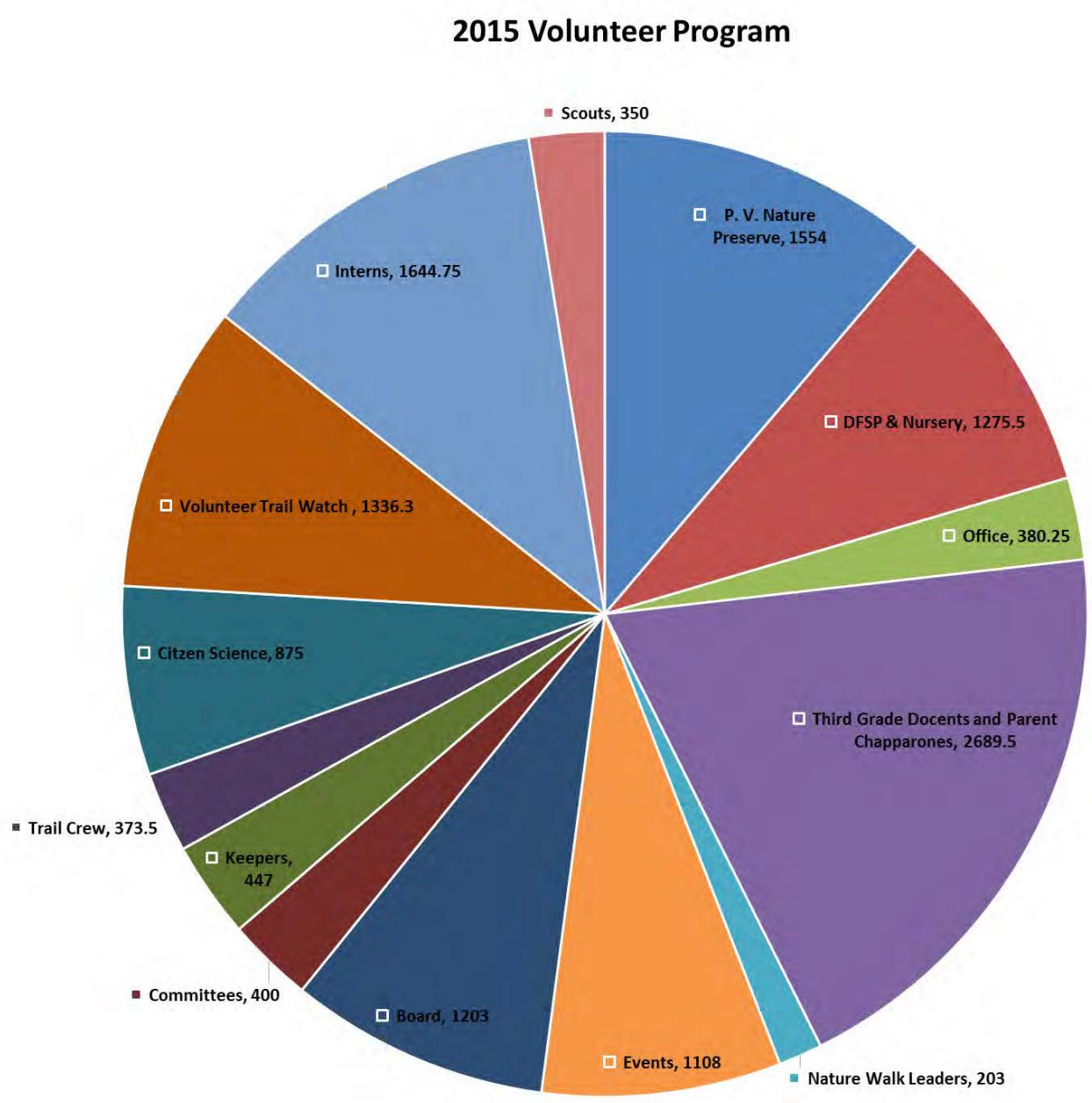
- Board of Directors
- Committees and Advisory Boards
- Special Events and Office Assistance
- Education Docents and Nature Walk Leaders
- Interns

The second category, Stewardship Volunteers, supports activities that are performed on the land to assist with habitat management of the Preserve. In all, there are six elements within this category that are described in more detail in the Stewardship Volunteer section of this report. The backbone of the program is our regularly scheduled Saturday Outdoor Volunteer Days that are open to participation by all and require no long-term commitment. Periodically, there are also individuals or groups that complete stewardship projects outside of the normally scheduled outdoor events. Boy Scouts and Girls Scouts interested in obtaining their final awards are two such groups. There are also several Stewardship Volunteer opportunities that require long term commitments. The six programs are listed below:

- Outdoor Volunteer Days
- Team Leaders
- Scout Projects
- Trail Crew
- Keeping an Extra Eye on the Preserve for Environmental Review and Stewardship (KEEPERS)
- Volunteer Trail Watch
- Citizen Science

In 2015, volunteers provided a grand total of 13,839.8 hours of service (Figure 1) to support conservation, restoration and management of the Palos Verdes Nature Preserve. According to the Independent Sector, volunteer time in California is valued at $26.87 per hour (based on Dollar Value

of a Volunteer Hour, by State: 2014, Independent Sector), thus generating a total of $371,875.43 of in- kind services. The amount of volunteer hours donated at each Nature Preserve or for a specific volunteer category depends on the size of property or specific projects that transpired during the reporting period.



2 COMMUNITY INVOLVEMENT

2.1 Board of Directors

PVPLC is driven and supported by a fifteen-member volunteer board, which meets on a regular basis to strategize and direct the organization's mission. This year, the board contributed about 1203 hours in serving the Land Conservancy's mission.

2.2 Committees and Advisory Boards

The PVPLC maintains numerous committees and advisory boards for the following purposes:

- To provide review and recommendations regarding organizational plans and policies
- To provide assistance with the operations of the organization
- To provide community input for PVPLC activities
- To provide a training and evaluation ground for potential members of the Board of Directors

Committee volunteers donated a total of 300 hours, with many committees meeting on a quarterly basis. Hours for committee-involved board members are compiled with their board volunteer time. The committees that were active during the reporting period are listed below:

- Audit Committee
- Finance Committee
- Development Committee
- Investment Committee
- Science Advisory Panel
- Special Events Committee(s)

2.3 Special Events and Office Assistance Volunteers

The PVPLC relies on individual volunteers and community groups, such as the National Charity League (NCL), Los Hermanos, and Assisteens, to assist PVPLC staff with all major fundraising and friend-raising events. We have built very strong and fulfilling relationships with these groups and strive to provide an environment that lets volunteers know they are indispensable and an integral part of our organization.

Special events supported by committees and volunteers this year included the Trump Wine Festival, Palos Verdes Pastoral and the Abalone Cove Grand Reopening Event.

In the office, volunteers handle routine tasks such as labeling newsletters, stuffing envelopes, assembling event materials, planning and preparation for special events, and much more. During the 2014 reporting year, office volunteers and special event volunteers, donated 1108 hours of assistance.

2.4 Nature Walks

Nature Walk Leaders donated a total of 203 hours in 2015. Former PVPLC Board of Directors member Anke Raue coordinates this group of dedicated volunteers and each prospective walk leader must have a high level of knowledge the local ecosystem, particularly the native and non-native plants found on the Peninsula. Leaders must go through extensive training and be willing to research and learn about local history, geology, flora and fauna. Continued research and exploration serves to add to a walk leader's knowledge base, preparing them to give accurate and in-depth presentations to the public.

Walks are held all over the Peninsula, from the edge of the coast to deep within the canyons. Each leader designs his or her presentation to include special attributes and stories particular to a site. Nature walks occur once a month every month throughout the year, featuring a different location every time.

2.5 Internships

Interns dedicate much of their volunteer time to helping the Land Conservancy's mission to educate

and restore. In 2015, 20 interns dedicated a total of 1336.75 hours to various projects such as educational outreach, field trips, weed mapping, native plant propagation, wildlife monitoring and much more.

3 STEWARDSHIP VOLUNTEERS

Volunteers play an integral part in helping PVPLC staff exceed our goals for restoring land in the Preserve. Outdoor volunteer days provide an opportunity for public volunteers to contribute to habitat and trail restoration efforts. Team Leaders provide leadership on Saturday events, the Trail Crew class volunteers build skills to maintain the trail system, and KEEPERS help "keep an eye" on the Reserves on a monthly basis. The Volunteer Trail Watch, Adopt-a-Plot program, Citizen Science wildlife monitoring, scout projects, local HERO Club chapters and nursery volunteers are also Stewardship volunteers that support Conservancy conservation efforts within the Palos Verdes Nature Preserve, the native plant nursery and other management areas (PNVP and nursery are the only metrics outlined for this report).

Palos Verdes Nature Preserve Stewardship volunteer highlights in 2015:

- 7,856.05 hours of outdoor stewardship volunteer time
- Grant from REI Inc. to support volunteer programs, youth engagement, and restoration initiatives

3.1 Outdoor Volunteer Days

The PVPLC holds outdoor volunteer days nearly every Saturday of the year, held from 9am-12pm, excluding holiday weekends and during the month of August. The focus of these events is to restore native habitat, maintain the trail system, and do general clean-ups. All age groups are encouraged to participate though the common demographic of half of the participants are volunteers under 18 years of age. There is a particular focus on getting young people involved as a mechanism to ensure education and stewardship on the Preserves in perpetuity. We work with local schools and colleges to have teachers bring groups of students or give incentives such as extra credit and service-learning hours for students who participate on the Saturday volunteer events. Also included in this summary are events catered for special groups and corporations. Rapid Response is a new Outdoor Volunteer Opportunity held almost every Friday and Saturday from 9am to 12pm. During these events volunteers are invited to work alongside staff closing spur trails.

A detailed account of volunteer days and group events are listed below. Events are listed chronologically by Preserve with the Palos Verdes Nature Preserve (PVNP) further separated by Reserve.

3.1.1 Palos Verdes Nature Preserve (PVNP)

<u>Abalone Cove Reserve</u>

Date	Activity
11-Jul	Rapid Response
19-Sept	Coastal Clean-Up Day
2-Oct	Salvation Army volunteers helped to close spur trails
3-Oct	Rapid Response

16-Oct	Rapid Response
17-Oct	Rapid Response
23-Oct	Rapid Response
30-Oct	Rapid Response

Agua Amarga Reserve

Date	Activity
10-Jan	Planted 50 mulefat and willow and removed trash
21-Feb	removed mustard from restoration area and adjacent trail corridor
28-Mar	removed mustard from restoration area, watered plants, and lower trail corridor
21-Nov	planted 125 shrubs and watered them

Alta Vicente Reserve

Date	Activity
29-Nov	Volunteers removed invasive weeds

Portuguese Bend Reserve

Date	Activity
8-May	Salvation Army volunteers planted 800 shrubs in NCCP area
18-Jul	Rapid Response
28-Jul	REI volunteers planted Palos Verdes Blue Butterfly host plants
1-Aug	Rapid Response
8-Aug	Rapid Response
21-Aug	Rapid Response
22-Aug	Rapid Response
29-Aug	Rapid Response
17-Oct	Volunteers removed weeds in NCCP area
24-Oct	Rapid Response
20-Nov	Rapid Response
21-Nov	Rapid Response
11-Dec	Rapid Response
12-Dec	Volunteers planted 80 shrubs in phase 5

Filiorum Reserve

Date	Activity
14-Nov	Rapid Response

Forrestal Reserve

Date	Activity
4-Sept	Rapid Response
11-Sept	Rapid Response
12-Sept	Rapid Response
18-Sept	Rapid Response
19-Sept	Rapid Response
13-Nov	Rapid Response

3.1.2 Native Plant Nursery/DFSP

Activities in the Native Plant Nursery include transplanting seedlings from flats into individual containers, removing weeds from the containers. On occasion, groups and scouts help maintain the shade structure, build plant benches and repair the weed barrier cloth. Volunteers help at the nursery on select Saturday events as well as during the week throughout the year. A total of 1275.5 volunteer hours were contributed to nursery efforts in 2015.

3.2 Team Leader Program

The Team Leader program was started in 2007 in response to the growing number of volunteers that were attending the Outdoor Volunteer Days. Team Leaders are volunteers, sixteen years or older, who assist in supervising the Saturday outdoor volunteer activities. They ensure that volunteers have adequate instruction and the tools necessary to complete the task. They also assist in educating the public about the PVPLC.

The program requires that interested volunteers go through an application and interview process. Candidates then attend a half-day weekend workshop where they learn the skills necessary to motivate and supervise volunteers during Saturday Outdoor Volunteer Days. Training involves practicing leadership skills and communicating restoration techniques. Team Leaders commit to working at least four volunteer days within one season or half-year. The goal of the PVPLC is to hold two Team Leader workshops each year and train a minimum of six new Team Leaders at each one. In 2015, two workshops were held which trained 33 leaders at White Point Preserve on August 29th and September 12th.

The Team Leader Program has helped develop leadership skills in participants and has greatly contributed to the success of our Outdoor Volunteer Days. The quality of work from regular volunteers has increased with the guidance of Team Leaders. In addition to adult participants, many of the Team Leaders attend local high schools and universities. During the reporting period, the program has allowed these students to build leadership skills that they will find useful in their future.

3.3 Scout Projects

The PVPLC encourages Boy Scouts and Girl Scouts who are looking for projects to complete their final awards, Eagle Awards for Boy Scouts and Gold Awards for Girl Scouts, by providing them with opportunities to complete their projects on preserves the PVPLC manages. This collaboration is beneficial to the scout groups, the PVPLC, and the public that uses the preserves. Scouts work under the mentorship of one of the PVPLC staff to complete their projects and are steered toward objectives that meet the PVPLC stewardship goals. In 2015, scout projects accumulated 350 hours of volunteer service.

