

AGENDA DESCRIPTION:

Consideration and possible action to receive and file the 2016 Annual Report submitted by the Palos Verdes Peninsula Land Conservancy (PVPLC) regarding its management activities for the Palos Verdes Nature Preserve

RECOMMENDED COUNCIL ACTION:

- (1) Receive and file the 2016 PVPLC Annual Report.

FISCAL IMPACT: None

Amount Budgeted:	N/A
Additional Appropriation:	N/A
Account Number(s):	N/A

ORIGINATED BY: Katie Lozano, Administrative Analyst/Open Space Manager *KL*

REVIEWED BY: Cory Linder, Director of Recreation and Parks *CL*

APPROVED BY: Doug Willmore, City Manager *DW* *for*

ATTACHED SUPPORTING DOCUMENTS:

- A. 2016 PVPLC Annual Report (page A-1)

BACKGROUND AND DISCUSSION:

The City's Draft Natural Communities Conservation Plan (NCCP) calls for the Palos Verdes Peninsula Land Conservancy (PVPLC) to serve as the City's habitat manager for the Palos Verdes Nature Preserve (Preserve). In this capacity, PVPLC is required by the draft NCCP to submit certain annual reports to the City and resource agencies (the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service). Specifically, PVPLC is required to submit a monitoring report on its habitat restoration areas in the Preserve and on its exotic plant removal efforts.

Pursuant to the draft NCCP approved by the City Council in 2004 and the formal management agreement authorizing PVPLC to manage and restore Preserve habitat on behalf of the City, PVPLC has submitted, for the City Council's acceptance, the 2016 Annual Report summarizing the PVPLC's management activities pursuant to the management agreement in the Preserve (Attachment A). A link to an electronic copy of the 2016 Annual Report was provided to the City Council via email on October 23, 2017.

The PVPLC Annual Report covers the period between January 1, 2016, and December 31, 2016. The Annual Report describes PVPLC's habitat management activities relating to habitat enhancement and restoration; property maintenance and monitoring; vegetation and wildlife monitoring; trail management and monitoring; and volunteer involvement during the 2016 calendar year. The 2016 PVPLC Annual Report includes the following sub reports (see Attachment A):

- Habitat Restoration Monitoring
- Restoration Plans
- 2016 Targeted Exotic Removal Program for Plants (TERPP)
- Scientific Research and Wildlife Monitoring
- Volunteer Involvement
- Trail Management and Monitoring
 - Unauthorized Trail Closures (Appendix G)
 - Future Trails Project List (Appendix H)

According to the cover letter from PVPLC Executive Director Andrea Vona, the Annual Report is consistent with the reporting requirements of the draft NCCP. Furthermore, the resource agencies have reviewed and accepted the Annual Report as presented. Staff has reviewed the Annual Report and agrees that it is consistent with PVPLC's Preserve habitat management responsibilities.

As a means of notifying the public and interested parties regarding the 2016 Annual Report, on October 26, 2017, an email was sent to the subscribers of the Palos Verdes Nature Preserve listserv, announcing the availability of the 2016 Annual Report (with a link to view the document), and the November 8, 2017, City Council meeting at which it would be presented. On November 1, 2017, the document was posted on the City's website. Hard copies are also available at City Hall and Hesse Park for public review upon request. To date, no public comments have been submitted to the City.

ALTERNATIVES:

In addition to the Staff recommendation, the following alternative action is available for the City Council's consideration:

1. Provide direction to Staff and/or PVPLC regarding City Council or community concerns about the 2016 Annual Report.



PRESERVING LAND AND RESTORING HABITAT FOR THE EDUCATION AND ENJOYMENT OF ALL

August 22, 2017

Ara Mihranian
Community Development Director
City of Rancho Palos Verdes
30940 Hawthorne Boulevard
Rancho Palos Verdes, CA 90275

Re: Palos Verdes Nature Preserve Annual Report for January 1, 2016 to December 31, 2016 for the Rancho Palos Verdes Draft Natural Community Conservation Plan and Habitat Conservation Plan

Dear Mr. Mihranian,

This letter is to confirm that 2016 Palos Verdes Nature Preserve Annual Report for the Rancho Palos Verdes Draft Natural Community Conservation Plan and Habitat Conservation Plan has been approved by the Wildlife Agencies. A copy of this report was delivered to Rancho Palos Verdes City Hall.

An additional appendix needed in the Report, which the City of Rancho Palos Verdes should provide, is the habitat tracking matrix.

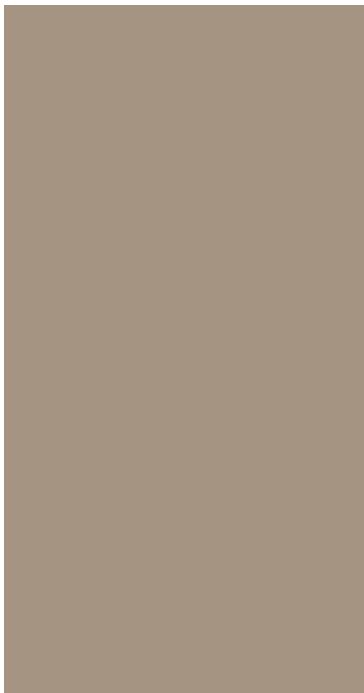
Please contact me with any questions.

Thank you!

Adrienne Mohan
Conservation Director

Andrea Vona
Executive Director

Palos Verdes Peninsula **Land Conservancy**



January -- December 2016

PALOS VERDES NATURE PRESERVE ANNUAL REPORT

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FOR THE
**RANCHO PALOS VERDES
NATURAL COMMUNITY CONSERVATION PLAN**

May 2017

A-2

2016 ANNUAL REPORT

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1.0 INTRODUCTION

The 2016 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) for 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, 2016 through December 31, 2016.

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 per the requirements of the draft NCCP and 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 three-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 25 acres at Portuguese Bend Reserve. The 25 acre Portuguese Bend project has been implemented and the remaining acreage at Alta Vicente Reserve will be completed in the coming years. 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. Collaborating with regional high schools and colleges allows for scientific research that expands our understanding of the Preserve.

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, three Comprehensive Reports have been completed, covering the periods 2007 through 2009, 2010 through 2012, and 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
4. Volunteer involvement and support
5. Scientific research

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.

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

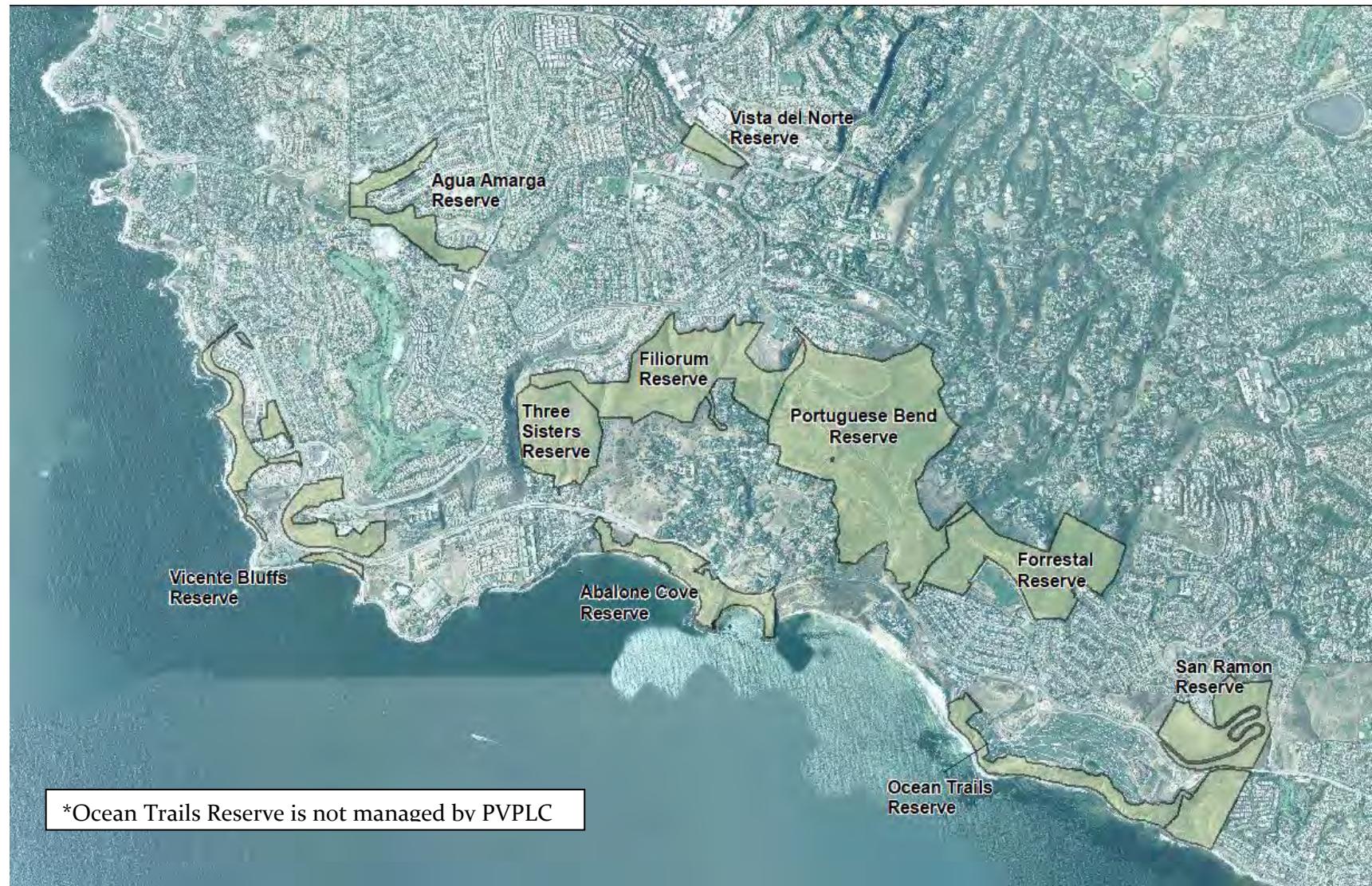


Table I
Reserve Names of the Palos Verdes Nature Preserve. See Figure I for locations.

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 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 five 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. The Restoration Plan for Portuguese Bend covers restoration and monitoring 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 Phase 1 through 5 at Portuguese Bend.

In 2015, PVPLC developed new restoration plans to execute the final phases of the restoration at Alta Vicente, and were included in the 2015 Comprehensive Report. Phase 3 was initiated in 2016,

with the installation of drip irrigation and coastal sage scrub vegetation species. Table 3 provides the implementation schedule for Phase 3 and 4 at Alta Vicente.

2.1 PORTUGUESE BEND RESERVE RESTORATION

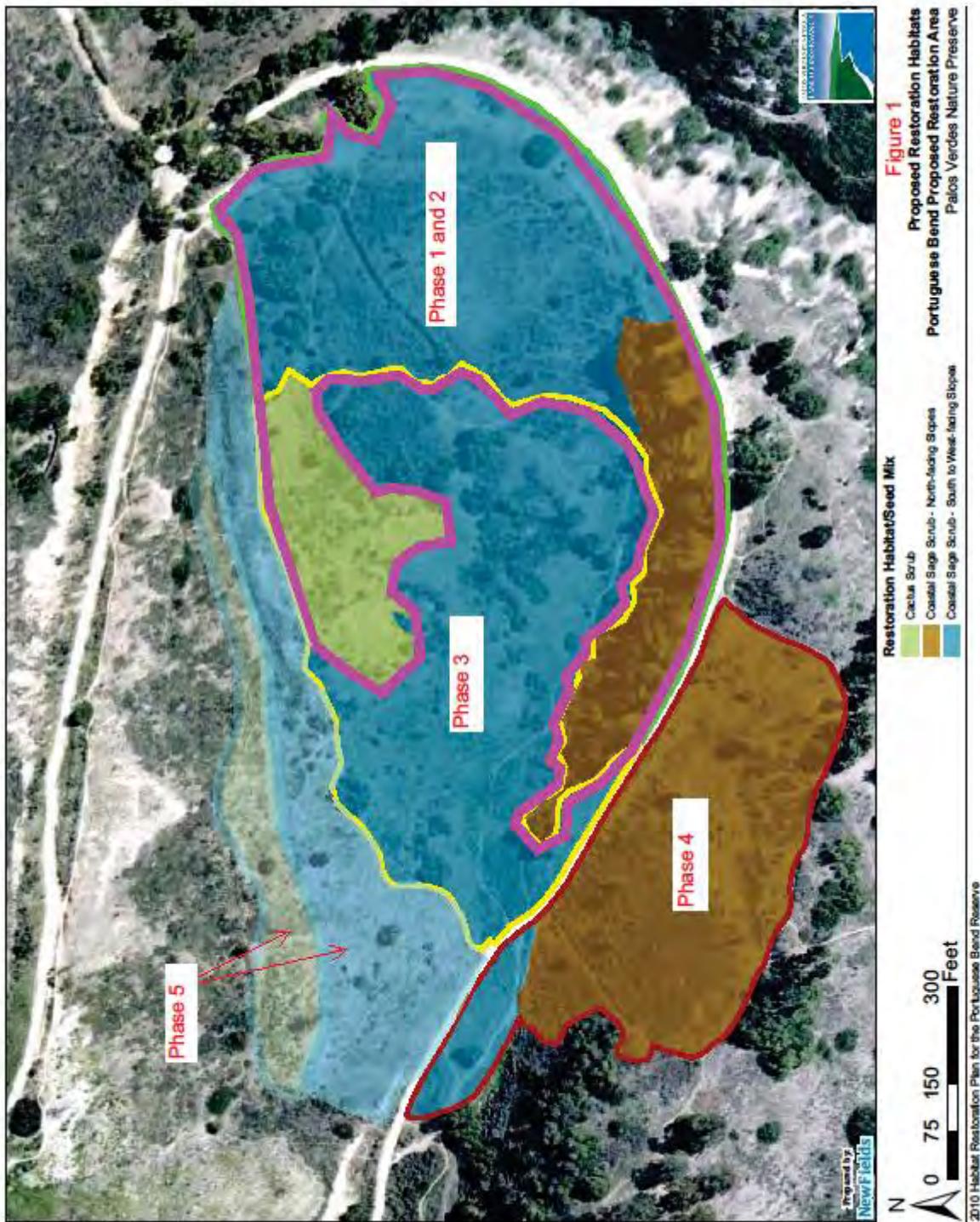
The restoration plan for Portuguese Bend is to complete 25 acres in five phases (Table 2, Figure 2). Site preparation at Portuguese Bend began in February 2010. Field staff weeded (hand/herbicide) the burn area in 2010. In February, 2011, goats were deployed to clear vegetation. Due to the high density of weeds, an additional year of weeding was implemented, and plants were installed on ten 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 five years minimum after they are initiated.

Table 2
**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
PHASE 1 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 2. Map of restoration areas at Portuguese Bend Reserve.



2.2 ALTA VICENTE RESERVE RESTORATION

The habitat restoration conducted at the Alta Vicente Reserve consists of four phases, with one phase initiated each year. The first five 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.

Phase 3 (Figure 3) was initiated in fall 2016 with the installation of drip irrigation system and container plants throughout the 5 acre area. Year 1 monitoring will begin in spring 2017.

Table 3
Restoration Project Schedule for Alta Vicente Reserve, based on the Alta Vicente Reserve Habitat Restoration Plan.

	Task	Date
PHASE 3	Begin site preparation, weed removal	Fall 2016
	Install irrigation	Fall 2016
	Planting Container Stock	Fall and Early Winter 2016
	Seed application	Fall and Early Winter 2017
	Monitoring and Maintenance	To begin after planting, Winter 2016
	5-year biological monitoring and maintenance	Spring 2017-Spring 2021
PHASE 4	Begin site preparation, weed removal	Summer 2017
	Install irrigation	Fall 2017
	Planting Container Stock	Fall and Early Winter 2017
	Seed application	Fall and Early Winter 2017
	Monitoring and Maintenance	To begin after planting, Winter 2017
	5-year biological monitoring and maintenance	Spring 2018-Spring 2022

Figure 3. Map of 2016 restoration area at Alta Vicente Reserve (Phase 3 in yellow).



3.0 ADDITIONAL RESTORATION IN 2016

PVPLC seeks additional funding, to perform restoration on more than the minimum five acres per year required in the NCCP. Several opportunities 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 2016, including the restoration at Alta Vicente and Portuguese Bend Reserves that fulfills the requirements of the NCCP Habitat Restoration Plan. A complete summary of all restoration work completed in the Preserve, along with maps of restoration sites, can be found in Appendix C.

3.1 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, 2015, and 2016.

3.2 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. The project was monitored in 2016.

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 and monitored the site's recovery in 2015 and 2016.

3.3 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. Volunteers have continued to plant host plants and remove weeds through 2016 to expand habitat area for the El Segundo blue butterfly.

3.4 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. This work is ongoing through 2017.

Figure 4. Site map for active 2016 restoration projects in the Palos Verdes Nature Preserve.

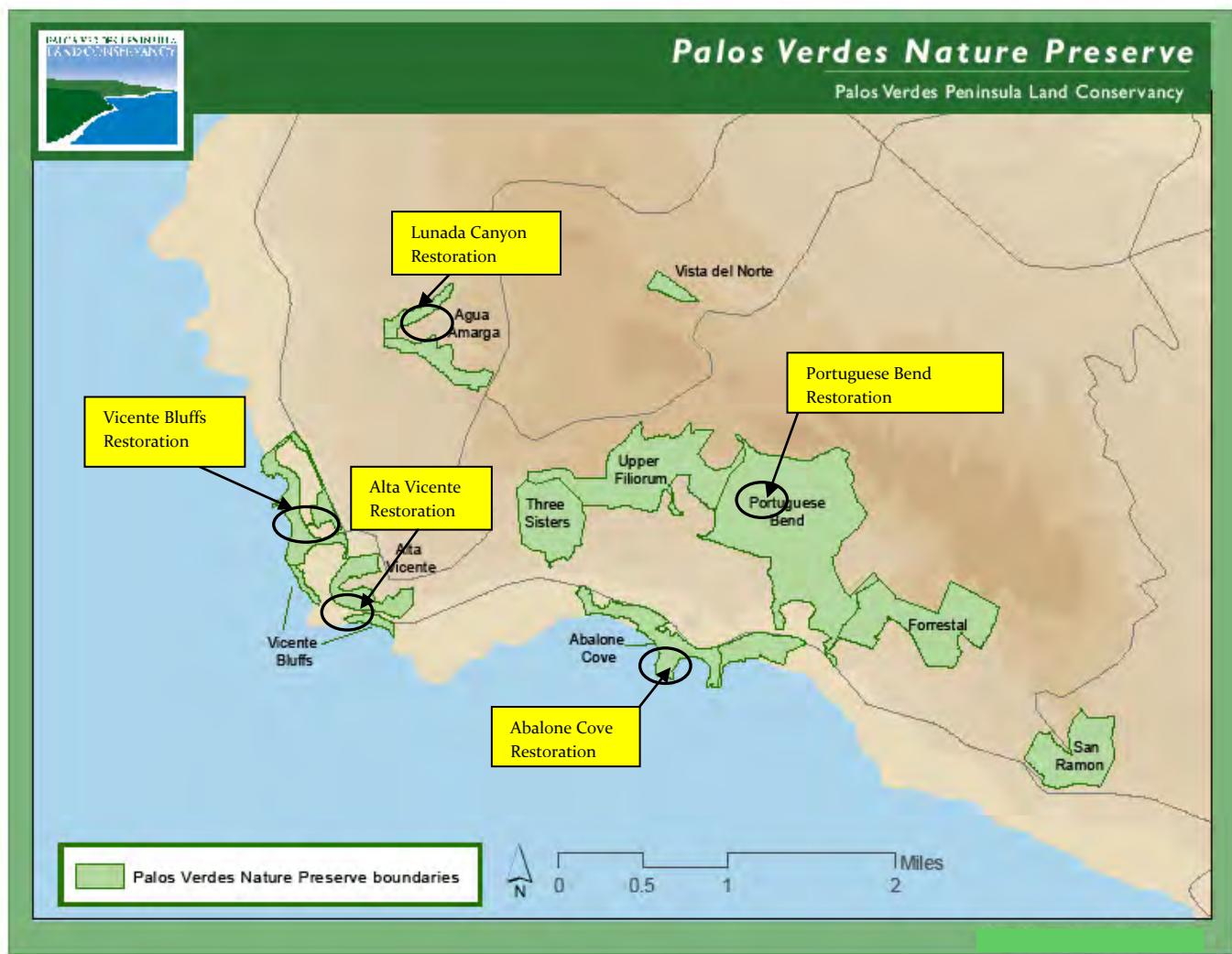


Table 4
Restoration Project Schedule for Additional Restoration in
Palos Verdes Nature Preserve.

	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
Vicente Bluffs (0.75 acres)	Remove invasive plants	Spring – Fall 2012
	Install native plants	Fall 2012
	Weed and maintain site	Through 2016
Portuguese Bend Grants (0.75 acres)	Remove invasive plants	Spring – Fall 2012
	Install native plants	Fall 2012
	Weed and maintain site	Through 2017

4.0 MONITORING

4.1 RESTORATION MONITORING

PVPLC's stewardship staff conducted surveys at the restoration sites throughout the preserves, including quantitative vegetation transects, qualitative vegetation assessments and photo point monitoring. 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 2016, restoration monitoring as per NCCP requirements was conducted at Alta Vicente and Portuguese Bend Reserves. Detailed monitoring reports are in Appendix A.

At Alta Vicente, the plants in all phases of the restoration site are healthy and growing. The cactus scrub has met success criteria. The coastal sage scrub has nearly achieved success criteria of 50% native plant cover (46-49% observed). There remain gaps in native vegetation due to low seed germination, likely a result of prolonged drought conditions. PVPLC has

adapted by increasing plant density and utilizing drip irrigation instead of overhead sprinklers in subsequent restoration projects. The Palos Verdes blue butterfly habitat has not met the success criteria, due to low numbers of host plants along the transect. In 2017 staff will focus on controlling weeds on a regular basis to decrease competition and increase bare ground for seed germination. PVPLC will continue to observe and control weeds in Phase 1 and Phase 2 to observe the rate of restoration.

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 4 after plant installation for the 2016 monitoring. 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 3) native plant cover has achieved success criteria. Phase 4 (Year 2) has surpassed the success criteria for a more mature Year 5 restoration. Phase 5 (Year 1) is meeting the year-one goal for coastal sage scrub cover, however cactus cover has not yet met goals for the first year. Fill-in planting and weed control will take place in 2017 to bolster native vegetation in Phase 5.

4.2 COVERED SPECIES MONITORING

The NCCP/HCP requires surveys for covered species on the Preserve every three years. The Comprehensive Management and Monitoring Report for 2013-2015 contains the latest report on the status of covered plant species, El Segundo blue butterfly, California gnatcatcher and cactus. The next survey for covered plant species will be triggered by precipitation that totals 9.75 inches (75% of the annual average).

The draft NCCP/HCP includes a total of six covered plant species. They are aphanisma (*Aphanisma blitoides*), south coast salt scale (*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*).

4.3 MONITORING CITY PROJECTS

PVPLC provided monitoring and consultation for four City projects in 2016 – the La Rontonda Drainage Repair Project at Ocean Trails, the ACLAD dewatering wells in Portuguese Bend Reserve, the CalWater pipeline rupture repairs on Burma Road Trail in Portuguese Bend Reserve, and the Toyon Trail remediation project in Portuguese Bend Reserve. A table of habitat impacts is shown in Appendix J.

The La Rontonda Drainage Repair Project began in 2015 and repaired underground pipelines along the southern edge of Ocean Trails Reserve in the Shoreline Park area. The project occurred within the vicinity of known *Atriplex pacifica* plant populations and CSS habitat. Staff flagged individual *Atriplex* plants near the roadsides, which were avoided during construction. The project was completed in early 2017, and our staff verified that no permanent damage incurred to CSS or the *Atriplex* vegetation.

The Abalone Cove Landslide Abatement District (ACLAD) dewatering well project began summer 2016 and is still ongoing at the time of this report (April 2017). Four new well sites were drilled – two of Burma Road south of Water Tank Trail and two along Ishibashi Farm Trail. Approximately 0.1 acres of CSS was permanently removed and 0.1 acres of non-native annual grasses. Mitigation at a 2:1 ratio for the CSS impacts will be required for this project and has not yet been performed at the time of this report.