3.4 Trail Crew Program

In 2015, the volunteer Trail Crew contributed a total of 373.5 hours to maintaining the Preserve's trail system. These hours include the second-Saturday monthly class trainings as described below, as well as additional trail work, such as weed whacking or spur trail closures, executed by Trail Crew members outside of the classes. This year, Leadership Training was offered for graduates and dedicated Trail Crew members through two workshops to help prepare volunteers to initiate additional trail projects with smaller teams outside of the monthly Trail Crew

The Volunteer Trail Crew class offered is based on the Basic Trail Maintenance class developed by Frank Padilla, Jr. (retired California State Parks Supervisor), and Kurt Loheit. Originally started in 1992, the class focused on both volunteer and agency skill building. Adopted by the Los Angeles District of California State Parks and later the Southern California Trails Coalition, it became the first step in advanced classes for crew leader training and design and construction classes, allowing a structured path for participants to build skills associated with trails from basic maintenance to highly advanced techniques. The class is a combination of classroom and hands-on training to familiarize the participants in all aspects of trail maintenance. The course emphasizes safety, assessments, basic maintenance skills, water control, erosion sources, terminology, proper tool use, basic survey skills, resource considerations, and user experience and maintenance value. Volunteers who demonstrate proficiency in each learned skill and fulfill a yearly indoctrination will maintain status as a qualified Trail Crew member.

Participants must be at least 18 years old and must first take the introductory course. The 50-hour course can be taken at the participant's own pace and it is estimated to take about a year to complete. There are scheduled Trail Crew Skills Classes that coordinate with the trail instructor's availability and the PVPLC Outdoor Volunteer Workday schedule.

Table 1. Trail Crew training classes

Date	# Volunteer Hours	Location	Project/Skill Learned
January 10	33	Portuguese Bend	Rim Trail spur closure
January 17	33	Portuguese Bend	Rim Trail spur closure
February 14	36	Forrestal	Flying Mane overlook and Pirate Trail grade dip
April 11	42	Alta Vicente	North Spur Trail rock stairs
May 9	24.5	Abalone Cove	Cave Trail rock stairs
July 11	36	Abalone Cove	Sea Dahlia stairs repairs
August 8	21	PVPLC Office	Introductory Class
August 12	20	Forrestal	Repaired five grade dips on the Pirate trail
Sept 10	10	Forrestal	Repaired four check dams on the Pirate trail
November 14	32	Filiorum	Vanderlip Canyon and Zotes Cutacross Trail
November 21	16	Three Sisters	Assist scout troop - The Sunshine trail links the Three Sisters trail and the Barkentine Trail across
December 12	27	Three Sisters	Sunshine Trail switchbacks

3.5 Keeping an Extra Eye on the Preserves Stewardship (KEEPERS) Program

In 2015, The KEEPERS program contributed 447 hours to monitoring the Preserve. The program was developed in April of 2007 to help monitor the nearly 1600 acres of land that is managed by the PVPLC. Keepers are volunteers who monitor an area within a preserve and fill out monthly property review forms. These forms are reviewed by staff and consolidated into a monthly report that is sent to all of the current Keepers.

The property review form is a one page form that requires some knowledge of basic trail maintenance and plant identification. The skills needed to fill out these forms are provided in a training session with a PVPLC staff person and are continually developed with an ongoing relationship between the volunteer, the PVPLC staff, and regular visits to the preserve being monitored. This volunteer opportunity is a one year commitment (a total of 12 visits) to the chosen preserve area. Some of the properties managed by the PVPLC are large enough to require more than one Keeper to monitor them. The person or group that accepts this responsibility also helps, if necessary, to train the following year's replacement volunteer Keeper. Currently, there is no term limit.

3.6 Volunteer Trail Watch Program

The Volunteer Trail Watch Program was initiated in 2013 to help educated trail users about appropriate trail use and monitor preserve misuse. Volunteers dedicated 1336.3 hours to the program through training and field implementation activities, and reporting observations through the web portal for record keeping. A large portion of this year's hours was contributed by Barbara Ailor and Eva Cicoria, the Volunteer Trail Watch coordinators, who dedicated much of their time to training and coordinating the program's volunteers in addition to their time as VTW volunteers on the trails.

3.7 Citizen Science

Volunteers help the PVPLC monitor wildlife on the Preserve in order to document populations and their response to restoration efforts. Citizen Science volunteers contributed 875 hours to documenting the behavior of cactus wrens and the evidence of mammalian populations like coyotes

and foxes through tracking efforts.

4 GRANTS SUPPORTING VOLUNTEER ENGAGEMENT

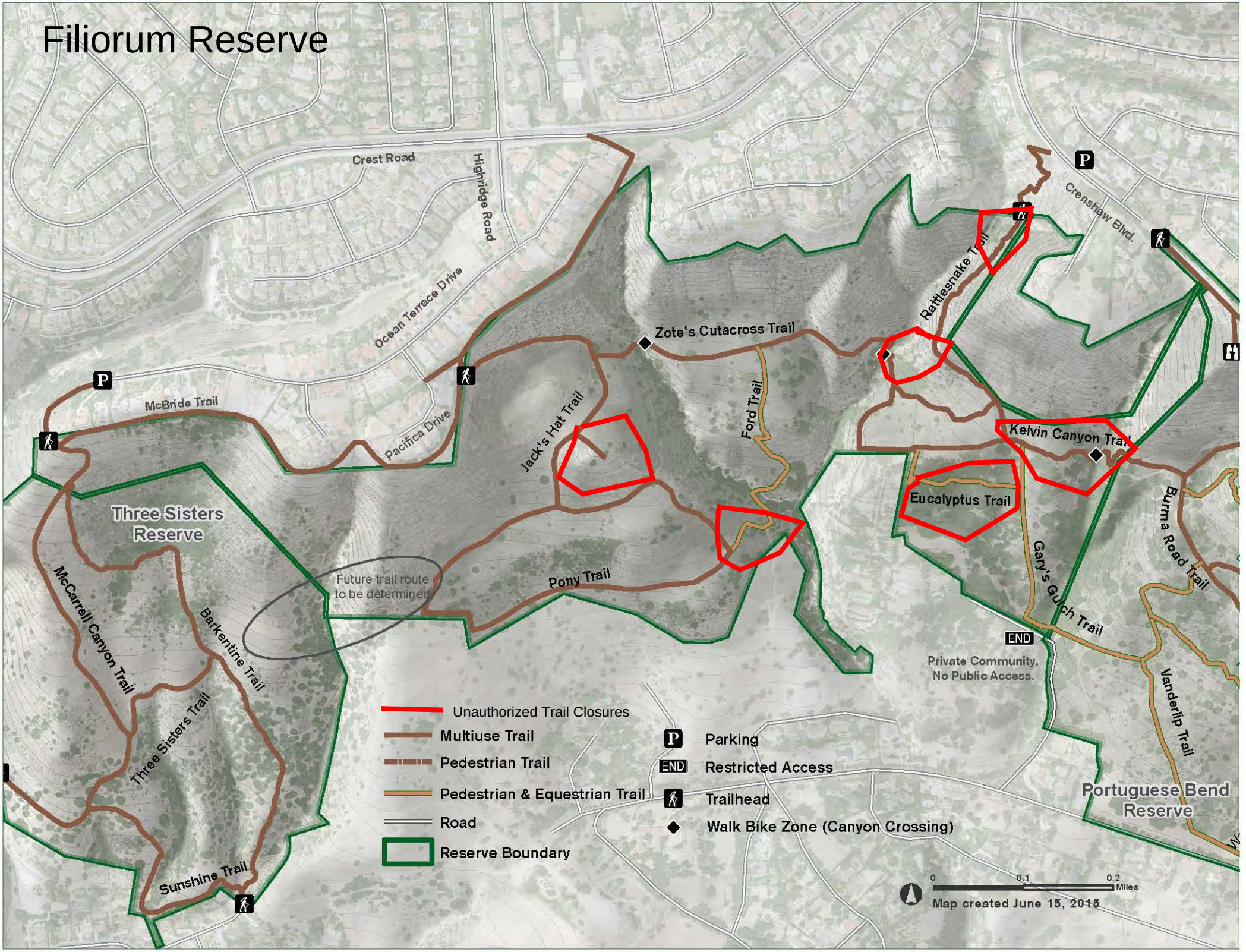
In 2015 the Conservancy received a grant from REI for $10,000 to help with volunteer efforts to build trails and restore habitat.

APPENDIX G

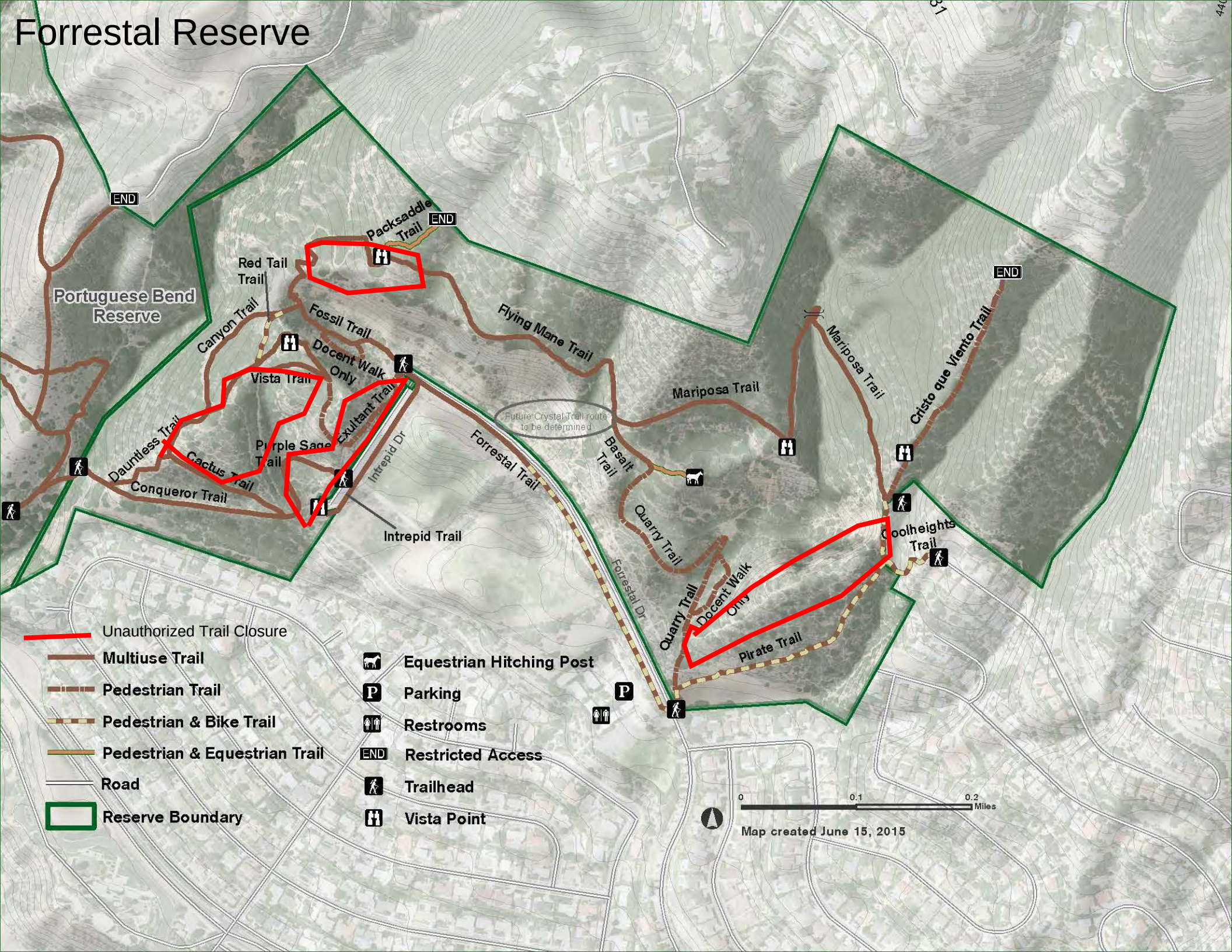
UNAUTHORIZED TRAIL CLOSURES

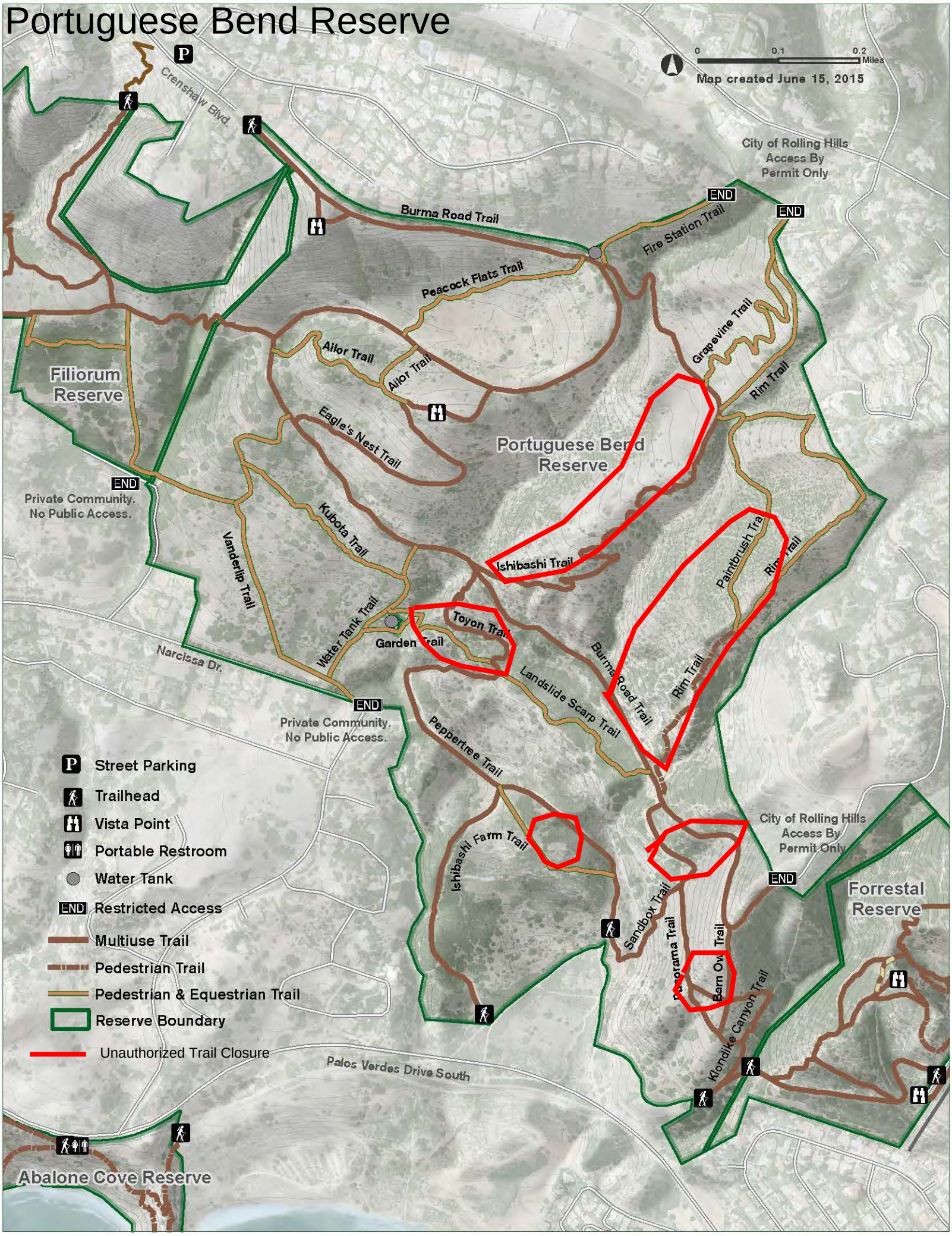
Abalone Cove

Filiorum Reserve



Forrestal Reserve




Portuguese Bend Reserve
0
0.1
0.2
Miles
Map created June 15, 2015
Crenshaw Blvd.
City of Rolling Hills
Access By
Permit Only
Burma Road Trail
Fire Station Trail
END
Peacock Flats Trail
Grapevine Trail
Rim Trail
Ailor Trail
Ailor Trail
Filiorum
Reserve
Eagle's Nest Trail
Portuguese Bend
Reserve
END
Private Community.
No Public Access.
Kubota Trail
Vanderlip Trail
Ishibashi Trail
Paintbrush Tra
Rim Trail
Water Tank Trail
Toyon Trail
Garden Trail
Narcissa Dr.
Burma Road Trail
Landslide Scarp Trail
Rim Trail
END
Private Community.
No Public Access.
Peppertree Trail
Street Parking
Trailhead
Vista Point
Portable Restroom
Water Tank
Restricted Access
Multiuse Trail
Pedestrian Trail
Pedestrian & Equestrian Trail
Reserve Boundary
Unauthorized Trail Closure
Ishibashi Farm Trail
City of Rolling Hills
Access By
Permit Only
END
Forrestal
Reserve
Sandbox Trail
Panorama Trail
Barn Owl Trail
Klondike Canyon Trail
Palos Verdes Drive South
Abalone Cove Reserve

Trail Safety and Resource Protection

Protect the Nature Preserve.

You are enjoying a Nature Preserve with delicate habitat and wildlife. Tread lightly and help protect nature.

Stay on designated trails.

Check out the trail map for the reserve you are visiting. Only use trails marked with signs or listed on the map.

Using unauthorized paths and short-cuts damages sensitive plants, erodes soil, compacts soil, fragments wildlife habitat and sets a bad example for others.

Protect habitat by staying within the trail margin, even when stopped.

Travel single file on narrow trails.

Don't use wet trails.

If you are leaving deep prints (hoof, tire, or boot), the trail is too wet to use. Going off trail or "skirting" trails widens existing trails and impacts habitat.

Respect.

It's a simple concept: if you offer respect, you are more likely to receive it. Education with friendly respect will diminish negative encounters on the trail for all.

Don't block trail.

When taking a break, move to the side of the trail (but not off the trail).

What does "yield" mean?

1. Yielding means slow down, establish communication, be prepared to stop if necessary, and pass in a safe and friendly manner.
2. Allow faster users to pass when safe, and complete all passes within the existing trail bed.

Thank you for helping us protect the Palos Verdes Nature Preserve. We hope you have a great experience on the trails!

Contacts:

MRCA Ranger Hotline
Report Preserve violations
310-491-5775

Lomita Sheriff Station
Report crime and matters of public safety
310-539-1661

City of Rancho Palos Verdes
Preserve information, maps, interpretive programming.
310-544-5260
www.rpv.com parks@rpv.com

Palos Verdes Peninsula Land Conservancy
Detailed Maps
Volunteer Opportunities,
Citizen Science Projects.
310-541-7613
www.pvplc.org info@pvplc.org

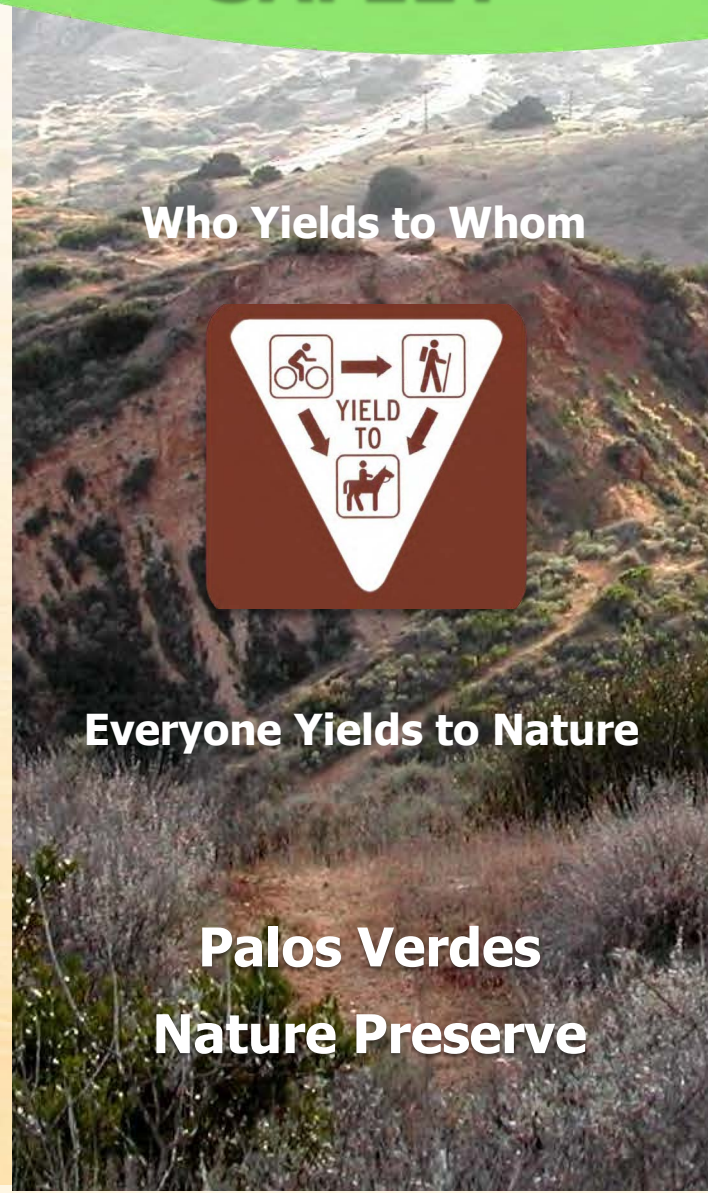
Palos Verdes Nature Preserve

Abalone Cove Reserve
Agua Amarga Reserve
Alta Vicente Reserve
Filiorum Reserve
Forrestal Reserve
Ocean Trails Reserve
Portuguese Bend Reserve
San Ramon Reserve
Three Sisters Reserve
Vicente Bluffs Reserve
Vista Del Norte Reserve

Consider sharing this brochure with a fellow trail user or recycling it by placing it back in the brochure rack at the end of your Preserve visit!

Hike Horse Bike

SHARING TRAILS SAFELY



YIELD TO HORSES & HIKERS

What can you expect?

Surprised trail users. Faster moving users can startle others, especially when approaching from behind. Don't assume others will anticipate your approach and will be able to move out of the way. Always ride slow enough to be under control. Anticipate users around blind corners, and be friendly and communicative.

What is your responsibility?

Mountain bikers yield to hikers and horses. Manage your bicycle safely and responsibly. Habitat can be damaged if bikes go too fast or go off the trail.

Passing Hikers:

1. Try not to startle hikers.
2. Slow down to about the same speed as the hiker.
3. Ask in a friendly voice if it's okay to pass. Pass slowly and be prepared to stop if necessary.

Passing cyclists:

1. Generally, uphill cyclists have the right-of-way on narrow trails. Ask if it's okay to pass anyway.
2. Always be prepared to stop.

Passing horses (from the front and behind):

1. Horses can be easily spooked by quick movement or noises, especially from behind.
2. Stay at least 30 feet from the horse. Ask in a friendly voice if it's okay to pass.
3. Follow the equestrian's instructions. Stop on the downhill side of the trail if necessary.
4. Pass slowly and steadily, but only after the equestrian gives you the go-ahead. A friendly human voice can help calm a horse.

HIKERS & BIKERS YIELD TO HORSES

What can you expect?

Inexperienced trail users. While all trail users yield to horses, many users are intimidated by large horses, or they just don't know what to do.

What is your responsibility?

Manage your animals. Don't train green horses on high-traffic or shared-use trails. Familiarize horses with expected trail encounters (cyclists, dogs, backpack-wearing hikers, etc.).

Negotiate safe passes. Help protect people & habitat.

1. Greet users early.
2. Guide trail users to move to the downhill side of the trail.
3. Continue communication until the pass is complete.

Expect the unexpected. Small children and animals can be unpredictable or easily frightened by horses.

Rules For All Preserve Users

Dogs on leash: Keep your dog on a short leash when passing or being passed. Other trail users may be frightened by dogs.

Pass cautiously: Don't pass if too narrow. Don't pass by going off trail. Don't expect others to go off trail for you to pass. Use a wider trail segment even if you need to go backwards.

Communication: Talk to other Preserve users, especially when passing.

Don't Tune Out: If you wear headphones, keep the volume down or only wear one earpiece.

Single File: Hike, ride, or bike single file on narrow trails. This is safer and will limit trail widening and habitat impact.

YIELD TO HORSES

What can you expect?

Faster trail users. You can expect to see bikes & horses and other users on the trail. Although yield rules exist, be prepared to offer friendly communication to allow for safe passage to protect people and habitat.

What is your responsibility?

Share the trail. Make sure everyone in your group understands what actions to take when encountering horses, bikers, and other hikers.

Yield to horses.

1. It is important to understand that horses can be easily spooked by quick movement (including runners) or noises, especially from behind.
2. Stay on downhill side of trail. Spooked horses go uphill.
3. Greet the rider. Your voice establishes your humanity.
4. Ask how to proceed. If hiking with a child, hold their hand when passing.

Cactus Wren (Protected Species)

APPENDIX H

FUTURE TRAIL PROJECTS LIST

APPENDIX H. 2015 Trail Projects List

The following is a list of trail needs that may be implemented in 2015 based on priority and funding opportunities. This list is intended to outline potential projects including trail repairs, spur trail closures and signage improvements but may be amended. While all projects are important, a priority ranking system has been established to optimize implementation. Projects not completed will carry over to the following year and projects may be added to the list on an ongoing basis. In addition to the list below, smaller-scale projects may be accomplished by the Volunteer Trail Crew on an as-needed basis.

Reserve Name	Trail Name	Issues	Priority
Abalone Cove			
	Cave Trail	Trail erosion control	Medium
	Sacred Cove (West to beach)	Trail erosion	Low
	Olmstead Trail	Spur trail closures	Medium
Agua Amarga			
Alta Vicente			
	Prickly Pear Trail	Spur trail closures	Medium
Filiorum			
	Jack's Hat	Spur trail closure and signage replacement	Low
	Pony Trail	Trail reroute and spur closure	High
	Rattlesnake Trail	Spur trail closure	Medium
	Closures at York property	Signage replacement	Medium
	McBride Trail	Spur trail closures	Medium
	Trail connection	Develop trail connection to Three Sisters	High
Forrestal			
	Conqueror Trail	Trail erosion	Medium
	Crystal Trail	Trail delineation and signage	Medium
	Quarry Trail	Spur trail closure	Low
	Cool Overlook	Spur trail closure	Medium
	Dauntless Trail	Spur trail closure (upper section) and trail erosion (lower section)	Medium
	Mariposa Trail	Bridge replacement	Medium
	Vista Trail	Spur trail closure	Medium
	Exultant Trail	Spur trail closure	Low
	Cristo que Viento Trail	Spur trail closure	Medium
	Packsaddle Trail	Close	Medium
	Flying Mane Trail (west)	Spur trail closure	Medium

	Pirate Trail	Post and cable repair and trail erosion	Medium
Portuguese Bend			
	Sandbox Trail	Trail erosion	Medium
	Ishibashi Trail	Spur trail closure	Medium
	Barn Owl Trail	Trail erosion and spur trail closure	Medium
	Fire Station Trail	Maintain closure into private property; Signage (ongoing)	Low
	Toyon Trail	Restore widened trail to appropriate trail width	High
	Rim Trail (lower section)	Spur trail closure	High
	Panorama Trail	Spur trail closure	Low
	Paintbrush Trail	Spur trail closure	Medium – Ongoing
	Grapevine Trail	Spur trail closure	Low
San Ramon			
	Switchback trail	Install bridge over gully	Medium
	Marymount Trail	Repair erosion at upper trail head	Medium
Three Sisters			
	Sunshine Trail	Trail Delineation in fuel modification area	Medium
	Barkentine Trail	Spur trail closure	High
	Trail conntection	New trail creation to Filiorum Reserve	High
	McCarrell Canyon Trail	Trail erosion and spur trail closure	Medium – Ongoing
Vista del Norte			
	Indian peak loop trail	Trail delineation to connect to new development's trail easement	Medium