In August 2016, a CalWater pipeline failure caused the emergency removal of habitat in Portuguese Bend Reserve in order to access and repair the underground pipeline. The location of the impacted areas are adjacent to Burma Road, south of the intersection of Eagles Nest trail. According to the draft NCCP, this impact requires restoration at a 2:1 ratio for coastal sage scrub (CSS) and 0.5:1 ration for non-native annual grassland (NNAG). The measured area of impact is 0.04 acres of CSS and 0.03 acres of NNAG, therefore the resulting restoration required is 0.08 acres of CSS and 650 sq. ft. of NNAG. The City has hired PVPLC to perform the restoration, where appropriate CSS species were planted and seeds dispersed in the affected areas. PVPLC will continue to maintain and monitor the restored areas through 2019.

The Toyon Trail and Peppertree Trail in Portuguese Bend were accidentally graded in October 2014 by a City contractor, impacting 0.3 acres of trailside CSS. The City and PVPLC coordinated repairs to the Toyon trail to restore its historic width in the impacted area by planting approximately 400 plants and installing post-and-rope and boulders to protect the plants from trampling. The City hired PVPLC to perform a site assessment in January 2017, which found that plant survival was low (about 25% survival rate) and weeds (namely *Brassica*) were encroaching into the restoration area. PVPLC recommends the City replant bare areas in fall 2017 to successfully remediate this damage.

5.0 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 will develop a protocol for utilities to follow when they access the Preserve.

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.

In 2016, PVPLC met the objectives for the TERPP program by treating 21 populations of invasive plants. PVPLC treated 18 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.

At Abalone Cove, an *Arundo donax* that had previously been treated was retreated. And a population of *Coronilla valentina* that had previously been treated experienced some new germination and was retreated. Maps and detailed reports of the TERPP program are found in Appendix D.

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 CITIZEN SCIENCE

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. Citizen Science volunteer programs assist the Land Conservancy with annual monitoring of the presence and abundance of cactus wren and mesopredators (coyote, grey fox and red fox). A report of 2016 research projects and citizen science monitoring programs is located in Appendix E.

9.0 TRAIL MANAGEMENT AND MONITORING

9.1 PRESERVE TRAILS PLAN

The Preserve Trails Plan is a part of 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 latest version updates of PUMP in March 2013 after the designation of trails in Filiorum Reserve.

9.2 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 refreshes carsonite signs and decals in the Preserve to better delineate trails. A full-time PVPLC field operations technician focuses on unauthorized trail closure, trail delineation and graffiti removal. The following represent the accomplishments in 2016 for trail management:

Area Closed Signs Installed	15 signs
Decals Replaced	119 decals
Graffiti Removed	32 removed
New Carsonite Trail Markers	7 markers
Trail Maintenance Projects	23 projects
New Spur Trail Closures	101 closures
Repaired/Fortified Spur Closures	137 closures
Brush Trimming/Weed clearance	48 projects
Repaired Signage/Trail Markers	23 signs
Trail Crew Events (Maintenance Projects)	11 events, 450 volunteer hours
Rapid Response Volunteer Days	50+ events, 1050 volunteer hours

With support of grants from Habitat Conservation Fund, PVPLC worked with the City of Rancho Palos Verdes to design a master plan for Preserve signage to include designs for primary trailhead markers, interpretive panels and regulatory signage (Appendix I). The signage plan was approved by City Council in July 2016. Some remaining grant funding is available to produce and install signage in limited locations, and both the City and PVPLC are seeking additional funding to implement the entire signage plan.

9.3 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. 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. Additionally, the Volunteer Trail Watch watered cactus pads during the summer to help maintain trail closures. 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 2016, focal areas were Filiorum (Jack's Hat Trail, Rattlesnake Trail, Eucalyptus Trail, Gary's Gulch Trail, Kelvin Canyon Trail and the canyon that connects to Three Sisters); 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, Dauntless Trail, Cactus Trail and Exultant Trail); and Abalone Cove Reserves (Sea Dahlia Trail, Smuggler's Trail and Olmsted Trail) (Appendix G).

9.4 TRAIL REPAIR

The 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 staff including Open Space Management, Recreation and Parks, and Public Works personnel were also involved in trail enhancements. The following lists the trail projects that the PVPLC Volunteer Trail Crew conducted in 2016:

Abalone Cove

- Repaired rock steps on Sea Dahlia Trail (June)

Filiorum

- Installed retaining wall on Kelvin Canyon Trail to reestablish trail bed (January and August)
- Cleared boulders and debris from canyon crossing on Zotes Cutacross (January)
- Tread repair, outsloping and installed check dam in canyon crossing on Zotes Cutacross (March and July)
- Reestablish canyon crossing on Ford Trail (October)

Forrestal

- Repaired grade dips on Pirate Trail (May)
- Repair Mariposa Trail bridge and adjacent tread repair (December)

Portuguese Bend

- Realign segment of Toyon Trail and assist City of RPV with narrowing graded trail segments (February)

Three Sisters

- Re-establish trail tread in switchback section of Sunshine Trail (April)

Vista del Norte

- Establish trail connection to Sol Y Mar development's trail system (September)

Future Trail Projects

Trail projects that may be completed in the future, based on funding, are listed in Appendix H.

9.5 TRAIL MONITORING

PVPLC stewardship staff and volunteers from the Keeping an Extra Eye on the Preserve for Environmental Review and Stewardship (Keepers) Program and the Volunteer Trail Watch (VTW) Program conducted all trail monitoring during the reporting period. The Keepers program and VTW program are described in detail in the Volunteer Involvement section of the report (Appendix F).

The City of RPV grants permission for night hikes in the Preserve. A listing of night hikes is found in Appendix K.

9.6 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 enforcement personnel and Preserve managers to track time and location of these activities. Eleven new volunteers completed the fourth training workshop for the Volunteer Trail Watch, which took place in January. The VTW also meets every quarter to provide additional training and information to share with Preserve visitors.

10.0 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. In 2016, volunteers contributed over 16,140 hours of service in support of conservation, restoration, education and management of the Palos Verdes Nature Preserve. The 2016 Volunteer Annual Report detailing the volunteer programs is located in Appendix F.

11.0 ABILITY TO ACCOMPLISH RESOURCE MANAGEMENT GOALS

PVPLC, City staff and Wildlife Agency representatives have been working diligently to update figures and finalize the language in the draft NCCP. However, this belabored process is delaying the finalization of the Plan and has presented problems for the City who would like to implement projects in the Preserve for which they do not have take permit authorization. The completion of the NCCP must remain a priority for staff so that operations and projects may commence.

PVPLC has been successful at completing restoration under the NCCP, monitoring NCCP covered species, 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 through the TERPP program since 2009. Additionally, the prolonged drought from 2013 to 2016 put great stress on habitat, restoration projects and covered species, as observed in our monitoring efforts.

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, drought, and increasing use of the Preserve. PVPLC is taking information collected by staff and the VTW to coordinate with City of RPV staff and the Lomita Sheriffs assigned to patrol the Preserve to help determine which areas need more enforcement and maintenance attention.

12.0 FUNDING NEEDS

PVPLC would benefit from continued funding to control highly invasive species on the Preserve and continually battle back against unauthorized and widening trails that damage habitat. PVPLC continues to apply for funding from federal, state and private sources to increase the amount of acreage restored for the species listed under the plan.

13.0 BOARD AND STAFF

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Laura Lohnes, Development Associate

APPENDIX A

RESTORATION MONITORING

In 2016 vegetation surveys were conducted at restoration sites within Alta Vicente and Portuguese Bend reserves to estimate percent cover of native and non-native plants, litter, and bare ground. These data are used to measure the success of restoration based on the goals determined in each site-specific restoration plan.

I.0 ALTA VICENTE SURVEY METHODS

Restored habitat areas were surveyed through qualitative, quantitative, and photographic vegetative assessment techniques along 50m permanent transect lines (location of transects: Appendix A1 and A2, Figure 1 and Figure 2) within three habitat types (coastal sage scrub, cactus scrub, and Palos Verdes Blue butterfly habitat). Success criteria was assessed using qualitative methodology (CNPS Rapid Vegetation Assessment Method) in monitoring Years 1 and Year 2 and with quantitative methodology (point-intercept method) in Years 3 and 5. Photopoints were collected in all monitoring years. Qualitative measurements of percent cover for native, non-native, species-specific, and bare/litter categories were collected through use of an adapted form of the CNPS Rapid Vegetation Assessment Method. Quantitative measurements of percent cover and plant size (height and width) were collected using the point-intercept method on a 50m transect to evaluate restoration success based on set criteria for the 3rd year following initial restoration activities and continued in the 5th year if success criteria measures were not met. Photopoints were taken at either end of permanent monitoring transects to aid in the assessment of plant health and establishment. Transects not meeting success criteria by Year 5 (end of required monitoring period) were monitored using at minimum qualitative measures to assess progress toward success criteria goals.

I.1 ALTA VICENTE PHASE I SURVEY RESULTS (YEAR 7)

Monitoring transects (AV1 – AV6) in Alta Vicente did not meet success criteria by the fifth year of monitoring (Year 5 reached in 2014 for Phase 1 and 2015 for Phase 2). These transects were monitored after their fifth year since they did not meet success measures last report.

Coastal Sage Scrub (CSS)

One monitoring transect (AV1) was surveyed within the CSS of Phase I restoration. Quantitative methods (point-intercept method) were used to identify the presence of 11 individual native plants, four native species, a total native plant cover of 32%, non-native cover of 56%, and bare ground/litter cover of 28% (Table 2). Native plant species with the highest percent cover at this transect included *Artemisia californica* (18%), *Eriogonum cinereum* (6%), *Eriogonum parvifolium* (2%), and *Opuntia littoralis* (6%) (Table 2). Average shrub height ranged from 7cm to 66.8cm (Table 4). Qualitative survey methods (CNPS Rapid Vegetation Assessment) found percent cover by native plant species to be 49% (Table 5). Photopoints show that many plants have increased in size and appear to be in good health (Appendix A1).

Quantitative measurements continue to describe this transect as below success criteria goals, although qualitative and photographic assessment indicate that habitat along AV1 is healthy and within 1% of meeting success goals for native plant cover (50% in Year 5).

Palos Verdes Blue Butterfly Habitat (PVB)

One monitoring transect (AV2) was originally intended to be aligned within the PVB habitat of Phase 1 restoration. AV2 is currently located in an area of PVB restored habitat within Phase 2 restoration although it is unclear if the transect was deliberately relocated or mistakenly placed when established. Monitoring of AV2 is reported in PVB Phase 2 restoration (Section 1.2 below).

1.2 ALTA VICENTE PHASE 2 (YEAR 6)

Cactus Scrub

One monitoring transect (AV3) was surveyed within the cactus scrub of Phase 2 restoration. Quantitative methods (point-intercept method) were used to identify the presence of 24 native plants, four native species, a total native plant cover of 48%, non-native cover of 4%, and bare ground/litter cover of 48% (Table 2). The native plant species with the highest percent cover at this transect were *Eriogonum cinereum* (22%) and *Encelia californica* (16%). Average shrub height ranged from 12.6cm to 33.5cm (Table 4). Qualitative survey methods (CNPS Rapid Vegetation Assessment Method) found percent cover of native plant species to be 37% with 9% cactus cover (Table 5). Photo points indicate that cactus is growing, with three to five pads on each individual (Appendix A1). Quantitative methods describe AV3 as being within 2% of achieving success criteria goals for native plant cover. Although cactus species were not detected in quantitative analysis, qualitative methods identified cactus cover as 9% at AV3, within 1% of the Year 5 success goal (10% cactus cover goal).

PVB Butterfly Habitat

Two monitoring transect (AV2 and AV5) were surveyed within the PVB butterfly habitat of Phase 2 restored areas. At AV5, quantitative methods (point-intercept method) were used to identify the presence of three native plants, three native species, a total native plant cover of 6%, non-native cover of 76%, and bare ground/litter cover of 28% (Table 2). Average shrub height ranged from 18cm to 35cm (Table 4). Qualitative survey methods (CNPS Rapid Vegetation Assessment Method) found percent cover by native plant species to be 27% (Table 5). Photo points show that native plants are present, but remain small (Appendix A1) and document the colonization of the bare ground at the site by the Crystalline Iceplant (*Mesembryanthemum crystallinum*). Quantitative measurements continue to describe this transect as below success criteria goals for native and host plant cover, although qualitative assessments indicate that habitat along AV5 is healthy and nearing success goals for native cover (30-60% in

Year 5). Qualitative assessments captured the presence (1% cover) of the host plant *Astragalus tricopodus*, although host plant cover remains below success criteria goals (10% in year 5).

AV2 was surveyed within the PVB habitat of Phase 2 restoration following a relocation from Phase 1. Quantitative methods (point-intercept method) were used to identify the presence of ten individual native plants, four native species, total native plant cover of 24%, non-native cover of 62%, and bare ground/litter cover of 38% (Table 2). The native plant species with the highest percent cover at this transect was *Artemisia californica* (12%). No PVB host plants (*Acmispon glaber* or *Astragalus trichopodus*) were detected along AV2. Average shrub height ranged from 22cm to 82.2cm (Table 4). Qualitative survey methods (CNPS Rapid Vegetation Assessment Method) found percent cover by native plant species to be 49% (Table 5). Photopoints indicate that many plants have increased in size and appear to be in good health (Appendix A1). Native plant cover is within the success criteria range for Year 5 goals (Table 11), but PVB host plants were not detected. Monitoring may need to occur earlier (March/April) to accurately capture host plant presence at the site.

Coastal Sage Scrub (CSS)

Transect (AV6) in Phase 2 restoration at Alta Vicente was incorrectly aligned since 2014. The correction was made post-monitoring in 2016. Future monitoring will use the correct alignment of AV6. Quantitative methods (point-intercept method) were used to identify the presence of 16 individual native plants, two native species, total native plant cover of 32%, non-native plant 34%, bare ground/litter cover of 36%. Native species with the highest percent cover at this transect was *Encelia californica* (24%) and *Eriogonum cinereum* (8%) (Table 2). Shrub height ranged from 31.2cm to 31.8cm (Table 4). Qualitative survey methods (CNPS Rapid Vegetation Assessment Method) found percent cover of native species to be 45% (Table 5). Photo points indicate that the transect was placed at a different location from the previous year (Appendix A1). In 2016, CSS cover was lower than the success goals for Year 5 (> 50% native cover). However, the percent cover of native CSS species is approaching the success criteria goal.

I.3 ALTA VICENTE PLANT INVENTORY

The native plant inventory identified through the monitoring of five permanent transects in Alta Vicente totaled 22 species

I.4 ALTA VICENTE CONCLUSIONS AND RECOMMENDATIONS

All monitoring transects surveyed in 2016 did not succeed in meeting success criteria standards. Despite this shortcoming, three transects (AV1, AV3, and AV6) were within 5% of meeting those goals and are expected to achieve success criteria in the next year of monitoring (2017). Perennial species such as *Artemisia californica*, *Encelia californica*, and *Eriogonum fasciculatum* appear to be well

established and in good health. Prolonged drought conditions may have inhibited the growth of these established plants and prevented the achievement of success criteria standards. The lack of PVB host plant within restored areas monitored at transects AV2 and AV5 may not only be attributed to drought conditions, but also to the colonization of restored PVB habitat by the aggressive non-native Crystalline Iceplant (*Mesembryanthemum crystallinum*) and survey scheduling. *M. crystallinum* was observed to have a strong presence in PVB habitat and may represent a significant competitive challenge to PVB host plants (*Astragalus tricopodus* and *Acmispon glaber*). Low detection of PVB host plants could also have been influenced by plant dormancy or senescence in May. Monitoring PVB habitat could benefit from monitoring earlier in the season prior to the onset of PVB host plant dormancy.

2.0 PORTUGUESE BEND SURVEY METHODS (PHASE 1, 2 AND 3)

Restored habitat areas were surveyed through qualitative, quantitative, and photographic vegetative assessment techniques. Qualitative measurements of percent cover for native, non-native, species-specific, and bare/litter were collected through use of an adapted form of the CNPS Rapid Vegetation Assessment Method across nine transects (PB1-PB9). Quantitative measurements of percent cover and plant size (height and width) were collected through use of the point-intercept method across two transects in their third year of establishment (PB4 and PB5). Photopoint documentation of all restored areas continued, and typically included a photograph being taken at the beginning and end of each monitoring transect. Monitoring surveys were conducted on April 14 and April 18, 2016. Locations of monitoring transects and photo points can be found in Appendix A2, Figure 2.

2.1 PORTUGUESE BEND SURVEY RESULTS (PHASE 1 AND 2) YEAR 4

South-facing Coastal Sage Scrub (CSS)

Two monitoring transects (PB1 and PB2) were surveyed within the south-facing CSS of Phase 1 and 2 restoration, although PB1 and PB2 were not under success criteria evaluation using quantitative point-intercept methods in 2016. At PB1, qualitative methods (CNPS Rapid Vegetation Assessment Method) were used to identify the presence of ten native plant species, a total native plant cover of 27%, and a non-native plant cover of 16% (Table 10). Native plant species with the highest percent cover at this transect included *Artemisia californica* (8%), *Heteromeles arbutifolia* (5%), and *Eriogonum fasciculatum* (4%) (Table 10). PB1 is not expected to meet the five year success criteria evaluation in 2017. At the second monitoring transect (PB2) qualitative methods identified 18 native species, a total native cover of 47%, and non-native cover of 9% (Table 10). Natives with the highest percent cover at this transect included

Artemesia californica (12%), *Eriogonum fasciculatum* (6%), and *Encelia californica* (4%) (Table 10). PB2 is expected to meet the final success criteria for native plant cover (>50%) and non-native plant cover (<25%) in Year 5 (2017).

North-facing Coastal Sage Scrub (CSS)

One monitoring transect (PB3) was surveyed within the north-facing CSS of Phase 1 and 2 restoration, although PB3 was not under quantitative success criteria evaluation in 2016. Qualitative methods (CNPS Rapid Vegetation Assessment Method) were used to identify the presence of ten native plant species, a total native plant cover of 39%, and a non-native plant cover of 21% at PB3 (Table 10). Native plant species with the highest percent cover at this transect included *Baccharis pilularis* (11%), *Heteromeles arbutifolia* (7%), and *Rhus integrifolia* (5%) (Table 10). PB3 is expected to meet the final success criteria for native plant cover (>50%) and non-native plant cover (25%) in Year 5 (2017).

Cactus Scrub

One monitoring transect was surveyed within the Cactus Scrub of Phase 1 and 2 restored areas (PB6), although PB6 was not under quantitative success criteria evaluation in 2016. Qualitative methods (CNPS Rapid Vegetation Assessment Method) were used to identify the presence of ten native plant species, a total native plant cover of 40%, and non-native plant cover of 9% at PB6 (Table 10). Native species with the highest percent cover were *Encelia californica* (7%), *Opuntia littoralis* (11%), and *Cylindropuntia prolifera* (5%) (Table 10). Large gaps observed in the vegetation in 2015 (litter and bare ground 63%) were planted in winter 2016 and thus reduced to 51% (Table 10). PB6 is expected to meet final success criteria for native plant cover (>40%), cactus cover ($\geq 10\%$), and non-native plant cover (<25%) in Year 5 (2017).

2.2 PORTUGUESE BEND SURVEY RESULTS (PHASE 3) YEAR 3

South-facing Coastal Sage Scrub (CSS)

Two monitoring transects (PB4 and PB5) were surveyed within the south-facing CSS of Phase 3 restoration. At PB4, quantitative methods (point-intercept method) were used to identify the presence of seven native plants, a total native plant cover of 24%, non-native cover of 26%, and bare ground/litter cover of 66% (Table 6 and 7). Native species with the highest percent cover were *Salvia mellifera* (8%), *Baccharis pilularis* (4%), and *Stipa pulchra* (4%) (Table 7). Year 3 success criteria goals at PB4 were not met for native (30%) or non-native plant cover (25%), although non-native plant cover was within 1% of success criteria goals (Table 11). Quantitative methods (point-intercept method) were used to identify the presence of 11 native plants, four native species, a total native plant cover of 14%, non-native cover of 8%, and bare ground/litter cover of 86% (Table 6 and 7). Native species with the highest percent cover were *Acmispon glaber* (4%), *Eriogonum fasciculatum* (4%), and *Salvia mellifera* (4%) (Table 7). Year 3 success criteria goals at PB5 were not met for native or non-native plant cover (Table 11).

2.3 PORTUGUESE BEND SURVEY RESULTS (PHASE 4) YEAR 2

North-facing Coastal Sage Scrub (CSS)

One monitoring transect (PB7) was surveyed within north-facing CSS of Phase 4 restored areas, although PB7 was not under quantitative success criteria evaluation in 2016. Qualitative methods (CNPS Rapid Vegetation Assessment Method) were used to identify the presence of 18 native plant species, a total native cover of 54%, and a non-native plant cover of 30%. Native species with the highest percent cover were *Artemisia californica* (20%), *Eschscholzia californica* (5%), and the PVB host plant, *Astragalus tricopodus* (5%). Native vegetation at PB7 has already surpassed Year 5 success criteria goals.

2.4 PORTUGUESE BEND SURVEY RESULTS (PHASE 5) YEAR 1

South-facing Coastal Sage Scrub (CSS)

One monitoring transect (PB8) was surveyed within the south-facing CSS of Phase 5 restoration, although PB8 was not under success criteria evaluation in 2016. Qualitative methods (CNPS Rapid Vegetation Assessment Method) were used to identify the presence of 12 native plant species, a total native cover of 24%, and a non-native plant cover of 38% (Table 10). Native species with the highest percent cover were *Artemisia californica* (4%), *Eschscholzia californica* (4%), the PVB host plant *Astragalus tricopodus* (4%), and *Malacothrix saxatilis* (3%). Native vegetation is expected to achieve success criteria goals in Year 3 monitoring (2017).

Cactus Scrub

One monitoring transect (PB9) was surveyed within the cactus scrub of Phase 5 restoration. Qualitative methods (CNPS Rapid Vegetation Assessment Method) were used to identify the presence of 18 native plant species, a total native cover of 38%, and a non-native plant cover of 8% (Table 10). Native species with the highest percent cover were *Encelia californica* (15%) and *Salvia leucophylla* (3%), with *Opuntia littoralis* at 1% cover. Native cover at PB9 is on track for meeting success criteria goals, however cactus maturity cover is low, with cactus cover likely to fall short of Year 3 goals (5% cactus cover).

2.5 PORTUGUESE BEND PLANT INVENTORY

The native plant inventory identified through the monitoring of nine permanent transects in Portuguese Bend totaled 43 species (Table 10).

2.6 PORTUGUESE BEND CONCLUSIONS AND RECOMMENDATIONS

Monitoring transects (PB 4 and PB 5) under Year 3 quantitative success criteria evaluation did not succeed in meeting or exceeding standards for percent cover measures. However, PB4 is on track to meet non-native plant cover measures (<25%) in Year 5 monitoring and PB 5 is showing strong presence (4% cover) of *Acmispon glaber*, an early successional coastal sage species which may facilitate the recruitment of later successional coastal sage species. PB5 also was found to have 86% cover of litter, describing the transect as having low living vegetative cover. Supplemental planting at PB5 could help infill the ground currently under high litter cover and improve native vegetative cover at the site. Of the transects not currently under success criteria evaluation, two transects (PB3 and PB7) are progressing toward future success criteria goals. Native cover at PB3 fell short by 1% in meeting the criteria goals (>40%) but did meet similar criteria for percent cover of native perennial species ($\geq 30\%$). PB7, within north-facing CSS habitat, has outperformed all other restoration sites, exceeding native cover success criteria goals in only the second year of monitoring. Both transects (PB3 and PB7) are expected to meet success criteria evaluation next year.

Two transects (PB 1 and PB 9) are not expected to meet success criteria goals in the next year of evaluation, although adaptive management activities could aid in success criteria achievement. In south-facing CSS, native plant cover at transect PB1 was low (27% out of 50%) despite also having relatively low percent cover measures for non-native species (16%). This may indicate that competition from non-native species is not an overly prohibiting factor and the introduction of additional plant material or more growing time may be required to achieve >50% native plant cover at PB1. Although PB9 will not be under evaluation until 2018, supplemental management over the next few years could aid in reaching desired cactus cover. PB9 is located within cactus scrub habitat and has already met Year 3 native cover goals, but was found to have low cactus cover (1%) in 2016. Slow growth rates of *Opuntia littoralis* may not allow the on-site plant material to achieve 5% cover by 2018. Additional cactus plantings could be added over the course of two years to help achieve adequate cactus cover at this transect.