APPENDIX I

CURRENT TRAIL MAPS


Sea Cove Dr.
Palos Verdes Drive South
Via de Campo Trail
Abalone Cove Trail
Chapel View Trail
Beach School Trail
Sea Dahlia Trail
Olmsted Trail
Portuguese Point Loop Trail
Narcissa Dr.
Peppertree Dr.
Smuggler's Trail
Sacred Cove View Trail
Cave Trail
Cliffside Trail
Inspiration Point Trail
Reserve Boundary
Parking Lot
Restrooms
Trailhead
Vista Point
Multiuse Trail
Pedestrian Trail
Pedestrian & Bike Trail
0
0.1
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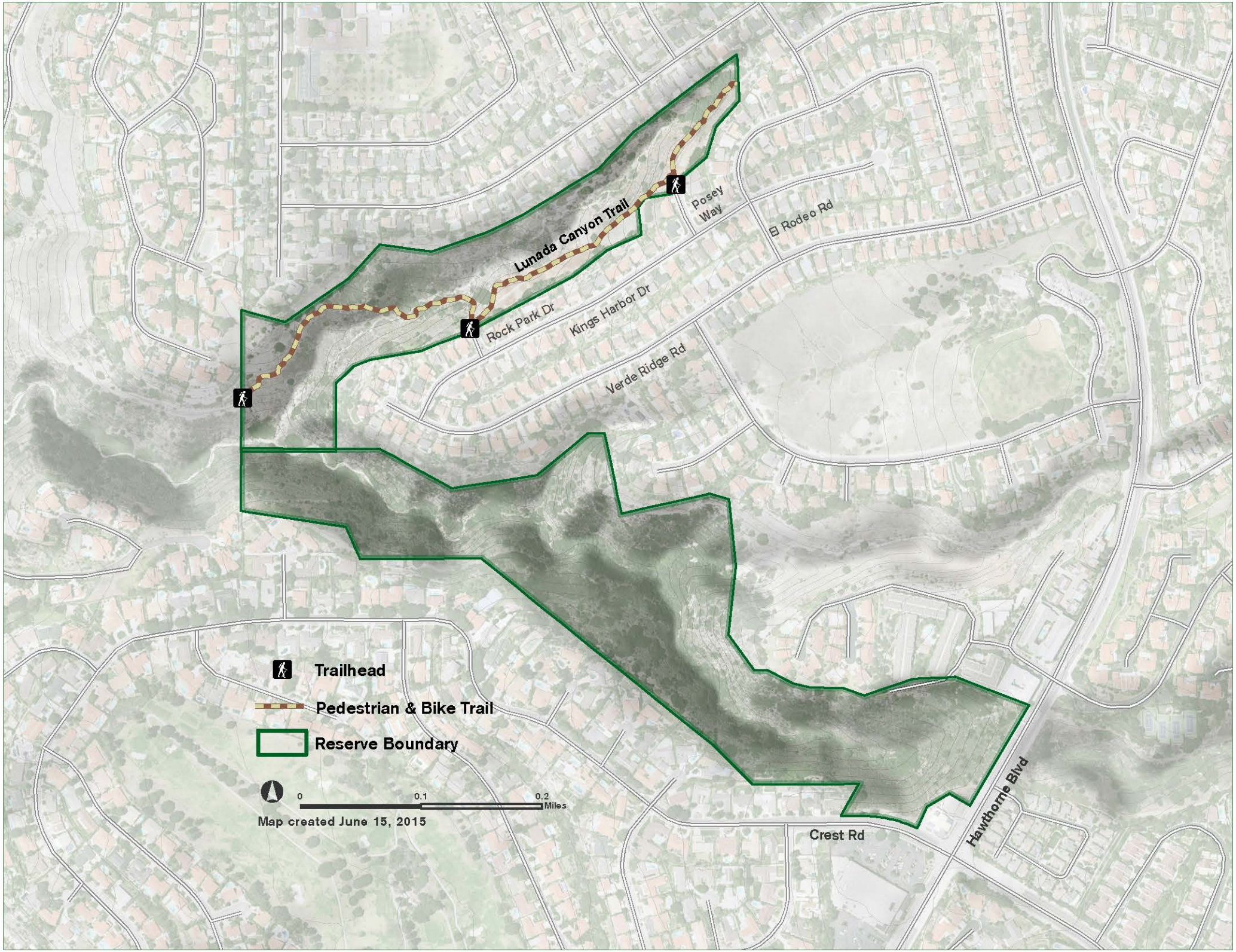
Miles
Map created June 15, 2015


Lunada Canyon Trail
Posey Way
El Rodeo Rd
Rock Park Dr
Kings Harbor Dr
Verde Ridge Rd
Crest Rd
Hawthorne Blvd
Trailhead
Pedestrian & Bike Trail
Reserve Boundary
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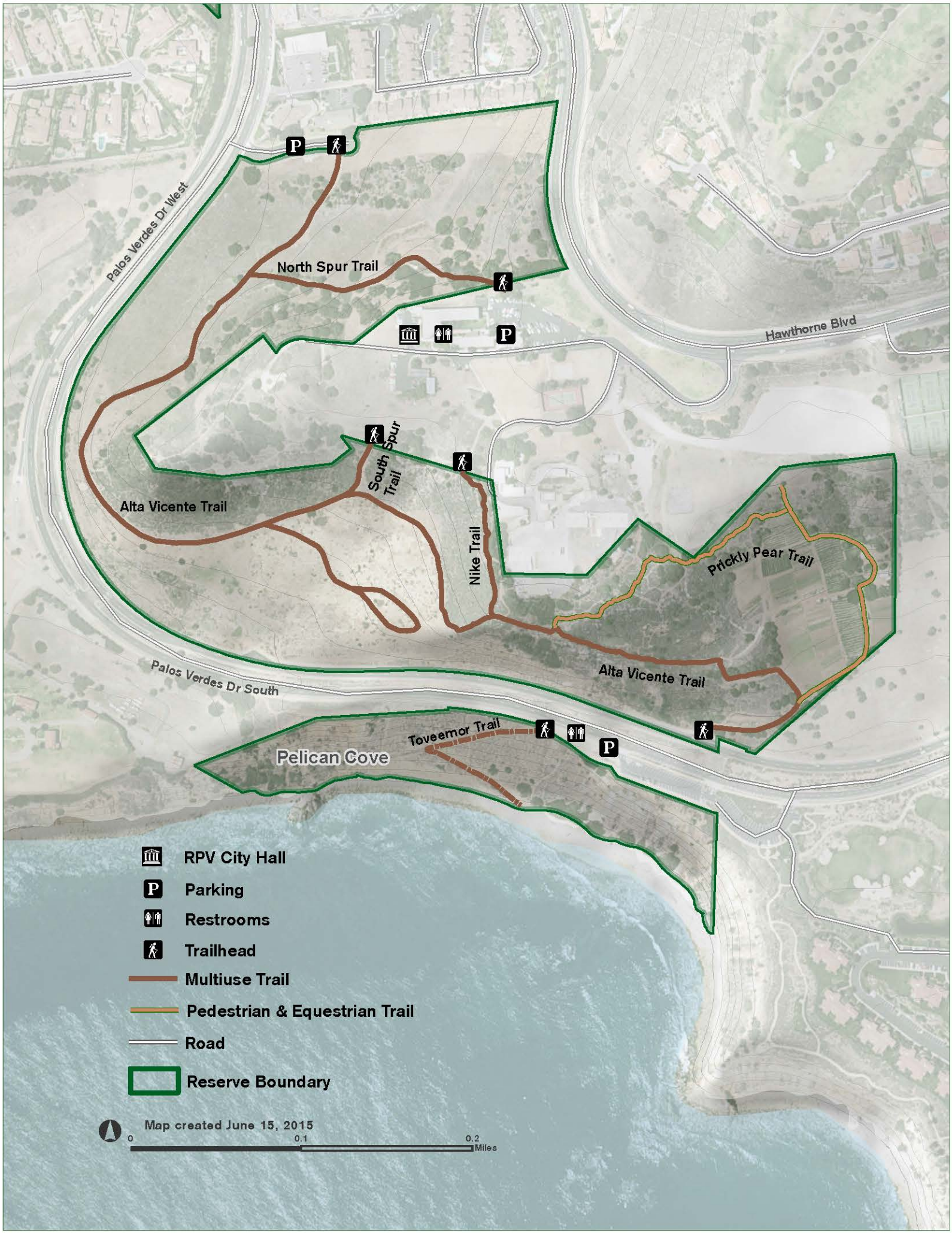
Miles
Map created June 15, 2015


Palos Verdes Dr West
North Spur Trail
Hawthorne Blvd
South Spur Trail
Alta Vicente Trail
Nike Trail
Prickly Pear Trail
Palos Verdes Dr South
Alta Vicente Trail
Toveemor Trail
Pelican Cove
RPV City Hall
Parking
Restrooms
Trailhead
Multiuse Trail
Pedestrian & Equestrian Trail
Road
Reserve Boundary
Map created June 15, 2015
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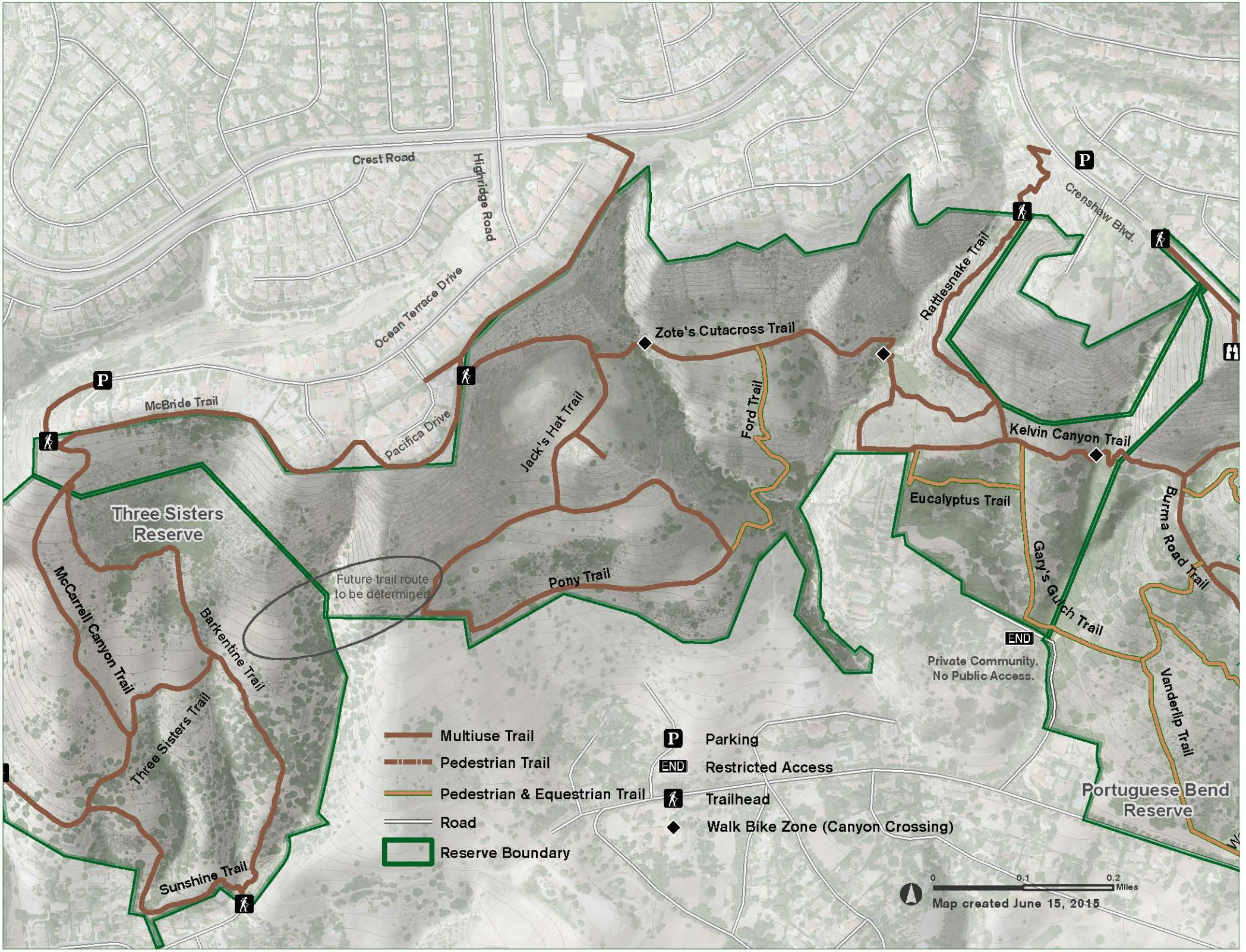
Miles


Crest Road
Highridge Road
Ocean Terrace Drive
Crenshaw Blvd.
Rattlesnake Trail
Zote's Cutacross Trail
McBride Trail
Pacifica Drive
Jack's Hat Trail
Ford Trail
Kelvin Canyon Trail
Eucalyptus Trail
Burma Road Trail
Gary's Gulch Trail
Three Sisters Reserve
McCarrell Canyon Trail
Barkentine Trail
Three Sisters Trail
Future trail route to be determined
Pony Trail
END
Private Community. No Public Access.
Vanderlip Trail
Portuguese Bend Reserve
Sunshine Trail
Multiuse Trail
Pedestrian Trail
Pedestrian & Equestrian Trail
Road
Reserve Boundary
Parking
Restricted Access
Trailhead
Walk Bike Zone (Canyon Crossing)
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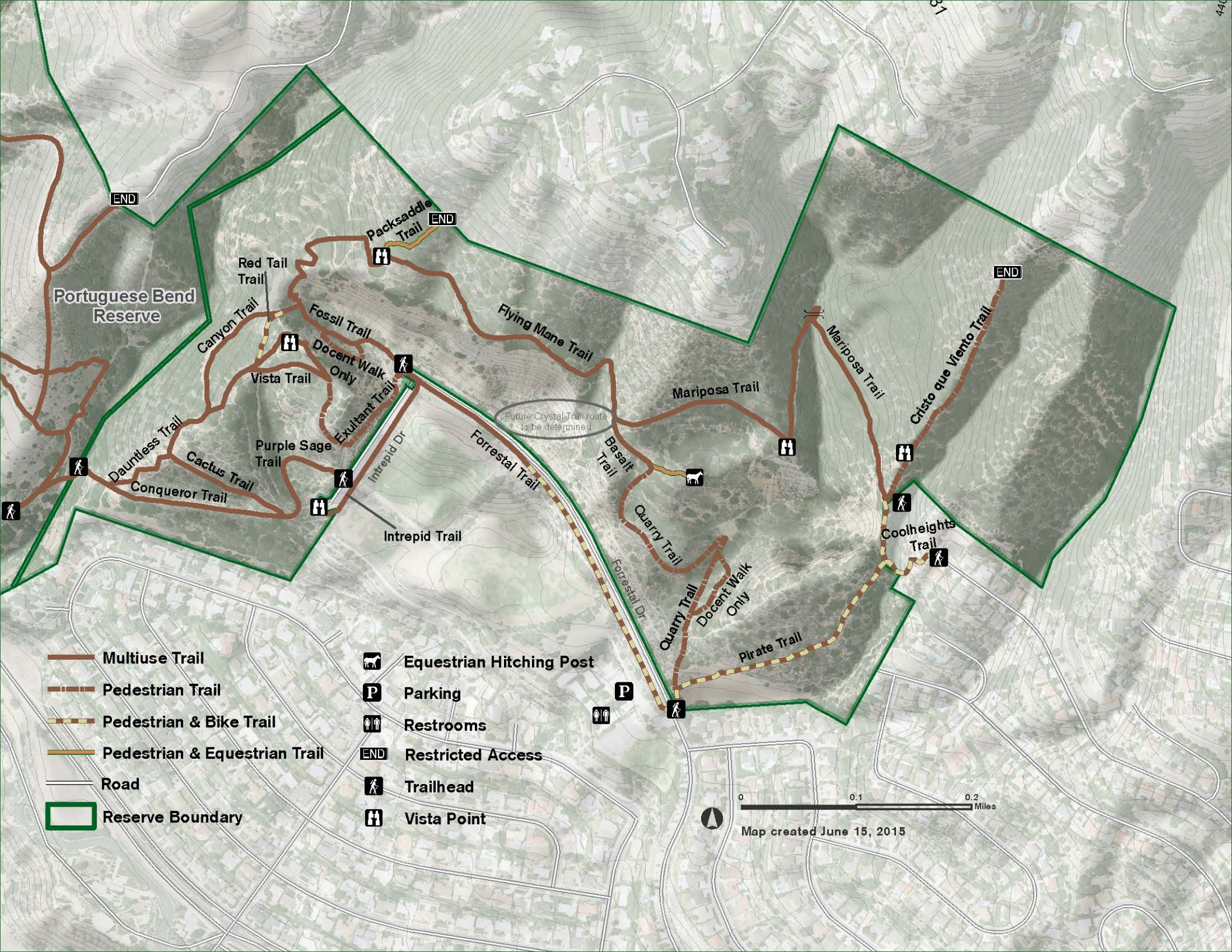
Miles
Map created June 15, 2015