Table 1: Alta Vicente**Number of plants per 50m transect with line intercept method, 1 m intervals.**

Species	AV1	AV2	AV3	AV5	AV6	Total
<i>Artemisia californica</i>	5	4	4	1		14
<i>Elymus condensatus</i>		2				2
<i>Encelia californica</i>			8	1	12	21
<i>Eriogonum cinereum</i>	3	2	11	1	4	21
<i>Opuntia littoralis</i>	1		1			2
<i>Peritoma arborea</i>	2					2
<i>Salvia mellifera</i>		2				2
Total Native Plants	11	10	24	3	16	64
NNAG	7	9		14	4	34
NNP	18	21	2	24	13	78
Total Non-native Plants	25	30	2	38	17	112
Bare	10	5	21	13	15	64
Litter	2	14	3	1	3	23
Total Bare and Litter	12	19	24	14	18	87
Total Plant Cover	36	40	26	41	33	176

Table 2: Alta Vicente**Percent cover along 50m line transects with point-intercept method, 1 m intervals.**

Species	AV1	AV2	AV3	AV5	AV6
<i>Artemisia californica</i>	18	12	8	2	0
<i>Elymus condensatus</i>	0	4	0	0	0
<i>Encelia californica</i>	0	0	16	2	24
<i>Eriogonum cinereum</i>	6	4	22	2	8
<i>Eriogonum parvifolium</i>	2	0	2	0	0
<i>Opuntia littoralis</i>	6	0	0	0	0
<i>Salvia mellifera</i>	0	4	0	0	0
Total Native Plants	32	24	48	6	32
NNAG	16	18	0	28	8
NNP	40	44	4	48	26
Total Non-native Plants	56	62	4	76	34
Bare	20	10	42	26	30
Litter	8	28	6	2	6
Total Bare and Litter	28	38	48	28	36
Total Plant Cover	88	86	52	82	66

Table 3: Alta Vicente

Relative percent cover along 50m line transects with line intercept method, 1 m intervals.

Species	AV1	AV2	AV3	AV5	AV6
<i>Artemisia californica</i>	20	14	15	2	0
<i>Elymus condensatus</i>	0	5	0	0	0
<i>Encelia californica</i>	0	0	31	2	36
<i>Eriogonum cinereum</i>	7	5	42	2	12
<i>Eriogonum parvifolium</i>	2	0	4	0	0
<i>Opuntia littoralis</i>	7	0	0	0	0
<i>Salvia mellifera</i>	0	5	0	0	0
Total Native Plants	36	28	92	7	48
NNAG	18	21	0	34	12
NNP	45	51	8	59	39
Total Non-native Plants	64	72	8	93	52

Table 4: Alta Vicente

Average plant height (ft) at each transect.

Species	AV1	AV2	AV3	AV5	AV6
<i>Artemisia californica</i>	66.8	82.2	22.5	35.0	
<i>Elymus condensatus</i>		22.0			
<i>Encelia californica</i>			12.6	29.0	31.2
<i>Eriogonum cinereum</i>	42.3	23.0	33.5	18.0	31.8
<i>Opuntia littoralis</i>	7.0		19.0		
<i>Peritoma arborea</i>	56.7				
<i>Salvia mellifera</i>		46.5			

Table 5: Alta Vicente**Vegetation percent cover based on CNPS Rapid Vegetation Assessment Method.**

Species	AV1	AV2	AV3	AV5	AV6
<i>Artemisia californica</i>	13	8	8	6	10
<i>Astragalus trichopodus</i>				1	
<i>Cylindropuntia prolifera</i>	1	1	2	1	1
<i>Deinandra paniculata</i>				1	
<i>Elymus condensatus</i>	1	2			
<i>Encelia californica</i>			9	6	13
<i>Eriogonum cinereum</i>	8	4	9	3	8
<i>Eriogonum fasciculatum</i>	1				
<i>Eriogonum parvifolium</i>	1	1			2
<i>Heteromeles arbutifolia</i>	2	1			
<i>Isocoma menziesii</i> var. <i>sedoides</i>	1		1		
<i>Lupinus succulentus</i>				1	
<i>Malosma laurina</i>	5	1			
<i>Marah macrocarpa</i>					1
<i>Mirabilis californica</i>		1			
<i>Opuntia littoralis</i>	2	3	7	1	5
<i>Peritoma arborea</i>	2	2		1	1
<i>Rhus integrifolia</i>	7	2	1	2	2
<i>Ricinus communis</i>				1	
<i>Salvia leucophylla</i>	3	3		2	1
<i>Salvia mellifera</i>	2	2			1
<i>Stipa pulchra</i>				1	
Total Native Cover	49	31	37	27	45
NNAG	2	4	2	5	1
NNP	19	34	24	31	22
Total Non-native Cover	21	38	26	36	23
Bare	17	24	36	40	35
Litter	13	7	1	1	1
Total Bare and Litter	30	31	37	41	36
Total Plant Cover	70	69	63	63	68

Table 6. Number of individual plants counted along 50-m transects.

Species	PB4	PB5	Total
<i>Acmispon glaber</i>	0	2	2
<i>Baccharis pilularis</i>	2		2
<i>Eriogonum fasciculatum</i>	1	2	3
<i>Isocoma menziesii</i> var. <i>sedoides</i>	1	1	2
<i>Salvia leucophylla</i>	1	0	1
<i>Salvia mellifera</i>	2	2	4
<i>Stipa pulchra</i>	2	0	2
<i>Stipa</i> sp.	1	0	1
<i>Stipa</i> spp	1	0	1
Total Native Plants	11	7	18
NNAG	4	0	4
NNP	0	0	0
Total Non-native Plants	4	0	4
Bare	4	0	4
Litter	29	42	71
Total Bare and Litter	33	42	75
Total Plant Cover	15	7	22

Table 7. Percent cover for each species observed along the 50m transects.

Species	PB4	PB5
<i>Acmispon glaber</i>	0	4
<i>Baccharis pilularis</i>	4	0
<i>Encelia californica</i>	2	0
<i>Eriogonum fasciculatum</i>	2	4
<i>Isocoma menziesii</i> var. <i>sedoides</i>	2	2
<i>Salvia leucophylla</i>	2	0
<i>Salvia mellifera</i>	8	4
<i>Stipa pulchra</i>	4	0
Total Native Plants	24	14
NNAG	8	0
NNP	18	4
Total Non-native Plants	26	4
Bare	8	0
Litter	58	86
Total Bare and Litter	66	86
Total Plant Cover	50	18

Table 8. Relative percent coverage among all species along the 50m transects.

Species	PB4	PB5
<i>Acmispon glaber</i>	0	22
<i>Baccharis pilularis</i>	8	0
<i>Encelia californica</i>	4	0
<i>Eriogonum fasciculatum</i>	4	22
<i>Isocoma menziesii</i> var. <i>sedoides</i>	4	11
<i>Salvia leucophylla</i>	4	0
<i>Salvia mellifera</i>	16	22
<i>Stipa pulchra</i>	8	0
Total Native Plants	48	78
NNAG	16	0
NNP	36	22
Total Non-native Plants	52	22

Table 9. Average plant height (cm) by transect.

Species	PB4	PB5
<i>Acmispon glaber</i>	0	8.0
<i>Baccharis pilularis</i>	0	67.0
<i>Encelia californica</i>	0	50.5
<i>Eriogonum fasciculatum</i>	44.0	39.0
<i>Isocoma menziesii</i> var. <i>sedoides</i>	38	0
<i>Salvia leucophylla</i>	0	60.0
<i>Salvia mellifera</i>	58.5	0
<i>Stipa pulchra</i>	0	61.0
<i>Stipa spp</i>	0	7.0

Table 10. Portuguese Bend
Vegetation percent cover based on CNPS Rapid Vegetation
Assessment Method

Species	PB1	PB2	PB3	PB4	PB5	PB6	PB7	PB8	PB9
<i>Acmispon glaber</i>	2	2		1	3		3		
<i>Alium angustifolium</i>							1		
<i>Artemisia californica</i>	8	12		7	8	6	20	4	2
<i>Asclepias fascicularis</i>		1					2	2	
<i>Astragalus trichopodus</i>							5	4	
<i>Baccharis pilularis</i>	2	3	11	3			1		
<i>Baccharis salicifolia</i>		1					1		
<i>Calystegia macrostegia</i>								1	
<i>Cylindropuntia prolifera</i>						5			
<i>Deinandra fasciculata</i>		1							
<i>Dichelostemma capitatum</i>		1							
<i>Elymus condensatus</i>			2				1		
<i>Encelia californica</i>	1	4		6	4	7		2	15
<i>Eriogonum cinereum</i>									2
<i>Eriogonum fasciculatum</i>	4	6		4	3	1	4	1	1
<i>Eriogonum parvifolium</i>								1	1
<i>Eschscholzia californica</i>				1			5	1	1
<i>Hazardia squarrosa</i>							1		
<i>Heteromeles arbutifolia</i>	5	3	7	4		2	2		1
<i>Isocoma menziesii</i> var. <i>sedoides</i>		1	1	2	2	1		2	1
<i>Lupinus succulentus</i>									1
<i>Malacothrix saxatilis</i>				1			1	3	1
<i>Marah macrocarpa</i>			3						1
<i>Melica imperfecta</i>	1		2	1					
<i>Mirabilis californica</i>									2
<i>Opuntia littoralis</i>						11			1
<i>Phacelia cicutaria</i>							1		1
<i>Plantago</i> sp.								2	2
<i>Pseudognaphalium biolettii</i>		1							
<i>Pseudognaphalium</i> <i>californicum</i>				1					
<i>Pseudognaphalium</i> sp							1		
<i>Rhus integrifolia</i>	1	1	5			3	1		
<i>Salvia mellifera</i>		3							
<i>Salix gooddingii</i>		1							
<i>Salvia leucophylla</i>	1	2	1	5	1	2	3		3
<i>Salvia mellifera</i>	2			3	3	2			
<i>Sambucus nigra</i>			3					1	1
<i>Sisyrinchium bellum</i>		1							
<i>Stipa lepida</i>			4	1					

<i>Stipa pulchra</i>		2		3	2		1		1
Unidentified No I		1							
Total Native Cover	27	47	39	43	26	40	54	24	38
NNAG	9	2	18	31	7	3	27	5	1
NNP	7	7	3	5	2	6	3	33	7
Total Non-native Cover	16	9	21	36	9	9	30	38	8
Bare	29	27	1	3	5	33	6	16	37
Litter	29	23	39	20	60	18	10	24	19
Total Bare and Litter	58	50	40	23	65	51	16	40	56
Total Plant Cover	43	56	60	79	35	49	84	62	46

Table 11. Alta Vicente and Portuguese Bend success criteria measures.

Preserve	Year	Percent Cover of Native Species (%)			Percent Cover of Non-native Species (%)	
		CSS	Cactus Scrub ¹	PVB Habitat ²	CSS	Cactus Scrub
Alta Vicente	Year 1*	10%	10%	10%		
	Year 2*	20%	20%	20%		
	Year 3	>40%	>30%	30%-60% max		
	Year 5	>50%	>40%	30%-60% max		
Portuguese Bend	Year 3	>40% (≥30% perennial)	>30% (≥20% perennial and 5% cactus)			
	Year 5	>50%	>40% (≥ 10% cactus)		<25% (<5% perennials w/ no CAL-IPC List A except NNAG)	<25% (<5% perennials w/ no CAL-IPC List A except NNAG)

* Percentage based on visual estimates.

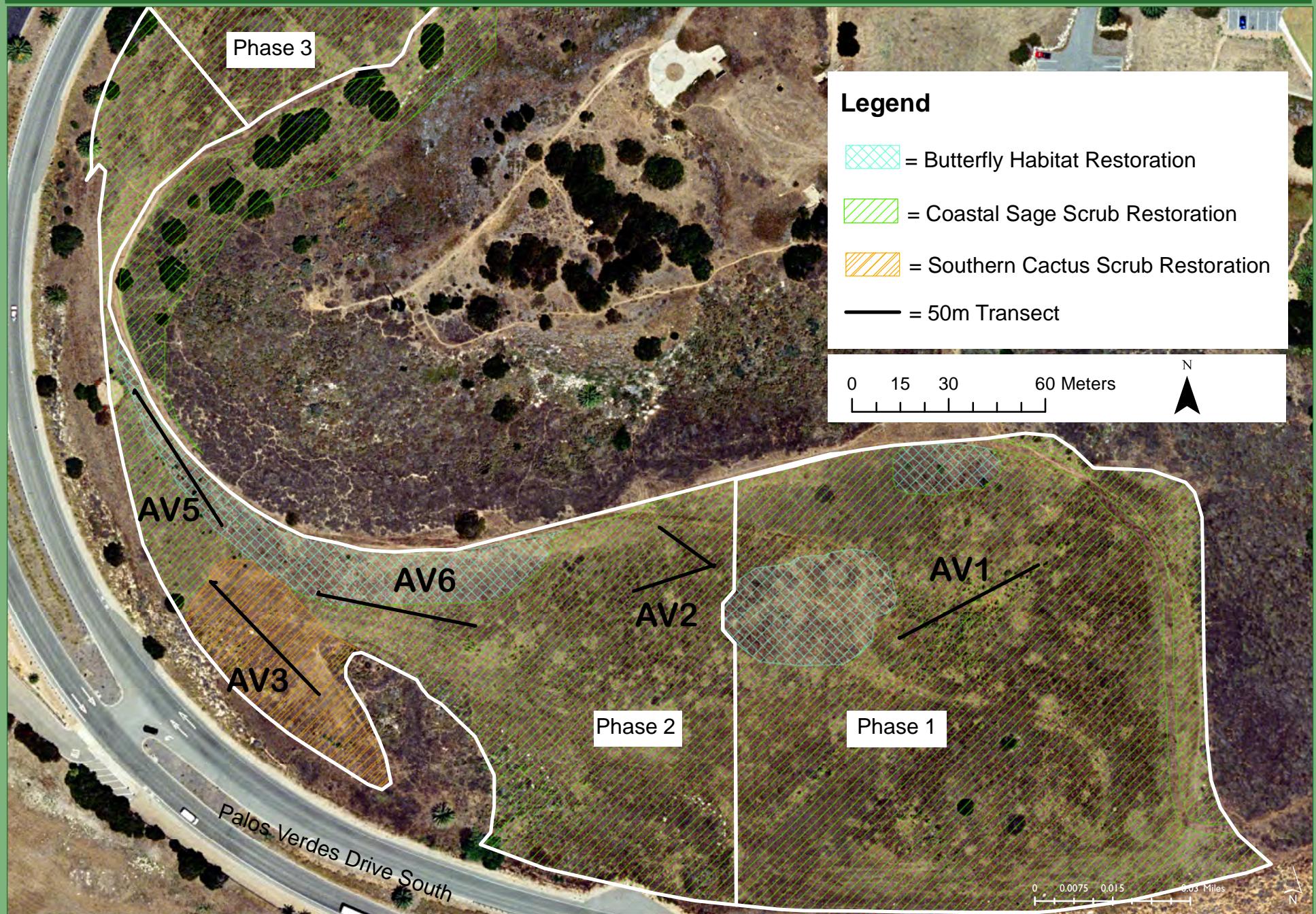
¹ Percentage coverage of cactus species should be at least 1% for Year 1, 3% for year 2, 5% for Year 3, and 10% for Year 5.

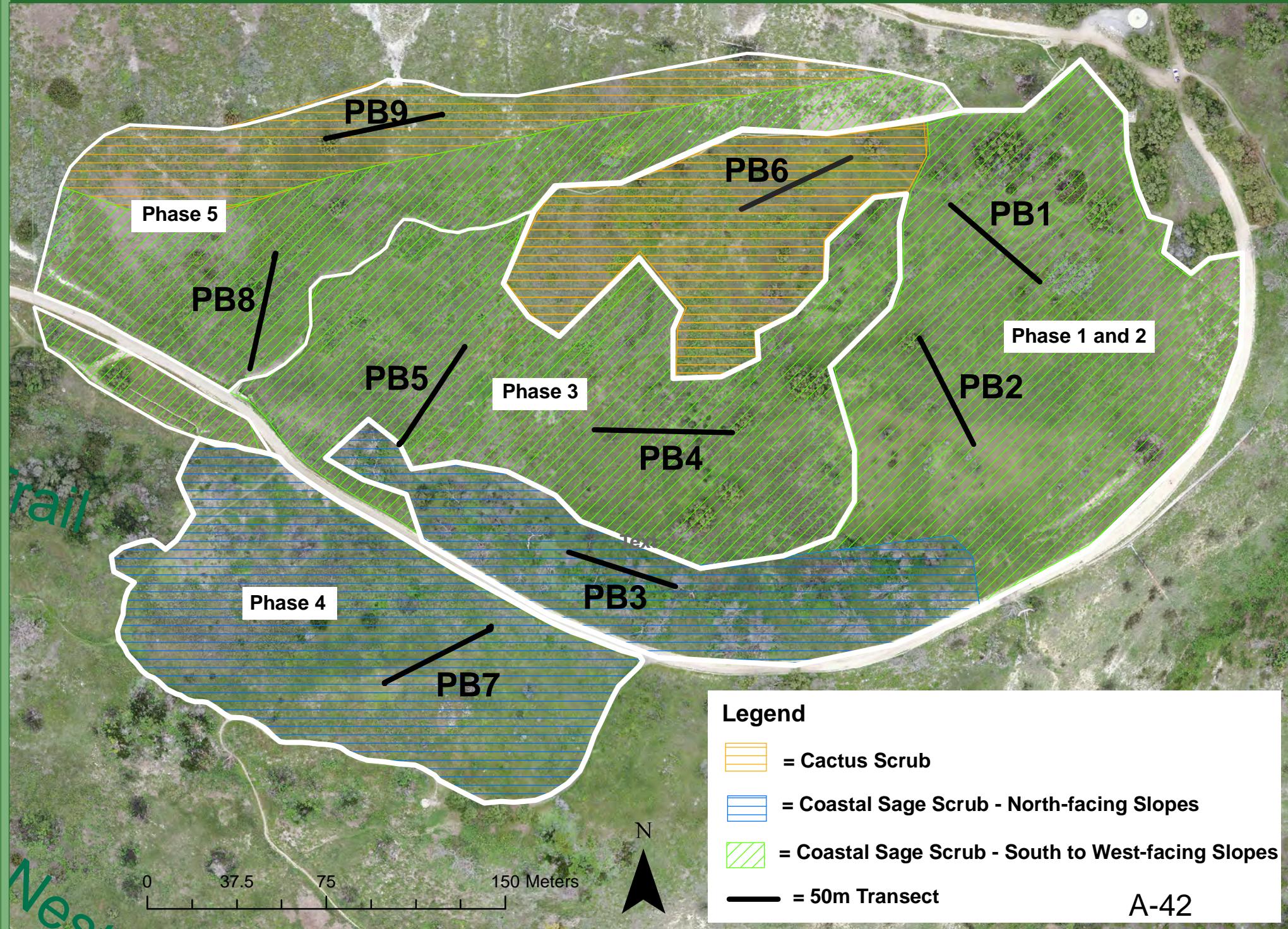
² From Year 3 on, there should be at least 10% coverage from *Acnison glaber* and/or *Astragalus tricopodus* and the woody shrubs should be maintained at 10-20%.

CAL-IPC = California Invasive Plant Council

NNAG = non-native annual grass

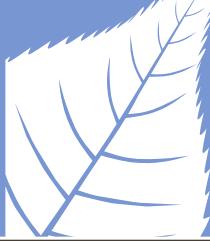
Alta Vicente Monitoring Transects





APPENDIX B

ALTA VICENTE RESTORATION PLAN



Habitat Restoration Plan for the

Alta Vicente Ecological Reserve in the Portuguese Bend Nature Preserve



FEBRUARY 2016

PREPARED BY:



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

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Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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.

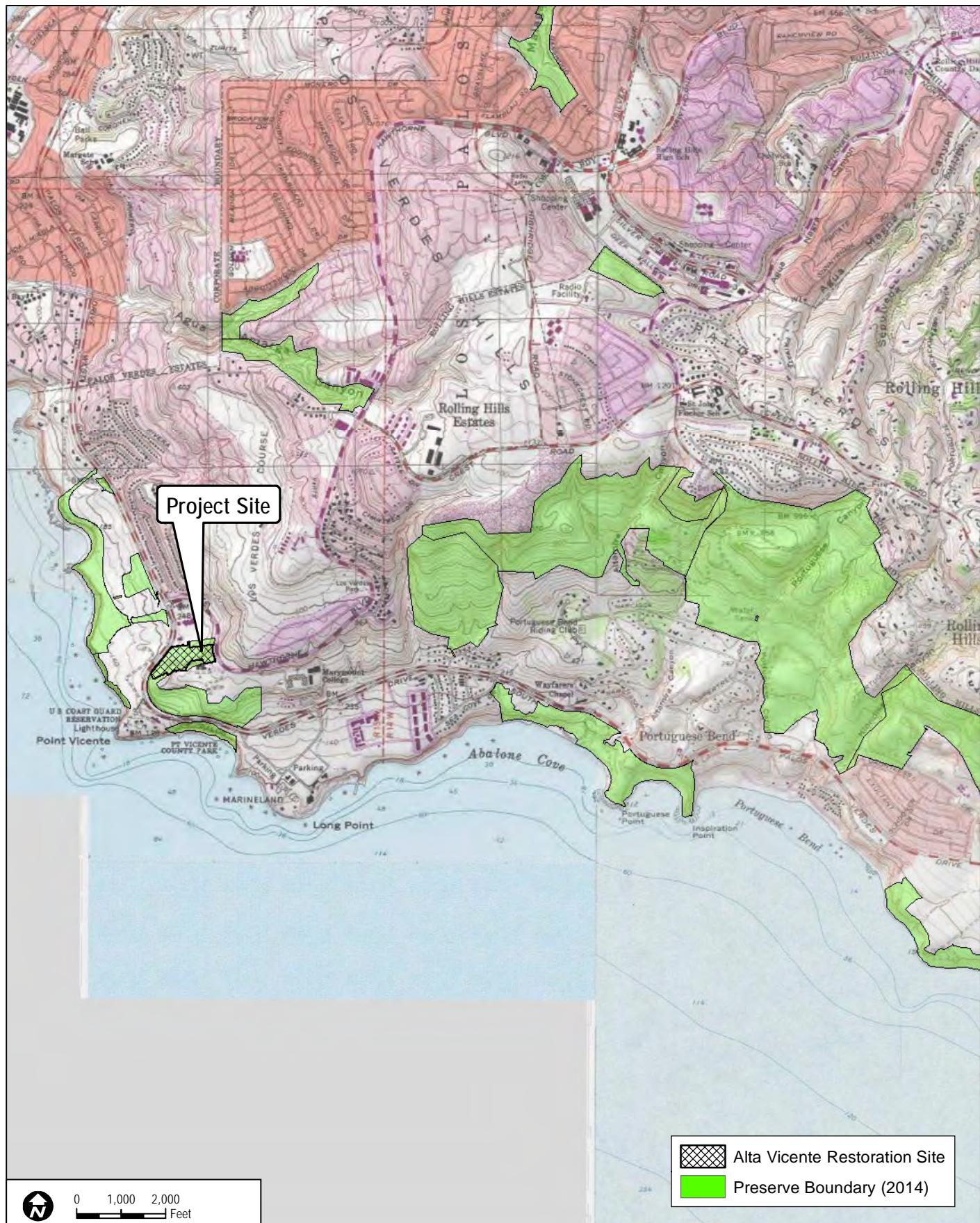
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DUDEK	SOURCE: USGS 7.5-Minute Redondo Beach, San Pedro Series Quadrangles.	FIGURE 2 Vicinity Map
7718	Habitat Restoration Plan for the Alta Vicente Ecological Reserve in the Portuguese Bend Nature Preserve	

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Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

(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.

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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 ($\text{pH} = 7.87 - 7.95$) and the salinity is low ($\text{ECe} = 0.40 - 0.55 \text{ mho/cm}$). 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 allynii*) 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 (*Glaucomysche lygdamus palosverdesensis*) also occurs within the Alta Vicente Reserve.

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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

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

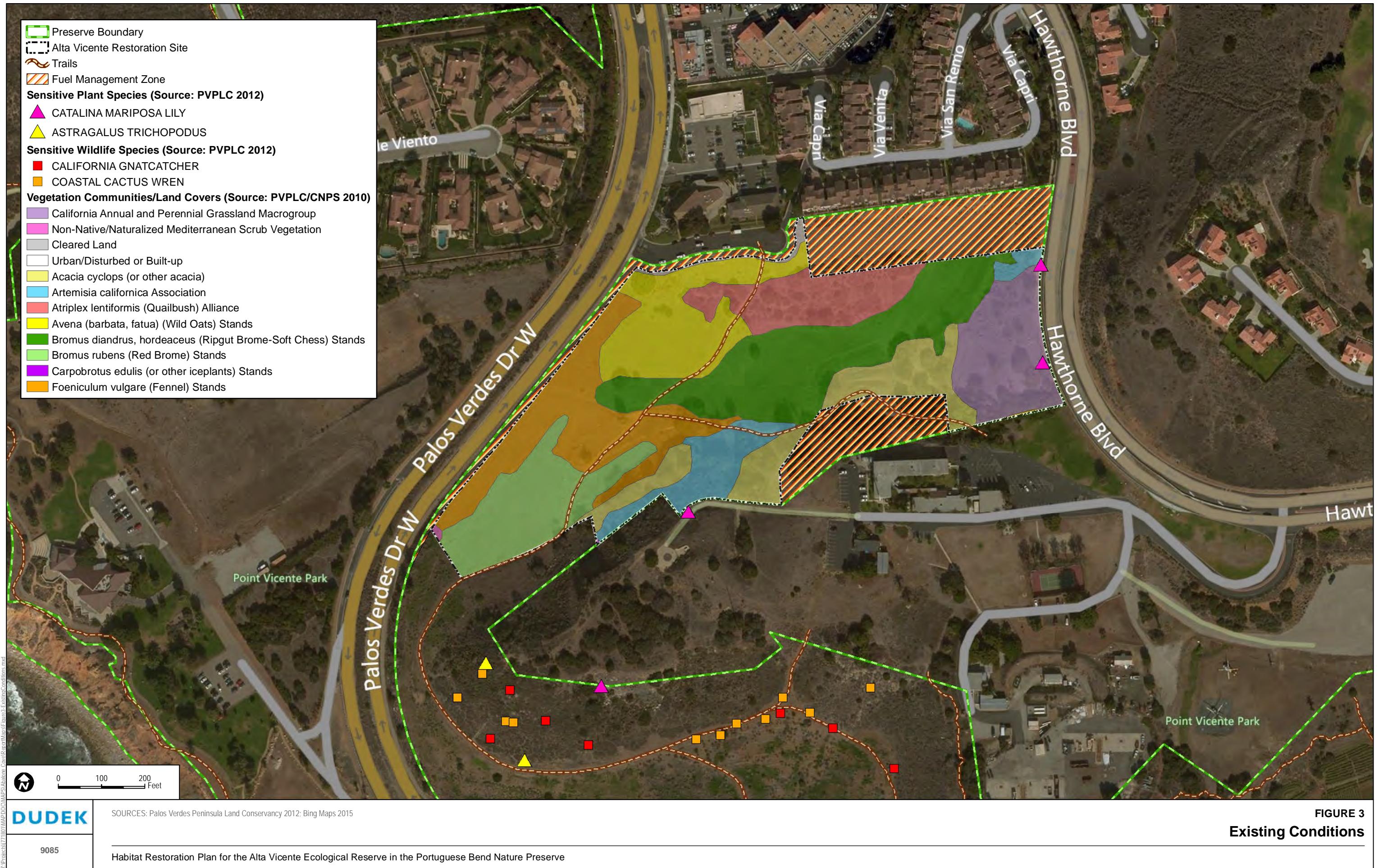
2.6 Additional Considerations

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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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;

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

- 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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Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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

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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
<i>Rhus integrifolia</i>	Lemonadeberry	D40	12	1	3	31
<i>Salvia leucophylla</i>	Purple sage	D40	6	5	61	629
<i>Salvia mellifera</i>	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.
<i>Asclepias fascicularis</i>	narrow leaved milkweed	50		1.0		10.4
<i>Castilleja exserta</i>	purple owl's clover	25		0.5		5.2
<i>Clarkia purpurea</i>	winecup clarkia	80		0.5		5.2
<i>Deinandra fasciculata</i>	fascicled tarplant	3		1.0		10.4
<i>Eschscholzia californica</i> var <i>maritima</i>	California poppy	74		2.0		20.8
<i>Lupinus bicolor</i>	pygmy lupine	78		2.0		20.8
<i>Lupinus succulentus</i>	arroyo lupine	81		4.0		41.6
<i>Melica imperfecta</i>	coast melic grass	54		0.5		5.2
<i>Pseudognaphalium</i> <i>californicum</i>	California everlasting	3		0.5		5.2
<i>Stipa lepida</i>	foothill needlegrass	54		2.0		20.8
<i>Stipa pulchra</i>	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.

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

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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
<i>Container Plants</i>						
<i>Artemisia californica</i>	California sagebrush	D40	6	5	61	61
<i>Astragalus trichopodus</i> var. <i>lonchus</i>	Ocean locoweed	D40	2	7	1,634	1,634
<i>Corethrodyne filaginifolia</i>	Common sandaster	D40	3	3	145	145
<i>*Dudleya lanceolata</i>	Lanceleaf liveforever	1-gallon	2	3	54	54
<i>Elymus condensatus</i>	Giant wildrye	D40	6	3	6	6
<i>Encelia californica</i>	California brittlebush	D40	6	3	12	12
<i>Eriogonum fasciculatum</i>	California buckwheat	D40	6	5	24	24
<i>Eriogonum parvifolium</i>	Coast buckwheat	D40	6	5	12	12
<i>Eriophyllum confertiflorum</i>	Golden yarrow	D40	3	3	97	97
<i>Mirabilis laevis</i> var. <i>crassifolia</i>	Wishbone bush	D40	4	5	54	54
<i>Peritoma arborea</i>	Bladderpod	D40	6	5	12	12
<i>Salvia leucophylla</i>	Purple sage	D40	6	5	12	12
<i>Salvia mellifera</i>	Black sage	D40	6	3	12	12
Total Container Plants					2,135	2,135

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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.
<i>Asclepias fascicularis</i>	narrow leaved milkweed	50	1.0	1.0
<i>Castilleja exserta</i>	purple owl clover	25	0.5	0.5
<i>Clarkia purpurea</i>	winecup clarkia	80	0.5	0.5
<i>Deinandra fasciculata</i>	fascicled tarplant	3	1.0	1.0
<i>Eschscholzia californica</i> var. <i>maritima</i>	California poppy	74	2.0	2.0
<i>Lasthenia californica</i>	California goldfields	30	1.0	1.0
<i>Layia platyglossa</i>	tidy tips	60	1.0	1.0
<i>Lupinus bicolor</i>	pygmy lupine	78	2.0	2.0
<i>Lupinus succulentus</i>	arroyo lupine	81	4.0	4.0
<i>Stipa lepida</i>	foothill needlegrass	54	2.0	2.0
<i>Stipa pulchra</i>	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
<i>Container Plants</i>						
<i>Bloomeria crocea</i> ¹	Goldenstar	Bulb	1	1	as available	TBD
<i>Brodiaea jolonensis</i> ¹	Jolon brodiaea	Bulb	1	1	as available	TBD
<i>Calochortus catalinae</i> ¹	Catalina mariposa lily	Bulb	1	1	as available	TBD

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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
<i>Dichelostemma capitatum</i> ¹	Blue Dicks	Bulb	1	1	as available	TBD
<i>Dudleya virens</i>	Bright green dudleya	D40	2	3	218	109
<i>Epilobium canum</i>	California fuchsia	D40	3	5	145	73
<i>Eriophyllum confertiflorum</i>	Golden yarrow	D40	2	3	327	163
<i>Eschscholzia californica</i> var. <i>maritima</i>	California poppy	D40	2	5	545	272
<i>Mirabilis laevis</i> var. <i>crassifolia</i>	Wishbone bush	D40	4	3	163	82
<i>Verbena lasiostachys</i>	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.		
<i>Amsinckia intermedia</i>	Common Fiddleneck	49	1.0	0.5		
<i>Antirrhinum nuttallianum</i>	Purple Snapdragon	10	0.5	0.25		
<i>Asclepias fascicularis</i>	Narrowleaf milkweed	50	1.0	0.5		
<i>Castilleja exserta</i>	Purple owl's clover	25	0.5	0.25		
<i>Clarkia purpurea</i>	Winecup clarkia	80	0.5	0.25		
<i>Corethrogynne filaginifolia</i>	California-aster	80	2.0	1.0		
<i>Deinandra fasciculata</i>	<i>fascicled tarplant</i>	0.1	1.0	0.5		
<i>Emmenanthe penduliflora</i>	Whispering Bells	3	0.5	0.25		
<i>Eschscholzia californica</i> var. <i>maritima</i>	California poppy	50	2.0	1.0		
<i>Lasthenia californica</i>	California goldfields	74	0.5	0.25		
<i>Layia platyglossa</i>	Tidy tips	30	1.0	0.5		
<i>Lupinus bicolor</i>	Miniature lupine	60	2.0	1.0		
<i>Lupinus succulentus</i>	Arroyo lupine	78	6.0	3.0		
<i>Nemophila menziesii</i>	Baby blue eyes	81	0.5	0.25		
<i>Phacelia cicutaria</i>	Caterpillar phacelia	83	0.5	0.25		
<i>Phacelia ramosissima</i>	Branching phacelia	80	0.5	0.25		
<i>Salvia columbariae</i>	Chia	80	1.0	0.5		
<i>Sisyrinchium bellum</i>	Blue-eyed grass	54	3.0	1.5		
<i>Stipa lepida</i>	Foothill needlegrass	71	2.0	1.0		
<i>Stipa pulchra</i>	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,

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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.

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Chart 1
Average Monthly Precipitation for the Portuguese Bend Nature Preserve

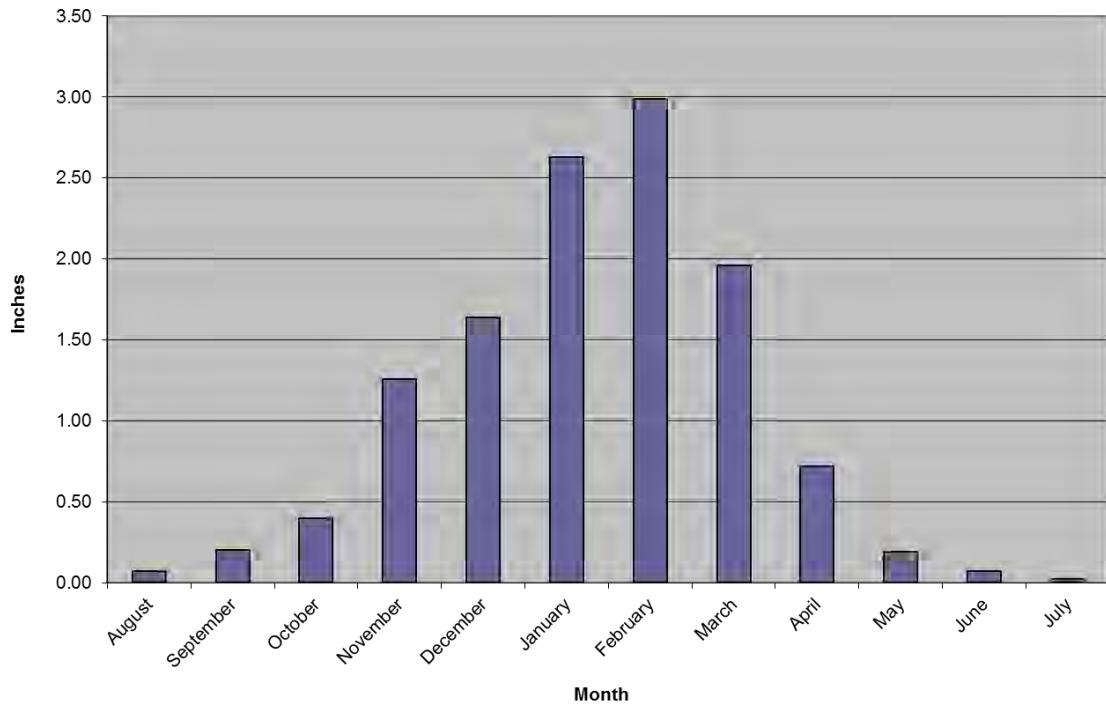
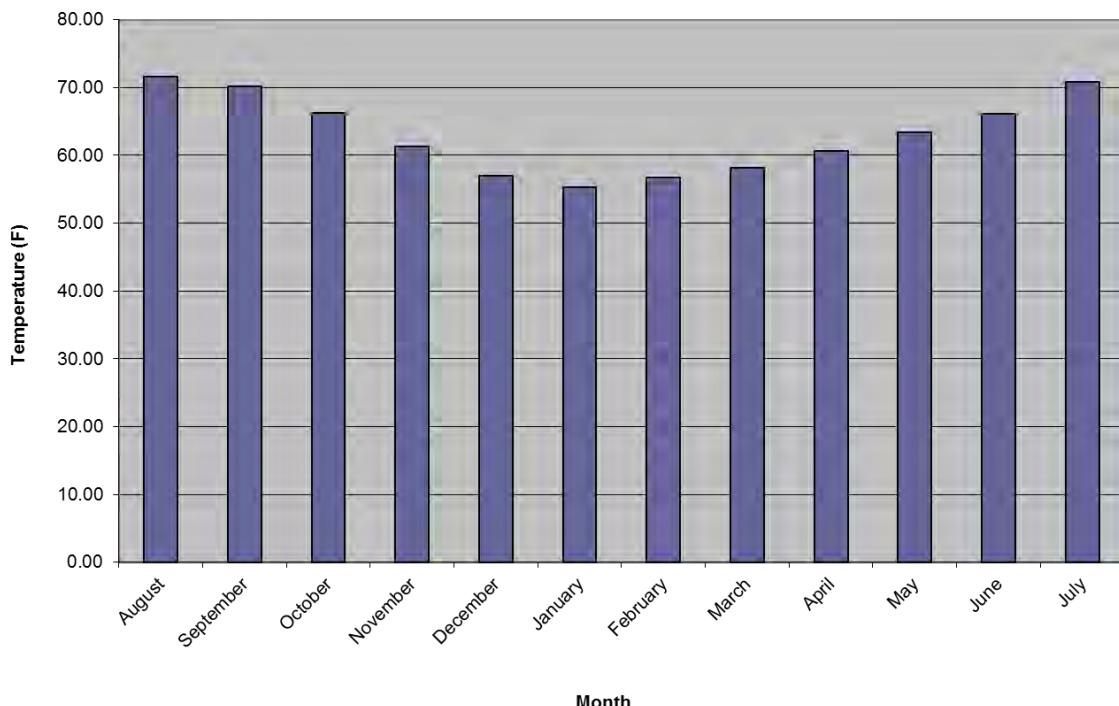


Chart 2
Average Monthly Temperatures for the Portuguese Bend Nature Preserve



Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes 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

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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.

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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.

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

- 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 be 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-

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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.

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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)	
	<i>Coastal Sage Scrub</i>	<i>Cactus Scrub</i>	<i>PV Blue Butterfly Habitat</i>	<i>Wildflower</i>	<i>Invasive Perennial Species Cover</i>	<i>Total Non-native Species Cover</i>
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

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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.

Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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Habitat Restoration Plan for the Alta Vicente Reserve in the Palos Verdes Nature Preserve

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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

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

Sample ID Number
Sample Description

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

15-198-01
AV #1

15-198-02
AV #2

15-198-03
AV #3

elements

graphic

phosphorus

1.77 *

3.28 **

2.64 *

potassium

154.88 ****

111.48 ***

139.59 ***

iron

2.36 *

2.54 **

2.13 *

manganese

1.44 ****

2.18 ***

1.30 ****

zinc

0.86 **

0.81 **

0.87 **

copper

4.44 *****

2.83 ***

3.85 *****

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

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.

aluminum

n d *

n d *

n d *

arsenic

0.05 *

n d *

0.03 *

barium

2.62 *

1.86 *

3.41 **

cadmium

0.23 *

0.24 *

0.39 *

chromium

n d *

n d *

n d *

cobalt

0.04 *

0.03 *

0.08 *

lead

1.63 **

0.93 *

2.01 **

lithium

0.30 *

0.26 *

0.40 *

mercury

0.11 *

n d *

n d *

selenium

n d *

n d *

n d *

silver

n d *

n d *

n d *

strontium

0.50 *

0.34 *

0.45 *

tin

n d *

n d *

n d *

vanadium

1.31 **

0.77 *

1.29 **

Saturation Extract

pH value

7.91 ****

7.95 ****

7.87 ****

ECe (milli-

0.55 **

0.47 **

0.40 **

mho/cm)

millieq/l

millieq/l

millieq/l

calcium

6.8

18.6

18.6

magnesium

2.0

6.3

6.5

sodium

78.5

47.8

39.6

potassium

-0.9

0.7

-0.8

cation sum

3.9

3.6

3.2

chloride

70

50

26

nitrate as N

3

2

5

phosphorus as P

0.2

0.2

0.0

sulfate as S

8.7

7.6

6.6

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

soil texture

lime (calcium carbonate)

organic matter

moisture content of soil

half saturation percentage

slow sand - 9.8%

clay silt - 29.2%

yes clay - 61.0%

fair

slow sand - 16.8%

clay silt - 35.6%

high clay - 47.7%

fair

12.5% gravel over 2 mm

10.7% gravel over 2 mm

44.0% 0.4%

40.7% 12.1%

slow sand - 16.5%

clay silt - 37.1%

slight clay - 46.5%

fair

12.6% gravel over 2 mm

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.

APPENDIX C

ALL RESTORATION PROJECTS

APPENDIX C. PALOS VERDES NATURE PRESERVE RESTORATION PROJECTS THROUGH 2016

	Funding source	Location	Habitat Type	Acres	Status	Start Date	End Date
NCCP							
Alta Vicente	NCCP	Phase 1	CSS	4.5	completed	2007	2014
Alta Vicente	NCCP	Phase 1	PVB habitat	0.5	completed	2007	2014
Alta Vicente	NCCP	Phase 2	CSS	4	active	2008	2015
Alta Vicente	NCCP	Phase 2	cactus scrub	0.5	active	2008	2015
Alta Vicente	NCCP	Phase 2	PVB habitat	0.5	active	2008	2015
Alta Vicente	NCCP/LA County Grant	Phase 3	CSS	4.5	active	2016	2021
Alta Vicente	NCCP/LA County Grant	Phase 3	wildflowers	0.5	active	2016	2021
Portuguese Bend	NCCP	Phase 1 and 2	CSS	8	active	2010	2017
Portuguese Bend	NCCP	Phase 1 and 2	cactus scrub	2	active	2010	2017
Portuguese Bend	NCCP	Phase 3	CSS	5	active	2012	2018
Portuguese Bend	NCCP	Phase 4	CSS	5	active	2013	2019
Portuguese Bend	NCCP	Phase 5	CSS	4	active	2014	2020
Portuguese Bend	NCCP	Phase 5	cactus scrub	1	active	2014	2020
Additional Projects							
Abalone Cove	Coastal Conservancy, NFWF, SMBRC, USFWS		CSS	5	active	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	completed	2011	2016
Agua Amarga	D&M		riparian	0.2	active	2012	2017
Portuguese Bend	El Segundo Mitigation	Ishibashi	CSS and grassland	9.5	completed	2010	2015
Portuguese Bend	HCF grant	Ishibashi	CSS	0.25	completed	2012	2015
Portuguese Bend	HCF grant	Peppertree	CSS	0.5	completed	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

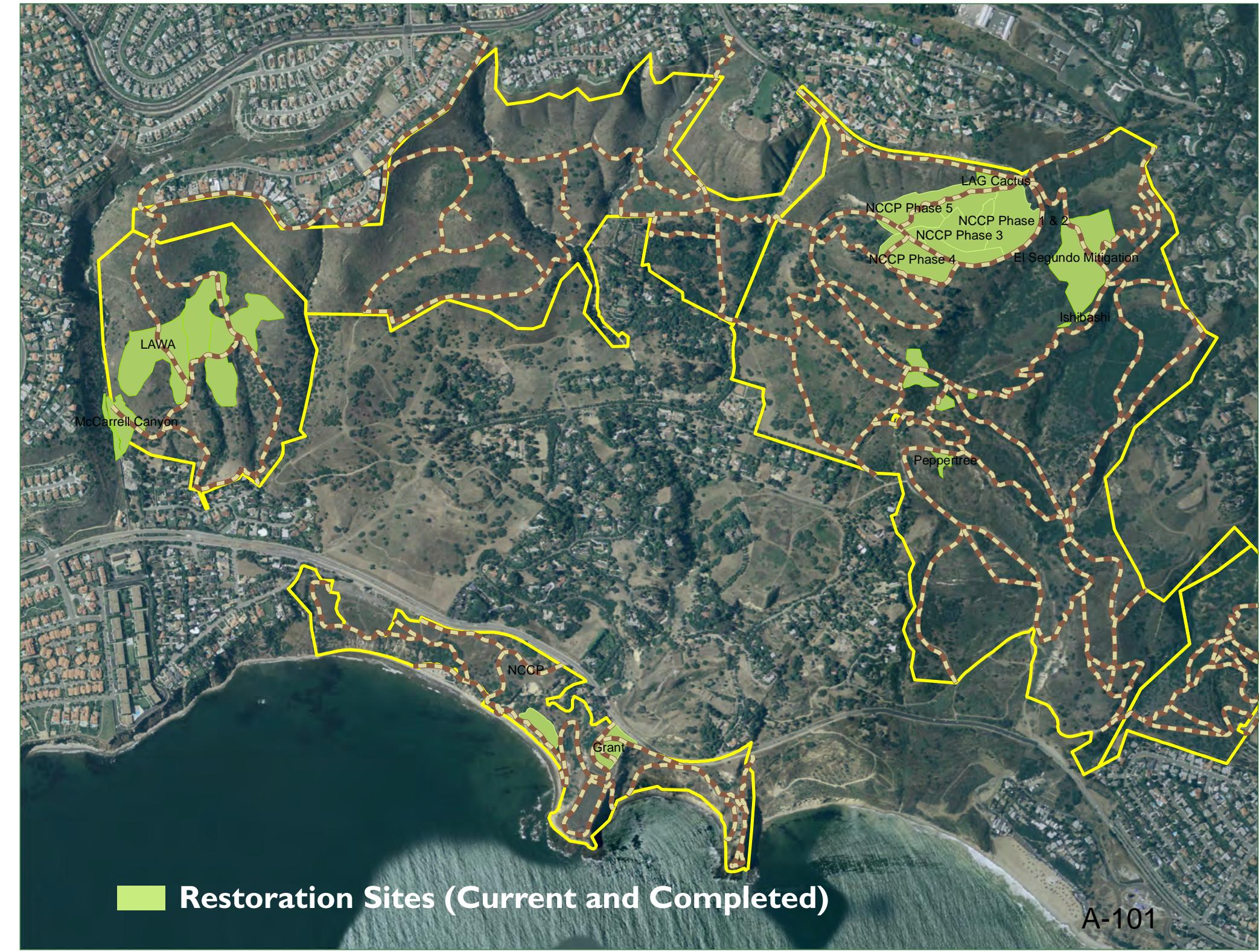
Three Sisters/McCarrell's Canyon	Coastal Conservancy		riparian	0.5	completed	2009	2012
Three Sisters/McCarrell's Canyon	Coastal Conservancy		CSS	2	completed	2009	2012
Vicente Bluffs	Coastal Conservancy		coastal scrub	2	completed	2009	2014