Portuguese Bend Reserve
END
Packsaddle Trail
END
Red Tail Trail
Canyon Trail
Fossil Trail
Flying Mane Trail
Docent Walk Only
Vista Trail
Exultant Trail
Mariposa Trail
Future Crystal Trail route to be determined
Dauntless Trail
Purple Sage Trail
Intrepid Dr
Forrestal Trail
Basalt Trail
Cactus Trail
Conqueror Trail
Intrepid Trail
Quarry Trail
Forrestal Dr
Quarry Trail
Docent Walk Only
Pirate Trail
Mariposa Trail
Cristo que Viento Trail
END
Coolheights Trail
Multiuse Trail
Pedestrian Trail
Pedestrian & Bike Trail
Pedestrian & Equestrian Trail
Road
Reserve Boundary
Equestrian Hitching Post
Parking
Restrooms
Restricted Access
Trailhead
Vista Point
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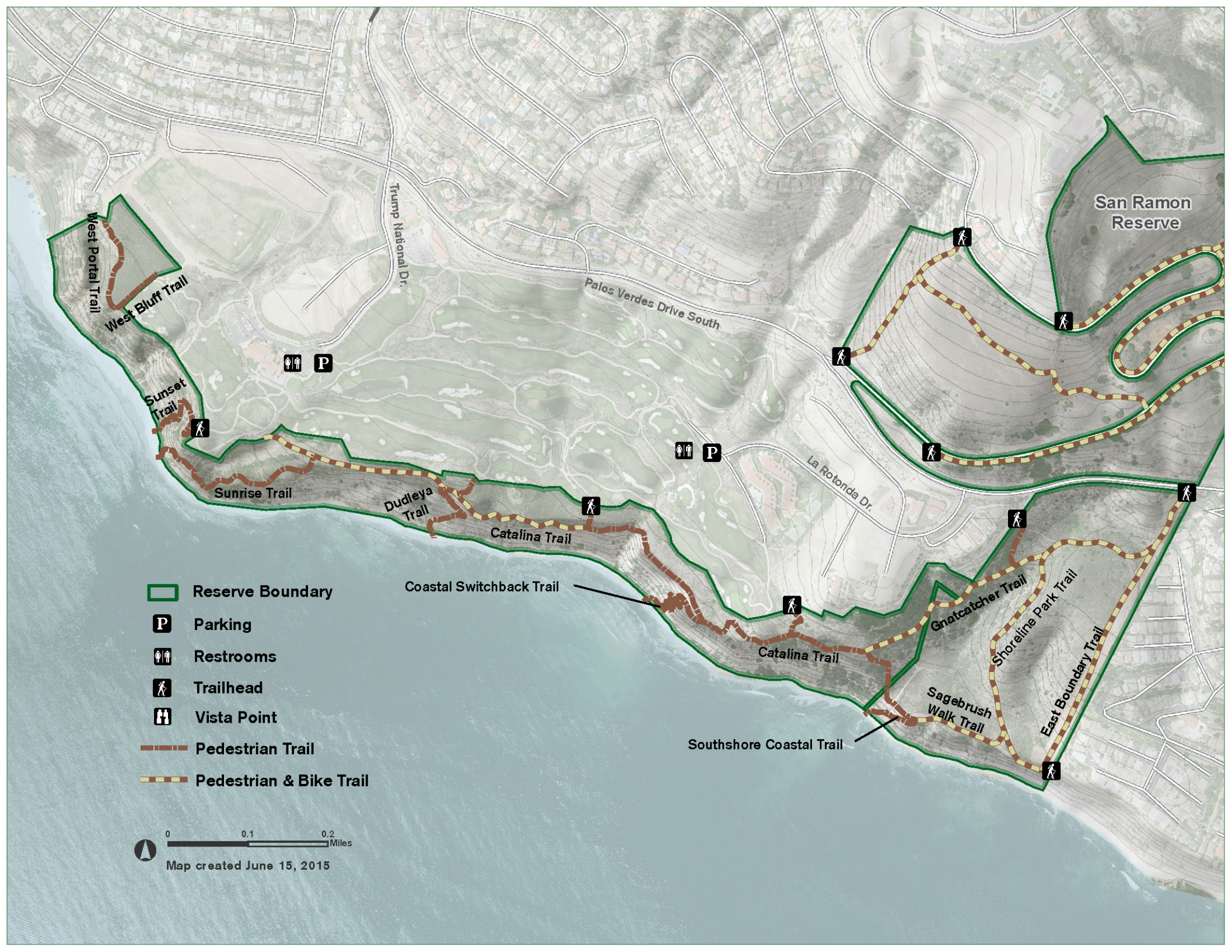
Miles
Map created June 15, 2015


West Portal Trail
West Bluff Trail
Trump National Dr.
Palos Verdes Drive South
San Ramon Reserve
Sunset Trail
Sunrise Trail
Dudleya Trail
Catalina Trail
La Rotonda Dr.
Coastal Switchback Trail
Catalina Trail
Gnatcatcher Trail
Shoreline Park Trail
East Boundary Trail
Sagebrush Walk Trail
Southshore Coastal Trail
Reserve Boundary
Parking
Restrooms
Trailhead
Vista Point
Pedestrian Trail
Pedestrian & Bike Trail
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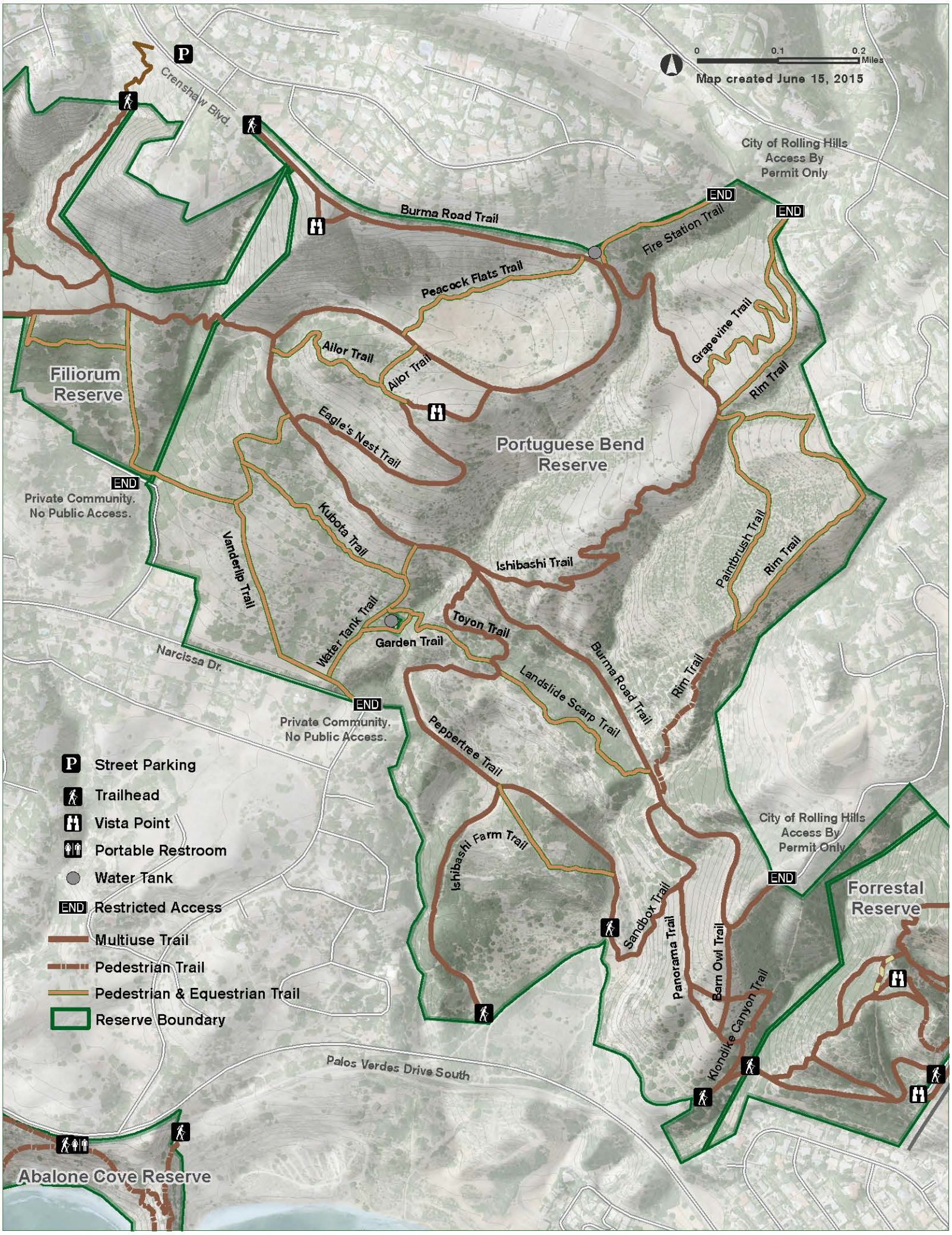
Miles
Map created June 15, 2015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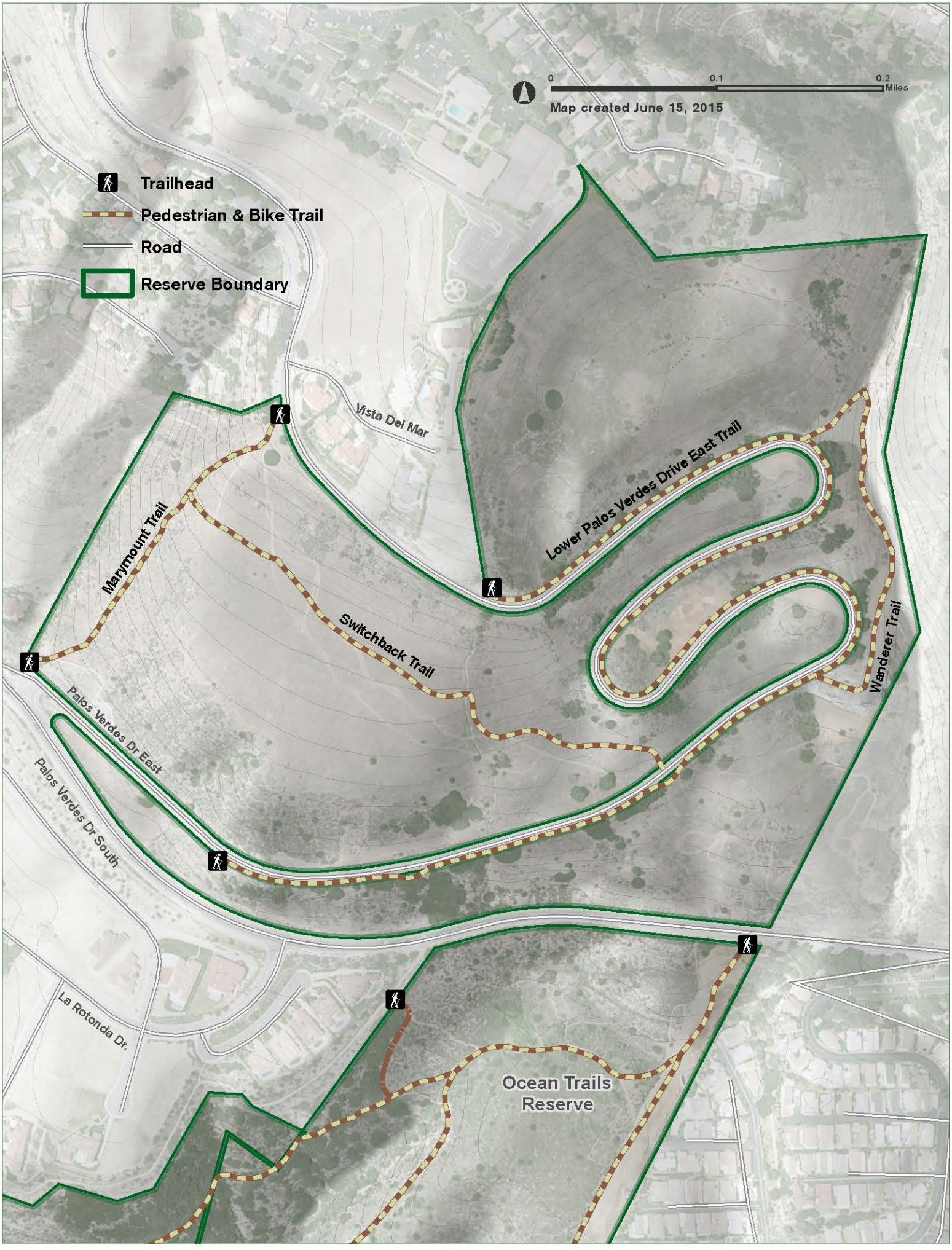
Miles
Map created June 15, 2015
Crenshaw Blvd.
City of Rolling Hills
Access By
Permit Only
Burma Road Trail
Fire Station Trail
Peacock Flats Trail
Grapevine Trail
Ailor Trail
Ailor Trail
Rim Trail
Filiorum
Reserve
Eagle's Nest Trail
Portuguese Bend
Reserve
Private Community.
No Public Access.
Kubota Trail
Vanderlip Trail
Ishibashi Trail
Paintbrush Trail
Rim Trail
Water Tank Trail
Toyon Trail
Garden Trail
Narcissa Dr.
Burma Road Trail
Rim Trail
Landslide Scarp Trail
Private Community.
No Public Access.
Peppertree Trail
Ishibashi Farm Trail
City of Rolling Hills
Access By
Permit Only
Forrestal
Reserve
Sandbox Trail
Panorama Trail
Barn Owl Trail
Klondike Canyon Trail
Palos Verdes Drive South
Abalone Cove Reserve
Street Parking
Trailhead
Vista Point
Portable Restroom
Water Tank
Restricted Access
Multiuse Trail
Pedestrian Trail
Pedestrian & Equestrian Trail
Reserve Boundary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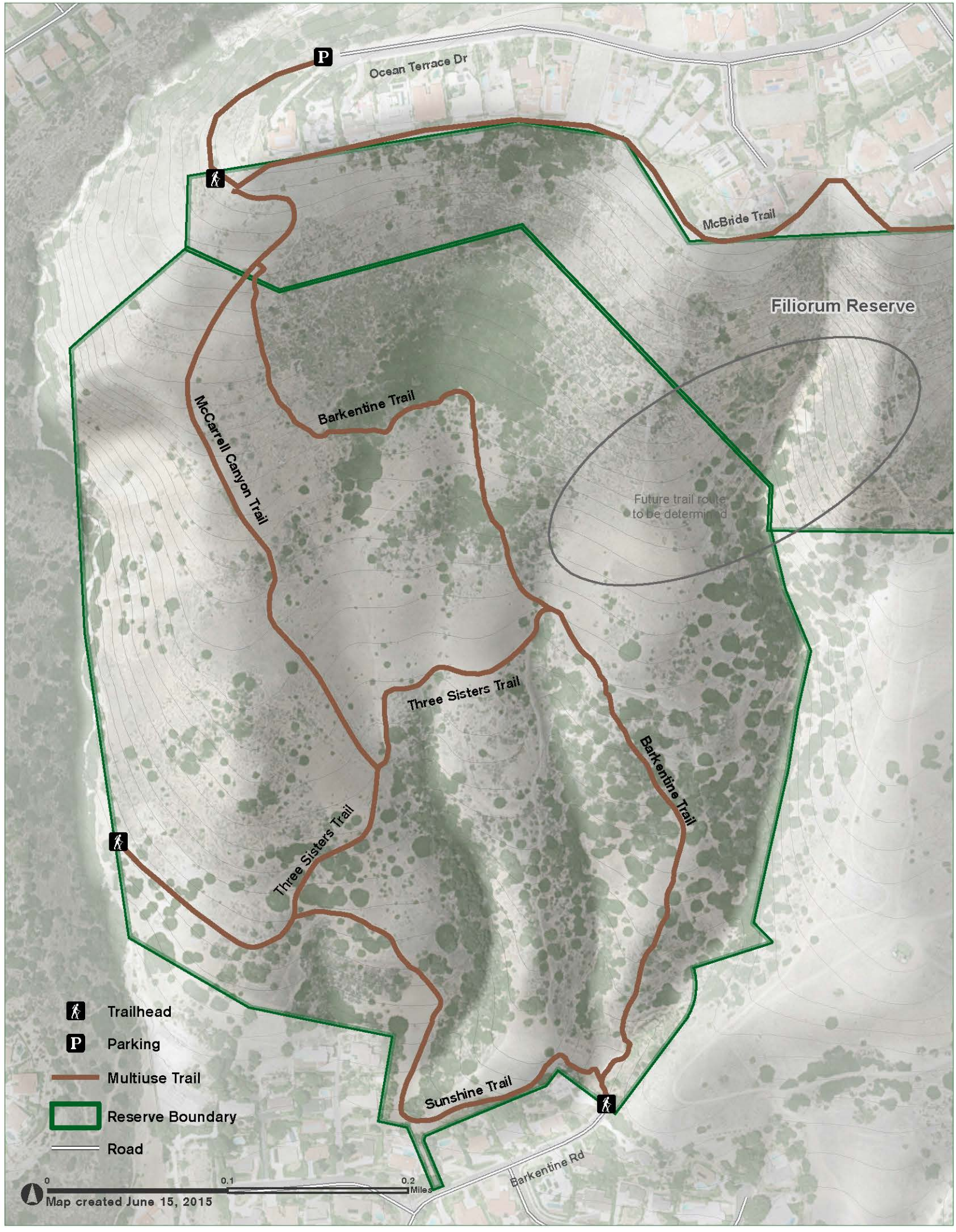
Miles
Map created June 15, 2015
Trailhead
Pedestrian & Bike Trail
Road
Reserve Boundary
Vista Del Mar
Lower Palos Verdes Drive East Trail
Marymount Trail
Switchback Trail
Wanderer Trail
Palos Verdes Dr East
Palos Verdes Dr South
La Rotonda Dr.
Ocean Trails
Reserve


Ocean Terrace Dr
McBride Trail
Filiorum Reserve
Future trail route
to be determined
Barkentine Trail
McCarrell Canyon Trail
Three Sisters Trail
Three Sisters Trail
Barkentine Trail
Sunshine Trail
Barkentine Rd
Trailhead
Parking
Multiuse Trail
Reserve Boundary
Road
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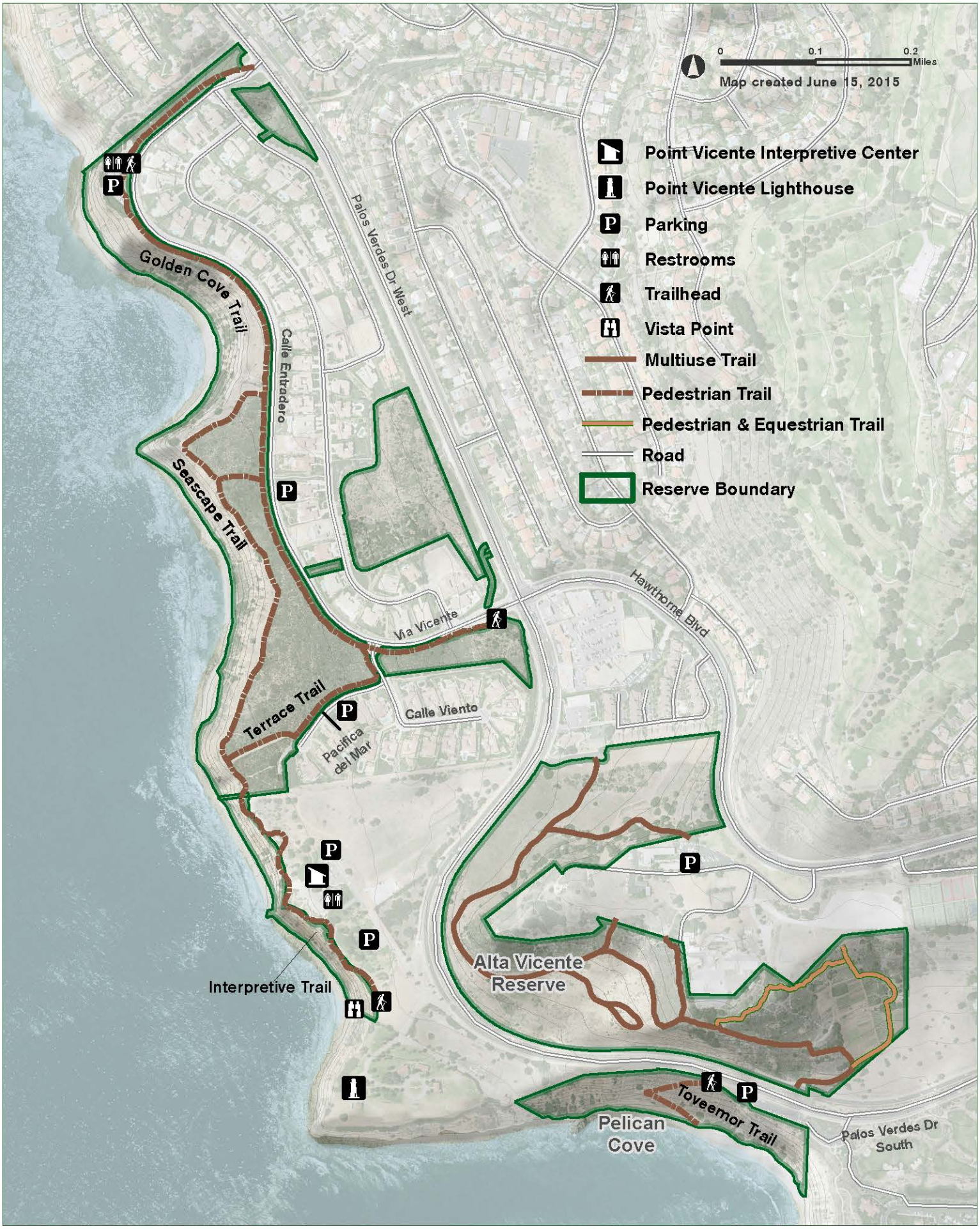
Miles
Map created June 15, 2015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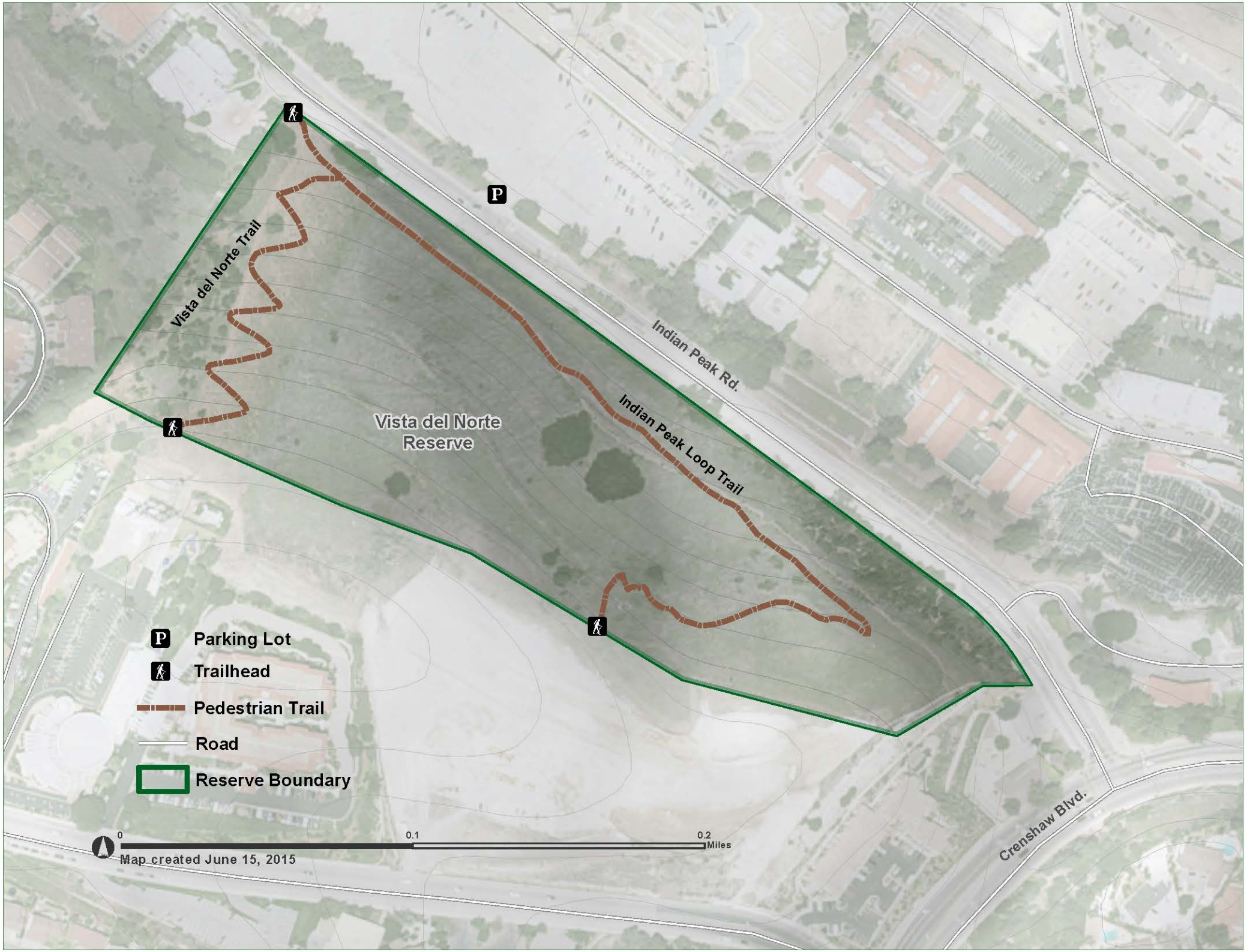
Miles
Map created June 15, 2015
Point Vicente Interpretive Center
Point Vicente Lighthouse
Parking
Restrooms
Trailhead
Vista Point
Multiuse Trail
Pedestrian Trail
Pedestrian & Equestrian Trail
Road
Reserve Boundary
Golden Cove Trail
Palos Verdes Dr West
Calle Entradero
Seascape Trail
Via Vicente
Hawthorne Blvd
Terrace Trail
Calle Viento
Pacifica del Mar
Interpretive Trail
Alta Vicente Reserve
Toveemor Trail
Pelican Cove
Palos Verdes Dr South


Vista del Norte Trail
Vista del Norte Reserve
Indian Peak Rd.
Indian Peak Loop Trail
Crenshaw Blvd.
Parking Lot
Trailhead
Pedestrian Trail
Road
Reserve Boundary
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Miles
Map created June 15, 2015

APPENDIX J

PVPLC FINANCIAL AUDIT

Harrington Group
Certified Public Accountants, LLP

PALOS VERDES PENINSULA LAND CONSERVANCY

FINANCIAL STATEMENTS and ADDITIONAL INFORMATION

DECEMBER 31, 2015

PASADENA
234 E Colorado Blvd
Suite M150
Pasadena, CA 91101
Tel: 626.403.6801
Fax: 626.403.6866

SAN FRANCISCO
50 Francisco St
Suite 160
San Francisco, CA 94133
Tel: 415.391.3131
Fax: 415.391.3233

CONTENTS

Harrington Group
Certified Public Accountants, LLP

INDEPENDENT AUDITORS' REPORT

To the Board of Directors
Palos Verdes Peninsula Land Conservancy

Report on the Financial Statements

We have audited the accompanying financial statements of Palos Verdes Peninsula Land Conservancy (a nonprofit organization), which comprise the Statement of Financial Position as of December 31, 2015, and the related Statements of Activities, Functional Expenses, and Cash Flows for the year then ended and the related notes to the financial statements.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Palos Verdes Peninsula Land Conservancy as of December 31, 2015, and the changes in its net assets and its cash flows for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matter

Summarized Comparative Information

We have previously audited Palos Verdes Peninsula Land Conservancy's 2014 financial statements, and our report dated March 19, 2015 expressed an unmodified opinion on those financial statements. In our opinion the summarized comparative information presented herein as of and for the year ended December 31, 2014, is consistent, in all material respects, with the audited financial statements from which it has been derived.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated March 17, 2016 on our consideration of Palos Verdes Peninsula Land Conservancy's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering Palos Verdes Peninsula Land Conservancy's internal control over financial reporting and compliance.