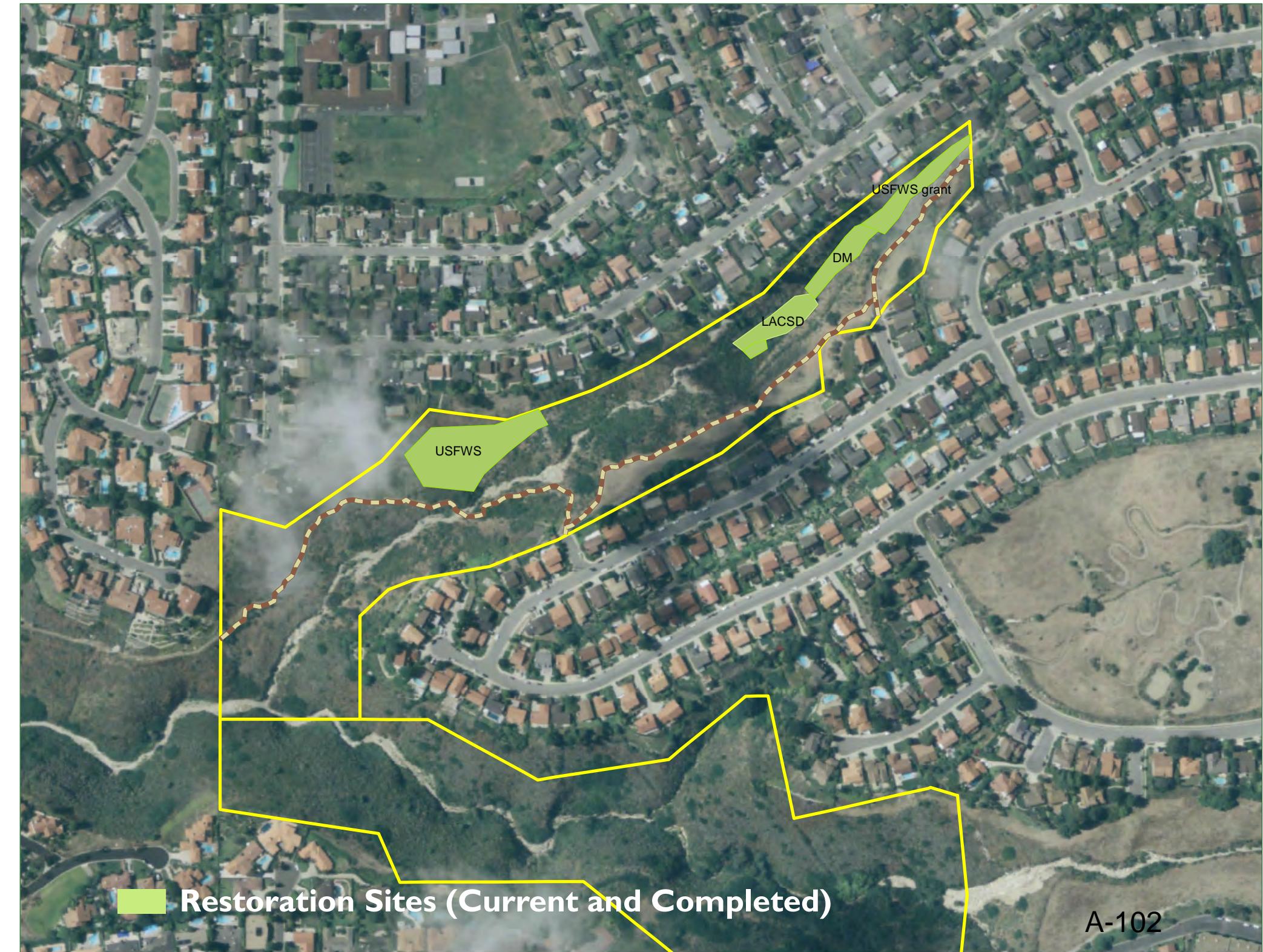
Vicente Bluffs	PVPLC	Adpot-a-Plot	ESB habitat	0.1	active	2016	TBD
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TOTAL	86.8
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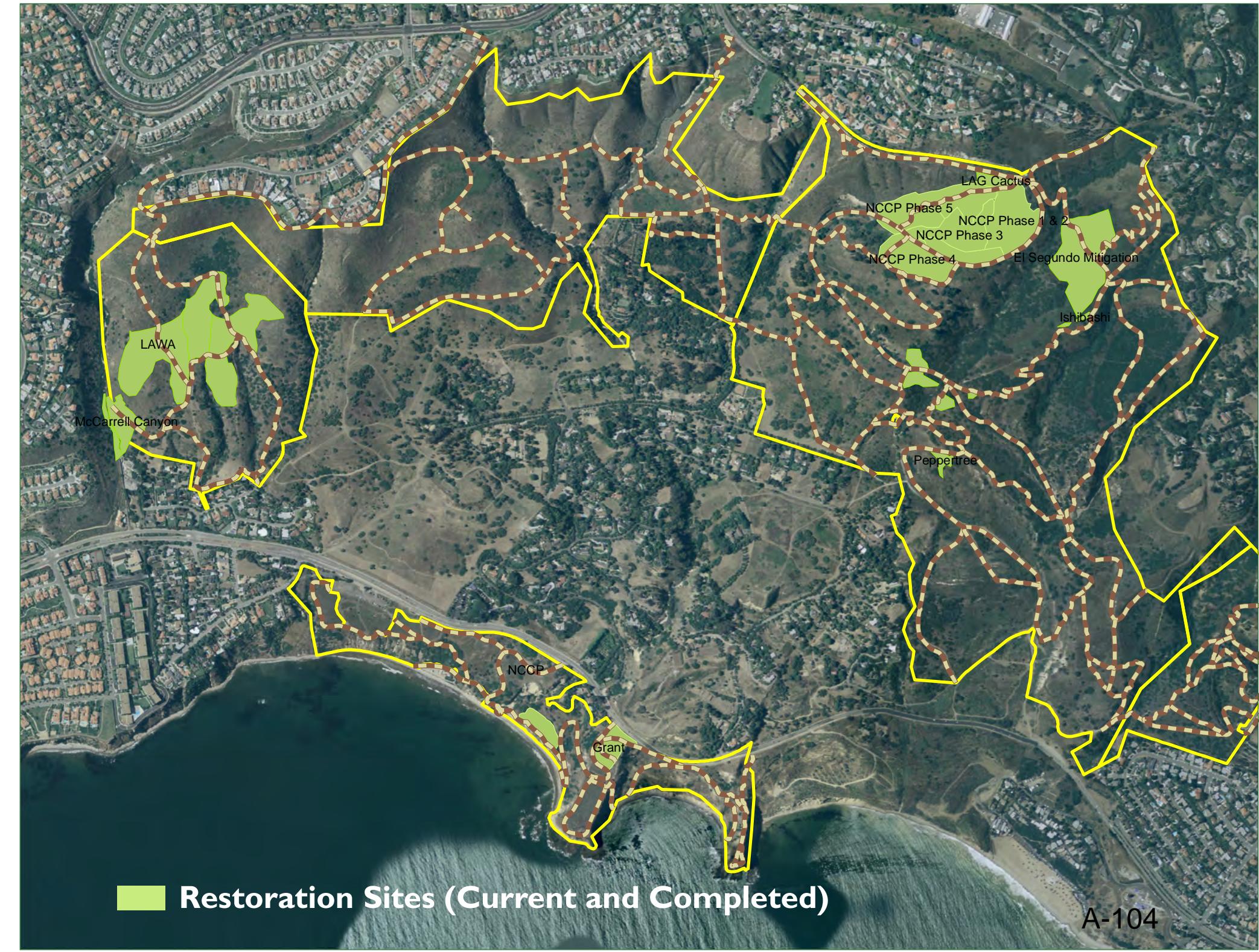












APPENDIX D

2016 TARGETED EXOTIC REMOVAL PROGRAM FOR PLANTS

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 (TEPRP). As directed in the draft Rancho Palos Verdes Natural Communities Conservation Plan (NCCP), PVPLC selects five acres or 20 small sites of invasive 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 2016 TEPRP 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.

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. 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 invasive species control across the entire Preserve area.

A sample of the TERPP field data collection 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. PVPLC has treated 112 individual TERPP sites since 2006. As *Euphorbia terracina* is a high priority invasive and may take multiple treatments to control, these populations are treated in numerous years. In 2016, 23 TERPP sites were treated. These include 17 *Euphorbia terracina* populations as well as previously treated sites of *Arundo donax*, *Acaia cyclops*, *Cephalophyllum alstonii*, *Coronilla valentina*, and *Mesembryanthemum crystallinum* (Table 1).

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 2016 TREATMENTS

In 2016, PVPLC treated 23 populations of invasive plants across seven reserves (Table 1, photopoints in Appendix D9). Of these, 17 were 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 reduced habitat quality compared to un-invaded areas. 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. In addition to Euphorbia treatments, the 2016 TERPP treated two populations of *Coronilla valentina*, one population of *Arundo donax*, *Mesembryanthemum crystallinum*, and *Cephalophyllum alstonii* at Abalone Cove as well as a population of *Acacia cyclops* at Vicente Bluffs.

Table I. 2016 TERPP Treatments

Stand ID	Reserve	Name	Stand Size	Number Individuals	Treatment	Percent Treated
AA_EuTe_02	Agua Amarga	<i>Euphorbia terracina</i>	10-100ft	10-50	Hand pull	75-100%
AC_CeAl_01	Abalone Cove	<i>Cephalophyllum alstonii</i>	10-100ft	100-200	Hand pull	0-25%
AC_EuTe_01	Abalone Cove	<i>Euphorbia terracina</i>	100-300ft	200-500	Herbicide	75-100%
AC_EuTe_04	Abalone Cove	<i>Euphorbia terracina</i>	100-300ft	1-10	Hand pull	75-100%
AC_Eu-Te_05	Abalone Cove	<i>Euphorbia terracina</i>	10-100	50-100	Herbicide	75-100%
AC_CoVa_01	Abalone Cove	<i>Coronilla valentina</i>	10-100	200-500	Herbicide	75-100%
AC_CoVa_02	Abalone Cove	<i>Coronilla valentina</i>	100-300ft	500-1000	Hand pull	75-100%
AC_ArDo_01	Abalone Cove	<i>Arundo donax</i>	1-10ft	1-10	Herbicide	75-100%
AC_MeCr_01	Abalone Cove	<i>Mesembryanthemum crystallinum</i>	100ft	50-100	Hand pull	25-50%
AV_EuTe_01	Alta Vicente	<i>Euphorbia terracina</i>	600-1000ft	50-100	Herbicide	75-100%

AV_EuTe_02	Alta Vicente	<i>Euphorbia terracina</i>	10-100ft	50-100	Herbicide	75-100%
AV_EuTe_03	Alta Vicente	<i>Euphorbia terracina</i>	10-100ft	50-100	Hand pull	75-100%
PB_EuTe_10	Portuguese Bend	<i>Euphorbia terracina</i>	>1000ft	100-200	Herbicide	75-100%
PB_EuTe_03	Portuguese Bend	<i>Euphorbia terracina</i>	10-100ft	1-10	Hand pull	75-100%
PB_EuTe_05	Portuguese Bend	<i>Euphorbia terracina</i>	10-100ft	10-50	Hand pull	75-100%
PB_EuTe_07	Portuguese Bend	<i>Euphorbia terracina</i>	10-100ft	1-10	Hand pull	75-100%
PB_EuTe_08	Portuguese Bend	<i>Euphorbia terracina</i>	600-1000ft	200-500	Hand pull	75-100%
TS_EuTe_01	Three Sisters	<i>Euphorbia terracina</i>	600-1000ft	500-1000	Herbicide	50-75%
TS_EuTe_02	Three Sisters	<i>Euphorbia terracina</i>	>1000ft	500-1000	Herbicide and weed whip	75-100%
TS_EuTe_03	Three Sisters	<i>Euphorbia terracina</i>	300-600ft	200-500	Herbicide	50-75%
TS_EuTe_04	Three Sisters	<i>Euphorbia terracina</i>	100-300ft	200-500	Herbicide	50-75%
VB_AcCy_01	Vicente Bluffs	<i>Acacia cyclops</i>	10-100ft	1-10	Tree Removal	0-25%
VB_EuTe_01	Vicente Bluffs	<i>Euphorbia terracina</i>	10-100ft	1-10	Hand pull	75-100%

5.0 REFERENCES

California Invasive Plant Council 2006. California Invasive Plant Inventory. February. California Invasive Plant Council: Berkley, CA.

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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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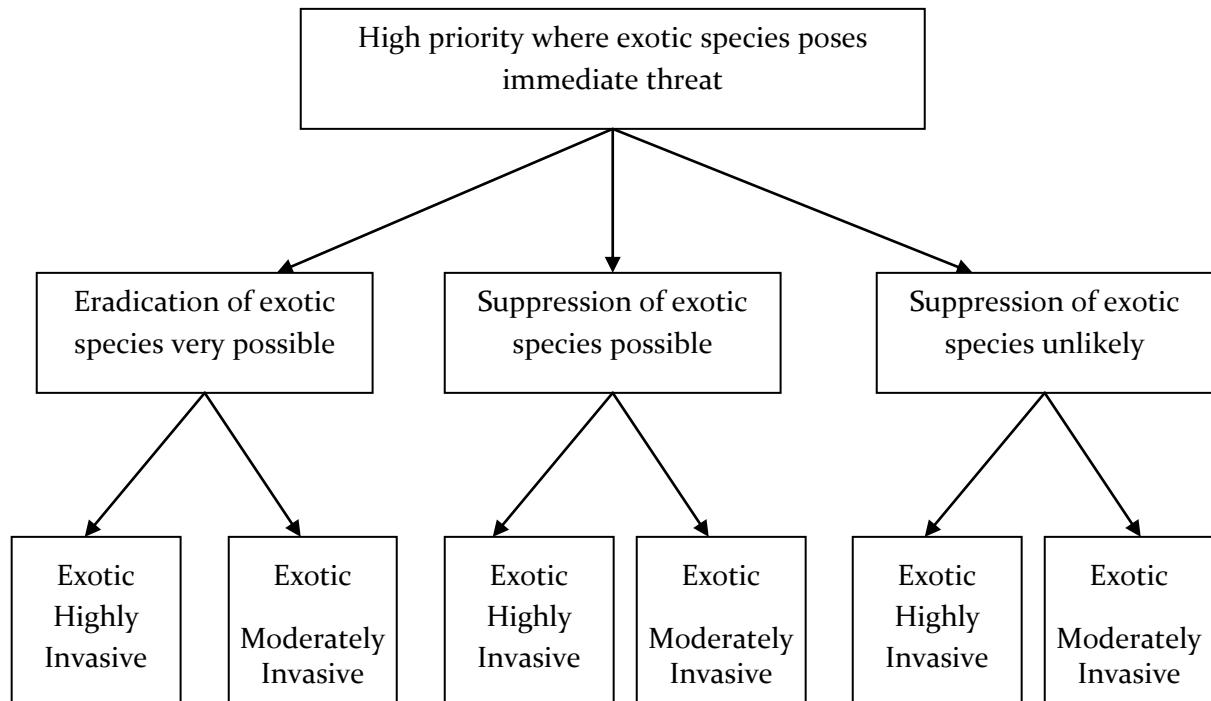
APPENDIX DI: SAMPLE TERPP FORM

Invasive Weed Mapping Field Datasheet

Survey Type			Surveyor's Name	
New Infestation	Assesment	Treatment		
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			Stand Comments:	
1 ft ² - 10 ft ² 300 ft ² - 600 ft ²	10 ft ² - 100 ft ² 600 ft ² - 1000 ft ²	100 ft ² - 300 ft ² > 1000 ft ²		
No. Individuals				
1-10 100-200	10-50 200-500	50-100 500-1000	>1000	
Percent Canopy Cover				
1-5% 300 ft ² - 600 ft ²	5-10% 600 ft ² - 1000 ft ²	10-25% > 1000 ft ²	25-50% 500-1000	50-75% >75%
Plant Phenology				
Flowering	Non-Flowering	Fruiting		
Plant Age				
Seedling	Juvenile	Mature	Dead	
Treatment Type			Treatment Comments:	
Hand pull Weed-whip	Herbicide Mulch	Hand-pull/Herbicide Tree removal	Other	
Area Treated				
1 ft ² - 10 ft ² 300 ft ² - 600 ft ²	10 ft ² - 100 ft ² 600 ft ² - 1000 ft ²	100 ft ² - 300 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
FI - Filiorum	FO - Forrestal	OT - Ocean Trails	PB - Portuguese Bend	GF - George F
TS - Three Sisters	VB - Vicente Bluffs	VN - Vista del Norte	WP - White Point	SR - San Ramon
				OR - Other

Rev 3/13

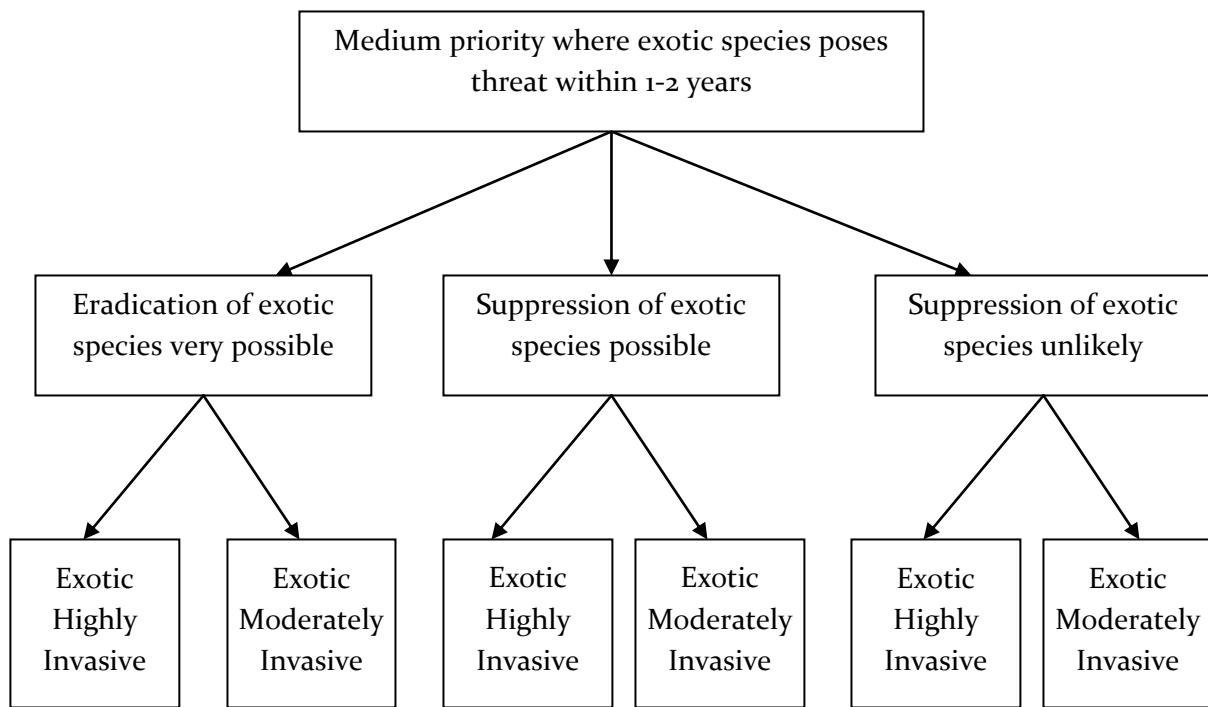
APPENDIX D2: FLOWCHART FOR HIGH PRIORITY THREAT TO NATIVE VEGETATION



Priority Ranking For Control of Exotic Species

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

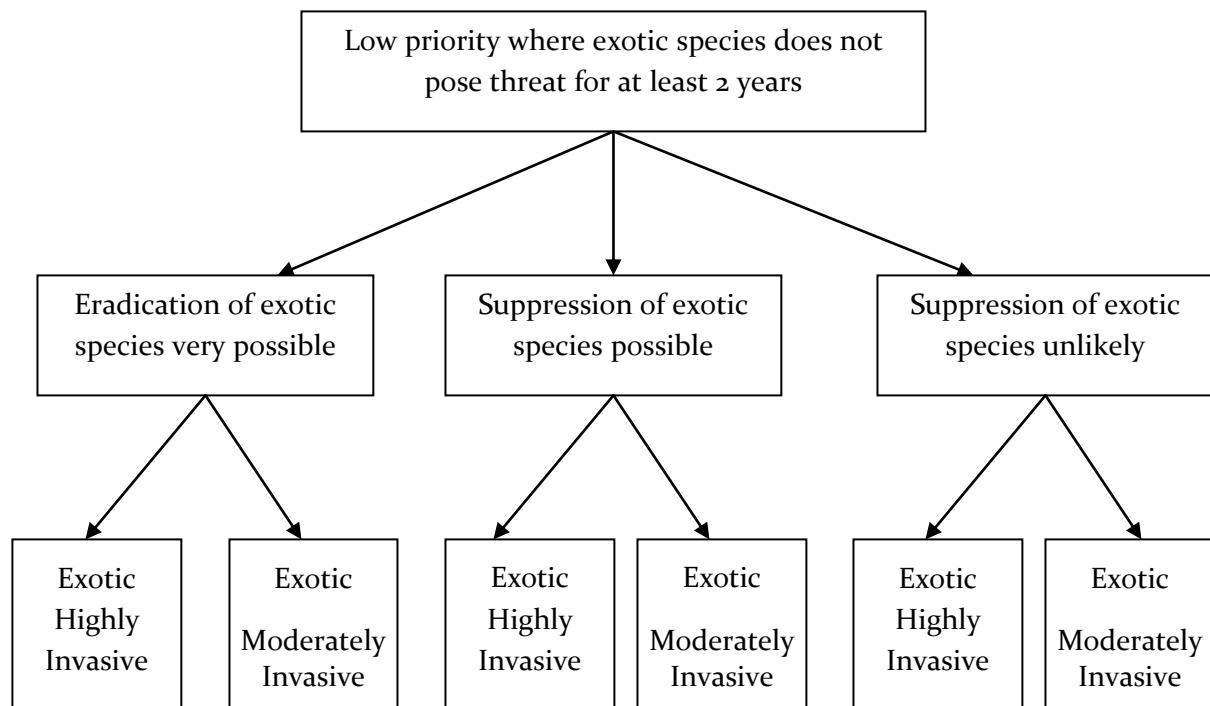
APPENDIX D3: FLOWCHART FOR MEDIUM PRIORITY DEGREE OF THREAT TO NATIVE VEGETATION



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**

<i>Arundo donax</i>	Giant reed
<i>Asparagus asparaagoides</i>	Bridal creeper
<i>Avena barbata</i>	Slender oat
<i>Avena fatua</i>	Wild oat
<i>Brachypodium distachyon</i>	False brome
<i>Brassica nigra</i>	Black mustard
<i>Bromus diandrus</i>	Ripgut grass
<i>Bromus madritensis</i> ssp. <i>rubens</i>	Red brome
<i>Carpobrotus edulis</i>	Hottentot fig
<i>Caesalpinia spinosa</i>	Spiny holdback
<i>Centaurea melitensis</i>	Tocalote
<i>Chrysanthemum coronarium</i>	Garland chrysanthemum
<i>Cortaderia selloana</i>	Pampas grass
<i>Cynodon dactylon</i>	Bermuda grass
<i>Euphorbia terracina</i>	Spurge
<i>Foeniculum vulgare</i>	Fennel
<i>Malva nicaeensis</i>	Bull mallow
<i>Malva parviflora</i>	Cheeseweed
<i>Malva sylvestris</i>	Mallow
<i>Mesembryanthemum crystallinum</i>	Annual iceplant
<i>Nicotiana glauca</i>	Tree tobacco
<i>Pennisetum clandestinum</i>	Kikuyu grass
<i>Pennisetum setaceum</i>	Fountain grass
<i>Picris echioides</i>	Bristly ox-tongue
<i>Pistacia atlantica</i>	Pistachio

<i>Pittosporum undulatum</i>	Pittosporum
<i>Raphanus sativus</i>	Wild radish
<i>Ricinus communis</i>	Castor bean
<i>Salsola tragus</i>	Russian thistle
<i>Silybum marianum</i>	Milk thistle
<i>Sonchus asper</i>	Prickly sow thistle
<i>Sonchus oleraceus</i>	Sow thistle
<i>Spartium junceum</i>	Spanish broom
<i>Tamarix species</i>	Tamarisk
<i>Tropaeolum majus</i>	Garden nasturtium

APPENDIX D6: MODERATELY INVASIVE SPECIES

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

<i>Schinus molle</i>	Mexican pepper	<i>Washington robusta</i>	Mexican fan palm
<i>Schinus terebinthifolius</i>	Brazilian pepper	<i>Vicia sativa</i>	Spring vetch
<i>Sisymbrium irio</i>	London rocket	<i>Vulpia myuros varhirsuta</i>	Annual fescue
<i>Trifolium hirtum</i>	Rose clover	<i>Vulpia myuros var myuros</i>	Rattail fescue