Harrington Group

Pasadena, California
March 17, 2016

PALOS VERDES PENINSULA LAND CONSERVANCY

STATEMENT OF FINANCIAL POSITION
December 31, 2015
With comparative totals at December 31, 2014

	Unrestricted	Temporarily Restricted	Permanently Restricted	2015	2014
ASSETS					
Cash	$ 226,546	$ -	$ -	**$ 226,546**	$ 270,390
Accounts receivable	530,144			**530,144**	165,182
Pledges receivable (Note 3)	20,000			**20,000**	51,357
Inventory	113,160			**113,160**	159,343
Prepaid expenses	18,755			**18,755**	23,470
Investments (Note 4)	4,629,667	338,085	1,212,949	**6,180,701**	5,985,393
Property and equipment (Note 5)	1,452,954			**1,452,954**	1,460,349
TOTAL ASSETS	$ 6,991,226	$ 338,085	$ 1,212,949	**$ 8,542,260**	$ 8,115,484
LIABILITIES AND NET ASSETS					
LIABILITIES					
Accounts payable	$ 60,821	$ -	$ -	**$ 60,821**	$ 32,939
Accrued liabilities (Note 6)	85,090			**85,090**	89,348
Deferred revenue				**-**	3,334
Line of credit (Note 7)				**-**	-
TOTAL LIABILITIES	145,911	-	-	**145,911**	125,621
NET ASSETS					
Unrestricted	2,467,389			**2,467,389**	2,032,989
Unrestricted-board designated	4,377,926			**4,377,926**	4,399,991
Temporarily restricted (Note 10)		338,085		**338,085**	346,823
Permanently restricted (Note 11)			1,212,949	**1,212,949**	1,210,060
TOTAL NET ASSETS	6,845,315	338,085	1,212,949	**8,396,349**	7,989,863
TOTAL LIABILITIES AND NET ASSETS	$ 6,991,226	$ 338,085	$ 1,212,949	**$ 8,542,260**	$ 8,115,484

The accompanying notes are an integral part of these financial statements.

PALOS VERDES PENINSULA LAND CONSERVANCY

STATEMENT OF ACTIVITIES
For the year ended December 31, 2015
With comparative totals for the year ended December 31, 2014

	Unrestricted	Temporarily Restricted	Permanently Restricted	2015	2014
REVENUE AND SUPPORT					
Contributions	$ 1,084,885	$ 128,000	$ 2,889	**$ 1,215,774**	$ 5,028,206
Government contracts and grants	841,977			**841,977**	479,207
Special events (net of direct expense of $20,685)	140,908			**140,908**	72,284
Interest and dividends	98,257			**98,257**	43,450
In-kind revenue (Note 2)	48,466			**48,466**	39,807
Program service fees	36,104			**36,104**	22,517
Inventory sales (net of expenses $11,197) and other income	5,647			**5,647**	15,715
(Loss) gain on investments	(139,025)			**(139,025)**	45,097
Net assets released from purpose restrictions	136,738	(136,738)		**-**	-
TOTAL REVENUE AND SUPPORT	2,253,957	(8,738)	2,889	**2,248,108**	5,746,283
EXPENSES					
Program services	1,536,484			**1,536,484**	1,343,898
Management and general	123,262			**123,262**	96,590
Fundraising	181,876			**181,876**	204,096
TOTAL EXPENSES	1,841,622	-	-	**1,841,622**	1,644,584
CHANGE IN NET ASSETS	412,335	(8,738)	2,889	**406,486**	4,101,699
NET ASSETS, BEGINNING OF YEAR	6,432,980	346,823	1,210,060	**7,989,863**	3,888,164
NET ASSETS, END OF YEAR	$ 6,845,315	$ 338,085	$ 1,212,949	**$ 8,396,349**	$ 7,989,863

The accompanying notes are an integral part of these financial statements.

PALOS VERDES PENINSULA LAND CONSERVANCY

STATEMENT OF FUNCTIONAL EXPENSES
For the year ended December 31, 2015
With comparative totals for the year ended December 31, 2014

	Program Services	Management and General	Fundraising	Total Expenses 2015	Total Expenses 2014
Salaries and wages	$ 753,836	$ 65,866	$ 127,806	**$ 947,508**	$ 879,268
Employee benefits	94,048	12,522	8,259	**114,829**	101,117
Payroll taxes	62,998	5,233	10,760	**78,991**	72,717
Total personnel costs	910,882	83,621	146,825	**1,141,328**	1,053,102
Outside labor	223,268	8,267	4,873	**236,408**	192,378
Supplies	86,541	1,069	9,417	**97,027**	115,180
Miscellaneous	60,421	1,604	296	**62,321**	13,074
Rent	52,064	1,092	4,224	**57,380**	63,172
In-kind expenses (Note 2)	42,931	5,535		**48,466**	39,807
Professional fees	38,705	3,542	2,024	**44,271**	42,458
Printing	19,246	9,860	4,109	**33,215**	30,039
Postage	24,608	1,500	3,343	**29,451**	22,063
Conferences and meetings	13,678	2,194	3,537	**19,409**	6,303
Insurance	14,097	3,599	683	**18,379**	17,501
Travel	15,510	576	47	**16,133**	15,491
Equipment rental	15,155			**15,155**	11,094
Telephone	11,777	465	1,135	**13,377**	11,424
Depreciation	7,395			**7,395**	9,256
Marketing	206	338	1,363	**1,907**	2,242
TOTAL 2015 FUNCTIONAL EXPENSES	**$ 1,536,484**	**$ 123,262**	**$ 181,876**	**$ 1,841,622**	
TOTAL 2014 FUNCTIONAL EXPENSES	$ 1,343,898	$ 96,590	$ 204,096		$ 1,644,584

The accompanying notes are an integral part of these financial statements.

PALOS VERDES PENINSULA LAND CONSERVANCY

STATEMENT OF CASH FLOWS
For the year ended December 31, 2015
With comparative totals for the year ended December 31, 2014

	2015	2014
CASH FLOWS FROM OPERATING ACTIVITIES:		
Change in net assets	**$ 406,486**	$ 4,101,699
Adjustments to reconcile change in net assets to net cash provided by operating activities:		
Depreciation	**7,395**	9,256
Loss (gain) on investments	**139,025**	(45,097)
Reinvested dividends and interest	**(97,424)**	(43,450)
(Increase) decrease in operating assets:		
Accounts receivable	**(364,962)**	(50,902)
Pledges receivable	**31,357**	35,943
Inventory	**46,183**	(18,508)
Prepaid expenses	**4,715**	(7,253)
Increase (decrease) in operating liabilities:		
Accounts payable	**27,882**	(835)
Accrued liabilities	**(4,258)**	20,172
Deferred revenue	**(3,334)**	(20,213)
NET CASH PROVIDED BY OPERATING ACTIVITIES	**193,065**	3,980,812
CASH FLOWS FROM INVESTING ACTIVITIES:		
Purchase of investments	**(742,953)**	(4,268,303)
Proceeds from sale of investments	**506,044**	141,533
NET CASH (USED) BY INVESTING ACTIVITIES	**(236,909)**	(4,126,770)
NET DECREASE IN CASH	**(43,844)**	(145,958)
CASH, BEGINNING OF YEAR	**270,390**	416,348
CASH, END OF YEAR	**$ 226,546**	$ 270,390

The accompanying notes are an integral part of these financial statements.

1. Organization

Since it was founded in 1988, the Palos Verdes Peninsula Land Conservancy ("PVPLC") has preserved more than 1,600 acres of open space on the Peninsula. The spectacular views and precious habitat not only contribute to the quality of human life on the peninsula, but provide valuable refuge and wildlife corridors for animal and plant inhabitants. Beaches and bluffs, steep slopes, canyons and ridgelines – this diverse topography leads to the Peninsula's rich biodiversity. Native coastal sage scrub, grassland, cactus, and riparian scrub grow alongside non-native annual grassland, exotic woodlands and large areas of disturbed vegetation.

PVPLC shelter four at-risk species: the El Segundo blue butterfly, the Palos Verdes blue butterfly, the Coastal California gnatcatcher and the cactus wren. The native plant nursery that PVPLC operates cultivates 100 different species of plants that are used in restoration projects that restore habitat critical to survival of these species.

The mission of PVPLC is to "*preserve land and restore habitat for the enjoyment and education of all.*" PVPLC preserves undeveloped land as open space for historical, educational, ecological, recreational, and scenic purposes.

PVPLC's vision is the creation and management of large blocks of natural open space where visitors may enjoy peaceful solitude, where children and adults can learn about the natural environment, and where native plants and animals can thrive.

PVPLC works cooperatively with the four cities in which the preserved lands are located: Rancho Palos Verdes, Rolling Hills, Rolling Hills Estates, and San Pedro (City of Los Angeles). In collaboration with these cities, PVPLC holds voluntary conservation easements and manage the public open space. PVPLC's successful approach to land protection has been endorsed by both public and private sector advocates. PVPLC works to raise funds from the community to purchase critical undeveloped properties as opportunities arise. Private donations enable PVPLC to leverage additional matching funds from state and federal agencies to secure the Peninsula's precious natural legacy.

Stewardship staff and crew, with the support of hundreds of volunteers year-round, restore native habitat on these properties and protect rare and threatened native species such as the California gnatcatcher and Palos Verdes blue butterfly. PVPLC mission includes:

- **Preservation of lands in perpetuity**
- **Restoration of wildlife habitat:** Work to improve the quality of habitat to better support wildlife by engaging in habitat restoration projects which include seeding and planting native species along with invasive plant control. PVPLC operates a native plant nursery that propagates more than 100 different species for restoration projects, and annually plants nearly 10,000 seedlings.
- **Educational and Enjoyment Opportunities:** The nature preserves on the Palos Verdes Peninsula comprise more than 40 miles of trails. Volunteer naturalists, historians, and geologists lead monthly guided nature walks, welcoming thousands of residents and visitors through the preserves and the two nature centers at White Point Nature Preserve and George F. Canyon Nature Preserve.

continued

1. **Organization**, continued

- **Education and Outreach:** Over 3,500 students a year, mostly from disadvantaged schools, are brought out to the preserves and engage in conservation education tied to the California state standards for science curriculum. Also, PVPLC operates two public Nature Education Centers which serve over 10,000 visitors annually.

2. **Summary of Significant Accounting Policies**

A summary of the significant accounting policies applied in the preparation of the accompanying financial statements is as follows:

Basis of Presentation

The accompanying financial statements have been prepared on the accrual basis of accounting.

Accounting

To ensure observance of certain constraints and restrictions placed on the use of resources, the accounts of PVPLC are maintained in accordance with the principles of net asset accounting. This is the procedure by which resources for various purposes are classified for accounting and reporting purposes into net asset classes that are in accordance with specified activities or objectives. Accordingly, all financial transactions have been recorded and reported by net asset class as follows:

Unrestricted. These generally result from revenue generated by receiving unrestricted contributions, providing services, and receiving interest from investments less expenses incurred in providing program-related services, raising contributions, and performing administrative functions.

Unrestricted – Board Designated. These are comprised of resources which the Board of Directors has established as being designated for future program and capital expansion and cash flow resources. For purposes of complying with net asset accounting, this fund is included in unrestricted net assets at December 31, 2015.

Temporarily Restricted. PVPLC reports gifts of cash and other assets as temporarily restricted support if they are received with donor stipulations that limit the use of the donated assets. When a donor restriction expires, that is, when a stipulated time restriction ends or the purpose of the restriction is accomplished, temporarily restricted net assets are reclassified to unrestricted net assets and reported in the Statement of Activities as net assets released from program or capital restrictions. PVPLC has $338,085 of temporarily restricted net assets as of December 31, 2015.

Permanently Restricted. These net assets are restricted by donors who stipulate that resources are to be maintained permanently, but permit PVPLC to expend all of the income (or other economic benefits) derived from the donated assets. PVPLC has $1,212,949 of permanently restricted net assets at December 31, 2015.

continued

2. **Summary of Significant Accounting Policies**, continued

Accounts Receivable

Accounts receivable are receivables from government agencies and are deemed fully collectible. Therefore, no allowance for doubtful accounts has been provided.

Contributions and Pledges Receivables

Unconditional promises to give that are expected to be collected within one year are recorded at net realizable value. Unconditional promises to give that are expected to be collected in future years are recorded at fair value, which is measured as the present value of their future cash flows. The discounts on those amounts are computed using risk-adjusted interest rates applicable to the years in which the promises are received. Amortization of the discount is included in contribution revenue. Conditional promises to give are not included as support until the conditions are substantially met.

Grant Funding

PVPLC receives multi-year grant funding from various sources, which in accordance with generally accepted accounting principles, are recorded in the period received or pledged. However, expenditures related to these grants can occur over several years. As a result, timing differences are created which can have an effect on the changes in net assets.

Inventory

Inventory consists of plants and merchandise for the use and benefit of or sale to the public throughout the year. Inventory is stated at lower of cost or fair value, determined on a first-in, first-out basis.

Investments

Investments in stocks, money market funds and fixed income are reported at their fair market values based upon published quotations. Investments for which the fair market values are not readily determinable are recorded at cost or, if received as a contribution, at their fair market values as determined at the time of the gift. Securities are generally held in custodial investment accounts administered by financial institutions. Money market funds held at securities institutions and not used for operations are included in investments.

Investment purchases and sales are accounted for a trade-date basis. Realized gains and losses are calculated based upon the underlying cost of the securities traded. Interest and dividend income is recorded when earned. Gains and losses and interest and dividend income are reflected in the Statement of Activities as net gain (loss) on investments.

continued

2. **Summary of Significant Accounting Policies**, continued

Fair Value Measurements

Generally accepted accounting principles provide guidance on how fair value should be determined when financial statement elements are required to be measured at fair value. Valuation techniques are ranked in three levels depending on the degree of objectivity of the inputs used with each level:

Level 1 inputs - quoted prices in active markets for identical assets
Level 2 inputs - quoted prices in active or inactive markets for the same or similar assets
Level 3 inputs - estimates using the best information available when there is little or no market

PVPLC is required to measure certain investments, pledged contributions, and in-kind contributions at fair value. The specific techniques used to measure fair value for each element is described in the notes below that relate to each element.

Concentration of Credit Risks

PVPLC places its temporary cash investments with high-credit, quality financial institutions. At times, such investments may be in excess of the Federal Deposit Insurance Corporation insurance limit. PVPLC has not incurred losses related to these investments.

PVPLC holds investments in the form of equity securities, fixed income securities and money market accounts. The Board of Directors routinely reviews market values of such investments.

The primary receivable balance outstanding at December 31, 2015 consists of government contract receivables due from city and state granting agencies. Concentration of credit risks with respect to trade receivables are limited, as the majority of PVPLC's receivables consist of earned fees from contract programs granted by governmental agencies.

At December 31, 2015, revenues derived from contributions represent 54% of total revenue and support.

Property and Equipment

Property and equipment are recorded at cost if purchased or at fair value at the date of donation if donated. Depreciation is computed on the straight-line basis over the estimated useful lives of the related assets. Maintenance and repair costs are charged to expense as incurred. Property and equipment are capitalized if the cost of an asset is greater than or equal to fifty thousand dollars i.e. ($50,000) and the useful life is greater than five years.

continued

2. **Summary of Significant Accounting Policies**, continued

Donated Materials, Services, and Facilities

Contributions of donated non-cash assets are measured on a non-recurring basis and recorded at fair value in the period received. Contributions of donated services that create or enhance non-financial assets or that require specialized skills, are provided by individuals possessing those skills, and would typically need to be purchased if not provided by donation, are recorded at fair value in the period received. The fair value of contributed materials, services, and facilities are measured on a non-recurring basis using quoted prices for similar assets. For the year ended December 31, 2015, PVPLC recorded a total of $48,466 for donated services. Donated services represent consulting services provided by board members related to review of various contract agreements.

A large number of unpaid volunteers have made significant contributions of their time to PVPLC. However, the value of these services is not reflected in these statements because the criteria for recognition under generally accepted accounting principles have not been met. The total hours of volunteer support received for the year ended December 31, 2015 was 18,633 hours.

Income Taxes

PVPLC is exempt from taxation under Internal Revenue Code Section 501(c)(3) and California Revenue and Taxation Code Section 23701d.

Generally accepted accounting principles provide accounting and disclosure guidance about positions taken by an organization in its tax returns that might be uncertain. Management has considered its tax positions and believes that all of the positions taken by PVPLC in its federal and state exempt organizations tax returns are more likely than not to be sustained upon examination. PVPLC's returns are subject to examination by federal and state taxing authorities, generally for three and four years, respectively, after they are filed.

Functional Allocation of Expenses

Costs of providing PVPLC's programs and other activities have been presented in the Statement of Functional Expenses. During the year, such costs are accumulated into separate groupings as either direct or indirect. Indirect or shared costs are allocated among program and support services by a method that best measures the relative degree of benefit. PVPLC uses salary dollars to allocate indirect costs.

continued

2. Summary of Significant Accounting Policies, continued

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect reported amounts of assets, liabilities, revenues, and expenses as of the date and for the period presented. Actual results could differ from those estimates.

Comparative Totals

The financial statements include certain prior-year summarized comparative information in total but not by net asset class. Such information does not include sufficient details to constitute a presentation in conformity with accounting principles generally accepted in the United States of America. Accordingly, such information should be read in conjunction with PVPLC's financial statements for the year ended December 31, 2014, from which the summarized information was derived.

Subsequent Events

Management has evaluated subsequent events through March 17, 2016, the date which the financial statements were available for issue. No events or transactions have occurred during this period that appear to require recognition or disclosure in the financial statements.

3. Pledges Receivable

Pledges receivable are recorded as support when pledged unless designated otherwise. All pledges are deemed fully collectible; accordingly, no allowance for uncollectible pledges has been recorded as of December 31, 2015. The total amount of the pledges receivable of $20,000 at December 31, 2015 are expected to be collected within one year.

4. Investments

Investments at December 31, 2015 consist of the following:

Equities	$3,509,839
Fixed income securities	1,748,239
Money market/cash	922,623
	$6,180,701

5. Property and Equipment

Property and equipment at December 31, 2015 consist of the following:

Land	$1,452,213
Vehicles	36,667
Equipment	30,453
	1,519,333
Less: accumulated depreciation	(66,379)
	$1,452,954

PVPLC is the owner of six parcels of vacant land located on the Palos Verdes Peninsula valued at $1,452,213.

The first parcel of land of approximately twenty acres, known as Lunada Canyon, is located in Rancho Palos Verdes. Lunada Canyon is permanently preserved due to its inclusion in the Natural-Communities Conservation Plan Preserve area. Total value of the property is $600,000.

The second parcel of land is approximately one and one-quarter acre, known as Middleridge, and is located in Rolling Hills. The total value of the property is $50,000.

The third parcel of land of approximately twenty-eight acres, known as the Linden H. Chandler, is located in Rolling Hills Estates. PVPLC has a partial ownership interest of approximately nineteen acres in this property. PVPLC is required to keep the property open and available to the public, generally for public use for open-space land purpose. A conservation easement held by the City of Rolling Hills Estates has been placed on the land. Total value of the property is $575,000.

The fourth parcel of land is 1.43 acres, known as Fig Tree parcel, and is located in Ranchos Palos Verdes. The total value of the property is $190,000.

The fifth and sixth parcels of land are approximately one half acre each, known as the Crown View parcels, and are located in Rancho Palos Verdes. The total value of the properties is $37,213.

The City of Rolling Hills Estates, the City of Rancho Palos Verdes and a Corporation are the owners in fee simple of one, three and one parcels of land, respectively. Both Cities and the Corporation, have granted Conservation Easement Deeds in favor of the PVPLC.

PVPLC has the responsibility to honor the intentions to preserve and protect in perpetuity the conservation values of the properties in accordance with the terms of the Conservation Easements.

Since the terms of the Easements do not transfer interest or possession of the parcels, and due to lack of foreseeable future cash flow benefits and absence of a secondary easement market, no value were assigned to the Conservation Easements.

continued

6. Accrued Liabilities

Accrued liabilities at December 31, 2015 consist of the following:

Accrued payroll	$40,492
Other accrued expenses	22,635
Accrued vacation	21,963
	$85,090

7. Line of Credit

PVPLC has an unsecured line of credit with a bank, in the amount of $200,000, due December 2016, with a variable interest rate, not less than 3.25% under any circumstances. There was no outstanding amount as of December 31, 2015.

8. Commitments and Contingencies

Contracts

PVPLC's grants and contracts are subject to inspection and audit by the appropriate governmental funding agency. The purpose is to determine whether program funds were used in accordance with their respective guidelines and regulations. The potential exists for disallowance of previously funded program costs. The ultimate liabilities, if any, which may result from any other governmental audits or disallowances, cannot be reasonably estimated and, accordingly, PVPLC has no provisions for the possible disallowance of any program costs on its financial statements.

continued

9. Fair Value Measurements

The table below presents the balances of assets measured at fair value at December 31, 2015 on a recurring basis:

	Level 1	Level 2	Level 3	Total
Equities				
Long term	$3,509,839	$ -	$ -	**$3,509,839**
Fixed income securities				
Short term	1,748,239			1,748,239
	$5,258,078	$ -	$ -	**$5,258,078**

The fair values of equities and fixed income securities are measured on a recurring basis using quoted prices for identical assets in active markets (Level 1 inputs).

The table below presents transactions measured at fair value on a non-recurring basis during the year ended December 31, 2015:

	Level 1	Level 2	Level 3	Total
Contributed services	$ -	$48,466	$ -	**$48,466**

The fair value of contributed services has been measured on a non-recurring basis using quoted prices for similar assets in inactive markets (Level 2 inputs).

10. Temporarily Restricted Net Assets

Temporarily restricted net assets at December 31, 2015 consist of the following:

Acquisition and restoration	$182,865
Education program	73,500
White point	59,000
Stewardship	22,720
	$338,085

For the year ended December 31, 2015, net assets released from purpose restrictions were $136,738.

continued

11. Permanently Restricted Net Assets and Endowment Funds

Permanently restricted net assets represent contributions which the donor has stipulated that the principal is to be kept intact in perpetuity and only the interest and dividends therefrom may be expended for unrestricted purposes. At December 31, 2015, a permanently restricted net asset consists of endowment funds in the amount of $1,212,949.

Generally accepted accounting principles provides guidance on the net asset classification of donor-restricted endowment funds for a nonprofit organization that is subject to an enacted version of the Uniform Prudent Management of Institutional Funds Act of 2006 ("UPMIFA"). It also requires additional disclosures about an organization's endowment funds (both donor-restricted endowment funds and Board-designated endowment funds) whether or not PVPLC is subject to UPMIFA.

PVPLC's Endowment Fund includes donor-restricted funds. As required by generally accepted accounting principles, net assets associated with endowment funds are classified and reported based on the existence or absence of donor imposed restrictions.

PVPLC classifies as permanently restricted net assets, (a) the original value of the gifts to the permanent endowment, (b) the original value of subsequent gifts to the permanent endowment, and (c) accumulations to the permanent endowment made in accordance with the direction of the applicable donor gift instrument at the time the accumulation is added to the fund. The remaining portion of the donor restricted endowment fund that is not classified in permanently restricted net assets is classified as temporarily restricted net assets until those amounts are appropriated for expenditure by PVPLC.

Endowment net assets composition by type of fund as of December 31, 2015 is as follows:

	Permanently Restricted	Total Endowment Net Assets
Donor restricted endowment funds	$1,212,949	**$1,212,949**

Changes in endowment net assets for the fiscal year ended December 31, 2015 are as follows:

	Temporarily Restricted	Permanently Restricted	Total Endowment Net Assets
Beginning balance, January 1, 2015	$ -	$1,210,060	**$1,210,060**
Additions		2,889	**2,889**
Interest and dividends	21,613		**21,613**
Transfer to unrestricted	(21,613)		**(21,613)**
Ending balance, December 31, 2015	$ -	$1,212,949	**$1,212,949**

ADDITIONAL INFORMATION

Harrington Group
Certified Public Accountants, LLP

Independent Auditors' Report on Internal Control Over Financial Reporting and on Compliance and Other Matters Based on an Audit of Financial Statements Performed in Accordance With *Government Auditing Standards*

To the Board of Directors
Palos Verdes Peninsula Land Conservancy

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of Palos Verdes Peninsula Land Conservancy ("PVPLC"), which comprise the Statement of Financial Position as of December 31, 2015, and the related Statements of Activities, Functional Expenses, and Cash Flows for the year then ended, and the related notes to the financial statements, and have issued our report thereon dated March 17, 2016.

Internal Control Over Financial Reporting

In planning and performing our audit of the financial statements, we considered PVPLC's internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinion on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of PVPLC's internal control. Accordingly, we do not express an opinion on the effectiveness of PVPLC's internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

Compliance and Other Matters

As part of obtaining reasonable assurance about whether PVPLC's financial statements are free of material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards.*

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of PVPLC's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering PVPLC's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Harrington Group

Pasadena, California
March 17, 2016

APPENDIX K

CITY OF RPV NIGHT HIKE ACTIVITY

2015 Night Hike Activity

Palos Verdes Nature Preserve

Night Hikes led by Mountains Recreation and Conservation Authority Rangers:
1/31/15 (9 participants)
2/22/15 (13 participants)
3/6/15 (30 participants)
9/27/16 (9 participants)
10/26/16 (8 participants)
11/25/16 (21 participants)
TOTAL MRCA-led night hikes: 90 participants

Sierra Club Night Hikes via City Permit:
1/5/15 (15 participants)
1/19/15 (15 participants)
1/22/15 (15 participants)
1/26/15 (15 participants)
1/29/15 (15 participants)
2/16/15 (15 participants)
2/23/15 (15 participants)
3/2/15 (30 participants)
3/9/15 (30 participants)
3/16/15 (30 participants)
3/23/15 (30 participants)
3/30/15 (30 participants)
10/19/15 (30 participants)
11/2/15 (15 participants)
11/9/15 (15 participants)
11/16/15 (15 participants)
11/23/15 (15 participants)
11/30/15 (15 participants)
12/7/15 (15 participants)
12/21/15 (15 participants)
12/28/15 (15 participants)
Sierra Club night hikes: 405 participants

TOTAL NIGHT HIKE PARTICIPATION: 495

APPENDIX L

HABITAT IMPACT TRACKING

2015 Habitat Loss Tracking Report

Responsible Party	Date of CSS Loss	Amount of CSS Loss (Acres)	Location of Loss	Description of Loss
City	Apr-15	0.1	Abalone Cove Reserve	Public Works graded area and filled in new fissures for public safety.
Private Resident	Oct-15	0.3	Abalone Cove Reserve	Private resident graded portion of Preserve as part of private construction project.

TOTAL: 0.4 Acres