APPENDIX D7: EXOTIC, NON-INVASIVE SPECIES

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

APPENDIX D
2016 TARGETED EXOTIC REMOVAL
PROGRAM FOR PLANTS
(TERPP)
PHOTOS

AA_EuTe_02



AC_CeAl_01



AC_EuTe_01



AC_EuTe_04



AC_EuTe_05



AC_ArDo_01



AC_CoVa_01



AC_CoVa_02



AC_MeCr_01



AV_EuTe_01



AV_EuTe_02



AV_EuTe_03



PB_EuTe_03



PB_EuTe_05



PB_EuTe_07



PB_EuTe_08



PB_EuTe_10



TS_EuTe_01



TS_EuTe_02



TS_EuTe_03



TS_EuTe_04



VB_EuTe_01



VB_AcCy_01



TERPP Sites: AGUA AMARGA

2016 TERPP

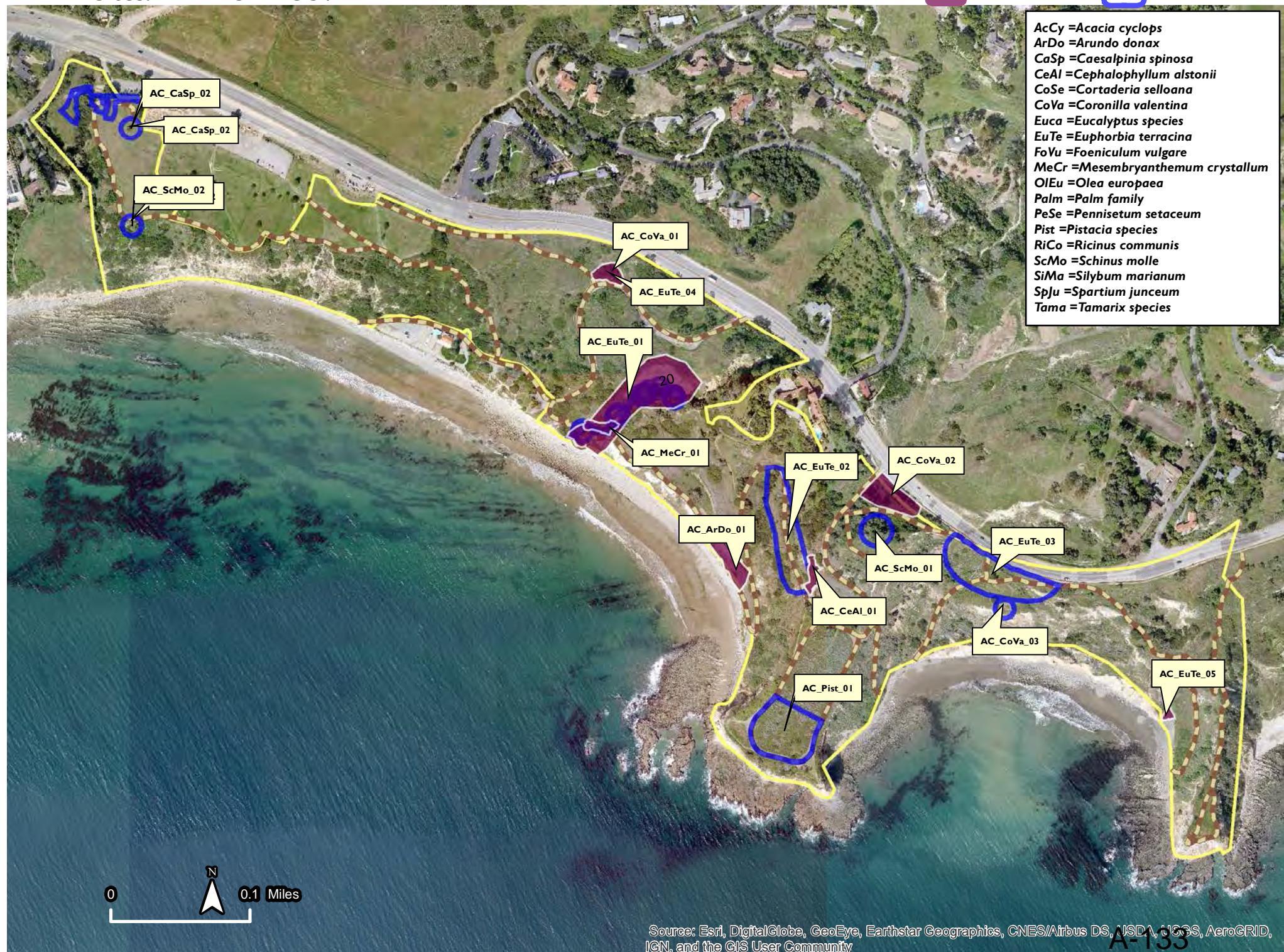
Former TERPP



TERPP Sites: ABALONE COVE

2016 TERPP

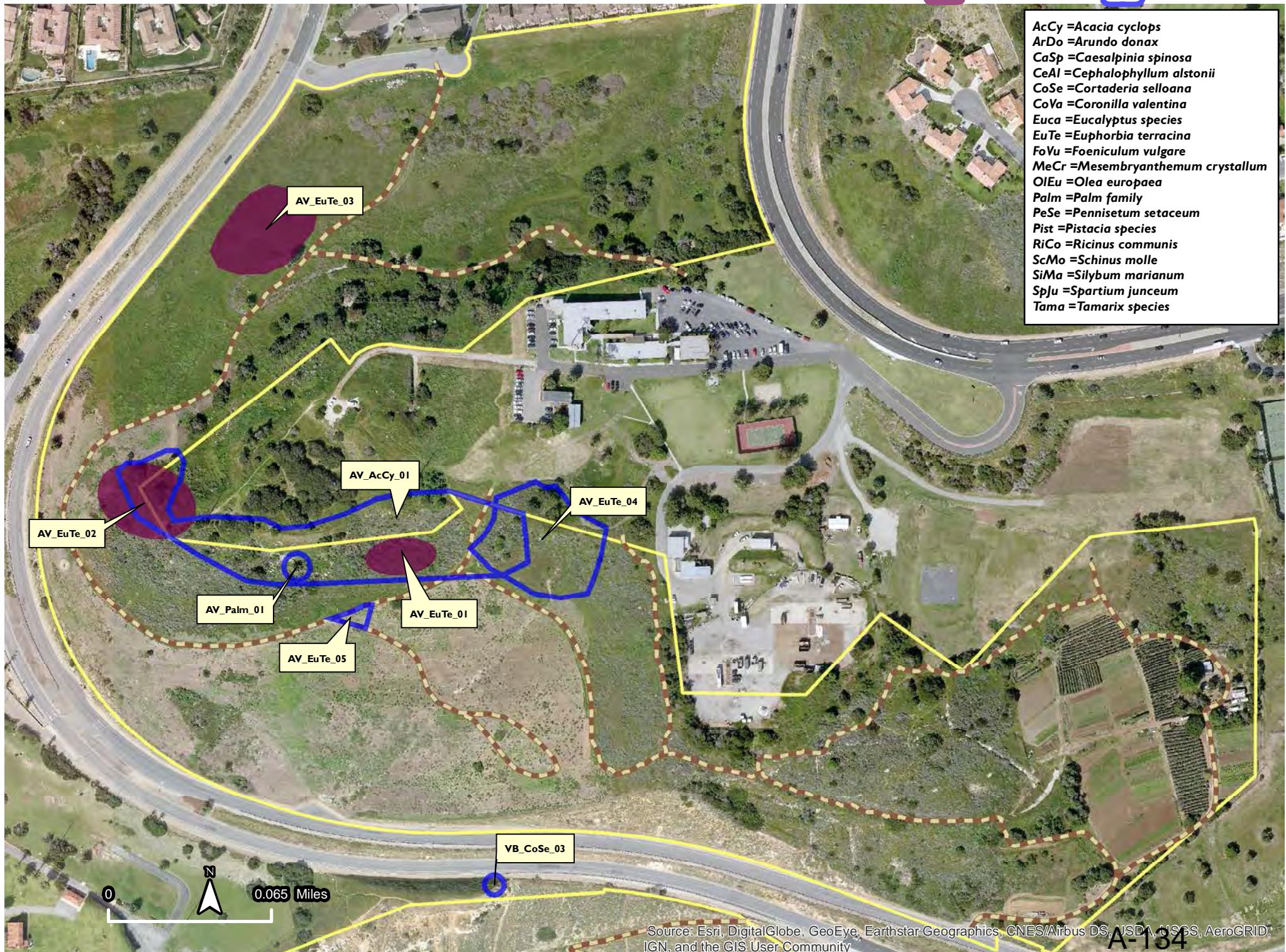
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TERPP Sites: ALTA VICENTE

2016 TERPP

Former TERPP



TERPP Sites: FORRESTAL

2016 TERPP

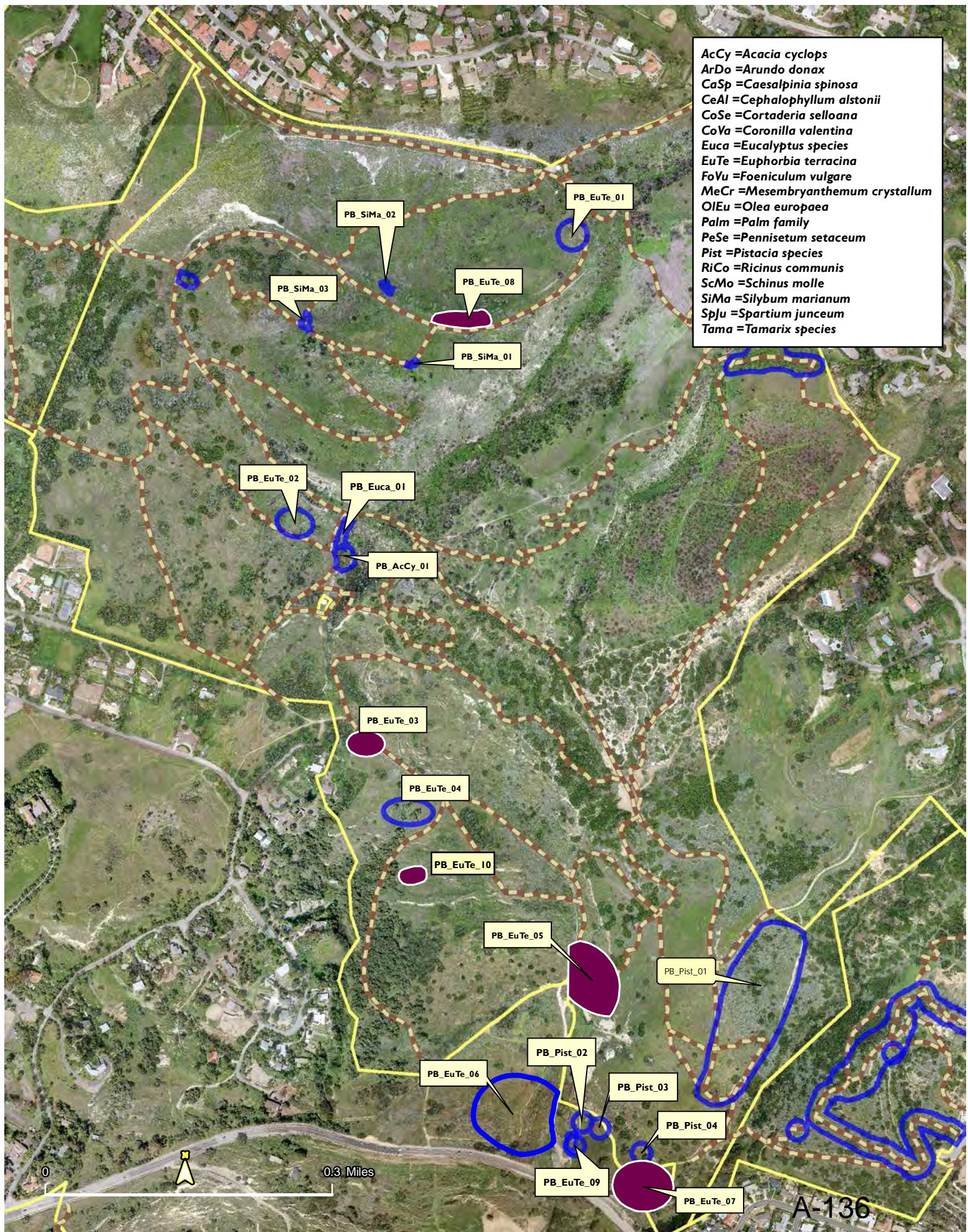
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TERPP Sites: PORTUGUESE BEND

2016 TERPP

Former TERPP

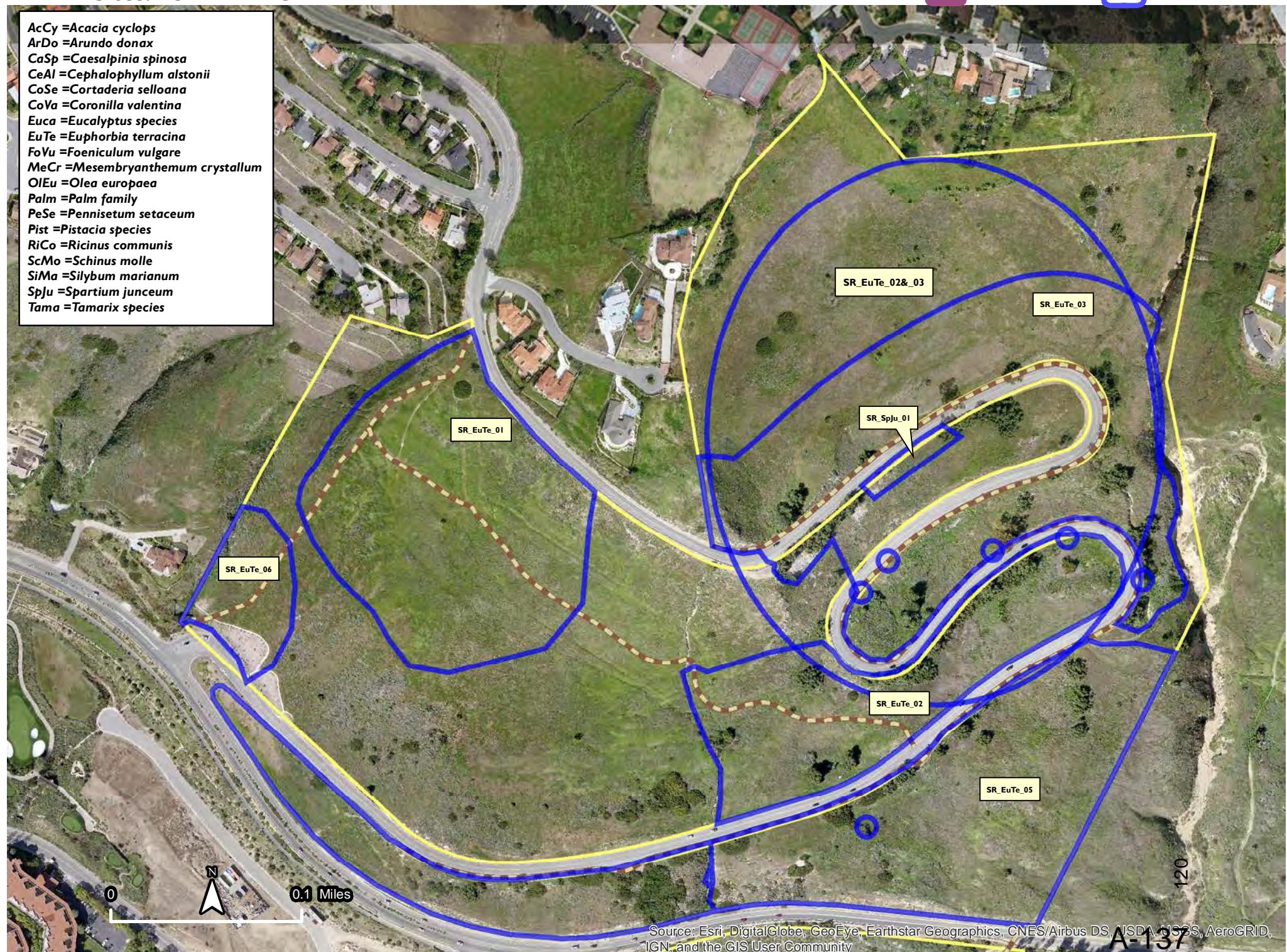


TERPP Sites: SAN RAMON

2016 TERPP

Former TERPP

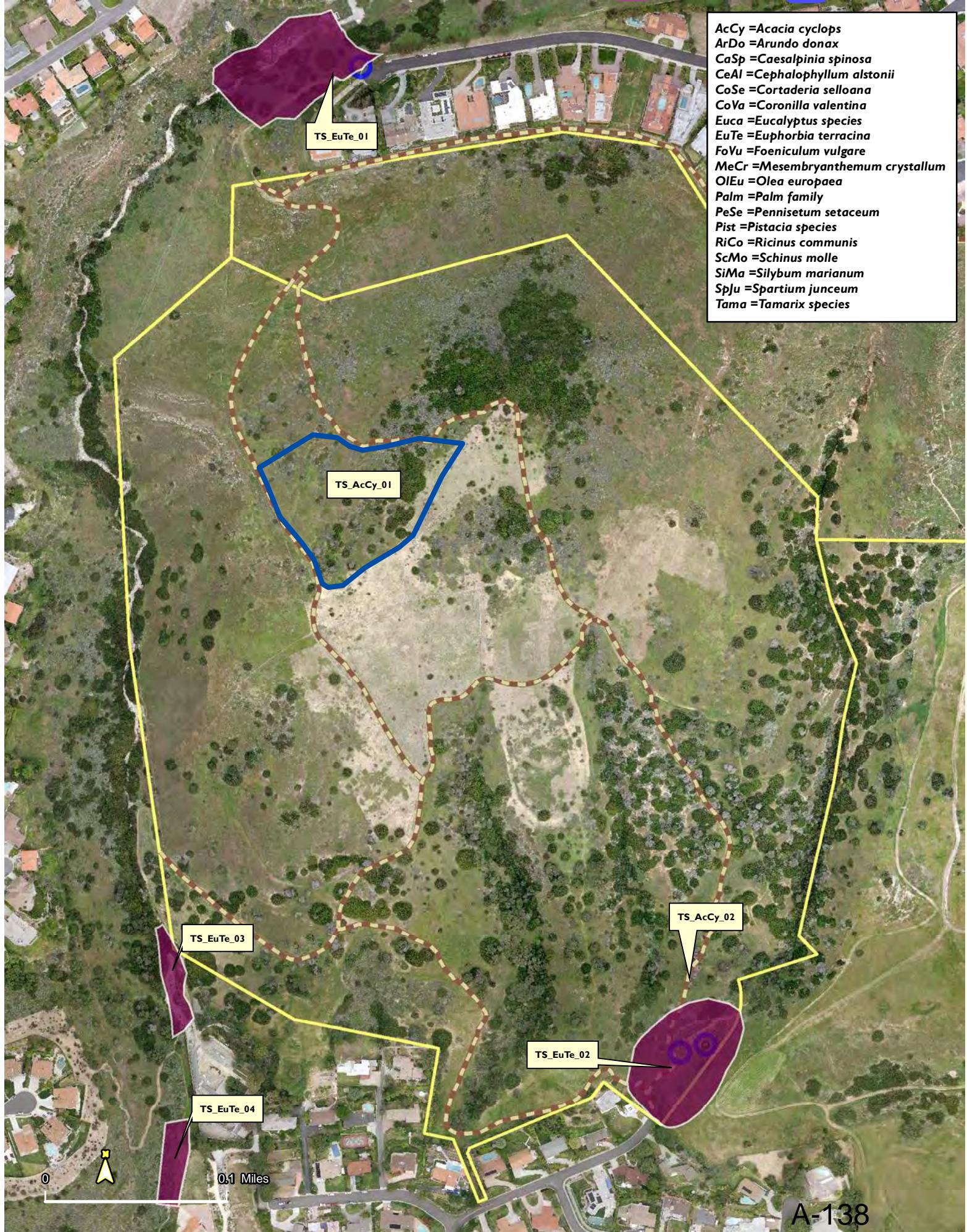
AcCy =*Acacia cyclops*
ArDo =*Arundo donax*
CaSp =*Caesalpinia spinosa*
CeAl =*Cephalophyllum alstonii*
CoSe =*Cortaderia selloana*
CoVa =*Coronilla valentina*
EuCa =*Eucalyptus species*
EuTe =*Euphorbia terracina*
FoVu =*Foeniculum vulgare*
MeCr =*Mesembryanthemum crystallum*
OlEu =*Olea europaea*
Palm =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: THREE SISTERS

2016 TERPP

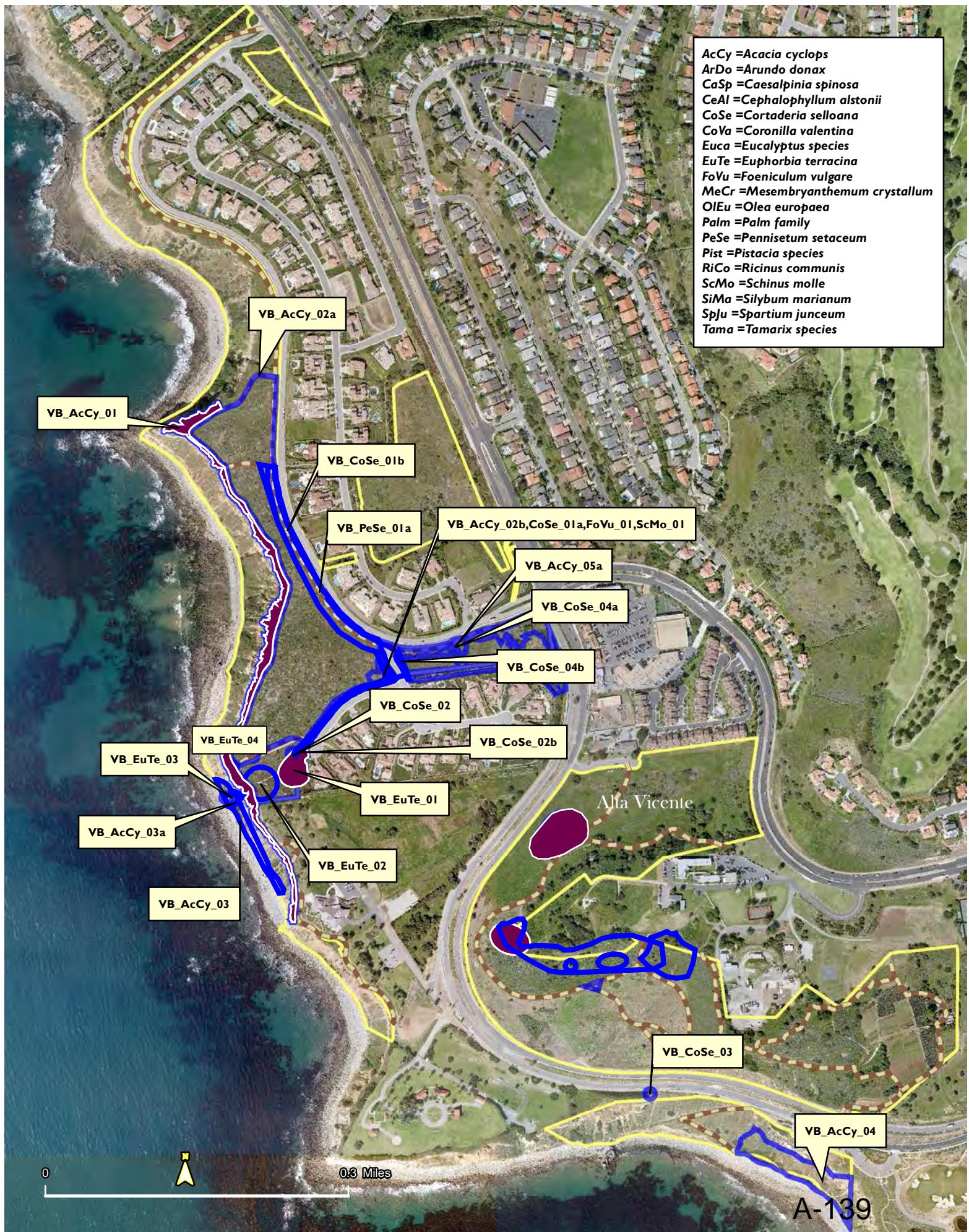
Former TERPP



TERPP Sites: VICENTE BLUFFS

2016 TERPP

Former TERPP



APPENDIX E

RESEARCH AND MONITORING

1.0 INTRODUCTION

PVPLC implements an integrated approach to research by involving students and community volunteers in programs that addresses specific conservation issues related to the management of the Palos Verdes Native Preserve. In 2016, high school and university students as well as community members participated in research that not only satisfied their educational and/or personal goals, but also contributed to informing PVPLC land management activities. The Citizen Science Program, initiated in Fall 2013, has brought volunteers to PVPLC for focused studies in the preserves. Citizen Science projects completed in 2016 include the Cactus Wren Monitoring Program and the Wildlife Tracking Program.

University professors are crucial for the success of research, as they provide expertise and technical guidance in managing several research projects. Land Conservancy staff provides access to the preserves as well as technical support to participants.

This report covers the Research and Education Program's activities via the major categories:

- High School Research
- University Researchers
- Citizen Science Programs

2.0 HIGH SCHOOL RESEARCH

High school and college students are important to PVPLC's field research. By participating in PVPLC's research program with professionals and university researchers, high school students obtain field and analytical skills in the natural science fields. Additionally, students increase their appreciation of nature while expanding their awareness of opportunities that the natural science fields have to offer. As a result, PVPLC students often win honors in science fairs and are able to leverage their experience for gaining entrance into top universities, satisfying course credits, or obtaining paid internships (Table I).

Table I. 2016 Science Fair Results for high school students in PVPLC research program

Student	Award	Project Title
Sarina Liu	Third Place at PV Science Fair in the Environmental Management category	Stimulating <i>Nasella pulchra</i> Growth Through Simulated Grazing.
Tiffany Minn	Honorable Mention at PV Science Fair in the Botany category.	Simulated Grazing Effects on Percent Cover of <i>Nasella pulchra</i> .

3.0 UNIVERSITY STUDENTS

College students from local universities participate in research under the umbrella of the Conservancy's Intern and Citizen Science programs. Students participate in research integral to land management and conservation activities, which provides the students valuable hands-on experience. PVPLC's stewardship staff conducts a variety of surveys throughout the preserves for assessing habitat quality as well as documenting the progress of our restoration efforts. The Conservancy's Interns participated in vegetation assessment surveys as well as entered the resulting data into the database. They also developed data tables for reports and conducted the initial stages of the report writing.

In addition to gaining work experience, many students leverage their internships for entrance into a professional job or graduate school. While the Conservancy benefits from their work, the students benefit from experience and training that will benefit them in future careers.

4.0 CITIZEN SCIENCE PROGRAMS

Volunteers are important for PVPLC, not only helping with growing plants, habitat restoration, guiding walks, and special events, but also with science research and education. Our volunteers travel from throughout the Peninsula and surrounding areas to help out.

The Citizen Science program blossomed in 2014 with the initiation of the Cactus Wren Program along with the ongoing Wildlife Tracking Program. The initial Cactus Wren Program resulted in detailed analysis of how the birds utilize mature cactus scrub habitat and newly-restored habitat at Alta Vicente Reserve. In addition, the volunteers were able to obtain detailed documentation of a single pair of cactus wrens as they built a nest, incubated eggs, and successfully fledged three chicks. Monitoring work in 2016 focused on cactus wren inhabitation adjacent to specific trail segments. This information described varying levels of cactus wren inhabitation across the preserve and made possible the inference of breeding activity based on a number of inhabitation criteria.

The 2016 Wildlife Tracking Project took place in the fall, beginning with training the volunteers for tracking wild coyotes, red fox, and gray fox in the Preserve. Once volunteers were confident in identifying tracks and scat of a particular species, they individually conducted regular surveys along specific routes. The data were submitted to the Conservancy for use in its management reports. A map document was also created to illustrate the location of scat or track observations.



Volunteers learn the basics of cactus wren observations before starting the first Citizen Science Cactus Wren monitoring season.

Statement of Problem

During this time of drought in California, the Palos Verdes Peninsula Land Conservancy is looking to find an additional factor besides water to stimulate *Nassella pulchra* growth. Its health is crucial, as its long roots limit invading plant species to our coastal sage scrub community.

Introduction

Nassella pulchra Background

- Commonly called purple needle grass
- State grass of California – perennial native grass from Baja California up to the Oregon border
- 60-100 cm tall with 0.8-2.5 mm wide leaves
- Roots extend down to over 60 cm deep – during droughts non-native annual grasses are able to out-compete the native grass by collecting water near the top of the soil
- Long living – life expectancy of 20-200 years



Photo by www.sonoma.edu

Why Simulated Grazing?

- Nassella pulchra* evolved under herbivory and physical impact through hoof action, which breaks up soil, incorporates seeds, and compacts soil.
- Grasses first appeared in California during the Pliocene period (5-2.5 MYBP) and supported at least 19 species of plant-eating megafauna, which would be as diverse as 20th century East Africa.
- The beginning of the Holocene period (12,000 YBP) led to the arrival of humans, and hunting attributed to the broad scale extinction of those grazers.
- Nassella pulchra* serves as an important source of forage because grasslands were only 15% of California's land area but accounted for 80% of the land for livestock.
- Historical list of grazers in southern California - Two zebras, Giant horse, Western horse, Three-toed horse, Large-headed llama, Brachyodomi deer, Pacific pronghorn, Dwarf antelope, Shrub ox, Woodland musk ox, Columbian mammoth, American mastodon, Harlan's ground sloth, Shasta ground sloth, Jefferson's ground sloth, Ice Age bison, Long-horned bison, Western camel, Tapir, Flat-headed peccary, Elk, Mule deer, Pronghorn, cattle, sheep, and horse

Hypothesis

If six plots containing *Nassella pulchra* are equally watered, then the plot with the greatest amount of trimming and disturbance will have the greatest average number of green sprouts per clump and the greatest average height.

Stimulating *Nassella pulchra* Growth Through Simulated Grazing

by Sarina Liu

Introduction

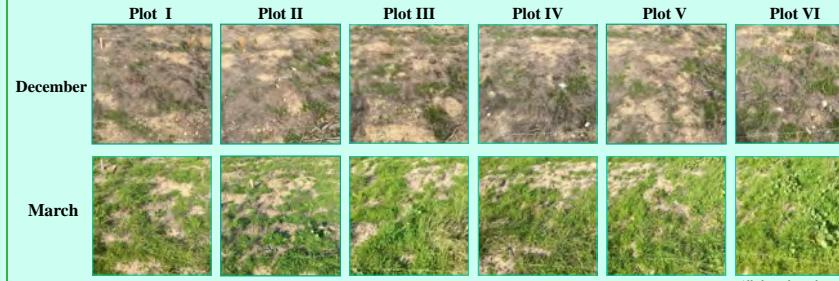
Nassella pulchra Background

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- State grass of California – perennial native grass from Baja California up to the Oregon border
- 60-100 cm tall with 0.8-2.5 mm wide leaves
- Roots extend down to over 60 cm deep – during droughts non-native annual grasses are able to out-compete the native grass by collecting water near the top of the soil
- Long living – life expectancy of 20-200 years



Photo by www.sonoma.edu

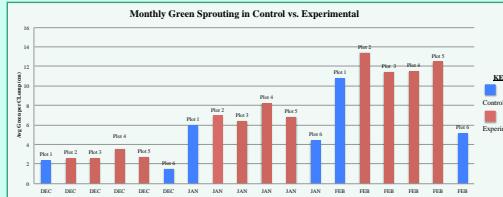
Data



All photos by author

DATA TABLE #1:

Month	Control Avg. Green per Clump	Experimental Avg. Green per Clump
December	1.9827	2.9043
January	5.2586	7.1652
February	8.2068	12.1826
March	9.9707	13.5070



DATA TABLE #2:

Month	Control Avg. Height (cm)	Experimental Avg. Height (cm)
December	0.8817	2.0078
January	1.1749	2.7645
February	6.9438	10.6561
March	13.8297	28.3023



Methods and Materials

- A plot of land was divided into six subplots of roughly 30 labeled clumps: control, light trimming, intense trimming, light trimming with disturbance, intense trimming with disturbance, and control.
- Before the first data collection, subplots #2 and #4 were lightly trimmed, and subplots #3 and #5 were intensely trimmed to a height of 5 cm. In the four experimental subplots, the thatch from regrowth was trimmed a couple centimeters every two months. Every month, subplots #4 and #5 were disturbed using a fireiron.
- All six plots will receive equal amount of water according to the average monthly precipitation.
- Every month, the number of green sprouts in each clump will be recorded along with its average height.

Results

T-test comparing green sprouts between control and experimental groups (95% confidence):

Month	P-value
December	0.10508
January	0.11834
February	0.13968
March	0.15903

- No statistically significant difference

T-test comparing average height between control and experimental groups (95% confidence):

Month	P-value
December	0.01708
January	0.00886
February	0.04772
March	0.04471

- Statistically significant difference

Two-Way ANOVA test to compare average height among four experimental groups:

Factor	P-level
Trimming	0.91359
Disturbance	0.83274

- No statistically significant difference

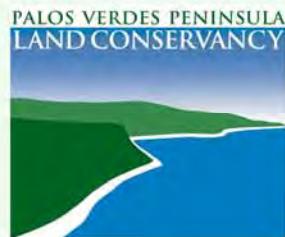
Conclusions

Neither trimming nor disturbance impacted the average number of green sprouts per clump, so the hypothesis is rejected. However, the average height in the experimental plots is significantly taller than the control plots, so the *Nassella pulchra* grew at a faster rate in the experimental plots. No single combination of trimming and disturbance in the experimental plots was most significant in producing the highest average height per clump, so the hypothesis is rejected. As a result, any of the four combinations can be applied, so the most efficient method should be chosen: light trimming with no disturbance. The data shows that excluding simulated grazing activity from *Nassella pulchra* restoration areas is excluding a biological condition needed to support healthy grass.

For the control, the steepness of the plot inversely affects sprouting and height, whereas for the experimental, those factors remain constant. The outlier lies in plot #6. Its location on the steeper part negatively affected water retention in the soil, leading to decreased sprouting and growth. It was also subject to the most amounts of weeds, leading to competition for resources.

Further Research

It would be useful to extend data collection to observe if the same patterns occur until the end of growing season in June. In addition, a second data collection on a flatter land area to see if it results in more consistent data.



Monitoring Wild Canids in the Palos Verdes Nature Preserve



INTRODUCTION

Three species of wild canid inhabit the Palos Verdes Nature Preserve (PVNP): coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), and red fox (*Vulpes vulpes*). These canids serve as top predators within PVNP. The Palos Verdes Peninsula Land Conservancy (PVPLC) has monitored wild canid presence within the PVNP since 2006 in accordance with the Rancho Palos Verdes Natural Community Conservation Plan (NCCP). This agreement provisions PVPLC to describe biological data on wildlife movements of predators. The Citizen Science Wildlife Tracking Program is currently engaged in performing this monitoring task.



METHODS

Study Area: The study area was within five reserves of the Palos Verdes Nature Preserve (Figure 4 and 5) in Rancho Palos Verdes, CA.

Survey Period: November 2016 - March 2017

Data Collection: Volunteers walked predetermined trail routes documenting scat or tracks of wild canids. A photo was taken of each observation and the location was noted on field data sheets (Figure 1).

Data Analysis: Track and scat observations were collectively mapped to spatially describe the movement of wild canids within the PVNP.

Figure 1. Completed field sheet for the Forrestal Reserve.

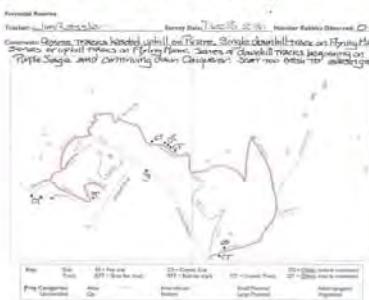


Figure 2. Track photo.



Figure 3. Scat photo.



RESULTS

- 1) Field surveys identified the presence of all 3 wild canid species known to exist within the Palos Verdes Nature Preserve.
- 2) The majority of scat and track observations were coyote.
- 3) Three areas of intensive use by wild canids were found within Three Sisters, Portuguese Bend, and Forrestal reserves.
- 4) Areas of low-use or near exclusion may exist between observed high-use areas.

Figure 4. Locations of wild canid scats detected across the PVNP.



Figure 5. Location of wild canid tracks detected across the PVNP.



CONCLUSIONS

- 1) Coyotes were observed to be the most abundant wild canid within the Palos Verdes Nature Preserve.
- 2) Habitat areas of the PVNP support varying intensities of wild canid activity. This may potentially describe differing levels of inhabitance factors known to affect canid occupancy such as habitat quality, prey abundance, and disturbance pressure.
- 3) High-use areas may generally depict den locations.

FUTURE STUDY

Future study will evaluate the validity of observed high/low-use areas as well as work towards better understanding wild canid movement across the PVNP. Trail cameras will be used to identify individual coyote movement and describe the presence or absence of territorial use of observed high-use areas. This work may also improve our understanding of wild canid presence within low-use areas and supplement current research methods in the case that environmental factors such as substrate composition or trailside vegetation impede track and scat detection. The development of a **relative abundance index** (# of scat/kilometer surveyed/week) will be created to track yearly fluctuations of wild canid populations.

Figure 6. Installation of a trail camera.



Figure 7. Trail camera capture of a coyote.



CITIZEN SCIENTISTS



Bethany Bax (AmeriCorps), Mike Bell, Tana Bell, Peter Cameron, Joseph Garcia, Linda Howat, Rebecca Heisey, Alex Kovary, Joan Krause, Connie Lao, Donna McLaughlin, Jim Rassler, Ben Smith, Wes Wyberg (AmeriCorps), and the Cisneros family.

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APPENDIX F

VOLUNTEER PROGRAMS

I. INTRODUCTION AND SUMMARY

1.1 Volunteer Programs

This 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, 2016 to December 31, 2016.

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:

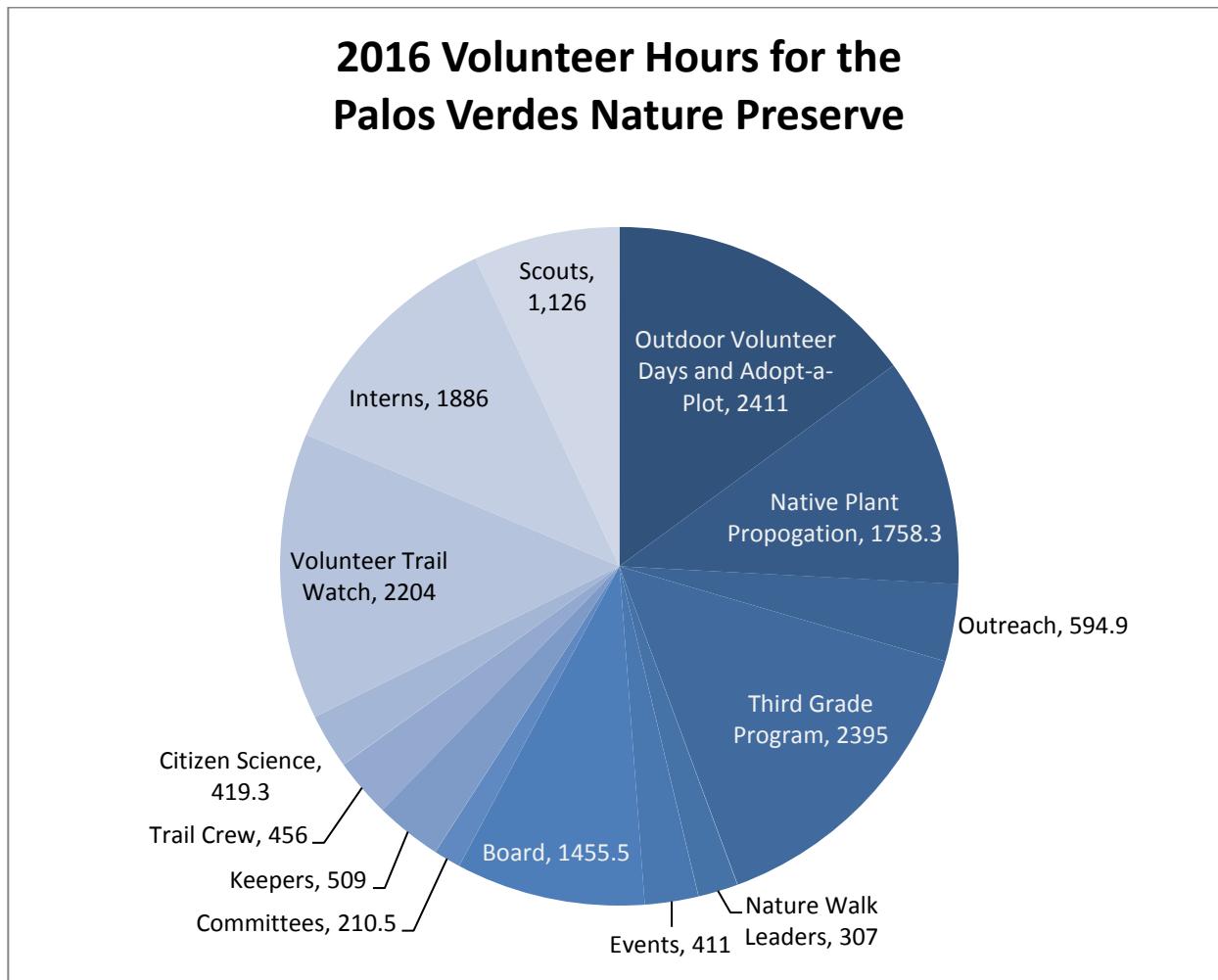
- Board of Directors
- Committees and Advisory Boards
- Special Events and Office Assistance
- Education Docents and Nature Walk Leaders
- Interns

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
- Adopt-a-plot
- Trail Crew
- Keeping an Extra Eye on the Preserve for Environmental Review and Stewardship (KEEPERS)
- Volunteer Trail Watch
- Citizen Science

In 2016, volunteers provided a grand total of **16,142.89** hours of service to support conservation, restoration and management of the Palos Verdes Nature Preserve. According to the

Independent Sector, volunteer time in California is valued at \$28.46 per hour (based on Dollar Value of a Volunteer Hour, by State: 2016, Independent Sector), thus generating a total of \$459,426.64 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 1,456 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 210.5 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
- 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) 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 such as Palos Verdes Pastoral held at Terranea Resort.

2.4 Nature Walks

Nature Walk Leaders donated a total of 307 hours in 2016. 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 2016, 15 interns dedicated a total of 1886 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 2016:

- 9,293.99 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. 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 an 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. Refer to Appendix G for maps of spur trail closures.

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

Abalone Cove Reserve

Date	Activity
15-Jan	Rapid Response
16-Jan	Rapid Response
8-July	Rapid Response
9-Sept	Rapid Response
17-Sept	Coastal Clean-Up Day
18-Nov	Rapid Response
19-Nov	Rapid Response
30-Dec	Rapid Response

Agua Amarga Reserve

Date	Activity
20-Feb	Planted 67: 20 sunflower, 5 lemonadeberry, 20 sea-cliff buckwheat., 10 goldenbush, 10 coyote brush, 2 elderberry
4-Jun	Weed removal: flowering bristly ox tongue, fennel treatment
16-Jul	Water retention berms, watering, hand weeding prickly lettuce, dandelion, bristly ox-tongue, and tobacco tree, cut-stump herbicide treatment of fennel
8-Oct	Ice plant removal from North side of Upper Lunada and watering restoration area

Alta Vicente Reserve

Date	Activity
17-Jan	Removed Acacia, fennel and Russian thistle
28-May	Remove ice plant, Russian thistle, Acacia
15-Sep	Removed Russian thistle in Phase 1 and 2; line trail with wood, remove Acacia seedlings
1-Oct	Rapid Response
15-Oct	Spread wildflower seed in poppy circle and rake it in
3-Dec	Weed ice plant, Russian thistle, clover, stork's bill, lamb's quarters, annual grass from Phase 2

Portuguese Bend Reserve

Date	Activity
30-Jan	Removed weeds from restoration area
13-Feb	Rapid Response
19-Feb	Rapid Response
20-Feb	Rapid Response
18-Mar	Rapid Response
19-Mar	Rapid Response
25-Mar	Rapid Response
2-Apr	Detailed weeding around installed plants
8-Apr	Rapid Response
16-Apr	Rapid Response
29-Apr	Removed all mustard from Phase 5 with ITG Corporate group
28-May	Rapid Response
25-June	Rapid Response
1-July	Rapid Response
2-July	Detailed weeding of various common weed spp. Phase 5
2-July	Rapid Response
27-Jul	Phase 5 light weed removal, Phase 3: Russian thistle and bristly ox tongue removal & dethatching, Phase 4: Fennel and Russian thistle removal
30-July	Rapid Response
6-Aug	Remove fennel seedlings NCCP: Phase 4, Russian thistle removal & rake Phase 3
26-Aug	Rapid Response

27-Aug	Rapid Response
3-Sep	Collect about 20 lbs of seed from <i>Eriogonum fasciculatum</i> , <i>Salvia mellifera</i> , <i>Rhus integrifolia</i>
30-Sept	Rapid Response
12-Oct	Plant 145 CSS in Phase 3: 47 <i>Artemisia</i> , 9 <i>Encelia</i> , 27 <i>E. cinereum</i> , 24 <i>E. fasciculatum</i> , 6 <i>Eschscholzia</i> , 3 <i>Heteromeles</i> , 2 <i>Rhus</i> , 15 <i>S. leucophylla</i> , 6 <i>S. mellifera</i>
28-Oct	Rapid Response
29-Oct	Rapid Response
5-Nov	240 fill-in plants in Phase 5 Portuguese Bend
9-Dec	Rapid Response
16-Dec	Rapid Response

Filiorum Reserve

<u>Date</u>	<u>Activity</u>
29-Jan	Rapid Response
26-Feb	Rapid Response
26-Mar	Rapid Response
15-Apr	Rapid Response
17-June	Rapid Response
18-June	Rapid Response
24-June	Rapid Response
22-July	Rapid Response
29-July	Rapid Response
17-Dec	Rapid Response
28-Dec	Eagle Scout project to build fence

Forrestal Reserve

<u>Date</u>	<u>Activity</u>
30-Jan	Rapid Response
5-Feb	Rapid Response
26-Feb	Rapid Response
4-Mar	Rapid Response
5-Mar	Rapid Response
1-Apr	Rapid Response
22-Apr	Rapid Response
13-May	Rapid Response
3-June	Rapid Response
4-June	Rapid Response
15-July	Rapid Response
5-Aug	Rapid Response
6-Aug	Rapid Response
12-Aug	Rapid Response
13-Aug	Rapid Response
16-Sept	Rapid Response
17-Sept	Rapid Response
7-Oct	Rapid Response

8-Oct	Rapid Response
14-Oct	Rapid Response
21-Oct	Rapid Response
22-Oct	Rapid Response
5-Nov	Rapid Response

3.1.2 Native Plant Nursery

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 1758.3 volunteer hours were contributed to nursery efforts in 2016.

3.2 Team Leader Program

The Team Leader program began 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 2016, three workshops were held which trained 67 leaders at White Point Preserve on April 16th, May 15th and September 10th.

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 2016, scout projects accumulated 1,126 hours of volunteer service.

3.4 Trail Crew Program

In 2016, the volunteer Trail Crew contributed a total of 456 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 classes.

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 16	40	Filiorum and Portuguese Bend	Kelvin Canyon trail wall and Zote's Cutacross trail alignment
February 6	31.5	Portuguese Bend	Toyon Trail re-routing with City volunteers & staff
February 20	27.5	Portuguese Bend	Planting in Toyon trail
February 27	15	Portuguese Bend	Toyon/Landslide Scarp/Peppertree junction
March 12	13	Filiorum	Zote's Cutacross tread repair, bench cut, checkdams
April 9	25	Three Sisters	Sunshine Trail rock retaining wall
May 14	21	Forrestal	Pirate trail check dam reinforcement
June 11	31.5	Abalone Cove	Sea Dahlia trail step repair
July 9	12	Filiorum	Zote's Cutacross trail repair
August 13	30	PVPLC Office	Trail Crew Introductory Class
August 14	13.5	Portuguese Bend	Kelvin Canyon retaining wall
September 10	28	Vista del Norte	Enhance trail connection
October 15	24.5	Filiorum	Ford trail realignment and bench cut
December 10	52	Forrestal	Mariposa tread repair, bridge repair, pruning

3.5 Keeping an Extra Eye on the Preserves Stewardship (KEEPERS) Program

In 2016, The KEEPERS program contributed 508.71 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 mission of the Palos Verdes Nature Preserve Volunteer Trail Patrol Program is to serve as eyes and ears of the City of Rancho Palos Verdes 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. The Volunteer Trail Watch Program was initiated in 2013 to help educate trail users about appropriate trail use and monitor preserve misuse. Volunteers dedicated 2203.93 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 the Volunteer Trail Watch co-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 419.3 hours to documenting the behavior of cactus wrens and the evidence of mammalian populations like coyotes and foxes through tracking efforts.

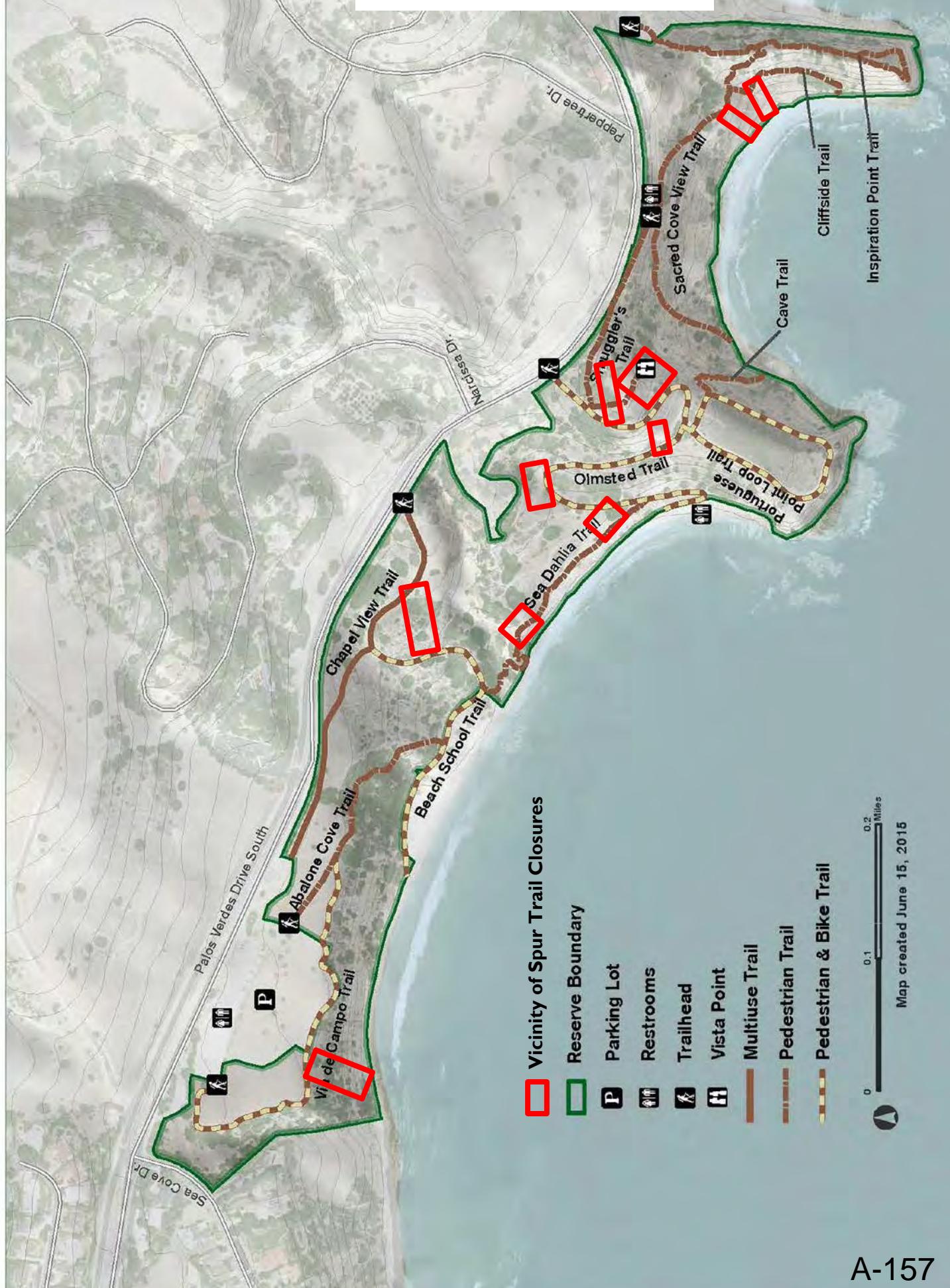
4. GRANTS SUPPORTING VOLUNTEER ENGAGEMENT

In 2016, 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 Reserve



Alta Vicente Reserve

Palos Verdes Dr West

North Spur Trail

Hawthorne Blvd

Alta Vicente Trail

South Spur
Trail

Nike Trail

Prickly Pear Trail

Palos Verdes Dr South

Alta Vicente Trail

Pelican Cove

Tremor Trail

■ Vicinity of Spur Trail Closures

RPV City Hall

P Parking

Restrooms

Trailhead

Multiuse Trail

Pedestrian & Equestrian Trail

Road

■ Reserve Boundary



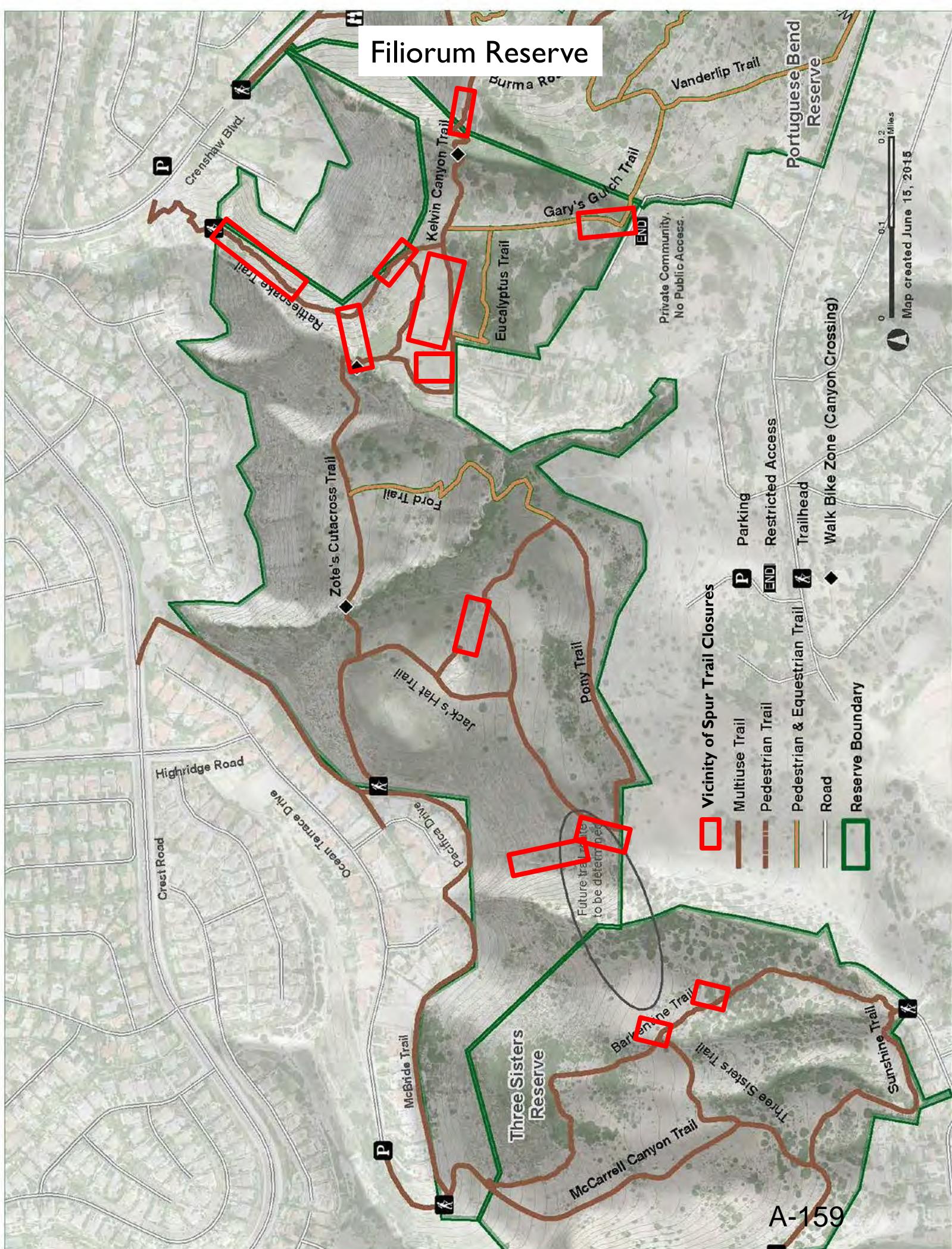
Map created June 15, 2015

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0.1

0.2 Miles

Filiorum Reserve



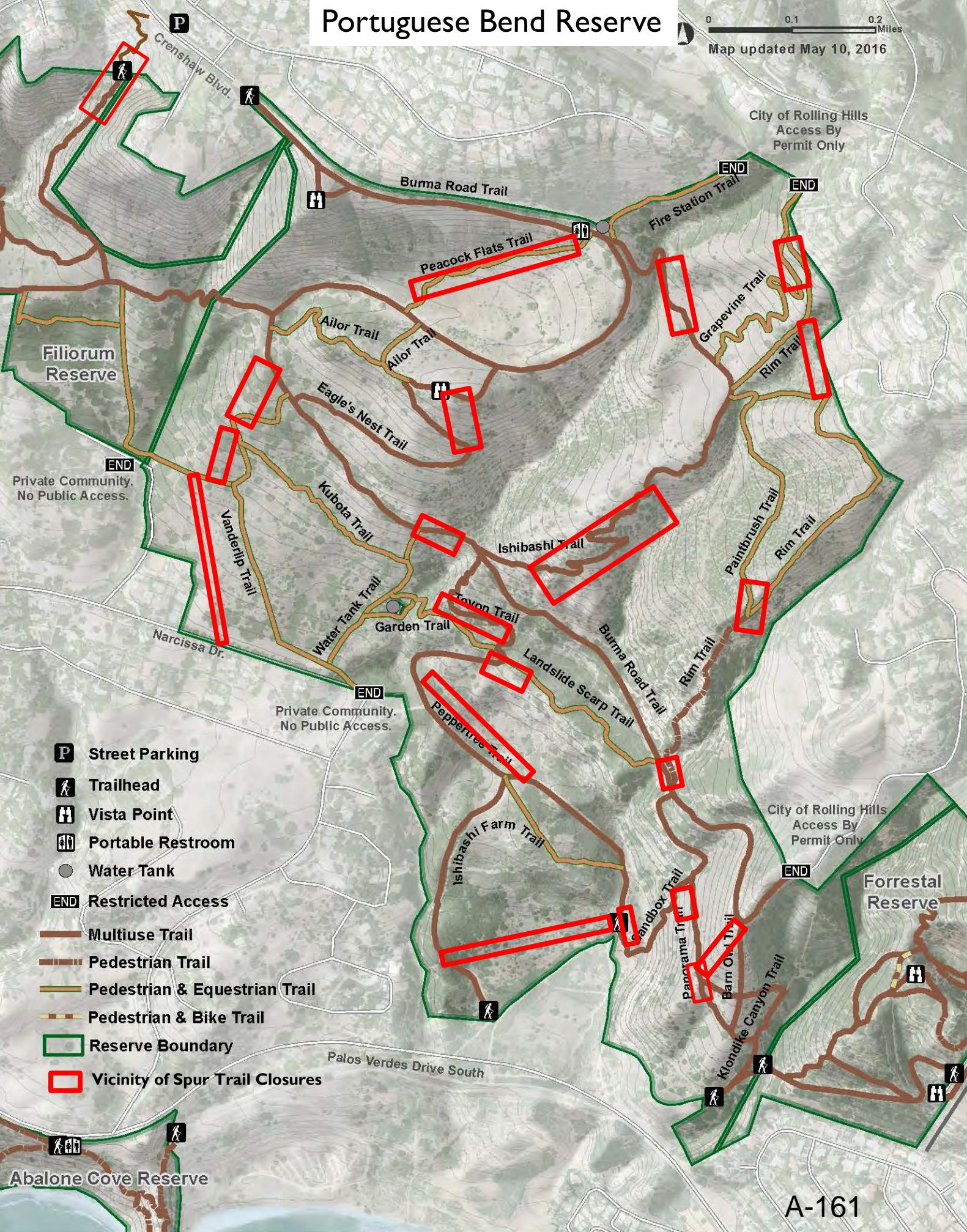
Forrestal Reserve



Portuguese Bend Reserve

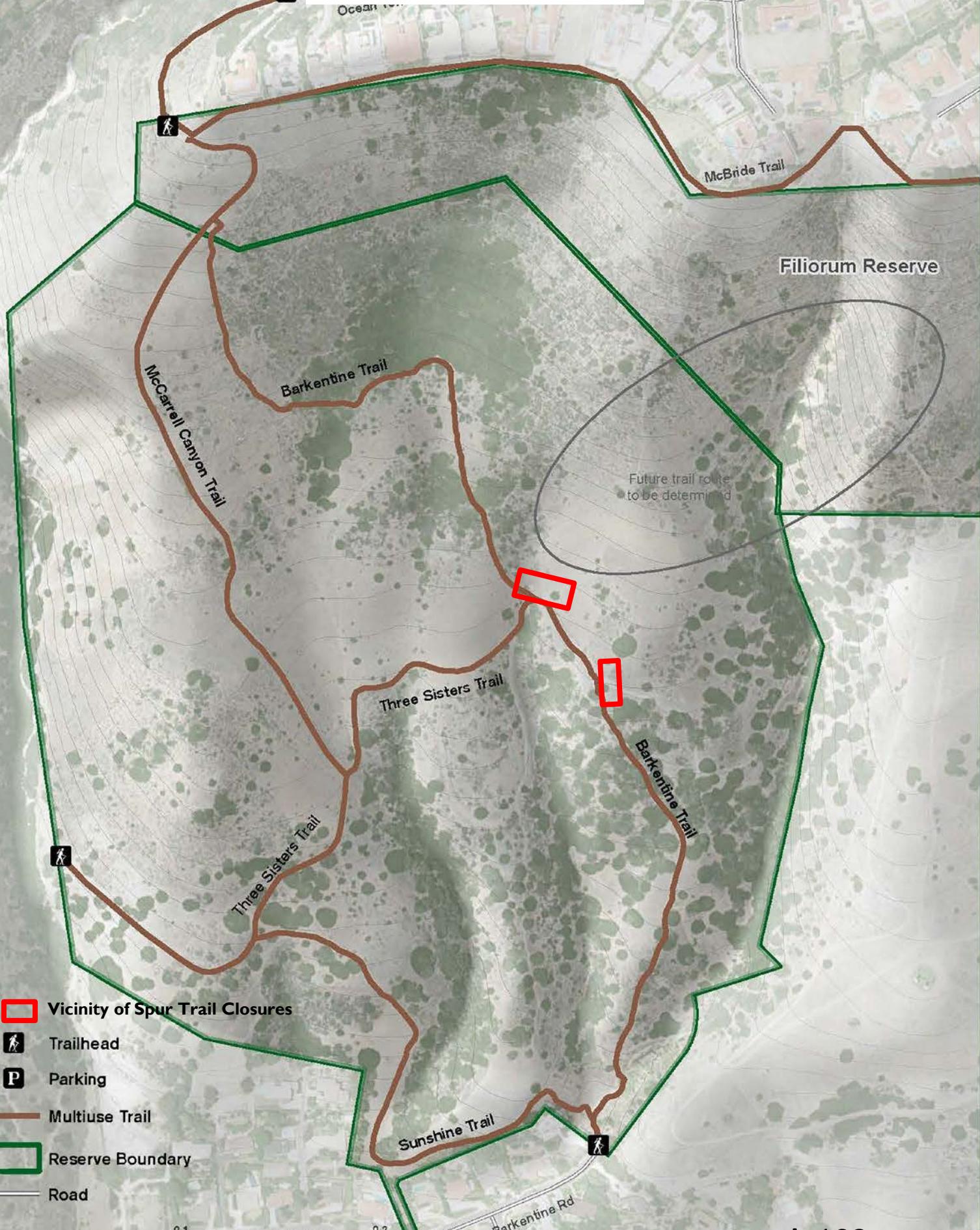
Map updated May 10, 2016

0 0.1 0.2 Miles



Three Sisters Reserve

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APPENDIX H

FUTURE TRAIL PROJECTS LIST

2017 Trail Project Needs List

The following is a list of trail project needs on priority and available funding opportunities. This list is intended to outline potential projects including trail repairs, spur trail closures and signage improvements but may be amended. 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.

Priority Ranking:

The following projects are ranked low to high with consideration to impacts to habitat, user safety and other issues. These rankings also take other considerations such as funding, feasibility, availability of staff or volunteers to accomplish project, and other factors into account.

High = poses immediate safety concern, significant impact to habitat, trespassing, etc.

Medium = spur trails and erosion issues that affect trail quality, cause user dissatisfaction, or mildly impact habitat

Low = spur trails and erosion issues that are minor and may not impact habitat, but may not meet user satisfaction

Reserve Name	Trail Name	Issues	Priority
Abalone Cove			
	Cave Trail	Trail erosion control	Medium
	Sacred Cove (West to beach)	Trail erosion	Medium
	Olmstead Trail	Spur trail closures	Medium -- Ongoing
	Sea Dahlia Trail	Safety concern around stairs – Closure of whole segment?	High
	Sea Dahlia Trail	Spur Trail Closures	Medium – Ongoing
	Smuggler's Trail	Spur Trail Closures	Medium – Ongoing
	Abalone Cove Trail	Spur Trail Closures	Medium – Ongoing
	Beach School Trail	Spur Trail Closures	Low – Ongoing
	Sacred Cove View Trail	Spur Trail Closures	Low
	Via del Campo Trail	Spur Trail Closures	Medium – Ongoing
Agua Amarga			
Alta Vicente			
	Prickly Pear Trail	Spur trail closures	Medium – Ongoing
Filiorum			
	Jack's Hat	Spur trail closure and signage replacement	Medium – Ongoing
	Pony Trail	Install bridge over gully and close spur trails	Medium – Ongoing
	Rattlesnake Trail	Spur trail closure	Medium
	Closures at York property	Signage replacement	Medium – Ongoing
	McBride Trail	Spur trail closures	Medium
	Zote's Cutacross	Improve canyon crossings	<i>Completed</i>

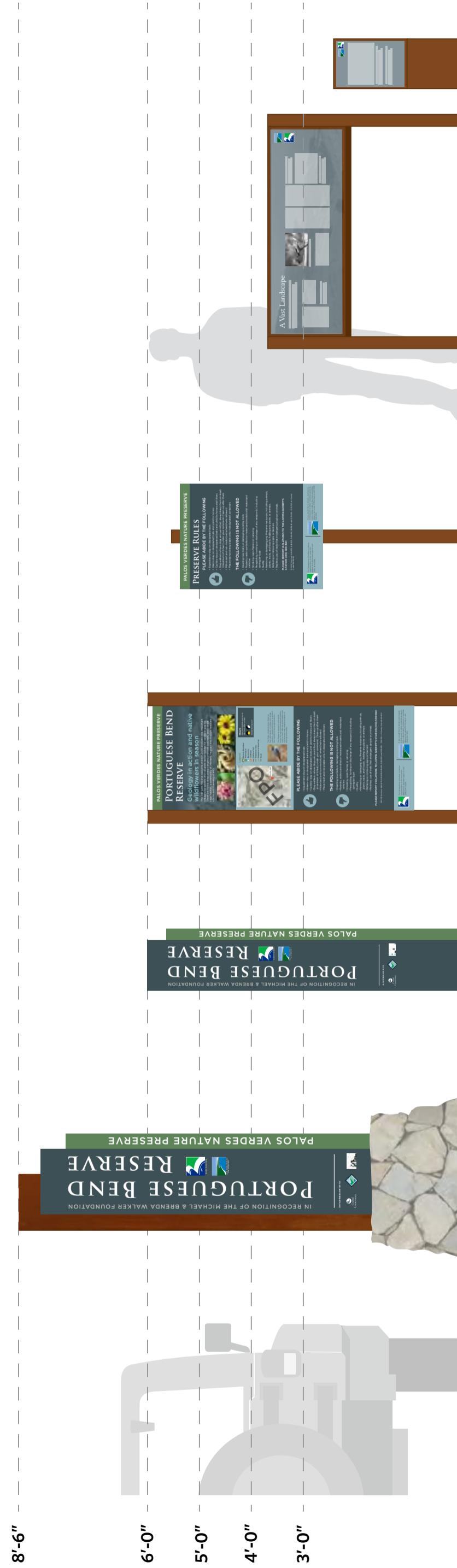
Forrestal			
	Conqueror Trail	Trail erosion	Medium
	Crystal Trail	Trail delineation and signage	Medium
	Quarry Trail	Spur trail closure	Low
	Cool Overlook	Spur trail closure	Medium
	Dauntless Trail	Spur trail closure (upper section) and trail erosion (lower section)	Medium
	Mariposa Trail	Bridge replacement	<i>Completed</i>
	Vista Trail	Spur trail closure	Medium
	Exultant Trail	Spur trail closure	Low
	Cristo que Viento Trail	Spur trail closure	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 and reduce widening	<i>Reduce widening completed</i> <i>Spur Closure Ongoing</i>
	Barn Owl Trail	Trail erosion and spur trail closure	Low
	Fire Station Trail	Maintain closure into private property; Signage (ongoing)	Low
	Toyon Trail	Restore widened trail to appropriate trail width	<i>In progress</i>
	Rim Trail (lower section)	Spur trail closure	High
	Panorama Trail	Spur trail closure	Low
	Paintbrush Trail	Spur trail closure	Medium – Ongoing
San Ramon			
	Switchback trail	Delineate single path and install bridge over gully	Medium
	Marymount Trail	Create sustainable trailhead at upper section; more sustainable trail delineation; Repair erosion at upper trail head	Medium
	Marymount Trail	Create sustainable lower access point	Medium
Three Sisters			
	Sunshine Trail	Trail Delineation in fuel mod area	Medium
	Barkentine Trail	Spur trail closure	Medium
	<i>Trail connection</i>	New trail creation to Filiorum Reserve	Medium
	McCarrell Canyon Trail	Trail erosion and spur trail closure	Medium – Ongoing
Vicente Bluffs			

	Tovemor Trail	Close spur trail	Medium -- Ongoing
Vista del Norte			
	Indian Peak Loop Trail	Trail delineation to connect to new development's trail easement	<i>Completed</i>

Last Updated 09/27/2016

APPENDIX I

PVNP SIGNAGE DESIGNS



APPENDIX J

HABITAT IMPACTS

2016 Habitat Loss Tracking Report

Date of Loss	Responsible Party	Amount of Loss (Acres)	Location of Loss	Description of Loss
Jul-16	City of Rancho Palos Verdes	0.1	Burma Road	Loss of coastal sage scrub during City dewatering well project.
Aug-16	Cal Water Company	0.07	Portuguese Bend Reserve	Cal Water damage off Burma Road. Undergoing restoration efforts. Damage includes 0.04 acres of coastal sage scrub and 0.03 acres of grassland.

APPENDIX K

CITY OF RPV NIGHT HIKE ACTIVITY

APPENDIX K

2016 Preserve Night Hikes and Activities

1/4/16 Sierra Club Hike*

1/23/16 Mountains Recreation & Conservation Authority Night Hike

1/25/16 Sierra Club Hike

2/1/16 Sierra Club Hike

2/8/16 Sierra Club Hike

2/15/16 Sierra Club Hike

2/22/16 Mountains Recreation & Conservation Authority Night Hike

2/22/16 Sierra Club Hike

2/29/16 Sierra Club Hike

3/21/16 Sierra Club Hike

10/24/16 Sierra Club Hike

11/7/16 Sierra Club Hike

11/14/16 Sierra Club Hike

11/28/16 Sierra Club Hike

12/5/16 Sierra Club Hike

*Night hikes may include a maximum of 30 participants per hike. Night hikes averaged 15 participants per hike in 2016.